Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Radio pirate anarchy: how unlicensed broadcasters create order without law

Pedro Bustamante
Carnegie Mellon University
Tate Fegley
tate.fegley@montreat.edu
Montreat College
Marcela Gomez
University of Pittsburgh
Ilia Murtazashvili
University of Pittsburgh
Ali Palida
Institute for Humane Studies
Martin Weiss
University of Pittsburgh

Research Article

Keywords: radio pirates, pirate radio, self-governance, anarchy, regulation, Federal Communications Commission

Posted Date: September 7th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10741532/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Public choice scholars have examined how organizations such as gangs, mafias, prison communities, and maritime pirates create order without effective state governance. Radio pirates have received comparatively little attention. We examine how unlicensed broadcasters govern access to airwaves despite lacking legally recognized rights. Radio pirates coordinate frequencies, monitor participants, impose reputational and organizational sanctions, adapt to enforcement, and provide community services. We use the distinction between exclusion and governance to explain these arrangements. The formal licensing regime relies primarily on state-backed exclusion, whereas broadcasters denied access to that regime must rely more heavily on rules governing conduct and use. Public choice analysis also helps explain why regulators and incumbent broadcasters may favor categorical exclusion even when pirate governance limits interference and produces local benefits. Pirate radio provides another example of the economics of anarchy view that lack of authorization is not the same as lack of governance.

JEL codes: D02; D71; H11; K23; L51

1 Introduction

Public choice scholars have shown how groups commonly associated with disorder can create institutions of governance. Maritime pirates adopted constitutions, constrained captains, and established rules for dividing plunder (Leeson 2007, 2009). Prison gangs govern illicit exchange, protect property rights, adjudicate disputes, and sanction opportunism (Skarbek 2020, 2024). Outlaw motorcycle gangs, mafias, and other extralegal organizations similarly use rules and enforcement mechanisms to sustain cooperation and control members whose behavior threatens the group (Piano 2017; Thompson 2026). These studies show that self-governance often works well even when activities are illicit or illegal (Leeson 2014).

We add to this literature by examining radio pirates. In the United States, radio pirates broadcast without authorization from the Federal Communications Commission (FCC), the primary agency allocating and assigning rights to use radio waves for non-governmental users. Yet the absence of a license does not mean they operate without rules, interfere with other broadcasters, or provide nothing of value. Some radio pirates coordinate their use of frequencies, monitor participants, sanction misconduct, adapt to enforcement, and provide information and programming valued by their communities.

The distinction between exclusion and governance provides a useful way to understand these arrangements. Smith (2002) distinguishes exclusion, which determines who may access a resource, from governance, which regulates particular dimensions of use. Hazlett (2005) applies this distinction to the radio spectrum. The FCC's licensing system relies heavily on exclusion: authorized broadcasters possess legally recognized access, while unauthorized broadcasters violate the law regardless of whether a particular transmission causes harmful interference.

Though governance comes from both government and organizations operating outside of or alongside of it, studies of exclusion and governance have generally been applied to government regulation of airwaves. For pirates, excluded from the formal regime, the importance of governance remains. They must instead rely more heavily on governance mechanisms for activities such as frequency selection, organizational sanctions, and restraint in transmission power.

Our empirical analysis draws on historical studies, ethnographic research, regulatory materials, and detailed accounts of pirate broadcasting in the United States. We find that pirate governance is neither universal nor necessarily effective. Unauthorized transmissions may interfere with licensed stations, impose costs on outsiders, or spread misinformation. Pirate stations sometimes generate local benefits but on balance, they display meaningful organizational capacity despite lacking formal authorization.

Radio pirates also differ from many gangs, mafias, and criminal enterprises. They violate the law by broadcasting without a license, but the underlying activity – transmitting music, discussion, news, advertising, and emergency information – is lawful when conducted by an authorized station. There is also a rich tradition which sees radio pirates as engines of liberation because they provide a direct flow of information to people, without government regulation (Brinson 2006; Anderson 2016). The institutional conflict concerns who may broadcast and under what conditions, not whether broadcasting itself should occur.

This conflict became especially visible with the Preventing Illegal Radio Abuse Through Enforcement Act of 2020 (PIRATE Act). For these reasons, the PIRATE Act provides a useful illustration of how a regulatory system organized around exclusion responds to informal governance outside the boundaries of legally recognized spectrum rights. The law substantially increased potential penalties for unauthorized broadcasting, accelerated federal enforcement, and extended possible liability to landlords and others who knowingly facilitate pirate stations. The Act also reflects the institutional ratchet described by Higgs (1987): the original crisis rationale for vesting a single authority, in this case the FCC, with control over the airwaves created a regulatory structure in which even relatively minor or localized problems could later justify substantial expansions of enforcement power.

The paper makes three contributions. First, it extends the public choice literature on self-governance to radio pirates, a neglected category of extralegal or illegal organization. Second, it connects that literature to the exclusion–governance framework by showing how users denied state-backed exclusion rights rely more heavily on rules governing conduct and use. Third, it uses Yandle's (1983) Bootleggers-and-Baptists framework to explain why public-safety rationales and incumbent economic interests may converge in support of categorical exclusion, even where informal arrangements constrain harmful behavior and provide (in some instances) local benefits.

Section 2 develops the exclusion–governance framework and explains how radio pirates may create order without legally recognized spectrum rights. Section 3 traces the institutional development of federal licensing and shows how regulation created the category of the radio pirate by limiting lawful entry into low-power broadcasting. Section 4 examines how radio pirates govern through coordination,

local knowledge, monitoring, sanctions, community service, and adaptation to enforcement. Section 5 considers the limits of pirate governance, analyzes the political economy of regulatory exclusion and the PIRATE Act, and evaluates institutional alternatives that place greater emphasis on demonstrated harm, graduated sanctions, and negotiated coexistence. Section 6 concludes by considering what radio piracy reveals about self-governance, freedom, and democratic association.

2 Exclusion, governance, and the use of airwaves

Radio spectrum presents a problem of institutional coordination. Multiple transmissions can coexist, but poorly coordinated uses may interfere with one another and reduce the value of reception. What is necessary is to establish property rights over the airwaves.

Smith (2002) distinguishes two broad strategies for organizing property rights: exclusion and governance. Exclusion assigns control over a resource to a recognized rights holder and relies on boundaries to determine who may use it. Governance regulates particular uses directly by specifying how, when, where, and under what conditions a resource may be employed. Neither strategy is absolute. Most property systems combine them, but the relative reliance on each varies with the costs of defining boundaries, monitoring conduct, and measuring harm.

Hazlett (2005) applies this distinction to the radio spectrum. The formal licensing system relies heavily on exclusion. Regulators allocate bands for particular services, assign licenses within those bands, and authorize license holders to transmit subject to technical conditions. These allocations also support coordination beyond individual licensees. Standardized bands allow manufacturers to produce compatible transmitters and receivers at scale, facilitate roaming across jurisdictions, and reduce the cost of communications equipment. The FCC's Enforcement Bureau reinforces these boundaries by identifying and removing unauthorized users.

Use of airwaves often requires governance even where there is exclusion. A license does not merely identify who may transmit; it typically specifies location, frequency, power, bandwidth, and other technical conditions. These rules address the effects of particular uses on other transmitters and receivers. Governance is especially important where interference cannot be controlled by a simple boundary around a resource. Radio propagation is a complex phenomenon and defies the establishment of clear geographic boundaries. Because signals travel beyond the physical location of the transmitter, adjacent uses may affect one another, and the consequences and utility of transmission depend on technology, geography, receiver quality, and the behavior of other users.

The formal licensing regime combines exclusion and governance, but it treats exclusion as the threshold condition for legitimate use. Licensed broadcasters may transmit within the terms of their authorization. Pirate broadcasters may not transmit at all, even when they select unused frequencies, limit their power, avoid interference, or coordinate informally with other users. The absence of a license is sufficient to trigger enforcement. In this respect, the formal regime evaluates radio pirates primarily according to who they are – unauthorized users – rather than according to how they use the spectrum.

Radio pirates are not the only spectrum users who must coordinate without exclusive rights to particular frequencies. Amateur-radio operators have legally recognized access to designated bands, but individual operators ordinarily do not receive exclusive assignments within those bands. Instead, they organize activity through band plans, operating conventions, clubs, technical associations, monitoring, mutual adjustment, and enforcement by both public and private actors (Bustamante et al. 2023). Research on unassigned and shared spectrum similarly shows that the absence of individually assigned frequencies need not produce ungoverned open access, since users can develop institutions for coordinating interference, sharing information, and adapting rules to changing technical conditions (Bustamante et al. 2020; Hazlett, Palida, and Weiss 2024).

Pirate radio represents a more thoroughly extralegal version of this broader spectrum-governance problem. Unlike amateur operators, pirates lack formal recognition of their right to transmit in the band at all and cannot appeal to regulators to protect their place on the dial. They have to coordinate access and control interference without either exclusive assignments or legally recognized access.

The distinction between exclusion and governance provides a useful and general way to describe these different institutional arrangements. Exclusion determines who has legally recognized access to a band or frequency, while governance structures how authorized or unauthorized users behave once access is shared, overlapping, or difficult to define precisely. Conventional licensing combines state-backed exclusion with detailed rules governing transmission. Amateur radio relies on legally recognized access to designated bands but leaves substantial coordination within those bands to operators and their organizations. Pirate radio lacks legally recognized exclusion rights and therefore depends more heavily on informal governance. For this reason, the relevant comparison is among different combinations of exclusion and governance.

State licensing may provide clear rights, support investment, and reduce coordination costs. It may also create an anticommons when rights are fragmented or prevent mutually beneficial uses when license boundaries are too rigid (Hazlett 2005, 2008; Werbach 2011). Exclusive rights may further enable incumbents to leave capacity idle or block entry where doing so protects the value of their existing position. More generally, property arrangements can generate monopoly costs when control rights are broader than necessary to manage harmful effects (Posner and Weyl 2017).

Radio pirates must depend more heavily on governance without legally recognized exclusion rights. This situation presents both opportunities and challenges. Local users may possess better information about available frequencies, community needs, and the actual effects of low-power transmissions. They may adapt rules more quickly than centralized regulators and sanction conduct that threatens the continued operation of the group. At the same time, informal institutions may be ineffective where users are anonymous, interactions are not repeated, interference is difficult to observe, or affected outsiders have no voice in rulemaking.

This framework yields two general propositions that guide the analysis. First, exclusion from the formal licensing system does not imply an absence of governance. It may instead shift the burden of

coordination toward informal rules governing conduct and use. Second, the institutional choice between exclusion and governance is political as well as technical. A licensing regime may favor categorical exclusion not only because it reduces interference, but also because incumbents benefit from restricting entry and regulators find authorization easier to monitor than the marginal harms of particular transmissions.

3 Regulation made the radio pirate

3.1 From open airwaves to licensed access

Radio pirates emerged from a regulatory system that gradually transformed broadcasting from an activity coordinated partly through informal practices into one conditioned on government authorization. It was not always that way. Radio pirates emerged in response to perceived issues with interference once technology to broadcast over the airwaves became more widely available.

Though federal regulation would emerge fairly quickly in response to these concerns about interference, early radio operators coordinated much like radio pirates. During the early development of commercial broadcasting, operators sometimes resolved frequency disputes through handshake agreements (Douglas 1987). These arrangements resembled the “order without law” described by Ellickson (1991): participants coordinated conduct through local knowledge, repeated interaction, and informal sanctions rather than centralized legal enforcement.

Federal involvement began with the Wireless Ship Act of 1910, which imposed equipment requirements on certain passenger vessels, and expanded with the Radio Act of 1912, which established licensing requirements for radio operators and stations in response to interference among amateur, commercial, naval, and maritime users. As broadcasting expanded, however, policymakers increasingly regarded decentralized coordination and the 1912 framework as inadequate for managing competing transmissions.

The Radio Act of 1927 marked the decisive institutional change. It established the Federal Radio Commission and authorized it to assign frequencies according to the “public interest, convenience, or necessity.” In doing so, the act replaced an emerging order based partly on priority, negotiation, and informal coordination with a national licensing regime. The Communications Act of 1934 then created the Federal Communications Commission and consolidated federal authority over radio, television, telephony, and related communications. Section 301 made government authorization the threshold condition for lawful transmission, except where FCC rules specifically permit unlicensed uses (47 U.S.C. § 301).

The emergence of federal licensing changed the institutional meaning of broadcasting. Before comprehensive regulation, disputes centered largely on interference and priority of use. Under the licensing regime, authorization itself became the threshold question. A broadcaster could violate federal law even when transmitting on an apparently unused frequency and causing no demonstrated

interference (Streeter 1996). The regime thus elevated exclusion – who is permitted to transmit – over case-by-case evaluation of how spectrum is used. Frequency allocations reduced conflicts among incompatible uses, allowed manufacturers to design standardized transmitters and receivers, and supported the development of national communications markets, but they also institutionalized a new category of user: the radio pirate.

3.2 Pirates, border broadcasters, and regulatory control

Concerns about unauthorized or evasive broadcasting were present early in the development of the federal regime. One prominent case involved John Brinkley, a physician and broadcaster whose American studios sent programming by telephone to station XERA in Ciudad Acuña, Mexico. XERA operated under a Mexican license but transmitted high-powered broadcasts to American audiences beyond the reach of ordinary U.S. content regulation. Brinkley used the station, among other things, to promote questionable medical treatments.

Congress responded by restricting the transmission of programming from American studios to foreign stations broadcasting back into the United States. These restrictions, commonly associated with the Brinkley Act, were later incorporated into the Communications Act (47 U.S.C. § 325(c)). The episode illustrates how concerns about interference, content, professional regulation, and regulatory evasion became intertwined. The dispute was not simply about unmanaged use of a frequency. It also concerned a broadcaster's ability to operate beyond the jurisdiction of domestic regulators.

A similar conflict developed in Britain over Radio Luxembourg. British officials opposed the station because it broadcast commercial programming to British audiences from abroad, challenged the BBC's protected position, and circumvented domestic licensing rules. The British General Post Office eventually restricted the telephone connections that facilitated its programming (Oudendijk 2020). In both cases, broadcasting from outside the domestic licensing regime was treated as a threat not only to technical coordination but also to incumbent institutions and the state's control over entry.

These cases foreshadow the modern treatment of pirate radio. Once licensing defined legitimate access, broadcasting outside the authorized system could be classified as harmful without a separate report showing that a particular transmission caused interference. The state's authority to determine who could broadcast became inseparable from its authority to coordinate use of the spectrum.

3.3 Low-power radio and the problem of entry

The development of Low-Power FM (LPFM) radio provides a useful test of whether the licensing regime distinguishes harmful interference from forms of entry that established broadcasters may simply prefer to avoid. Low-power stations can serve neighborhoods, towns, schools, churches, and other local communities at a scale that may not be economically attractive to large commercial broadcasters. In this regard, they are a useful comparison case for considering radio pirates, which serve similar purposes.

The FCC proposed an LPFM service in 2000. Incumbent broadcasters, represented especially by the National Association of Broadcasters, argued that low-power stations would interfere with established stations. National Public Radio also opposed important features of the proposal. Congress responded with the Radio Broadcasting Preservation Act of 2000, which imposed strict spacing requirements between low-power and full-power stations and sharply reduced the number of frequencies available for LPFM licensing.

The technical basis for those restrictions was weak. A congressionally mandated study found that low-power stations operating on third-adjacent channels generally did not produce the interference predicted by opponents of LPFM (MITRE Corporation 2003). Endemann (2006) similarly argues that confiscating equipment from low-power broadcasters that cause no interference does little to advance the public interest. The restrictions nevertheless remained especially consequential in dense urban markets, where potential community broadcasters faced the greatest difficulty finding available frequencies.

The politics of LPFM were explicit. FCC Chairman William Kennard accused established broadcasters of using interference claims to resist new entry. He compared their opposition to earlier efforts to restrict low-power television, cable, satellite radio, and satellite television, and asked why broadcasters had mobilized to deny community organizations “just a little piece of the broadcast pie.” In his view, the dispute reflected “fear of new entrants in the market” (Reporters Committee for Freedom of the Press 2000). Hazlett and Viani (2005) likewise show how incumbent lobbying shaped the statutory rules governing low-power stations. The resulting restrictions protected established broadcasters while limiting opportunities for local entrants.

Congress partially relaxed the rules through the Local Community Radio Act of 2010, which directed the FCC to expand LPFM licensing and reconsider the spacing restrictions. Yet LPFM remained an incomplete alternative for many would-be broadcasters. Licenses are generally limited to nonprofit educational organizations, public-safety entities, and federally recognized tribal organizations. Individuals and ordinary commercial enterprises cannot obtain them, and applicants must satisfy geographic and organizational requirements intended to ensure that they are locally based (Federal Communications Commission n.d.).

Past participation in unauthorized broadcasting creates another barrier. The FCC has generally treated applicants that engaged in unlicensed broadcasting after February 26, 1999, as ineligible for LPFM licenses (Federal Communications Commission 2000). The rule excludes people with direct broadcasting experience precisely because they previously operated outside the licensing system. It also makes legalization difficult for existing pirate stations, even where their operators might otherwise comply with low-power requirements.

The remaining alternatives are narrow. Microbroadcasting under Part 15 of the FCC’s rules is permitted without an individual license, but only at extremely low power and over a very short range. Such devices may be useful for drive-in theaters, property-information systems, or broadcasts covering a small site, but they generally cannot provide the community-wide terrestrial service sought by pirate stations.

Internet streaming avoids the licensing requirement, but as discussed below, it is not a perfect substitute for low-power terrestrial radio. The following section turns to how the pirates maintain their operations in an environment in which they are considered illegal users of the airwaves.

4 How radio pirates govern

4.1 Entry, coordination, and local knowledge

Pirate broadcasting often begins with access to inexpensive transmission equipment and knowledge of an apparently open place on the radio dial. But sustained operation requires more than turning on a transmitter. Broadcasters must choose frequencies, limit power, avoid competing signals, recruit participants, and maintain equipment.

The microbroadcasting movement in California illustrates how informal networks lowered the costs of entry. By the mid-1990s, hundreds of low-power stations had emerged in response to restrictions on licensed community broadcasting. Broadcasters formed the Association of Micropower Broadcasters, which provided technical and organizational advice to new stations (Soley 1999). The association did not assign legally enforceable rights, but it diffused information about equipment, station design, frequency choice, and strategies for operating under the threat of enforcement.

Where several pirates operate in the same region, these tasks create incentives for coordination. The resulting problem resembles coordination within amateur-radio bands, though under substantially different legal conditions. Amateur operators share legally designated spectrum and rely on band plans, calling conventions, clubs, repeater organizations, and norms of operating practice to reduce conflict among users. Pirate broadcasters similarly search for locally available frequencies, exchange technical information, and adjust their operations in response to other transmissions. Unlike amateur operators, radio pirates cannot openly register local arrangements, appeal to recognized coordinating organizations with the same security, or seek FCC protection for their continued use. Pirate radio clubs perform some of the informational and coordinating functions that amateur-radio clubs and technical associations perform within legally recognized amateur bands, although without the formal standing and ability to cooperate openly with regulators enjoyed by members of ham radio communities.

Radio Free Berkeley became one of the most prominent stations in this movement. Stephen Dunifer established the station after the first Gulf War to provide political expression and programming unavailable from established broadcasters. The station transmitted from the hills above Berkeley and reached much of the East Bay. Dunifer defended low-power broadcasting as a First Amendment right and challenged the FCC's enforcement action in federal court. The court rejected his challenge and upheld the licensing requirement in *United States v. Dunifer*, 997 F. Supp. 1235 (N.D. Cal. 1998).

The litigation treated unlicensed entry as a threat to orderly broadcasting. Yet the broader microbroadcasting movement suggests that entry did not occur randomly. Pirates selected frequencies, exchanged technical knowledge, and formed associations that helped stations begin and survive. These

arrangements did not eliminate the possibility of interference, but they demonstrate that unauthorized use was not necessarily equivalent to uncoordinated open access.

Radio Valencia provides another example of locally organized entry. The station began in San Francisco's Mission District in 2010 as a community-oriented operation with no centralized leadership and relatively few formal rules. Although it presented itself publicly as an internet station, it also transmitted terrestrially on 89.9 FM between the frequencies of nearby licensed stations. Co-founder John Hell emphasized that terrestrial radio was distinct from streaming because it was accessible to listeners who could not afford reliable internet service and discoverable by anyone scanning the dial (Waits 2010).

Such cases illustrate the role of local knowledge. Pirate broadcasters frequently operate at a scale below that of commercial radio. Their organizers know which neighborhoods are poorly served, which frequencies appear unused locally, and which kinds of programming attract nearby listeners. In Hayek's (1945) terms, they act as "men on the spot," using knowledge that is difficult for a centralized regulator or distant broadcaster to acquire. This informational advantage does not by itself establish good governance, but it helps explain why pirate stations can identify uses overlooked by the formal licensing system.

4.2 Monitoring, discipline, and punishment

The strongest evidence of pirate governance comes from Colorado's Front Range. Journalist Chris Walker (2018) describes a durable community of broadcasters that included Way High Radio, Boulder Free Radio, Green Light Radio, and other stations. These operations shared information, adapted to enforcement, and developed informal rules governing acceptable behavior.

Way High Radio began broadcasting from Ward, Colorado, in 1997. Its studio operated from a small trailer near the town hall, marked by a sign reading "Office of Human Rights." The station survived for two decades despite lacking an FCC license. Its longevity depended partly on community support and partly on the ability of participants to regulate conduct that might attract hostility or threaten the station's survival.

The Front Range pirates used reputational sanctions and exclusion to discipline participants. In one incident, a broadcaster known as DJ Phoenix insulted an FCC agent over the air and announced the agent's private telephone number. Other pirates condemned the act and banished him from the community. Way High Radio also maintained a "wall of shame" identifying DJs whose conduct violated community expectations. One broadcaster was placed on it after using the station's telephone to call sex lines and airing the conversations.

These sanctions served several purposes. They discouraged conduct that imposed financial or reputational costs on the station, protected the broader network from individuals who might provoke enforcement, and communicated standards to other participants. The sanctions were informal, but they were not trivial. Access to a transmitter, studio, audience, and community of broadcasters was valuable.

Exclusion from those resources gave the group leverage over members who endangered its continued operation.

The Front Range cases also demonstrate that pirate governance can constrain behavior toward outsiders. The banishment of DJ Phoenix was not imposed because he had interfered with another pirate. It followed conduct directed at a government official that other broadcasters viewed as excessive and threatening to the group. Pirate governance therefore extended beyond technical coordination to norms concerning how members should interact with regulators, listeners, and the surrounding community.

These arrangements resemble the forms of organizational discipline identified in studies of other extralegal groups. Members share an interest in constraining individuals whose behavior increases enforcement risk or damages collective reputation (Leeson 2007, 2009; Piano 2017; Skarbek 2014, 2020). Radio pirates generally lack the coercive capacity of gangs or mafias, but they can use access, reputation, and association as instruments of discipline.

4.3 Community voice and local public goods

Pirate stations also provide services that help sustain community support for their governance. These services are not themselves proof of self-governance, but they give listeners and participants reasons to protect stations, contribute resources, and comply with informal rules.

Mbanna Kantako's broadcasts in Springfield, Illinois provide an early example. Kantako, a blind activist living in a public housing project, constructed a low-power transmitter and began broadcasting under the call sign WTRA, representing the Tenants' Rights Association. The station gave residents a forum to discuss housing grievances, policing, drugs, racial inequality, and national politics. It later operated under names including Black Liberation Radio and African Liberation Radio. The station aired interviews with activists and scholars, political music, commentary on local and national events, accounts of police misconduct, and speeches by Black political figures. Kantako also retransmitted information from a police scanner so residents could know where officers were operating in the neighborhood (Shields and Ogles 1995).

Kantako's broadcasts combined political advocacy with practical information for residents who believed established institutions did not represent them. After the FCC issued a cease-and-desist order, Kantako asserted a right to use spectrum that was otherwise unoccupied. The agency fined him $750, and he eventually ceased broadcasting. His example nevertheless influenced later stations, including Radio Free Berkeley and Radio Free Detroit (Dunbar-Hester 2014). The institutional significance of Kantako's station lies not only in its content but also in its relationship with a defined community. The station emerged from an existing tenants' organization, addressed local concerns, and relied on the legitimacy it acquired among residents.

Way High Radio provided a different set of local services. Ward is a small mountain community in which some residents lacked televisions, telephones, vehicles, or reliable internet access. The station lent

radios to listeners and became an important source of community information. During the 2013 floods in northern Colorado, its DJs relayed bulletins from the Federal Emergency Management Agency and the Boulder County Sheriff's Office, along with notices about missing pets. During the Cold Springs Fire in 2016, the station provided updates around the clock (Walker 2018).

The example of Way High Radio shows how pirate stations may complement rather than merely duplicate larger broadcasters. It is complementary in its access to local knowledge and information. Licensed stations can disseminate regional emergency information, but small community broadcasters may have better knowledge of road conditions, missing animals, vulnerable residents, and immediate neighborhood needs.

4.4 Adaptation and institutional resilience

Pirate organizations also govern by adapting to external enforcement. Their survival often depends on changing transmitter locations, separating studios from transmission equipment, moving between terrestrial broadcasting and streaming, and limiting information available to regulators.

Boulder Free Radio illustrates this adaptive capacity. Monk, its founder, initially expected to receive an LPFM license and purchased equipment in anticipation of approval. After regulatory changes sharply limited available low-power frequencies, he began broadcasting without authorization (Roberts 2001). When the FCC identified the station and threatened its landlord with substantial fines, the operators moved the transmitter. According to Walker (2018), the FCC would locate the new transmission site approximately every ten to twelve months, but each warning applied to a particular address. Mobility therefore allowed the station to continue operating despite repeated enforcement.

This practice was more than evasion by a single broadcaster. It required technical knowledge, access to alternative sites, cooperation among participants, and discretion about equipment locations. Enforcement pressure encouraged organizational separation between the visible station and the transmitter, making the network more resilient.

The Front Range community also adapted collectively to the FCC crackdown of 2018. Green Light Radio and Boulder Free Radio shifted to internet streaming after receiving warnings. When agents approached Way High Radio, participants recognized the enforcement vehicle, avoided contact, and temporarily ended terrestrial transmission. The station informed listeners that it would continue online, although DJs emphasized that streaming did not provide the same community reach as FM radio (Walker 2018).

Streaming reduces exposure to spectrum enforcement, but it is not simply a technologically updated version of low-power terrestrial radio. It changes both the service being provided and the institutional structure of access. Internet broadcasting requires broadband connectivity, compatible devices, and either prior knowledge of the station or the ability to find it online. It also depends on privately controlled intermediaries, including hosting services, app stores, payment systems, domain-name services, and content-delivery networks. These intermediaries may be efficient and valuable, but they create points of vulnerability for controversial, marginal, or politically unpopular speakers. Cloudflare's decision to

terminate service to 8chan is an extreme example, but it illustrates the broader point: streaming shifts community broadcasting from a locally receivable, low-cost radio technology into a mediated internet environment dependent on private gatekeepers (Cloudflare, 2019). Terrestrial radio, by contrast, can be discovered by scanning the dial, received through inexpensive devices, and used by listeners who lack reliable internet access or face communications disruptions. Moving online may preserve programming, but it does not preserve the same openness, discoverability, resilience, or community reach that led many stations to broadcast terrestrially in the first place.

Adaptation can also involve partial movement into the formal sector. Some community broadcasters adopt “pirate” branding while operating legally through LPFM licenses or internet streams. Such cases show how the identity and programming style associated with pirate radio can survive even when unauthorized transmission ends. They should not, however, be confused with pirate governance itself. A licensed station called “The Pirate” may preserve the culture of alternative broadcasting without operating outside the formal licensing regime.

4.5 What the cases show

The cases reveal several recurring features of pirate governance. Durable stations tend to be embedded in communities rather than operate as anonymous transmitters. Repeated interaction allows participants to monitor conduct and develop shared expectations, while criticism, reputational damage, loss of studio access, and expulsion provide informal sanctions. Stations also adapt to enforcement by moving equipment, protecting information, and shifting technologies. Locally valuable programming helps generate the community support on which these arrangements depend.

The social value of pirate broadcasting should nevertheless be distinguished from pirate governance. Desirable programming, emergency information, and political expression may explain why communities support a station, but they do not by themselves demonstrate self-governance. The stronger evidence lies in the rules and mechanisms used to coordinate conduct, monitor participants, sanction misconduct, and preserve the organization. These institutions parallel those identified elsewhere in the public choice literature, although radio pirates generally lack the elaborate hierarchies and coercive capacities of prison gangs or mafias.

The above does not mean radio pirates are always effective or benevolent. The cases are drawn largely from stations visible enough to attract journalistic and scholarly attention, which may select for unusually durable or socially embedded organizations. Informal sanctions may protect insiders without adequately addressing costs imposed on licensed broadcasters or listeners affected by interference, and some stations may be unable or unwilling to control harmful participants.

5 Public policies to govern the airwaves

The evidence of pirate self-governance does not establish that unlicensed broadcasting should be unrestricted. Pirate stations may interfere with licensed broadcasts, emergency communications, or

aviation systems. Their internal rules may protect participants while failing to address costs imposed on listeners, license holders, and other spectrum users. Informal governance is most likely to work where transmissions are low power, conduct is observable, users interact repeatedly, and harmful effects remain local and readily detectable. It is less likely to succeed where signals affect safety-critical uses, cross large geographic areas, or impose harms that outsiders cannot easily identify or remedy.

Policy analysis must nevertheless avoid what Demsetz (1969) calls the nirvana fallacy: comparing imperfect informal institutions with an idealized regulatory alternative. The relevant comparison is between pirate governance, with its limitations, and the actual licensing regime, with its own information problems, political incentives, and enforcement costs. Formal licensing creates clear rights and protects against serious interference, but it can also restrict entry, protect incumbents, and suppress locally valuable uses that impose little demonstrated harm.

The current regime largely resolves this institutional choice through a bright-line rule. Licensed broadcasting is presumptively legitimate, while unlicensed broadcasting is unlawful even when no affected party alleges interference. The central policy question is therefore not whether the airwaves require governance. It is whether categorical exclusion is necessary for all unauthorized uses or whether some low-power broadcasting could be governed at lower social cost through technical limits, monitoring, graduated sanctions, and easier paths to lawful entry.

5.1 The PIRATE Act and the political economy of exclusion

Harmful interference and threats to public safety provide legitimate grounds for enforcing spectrum rights. Licensed broadcasters invest in obtaining authorization, constructing facilities, developing programming, and attracting audiences. Unauthorized stations may interfere with those investments, occupy frequencies assigned to other users, or disrupt emergency alerts, aviation communications, and other safety-critical uses. Nothing in the evidence presented here eliminates the need for formal rules or strong sanctions against broadcasters who impose serious harm.

The content and enforcement of those rules, however, are not selected by a perfectly informed and disinterested regulator. Incumbent broadcasters receive concentrated benefits from restrictions on entry, while the costs of foregone programming and unused frequencies are dispersed among potential broadcasters and listeners. Regulators also face asymmetric incentives. Licensing status is readily observable, whereas determining the interference, organizational capacity, and social value associated with a particular station is costly. Enforcement against an unauthorized broadcaster is therefore easier to administer and defend than a policy that distinguishes among unlicensed uses. Public-interest rationales may consequently coexist with rules that protect established competitors (Holcombe 2018).

The broader history of broadcasting illustrates these incentives. In the 1940s, NBC and CBS successfully urged the FCC to move FM broadcasting from the 42–50 MHz band to higher frequencies, rendering existing equipment obsolete and weakening FM relative to established AM broadcasters. The FCC also reduced permissible FM transmission power in the name of localism, limiting potential advertising

markets and commercial viability (Lessing 1954, 196–197; Longley 1968; Slotten 2000, 693; Hazlett 2017, 66–67). Similar allocation choices disadvantaged UHF television stations relative to technically superior VHF stations and reduced the number of viable competitors available to viewers. Applicants promising local ownership, local news, and locally produced programming were also less likely to receive licenses despite the FCC's stated commitment to localism (Noll, Peck, and McGowan 1973; Hazlett 2017, 92–97). These episodes do not establish that every regulatory decision reflected incumbent capture, but they show that technical regulation can shape market entry and competition as well as control interference.

The experience of LPFM, discussed in Section 3.3, provides the clearest precedent. Incumbent opposition helped produce restrictions that sharply limited lawful low-power entry even where the predicted interference was not well supported by subsequent evidence. The episode illustrates the broader political-economy problem: technical regulation can protect against interference while also determining which entrants and forms of local broadcasting receive legal recognition.

The PIRATE Act reflects the same institutional logic. Section 511 defines pirate radio broadcasting for purposes of the Act's specialized enforcement regime as unauthorized transmission between 535 and 1705 kilohertz or between 87.7 and 108 megahertz, the frequencies associated with conventional AM and FM broadcasting. It does not define pirate radio broadcasting to include every transmission made without an FCC license. Unauthorized transmission outside the AM and FM bands remains unlawful under Section 301 of the Communications Act, and the Commission may pursue such operators under its general enforcement powers. The narrower point is that the Act's enhanced penalties, enforcement sweeps, reporting requirements, and provisions targeting landlords and other facilitators apply specifically to piracy in the commercial broadcast bands rather than to unauthorized transmission throughout the radio spectrum (47 U.S.C. §§ 301, 511).

That statutory distinction is institutionally revealing. Unauthorized AM and FM stations are comparatively easy for local audiences and incumbent broadcasters to discover because they appear on familiar commercial broadcast dials. They may operate continuously, serve geographically concentrated audiences, and compete directly with licensed stations for listeners, advertising, programming, and cultural influence. High-frequency and shortwave pirates also violate the general requirement of prior authorization and may create interference, but they often transmit intermittently, reach more dispersed audiences, and pose a less direct competitive threat to incumbent local broadcasters. These technical and administrative differences may affect the probability of complaints, the cost of detection, and the expected benefits of sustained enforcement. The statutory concentration on AM and FM broadcasting nevertheless suggests that the intensity of enforcement reflects not only technical risk but also the commercial value, political visibility, and incumbent interests attached to the affected band.

This history reveals a recurring public choice problem. Incumbents benefit from limiting entry, while regulators find authorization easier to verify than marginal interference or social value. Enforcement may therefore focus on legal status rather than demonstrated harm. Several stations on Colorado's Front

Range attracted FCC scrutiny after news organizations publicized their operations rather than after documented complaints of interference. FCC Commissioner Michael O'Rielly subsequently criticized coverage that appeared sympathetic to the stations, insisting that pirate radio should not be romanticized or its negative effects minimized (Sebastian 2018). Visible defiance of the licensing regime can thus become an enforcement concern apart from evidence of measurable interference.

This approach also reflects a form of legal centralism. Formal law treats government-recognized rights as the exclusive source of legitimate order, even where actors have developed alternative institutions to govern their conduct. This orientation makes informal governance difficult for regulators to recognize. It may also encourage pirates to conceal their activities rather than improve their organizations, since evidence of durability and coordination may attract enforcement rather than accommodation.

The PIRATE Act intensified this reliance on exclusion. The statute increased the maximum daily penalty for unauthorized broadcasting from $10,000 to $100,000, raised the maximum cumulative penalty from $100,000 to $2 million, streamlined enforcement, and extended potential liability to landlords and others who knowingly facilitate unlicensed stations. The National Association of Broadcasters strongly supported the legislation, citing threats to licensed broadcasting, public-safety communications, and air-traffic control (Ashworth 2020). The resulting coalition joined concentrated economic interests in stronger exclusion with a broader public-interest justification for enhanced enforcement.

These concerns reflect real externalities, and severe sanctions may be justified when broadcasters endanger critical communications or refuse to resolve documented conflicts. The structure of the PIRATE Act nevertheless makes the absence of authorization, rather than demonstrated interference, the central violation. It does not require an affected broadcaster, listener, or public agency to establish actual harm before enforcement begins. Nor does it distinguish between a high-powered station interfering with safety-critical communications and a low-powered community station using locally vacant spectrum. The magnitude and structure of the penalties further indicate that the principal objective is deterrence and incapacitation rather than compensation for measurable harm. FCC officials have acknowledged that many pirate operators cannot pay the penalties imposed on them. Commissioner O'Rielly explained in connection with enforcement in Boston that the objective was to shut down operators, their collaborators, and landlords willing to provide space, rather than necessarily to collect the full fines (Ashworth 2019). The law therefore targets the organizational infrastructure of pirate broadcasting as well as harmful transmissions.

Public choice analysis helps explain why the PIRATE Act takes this form. Yandle's (1983) Bootleggers-and-Baptists framework shows how categorical exclusion may persist even when some unauthorized broadcasters impose little demonstrated harm. Public-safety officials, regulators, and licensed broadcasters can sincerely emphasize interference, emergency communications, and orderly use of the airwaves, while incumbent broadcasters receive the concentrated economic benefit of restricting unauthorized competition in commercially and politically important broadcast markets. These groups need not share the same motives or coordinate explicitly for their interests to converge around stricter

enforcement than marginal interference alone would justify (Yandle 1983; Smith and Yandle 2014). This interpretation does not require treating public safety concerns as insincere or pretextual. Some pirate stations cause harmful interference, and unauthorized broadcasting in densely used bands can create genuine risks. The point is comparative: one form of unauthorized transmission became the subject of exceptional penalties, mandatory enforcement sweeps, and sustained legislative attention, while other forms remain governed primarily through the FCC's ordinary enforcement authority.

The PIRATE Act can be understood as a further turn in the institutional ratchet effect identified by Higgs (1987). In this process, governmental authority expands in response to a perceived crisis but does not fully recede once the immediate threat passes, leaving a higher long-run baseline of regulatory power. In spectrum governance, the original crisis was the perceived "cacophony of competing voices" on the early airwaves. The Supreme Court later invoked this phrase to justify centralized regulation, reasoning that without government control, competing transmissions could not be clearly and predictably heard (*Red Lion Broadcasting Co. v. FCC*, 1969).

The developments above mean that the FCC presides over a monocentric spectrum regime, rather than distributing authority among multiple, partly autonomous centers of governance (Blackwater et al., 2024). Pirate broadcasting is an enduring problem within this monocentric system because lawful access depends on authorization from a single national regulator, while unauthorized stations are readily framed as threats to the order that regulator maintains. The PIRATE Act neither required the FCC to distinguish demonstrably harmful transmissions from low-power stations imposing limited or unproven costs nor reconsidered the exclusionary licensing structure that contributes to unauthorized broadcasting. The original "emergency" that gave rise to the federal agency regulating spectrum created an institutional framework that enables categorical exclusion and a ratcheting up of enforcement activities.

Unauthorized broadcasting is often presumed to be institutionally equivalent to disorder. The evidence developed in this paper makes that presumption more difficult to sustain. Some pirate organizations monitor participants, coordinate frequency use, sanction misconduct, adapt to enforcement, and respond to local conditions. Their existence does not establish that categorical licensing is unnecessary, but it does show that stronger exclusion is not the only feasible institutional response.

5.2 Opening the airwaves

One possibility to open the airwaves is to place greater enforcement weight, outside safety-critical bands, on demonstrated interference and refusal to coordinate rather than unauthorized status alone. The FCC can presently act against an unauthorized broadcaster even when no affected party has complained and no measurable interference has been established. For low-power broadcasting, enforcement priorities could instead turn on complaints from affected users, technical measurements, violation of specified power limits, or failure to respond to a documented conflict. Such an approach need not wait for catastrophic interference. Aviation, emergency, and other safety-critical bands could remain categorically protected, while ordinary broadcasting bands could distinguish more clearly

between harmful conduct and the mere absence of authorization. Weiser and Hatfield (2007) similarly argue that spectrum remedies should be tailored to actual risks rather than rely on broad prohibitions where narrower responses would suffice.

A second possibility is governed sharing backed by credible dispute-resolution and sanctioning mechanisms. A shared-access regime cannot rely on technical rules and voluntary cooperation alone; it requires institutions capable of identifying harmful conduct, resolving disputes, and sanctioning users who disregard the conditions of access (Weiser and Hatfield 2005). Applied to low-power broadcasting, the question is whether enforcement can be directed toward measurable interference, refusal to coordinate, and repeated violations rather than the mere absence of an exclusive license. Sanctions could also be graduated. Graduated sanctions are common in durable self-governing institutions because they preserve cooperation while escalating against persistent violations (Ostrom 1990). An initial violation might result in notice, a requirement to reduce power or change frequency, and an opportunity to negotiate with affected users, while repeated, deliberate, or dangerous interference could trigger equipment seizure and substantial financial penalties.

A third possibility is to treat demonstrated organizational capacity as relevant to compliance. A station that identifies responsible operators, monitors its broadcasts, responds to complaints, maintains technical standards, and sanctions misconduct presents a different institutional risk from an anonymous operator that ignores interference. Regulators could recognize these differences through reduced penalties, provisional authorization, or opportunities to cure violations. Such recognition would not legalize prior misconduct. It would use demonstrated self-governance as evidence relevant to future compliance.

A fourth possibility is to provide a more proportionate path to lawful terrestrial broadcasting. LPFM eligibility could be extended beyond nonprofit and governmental organizations to individuals, cooperatives, and small commercial broadcasters willing to comply with geographic, power, and interference limits. Previous unauthorized broadcasting should not automatically disqualify an applicant, particularly where the station has operated for an extended period without documented interference. Prior experience may indicate technical competence and organizational capacity rather than an inability to comply.

More divisible spectrum rights, negotiated access, and technical coordination could complement these reforms. Existing licenses may contain unused geographic, temporal, or frequency capacity that could be leased or shared without surrendering the full authorization (Hazlett 2008). Formal institutions could support standardized agreements and exchanges for temporary, local, or low-power access, while recognizing that secondary markets will be limited where incumbents prefer to leave capacity idle or small entrants lack resources. Negotiated coexistence offers another model. Werbach (2004) emphasizes that spectrum users can often resolve conflicts through decentralized coordination, and Guatemala’s telecommunications reforms show how rights to unassigned spectrum can be combined

with negotiation and ex post dispute resolution rather than exclusive reliance on administrative allocation (Ibarguen 2003).

Technological developments make intermediate arrangements more feasible. Spectrum monitoring can identify actual use and interference more precisely than older regulatory systems allowed (Weiss and Lehr 2009). For example, the FCC implement this general approach in the 3.5 GHz band through automated Spectrum Access Systems that coordinate among incumbent federal users, priority licensees, and generally authorized users. These examples show that spectrum sharing need not mean uncoordinated open access. A low-power broadcasting regime could similarly combine legal recognition, technical constraints, registration, monitoring, complaint procedures, and decentralized adjustment.

Such a regime would occupy an intermediate position between exclusive licensing and unauthorized use. It would resemble amateur radio as analyzed by Bustamante et al. (2023), where legally recognized users share designated bands under a polycentric system that combines FCC rules with coordination, monitoring, and rule enforcement by amateur-radio organizations and participants. Weiser (2009) similarly describes amateur radio as a form of FCC-supported self-regulation in which the American Radio Relay League monitors operator conduct, promotes norms against harmful interference, and refers serious violations to the Commission. It would also draw on more decentralized forms of spectrum governance, where norms, rules, and enforcement mechanisms can emerge from repeated interaction even without centralized assignment or enforcement (Bustamante et al. 2020), and where nonexclusive access can be structured through technical standards, power limits, sensing, and liability rules rather than treated as uncoordinated open access (Werbach 2004).

These reforms would not presume that informal governance always outperforms state licensing. Strong enforcement should remain available where interference is substantial, safety is threatened, or broadcasters refuse to coordinate. At the same time, low-power users should have access to simpler authorization, opportunities to remedy technical conflicts, and institutional recognition when they demonstrate effective self-governance.

6 Radio pirates and the self-governing society

Tocqueville understood American democracy as more than a system of elections and representative institutions. Its vitality depended on citizens forming associations, acting together, and developing the habits required for self-government. Vincent Ostrom similarly argued that democracy rests on citizens' capacity to organize themselves through multiple centers of authority rather than depend exclusively on centralized administration (Ostrom 1997). A self-governing society requires space for people to associate, solve problems, and create institutions of their own.

Radio pirates present a difficult but revealing case of this capacity. They operate outside the formal licensing system, yet some coordinate frequencies, monitor participants, discipline misconduct, adapt to enforcement, and provide services valued by their communities. Their institutions are imperfect and do not eliminate the possibility of interference or harm. They nevertheless demonstrate that the absence of

government authorization does not necessarily imply an absence of order. Radio pirates are especially revealing because the underlying activity is not inherently predatory or illicit. Broadcasting music, political discussion, emergency information, and community announcements becomes unlawful primarily because the broadcaster lacks government authorization.

Of course, the existence of informal rules does not guarantee that those rules are efficient, inclusive, or protective of outsiders. Private governance can itself become predatory when those who make and enforce rules use their authority to extract benefits or disregard the rights of the governed (Leeson 2025). Pirate institutions may therefore fail, protect insiders at the expense of others, or prove unable to control stations that cause serious interference. But formal regulation should not be romanticized either. Spectrum cannot be left ungoverned, and licenses, transferable rights, and technical standards can serve important purposes. The problem arises when formal authorization becomes the sole measure of legitimate conduct and the absence of a license is treated as sufficient evidence of disorder. Licensing and enforcement may reflect incumbent interests, administrative convenience, and institutional preferences for centralized control. The relevant comparison is between imperfect alternatives, not between benevolent regulation and frictionless self-governance.

The evidence in this paper suggests a more discriminating approach to dealing with radio pirates. Strong enforcement remains appropriate where broadcasters interfere with safety-critical communications, impose substantial costs on other users, or refuse to coordinate. But low-power, local, and experimental broadcasters should have simpler paths to authorization, including forms of legally recognized shared access modeled partly on the polycentric governance already found in amateur and other nonexclusive spectrum regimes. More divisible rights, negotiated coexistence, and recognition of demonstrated organizational capacity can preserve protection against interference while making room for decentralized experimentation.

Community radio can function as a form of democratic association. It enables residents to circulate local knowledge, discuss shared concerns, provide emergency information, and sustain forms of public life that larger commercial broadcasters may not supply. Small institutions matter not only because of the services they produce, but because of the capacities they cultivate. They give citizens experience in cooperation, rulemaking, monitoring, and collective problem-solving.

A free society benefits from regulation where conduct creates real risks to others. A self-governing society is strengthened when people have room to associate, experiment, and create institutions of their own. Although Ajit Pai’s statement in the epigraph accurately describes the current law, calling piracy “illegal, period” is not an institutional analysis. Rather than simply driving such broadcasters from the airwaves, or assuming that streaming is an adequate substitute, policymakers should consider how low-power stations that demonstrate restraint and organizational capacity might be given greater autonomy and a workable path to lawful operation.

Declarations

Pirate radio is unlawful, period. These transmissions can interfere with licensed radio signals – including broadcasters' sharing of vital public safety information with their communities…The FCC will continue to be an aggressive cop on the beat, cracking down on illegal broadcasting.

- Ajit Pai, then chairman of the Federal Communications Commission, presenting pirate radio as an unlawful source of harmful interference and pledging aggressive federal enforcement (Pai, 2020)

People are really feeling its absence. Twenty years of broadcasting is a long time. It's like losing an old friend.

- DJ Willy, after FCC enforcement led Way High Radio, a long-running unlicensed community station in Ward, Colorado, to cease FM broadcasting and move online (as quoted in Walker 2018)

Funding Declaration: The authors acknowledge support from National Science Foundation Grant AST-2132700.

Conflict of Interest Disclosure: The authors declare no conflicts of interest.

References

1. Anderson, John Nathan. 2016. "Illicit Transmissions: Engaging with the Study and Preservation of Pirate Radio." *Journal of Radio & Audio Media* 23 (2): 233–249.
2. Ashworth, Susan. 2019. "FCC Proposes Record-Breaking Forfeitures to Pirate Radio Operators." *Radio World*, December 16. https://www.radioworld.com/news-and-business/fcc-proposes-record-breaking-forfeitures-to-pirate-radio-operators.
3. Ashworth, Susan. 2020. "It's Official: PIRATE Act Signed into Law." *Radio World*, January 27. https://www.radioworld.com/news-and-business/trump-signs-pirate-act.
4. Blackwater, D., Murtazashvili, I., and Weiss, M. B. H. (2024). Polycentric systems for spectrum management: The case of Indigenous and tribal spectrum sovereignty. *European Journal of Law and Economics*, 57(3), 465–491.
5. Brinson, Peter. 2006. "Liberation Frequency: The Free Radio Movement and Alternative Strategies of Media Relations." *The Sociological Quarterly* 47 (4): 543–568.
6. Bustamante, Pedro, Marcela Gomez, William Lehr, Ilia Murtazashvili, Ali Palida, and Martin B. H. Weiss. 2023. "Examining the US Amateur-Radio Community Through a Polycentricity Lens." *Telecommunications Policy* 47 (10): 102667.
7. Bustamante, Pedro, Marcela M. Gomez, Ilia Murtazashvili, and Martin B. H. Weiss. 2020. "Spectrum Anarchy: Why Self-Governance of the Radio Spectrum Works Better than We Think." *Journal of Institutional Economics* 16 (6): 863–882.
8. Cloudflare. 2019. "Terminating Service for 8Chan." Cloudflare Blog, August 5.
9. Demsetz, Harold. 1969. "Information and Efficiency: Another Viewpoint." *Journal of Law and Economics* 12 (1): 1–22.

10. Douglas, George H. 1987. *The Early Days of Radio Broadcasting*. Jefferson, NC: McFarland.
11. Dunbar-Hester, Christina. 2014. *Low Power to the People: Pirates, Protest, and Politics in FM Radio Activism*. Cambridge, MA: MIT Press.
12. Ellickson, Robert C. 1991. *Order without Law: How Neighbors Settle Disputes*. Cambridge, MA: Harvard University Press.
13. Endemann, Buck. 2006. "Keelhauling Pirates: How Ex Parte Seizure of Non-Interfering LPFM Does Not Further the FCC's 'Public Interest.'" *San Diego Law Review* 43 (3): 661–700.
14. Federal Communications Commission. 2000. *In the Matter of Creation of Low Power Radio Service*. Report and Order, MM Docket No. 99-25, FCC 00-19, 15 FCC Rcd. 2205. Washington, DC: Federal Communications Commission. https://www.fcc.gov/document/matter-creation-low-power-radio-service.
15. Federal Communications Commission. n.d. "Low Power FM (LPFM) Broadcast Radio Stations." Accessed June 25, 2026. https://www.fcc.gov/media/radio/lpfm.
16. Hayek, Friedrich A. 1945. "The Use of Knowledge in Society." *American Economic Review* 35 (4): 519–530.
17. Hazlett, Thomas W. 2005. "Spectrum Tragedies." *Yale Journal on Regulation* 22 (2): 242–274.
18. Hazlett, Thomas W. 2008. "Optimal Abolition of FCC Spectrum Allocation." *Journal of Economic Perspectives* 22 (1): 103–128.
19. Hazlett, Thomas W. 2017. *The Political Spectrum: The Tumultuous Liberation of Wireless Technology, from Herbert Hoover to the Smartphone*. New Haven, CT: Yale University Press.
20. Hazlett, Thomas W., and Bruno E. Viani. 2005. "Legislators versus Regulators: The Case of Low Power FM Radio." *Business and Politics* 7 (1): 1–31.
21. Hazlett, Thomas W., Ali F. Palida, and Martin B. H. Weiss. 2024. "Governing Complex Externalities: Property Rights for Sharing Radio Spectrum." *Public Choice* 201 (3–4): 409–428.
22. Higgs, Robert. 1987. *Crisis and Leviathan: Critical Episodes in the Growth of American Government*. New York: Oxford University Press.
23. Holcombe, Randall G. 2018. *Political Capitalism: How Economic and Political Power Is Made and Maintained*. Cambridge: Cambridge University Press.
24. Ibarguen, Giancarlo. 2003. "Liberating the Radio Spectrum in Guatemala." *Telecommunications Policy* 27 (7): 543–554.
25. Leeson, Peter T. 2007. "An-arrgh-chy: The Law and Economics of Pirate Organization." *Journal of Political Economy* 115 (6): 1049–1094.
26. Leeson, Peter T. 2009. *The Invisible Hook: The Hidden Economics of Pirates*. Princeton, NJ: Princeton University Press.
27. Leeson, Peter T. 2014. *Anarchy Unbound: Why Self-Governance Works Better Than You Think*. Cambridge: Cambridge University Press
28. Leeson, Peter T. 2025. "Predatory Private Governance." *European Economic Review* 179: 105122.

29. Lessing, Lawrence. 1954. *Man of High Fidelity: Edwin Howard Armstrong*. Philadelphia: J. B. Lippincott.
30. Longley, Lawrence D. 1968. "The FM Shift in 1945." *Journal of Broadcasting* 12 (4): 353–365.
31. MITRE Corporation. 2003. *Experimental Measurements of the Third-Adjacent-Channel Impacts of Low-Power FM Stations. Volume 1: Final Report*. McLean, VA: MITRE Corporation.
32. Noll, Roger G., Merton J. Peck, and John J. McGowan. 1973. *Economic Aspects of Television Regulation*. Washington, DC: Brookings Institution.
33. Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.
34. Ostrom, Vincent. 1997. *The Meaning of Democracy and the Vulnerability of Democracies: A Response to Tocqueville's Challenge*. Ann Arbor: University of Michigan Press.
35. Oudendijk, Joost. 2020. "Radio Luxembourg: The Radio Station the BBC Despised." *RTL Today*, December 30. https://today.rtl.lu/your-luxembourg/knowledge-bites/a/1379891.html.
36. Pai, Ajit. 2020. "Chairman Pai Statement on the PIRATE Act," Federal Communications Commission, Office of Chairman Pai, January 27, 2020.
37. Piano, Ennio E. 2017. "Free Riders: The Economics and Organization of Outlaw Motorcycle Gangs." *Public Choice* 171 (3–4): 283–301.
38. Posner, Eric A., and E. Glen Weyl. 2017. "Property Is Only Another Name for Monopoly." *Journal of Legal Analysis* 9 (1): 51–123.
39. Reporters Committee for Freedom of the Press. 2000. "'Microbroadcasting' Continues to Generate Controversy." *The News Media & The Law*, Spring, 14. https://www.rcfp.org/journals/the-news-media-and-the-law-spring-2000/microbroadcasting-continues/.
40. Roberts, M. (2001). The making of a pirate. *Denver Westword*, October 4. https://www.westword.com/news/the-making-of-a-pirate-5068103/
41. Sebastian, Matt. 2018. "Pirate Radio Raises Its Flag in Longmont—and Gets the FCC's Attention." *The Denver Post*, January 12. https://www.denverpost.com/2018/01/12/longmont-pirate-radio-gets-fcc-attention/.
42. Shields, Steven O., and Robert M. Ogles. 1995. "Black Liberation Radio: A Case Study of Free Radio Micro-Broadcasting." *Howard Journal of Communications* 5 (3): 173–183.
43. Skarbek, David. 2020. *The Puzzle of Prison Order: Why Life behind Bars Varies around the World*. New York: Oxford University Press.
44. Skarbek, David. 2024. "The Political Economy of Criminal Governance." *Public Choice* 200 (1–2): 1–24.
45. Slotten, Hugh R. 2000. *Radio and Television Regulation: Broadcast Technology in the United States, 1920–1960*. Baltimore: Johns Hopkins University Press.
46. Smith, Henry E. 2002. "Exclusion versus Governance: Two Strategies for Delineating Property Rights." *Journal of Legal Studies* 31 (S2): S453–S487..

47. Smith, Adam, and Bruce Yandle. 2014. *Bootleggers and Baptists: How Economic Forces and Moral Persuasion Interact to Shape Regulatory Politics*. Washington, DC: Cato Institute.
48. Soley, Lawrence. 1999. *Free Radio: Electronic Civil Disobedience*. Boulder, CO: Westview Press.
49. Streeter, Thomas. 1996. *Selling the Air: A Critique of the Policy of Commercial Broadcasting in the United States*. Chicago: University of Chicago Press.
50. Thompson, Henry A. 2026. "Organized Thuggery." *Public Choice*. Published online June 20. https://doi.org/10.1007/s11127-026-01423-4.
51. Tocqueville, Alexis de. 2000 [1835–1840]. *Democracy in America*. Translated and edited by Harvey C. Mansfield and Delba Winthrop. Chicago: University of Chicago Press.
52. Waits, Jennifer. 2010. "San Francisco's Newest Radio Pirate: Radio Valencia." *Radio Survivor*, June 16. https://www.radiosurvivor.com/2010/06/16/san-franciscos-newest-radio-pirate-radio-valencia/.
53. Walker, Chris. 2018. "Will the FCC Sink Pirate Radio in Colorado?" *Westword*, February 27. https://www.westword.com/news/fcc-is-cracking-down-on-colorados-pirate-radio-stations-10033288.
54. Weiser, Philip J., and Dale N. Hatfield. 2007. "Spectrum Policy Reform and the Next Frontier of Property Rights." *George Mason Law Review* 15 (3): 549–609.
55. Weiser, Philip J. 2009. "The Future of Internet Regulation." *UC Davis Law Review* 43 (2): 529–590.
56. Weiser, Philip J., and Dale N. Hatfield. 2005. "Policing the Spectrum Commons." *Fordham Law Review* 74 (2): 663–694.
57. Weiss, Martin B. H., and William H. Lehr. 2009. "Market-Based Approaches for Dynamic Spectrum Assignment." Paper presented at TPRC37, the 37th Research Conference on Communication, Information and Internet Policy. https://doi.org/10.2139/ssrn.2027059.
58. Werbach, Kevin. 2004. "Supercommons: Toward a Unified Theory of Wireless Communication." *Texas Law Review* 82 (4): 863–973.
59. Werbach, Kevin. 2011. "The Wasteland: Anticommons, White Spaces, and the Fallacy of Spectrum." *Arizona Law Review* 53 (1): 213–270.
60. Yandle, Bruce. 1983. "Bootleggers and Baptists: The Education of a Regulatory Economist." *Regulation* 7 (3): 12–16.

Legal authorities

61. Communications Act of 1934, Pub. L. No. 73-416, ch. 652, 48 Stat. 1064 (1934), classified as amended principally to 47 U.S.C. § 151 et seq.
62. Red Lion Broadcasting Co. v. Federal Communications Commission, 395 U.S. 367 (1969).
63. Local Community Radio Act of 2010, Pub. L. No. 111-371, 124 Stat. 4072 (2011).
64. Preventing Illegal Radio Abuse Through Enforcement Act of 2020 (PIRATE Act), Pub. L. No. 116-109, 134 Stat. 3 (2020), codified at 47 U.S.C. § 511.
65. Radio Act of 1912, Pub. L. No. 62-264, ch. 287, 37 Stat. 302 (1912).

66. Radio Act of 1927, Pub. L. No. 69-632, ch. 169, 44 Stat. 1162 (1927).
67. Radio Broadcasting Preservation Act of 2000, Pub. L. No. 106-553, app. B, tit. VI, § 632, 114 Stat. 2762, 2762A-111 (2000).
68. Wireless Ship Act of 1910, Pub. L. No. 61-262, ch. 379, 36 Stat. 629 (1910).
69. C.F.R. pt. 15.
70. U.S.C. § 301.
71. U.S.C. § 325(c).
72. United States v. Dunifer, 997 F. Supp. 1235 (N.D. Cal. 1998), aff'd on other grounds, 219 F.3d 1004 (9th Cir. 2000).