

*Battle Over the Airwaves***PRINCIPLES FOR SPECTRUM POLICY REFORM**

By Michael Calabrese\*

Today the American people collectively own the most valuable resource in the emerging information economy: the airwaves, also known as the electromagnetic spectrum. Auctions conducted last year in Europe and early this year in the U.S. suggest that spectrum occupied by commercial licensees has a market value well in excess of \$300 billion.<sup>1</sup> Unfortunately, while high bids by wireless phone companies should be a boon to the ordinary citizens who own the airwaves, high prices also evidence a policy-induced spectrum shortage that threatens to delay the widespread availability and affordability of wireless broadband services.

In short, Americans are prisoners of an outdated industrial policy. We are trapped somewhere between the outmoded central-planning approach that characterized Federal Communications Commission (FCC) policy until the mid-1990s, and a new more flexible and market-based approach which, unfortunately, applies only to mobile wireless services. Most of the spectrum is still rigidly “zoned” for exclusive use by industries (viz., broadcasters, private two-way radio services, satellite and fixed wireless services) that pay nothing to use this increasingly scarce and valuable public asset. This outdated zoning and giveaway policy both fails to use a more flexible market mechanism to allocate spectrum *and* neglects to charge rent to all commercial licensees. This has produced the worst possible outcome: a spectrum shortage, no incentives for efficient use, government picking “winners” and “losers” among industries, and the forfeiture of tens of billions in public revenue.

This paper answers the question Senator John McCain asked FCC Chairman Michael Powell at the latter’s confirmation hearing in May: “What principles do you think should guide the FCC in its decision-making” with respect to competing demands for spectrum? In considering principles to guide spectrum reform, it is important to recognize that policymakers face both an immediate and a long-term challenge concerning management of this increasingly valuable public asset.

The *short-term* issue is how to reallocate spectrum from existing licensees (who pay nothing) to emerging technologies (particularly wireless broadband services) that promise both higher value-added services *and* the payment of substantial public auction revenue. The *longer-term* challenge is to modernize spectrum policy in a way that combines more flexible and market-oriented allocation rules with a level playing field that requires *all*

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\* Michael Calabrese directs the Public Asset Program at the New America Foundation. This is the first in a series of working papers examining issues related to reforming the management of the public airwaves.

commercial users to pay a market rate to rent space on the public airwaves. The bottom line is that we can do far more to increase the public's return on this asset.

The **four principles** that should guide Congress and the FCC in reforming spectrum policy can be summarized as follows:

1. The airwaves are a public asset owned in common by all Americans.
2. All commercial licensees should pay a market-based rent for use of spectrum.
3. Rigid “zoning” of the airwaves should be replaced by a more flexible, market-based allocation process.
4. Revenue from licensing spectrum should be reinvested in new public assets that benefit all Americans and update our educational technology and public media for the digital age.

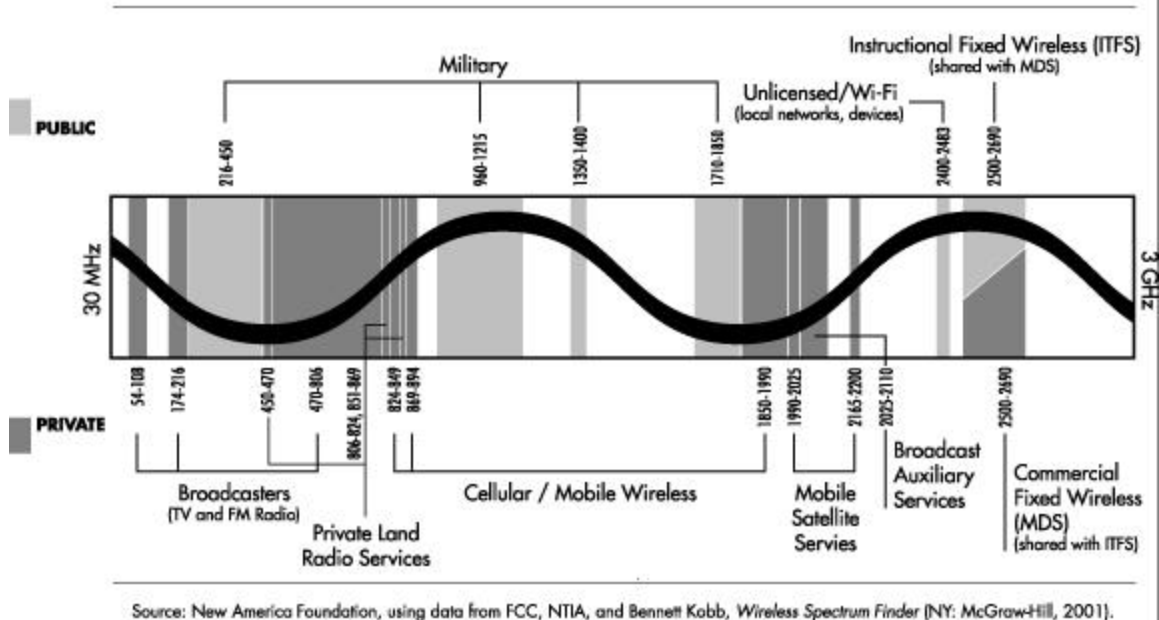
### **The Immediate Problem: A shortage of spectrum for 3G mobile wireless**

The immediate problem for policymakers is the shortage of spectrum caused by the rapid diffusion of wireless communication. Cell phone use is exploding and wireless Internet access is already available in certain central city and campus locations. More than 110 million Americans have cell phones that providers soon hope to enhance with always-on connections to the Internet. Later this decade, a variety of devices providing anywhere, anytime access to email, entertainment, videoconferencing and databases worldwide could be commonplace.

The potential consumer and commercial value of these “third generation” (3G) wireless applications is enormous. Last October, a report the President's Council of Economic Advisers (CEA) cited studies estimating the “consumer surplus” generated by current cellular services (1G and 2G) was between \$50 and \$110 billion per year in 1999.<sup>2</sup> Widespread adoption of 3G applications could be far more valuable, the CEA noted, quoting a report by the International Telecommunication Union (the U.N. body charged with coordinating spectrum policy globally) that predicted 3G devices – by combining the functions of a phone, email, videoconferencing and credit card – “will become the single indispensable ‘life tool’ carried everywhere by everyone.”<sup>3</sup>

The wireless industry estimates it will need to double its share of spectrum in order to make broadband wireless services widely available and affordable over the next five-to-ten years.<sup>4</sup> While Japan and major European governments have already doubled the airspace allocated to mobile wireless – raising over \$100 billion at auction last year alone – in the U.S. all of the prime frequencies that allow signals to penetrate buildings and bad weather are licensed to politically powerful incumbents. This spectrum squeeze became even more pressing on June 22, when a federal appeals court nullified the most recent U.S. auction that attracted \$17 billion in bids from wireless telephone companies.

## MAJOR SPECTRUM USERS (between 30 MHz and 3 GHz)



Around our largest cities the airwaves are already overcrowded with voice traffic. Unless current users give up spectrum, access to a host of high-speed mobile data applications may either be delayed or severely rationed by premium pricing.

### The Longer-term Challenge: A more efficient and equitable spectrum policy

If the U.S. had a more flexible and market-driven spectrum policy, we would expect wireless firms to simply bid spectrum licenses away from incumbent users. The problem is that our outdated regulatory structure – based on rigid spectrum “zoning” and perpetual, zero-cost licensing – gives incumbent users no incentive to give up spectrum or to use it more efficiently; nor can incumbents sublease or sell their licenses. While auctions have made the assignment of licenses among competing wireless phone companies more efficient, the *allocation* of spectrum is still determined service-by-service through elaborate rule makings. Regulators rigidly define – and freeze in place, often for decades – exactly which frequencies an industry can use, for precisely what purpose, and using what technologies. Although the wireless industry would pay billions of dollars for additional spectrum, it is not available at any price.

This failure to use a more flexible market mechanism to allocate spectrum among competing uses also creates a number of inequities. One is that private companies are not treated equally. While the FCC has used auctions to assign new allocations of spectrum since 1994 – accepting bids by wireless phone companies that total over \$36 billion – incumbent industries continue to use the spectrum rent-free.

A greater inequity is that the public is denied a fair return on an asset that any private company would lease at market rates. The financial stakes are enormous, and no more so than with respect to broadcast spectrum. At the National Association of Broadcasters (NAB) Futures Summit in March, Wall Street analysts revealed what NAB lobbyists already knew: that the industry's free licenses to the public airwaves are worth more than the stock market value of all U.S. broadcast stations combined. Based on prices paid at the most recent auctions for 3G spectrum in both the U.S. and Europe, one analyst estimated that the theoretical market value of spectrum assigned to commercial TV broadcasters is as high as \$367 billion.<sup>5</sup>

Any reform that adopts a market approach for allocating spectrum (on grounds of efficiency) should likewise ensure (on grounds of equity) that the financial return flows directly to the public and not as a windfall to any incumbent licensee. Moreover, while it may be impractical to directly rebate each citizen's share of this revenue, a substantial portion could be reinvested in new public assets that benefit everyone – ideally, as described below, in digital education, noncommercial media, and civic resources that the private communications market is unlikely to make freely accessible.

### **Four Principles for Comprehensive Spectrum Reform**

At FCC Chairman Powell's confirmation hearing, Senator McCain, who then chaired the Commerce Committee, asked what principles should shape the reform of U.S. spectrum policy. "I think there's a degree of incoherency on what obviously will become a scarcer and scarcer commodity," McCain stated. "As available spectrum becomes increasingly scarce, it will be increasingly difficult for the FCC to balance competing demands."

Although Powell skirted the question, he pointed out how difficult it is for the FCC to harmonize spectrum policy when, for example, Congress has mandated auctions for mobile wireless services (PCS), but has prohibited auctions to assign frequencies for broadcast or satellite services. As Powell implied, the spectrum policy mess is in large part a creation of Congress; and it will take legislative action to create the coherent and level playing field for commercial users that McCain and others claim to support.

Instead of limiting its effort to another ad hoc, stopgap fix for the wireless industry, Congress and the administration should grab this opportunity to lay the foundation for a more coherent spectrum policy. A more fair, efficient and long-term solution would ideally conform to the following four principles:

## 1. The Airwaves Are a Public Asset Owned by All Americans

Any spectrum reform must be premised on the government's fiduciary role as manager of this precious public asset. The spectrum, which represents nothing more tangible than the electromagnetic properties of the earth's atmosphere, is managed in every nation as a public resource. Shortly after commercial radio broadcasting began, Congress codified public ownership of the airwaves in the Radio Act of 1927, using language carried forward into the Communications Act of 1934, the law that regulates telecommunications today.

This principle is so fundamental that even *prior to* the Radio Act, President Coolidge signed into law a joint resolution of Congress stating: “[N]o original license . . . and no renewal of a license of an existing broadcasting station shall be granted . . . unless the applicant therefore shall execute in writing a waiver of any right or any claim to any right, . . . to any wave length or to the use of the ether in radio transmission because of a previous license . . . or because of use thereof.”<sup>6</sup>

To this day the Act plainly prohibits private ownership of spectrum, explicitly providing that “no such license shall be construed to create any right, beyond the terms, conditions and period of the license.”<sup>7</sup> The law authorizes the FCC to allocate frequencies to various services and to grant temporary licenses consistent with the “public interest, convenience, and necessity.” Under the Act's “public trustee” model, for example, the exclusive (and free) access of broadcasters to the airwaves has always been conditioned on certain public interest obligations.

While Congress initially justified public control largely on scarcity grounds – that is, the grant of exclusive licenses to avoid interference – the Supreme Court added a First Amendment dimension when it upheld the public trustee model. In the landmark case *Red Lion Broadcasting v. FCC* (1969), a unanimous court stated that “[l]icenses to broadcast do not confer ownership of designated frequencies, but only the temporary privilege of using them. . . . But the people as a whole retain . . . their collective right to have the medium function consistently with the ends and purposes of the First Amendment.”<sup>8</sup>

As wireless communication evolves, both First Amendment values and technology reinforce the importance of managing the airwaves as an inherently public asset. A number of legal scholars, engineers and entrepreneurs argue that new technologies – using ultra-wideband transmissions and software that allows frequency “hopping” – will soon permit a “spectrum commons” similar in concept to the open-access architecture of the Internet.<sup>9</sup> End users will be able to communicate directly, or via the Internet, without the need for an intervening commercial service to route their transmissions. As more direct and citizen-controlled communications becomes feasible, they argue, the government should make larger portions of the spectrum available for “unlicensed” use based on harmonizing equipment standards and etiquette protocols among hardware and software makers.

The more fundamental underpinning for common ownership and democratic control of the airwaves is that like other natural systems – including the oceans, navigable waterways, and the atmosphere – spectrum is inherently a *common asset*. There is a strong case to be made that not even Congress has the authority to “sell off” the public airwaves for all time. Throughout history both law and tradition have recognized that certain assets are inherently public and not subject to ownership – not by private parties, or even by the state. The classic examples from Roman law were roads, harbors, ports, bridges and navigable waterways. The Romans called this third category of property *res publicae*, a concept incorporated into English common law and later into 19<sup>th</sup> century American law as the “public trust doctrine.” The doctrine holds that, because of their unique characteristics, certain natural resources and systems are held in trust by the sovereign on behalf of all citizens.<sup>10</sup>

In U.S. jurisprudence, the U.S. Supreme Court recognized the inalienable public ownership of certain common assets most forcefully in *Illinois Central Railroad v. Illinois*.<sup>11</sup> In that case, the Court revoked an Illinois law transferring ownership of Lake Michigan shoreline to the railroad, holding that although the state held title to the land, it held it merely “in trust for the people of the State.”

At a minimum the public is entitled to just monetary compensation. As Professor Richard Epstein eloquently explained in an essay in the *Cato Journal*, the public trust doctrine is analogous to the Fifth Amendment’s takings clause; it requires public officials to seek fair compensation for the public when a common asset is transferred to private use:

The problem of disposing of public property thus raises the mirror image of public use and just compensation questions under the takings clause of the Fifth Amendment. . . . ‘No *public* property may be transferred to *private use*, without just compensation,’ payable to the public at large.’<sup>12</sup>

### ***Spectrum isn’t like real estate***

Some free market economists advocate privatization of the airwaves. Their long-held view is that creating permanent private ownership rights in the airwaves is the most efficient way to cope with the scarcity and interference problems that justify licensing.<sup>13</sup> Exclusive property rights in spectrum, they argue, can encourage optimal amounts of investment and interference with reduced transaction costs. In this Coasean view, the economic efficiency of using a price mechanism should therefore prevail over a historic conception that the airwaves are inherently a commonly-owned asset.

This view suffers from two fundamental misconceptions of its own. First, the airwaves are nothing like land or other tangible and irreducibly divisible property. As noted just above, recent advances in ultra-wideband and software-defined radio technologies suggest we shouldn’t presume to know the optimal way to organize *future* access to the airwaves. The FCC’s more than 50-year-old subdivision scheme based on exclusive control of discrete channels and guard bands may soon prove as inefficient as requiring

that land be subdivided using only circular plots. A growing number of scientists and engineers believe that assumptions about scarcity and interference that underlie today's exclusive licensing model may be temporary constraints that could be solved through advances in technology and architecture.<sup>14</sup> Paul Baran, who invented the packet-switching network principles behind the Internet and later founded Metricom, argued in 1994 that spectrum scarcity is a policy choice; and that digital and spread spectrum modulation could eliminate scarcity by allowing a large number of users to share the same frequencies.<sup>15</sup> As emerging technologies permit both more efficient re-use of spectrum and more democratic access to the airwaves, we should not foreclose the practical ability to greatly increase allocations of unlicensed spectrum. The possibility that technology could radically alter how society might choose to organize the airwaves provides another important reason for maintaining public control without the need to resort to eminent domain proceedings against "private owners" of the airwaves.

Second, while it may be true that flexible usage rights and private secondary markets for spectrum would provide a more efficient means of allocation, this by no means necessitates private ownership (or "propertizing," as one advocate calls it<sup>16</sup>). Private property itself is not absolute, but rather a bundle of rights that are "strong" or "weak" in various respects. Along the continuum between central planning and complete privatization, private rights in spectrum licenses can be defined that allow holders (for the period of the license) to sell, transfer, sublease, aggregate, or change the use of spectrum – a degree of property-like rights not now associated with the "free" licenses conferred as an instrument of FCC industrial policy.

In sum, if there's financial "pie in the sky" – in the form of scarcity rents for spectrum – it belongs equally to all Americans.

## **2. All Commercial Licensees Should Pay for Use of Spectrum**

Many of America's public assets – such as our national parks and civic spaces – are specifically protected from private commerce. But other public assets are made available for commerce on a limited basis – such as rights to extract mineral wealth, cut timber and graze herds on public lands – and generate billions of dollars in public revenue. By using auctions or charging rents, the government ensures that private users have a financial incentive to use the resources efficiently. And while political influence often results in firms paying below-market fees for using these resources, in most cases the public at least receives a direct return for the commercial use of public property.

Not so the public airwaves. Presidents dating back to Jimmy Carter sought the authority to auction spectrum, yet Congress did not authorize the first auctions until 1993, as a revenue-raising device in President Clinton's first budget. Prior to this, the FCC assigned licenses free of charge, selecting applicants based on comparative hearings ("beauty contests") or, for a brief time, based on lotteries. Although Congress mandated auctions as the means to assign new licenses for mobile communication services, it has not given the FCC the power to auction or charge rent for most spectrum already occupied by other powerful incumbents.

### ***The 1996 and 2001 Giveaways to Broadcasters***

Indeed, quite the opposite has occurred. The 1996 Telecommunications Act effectively *doubled* the share of the airwaves held by TV broadcasters – a giveaway then valued by the FCC at \$37-to-\$70 billion, but now worth far more.<sup>17</sup> Principled conservatives – including Senators McCain, Dole and Ashcroft – resisted what then-FCC Chairman Reed Hundt described as “the largest grant of government largess since the 19<sup>th</sup> century donation of 10 percent of the public land in the West to three dozen railroad companies to persuade them to build the transcontinental railroads.”<sup>18</sup> Dole, Senate Majority Leader at the time, complained: “We don't give away trees to newspaper publishers. . . . The airwaves are a natural resource. They do not belong to the broadcasters, phone companies or any other industry. They belong to the American people.”

But the broadcast lobby was too powerful. As *New York Times* columnist William Safire wrote: “This phalanx of freeloaders has stolen the free use of great chunks of the most valuable natural resource of the information age: the digital television spectrum owned by the American people.”<sup>19</sup>

Congressional supporters insisted that giving each incumbent station an extra channel was no windfall, only a loan. By no later than 2006 the public would benefit both from higher-quality digital TV signals and by eventually getting the revenues when the old analog channels were auctioned. Two years ago Congress directed the FCC to begin the exchange process by auctioning six channels that fall between channels 60 to 69 on television sets. In a public auction, this first small slice of broadcast spectrum could have generated \$20 billion or more for taxpayers.

This year it became clear that the broadcasters' promise to deliver high-definition television (HDTV) and to return the extra channel for public auction is as fictional as opponents feared five years ago. The broadcasters that license channels 60 to 69 protest that they are unable to give up their analog space because so few households have purchased digital-capable television sets – viewers without cable or satellite TV or a digital tuner would lose access to that programming. Broadcasters also found little economic benefit in converting to digital. Crisper digital pictures do not boost viewership – or ad dollars – especially when nearly 85 percent of homes already receive their primary signal from a paid cable or satellite subscription. Meanwhile, the nation's need to free up large swaths of scarce spectrum to rollout 3G wireless broadband services suddenly became a high priority among government policymakers. The longer broadcasters delayed, the more leverage they gained to demand a payback for returning the extra spectrum they hoarded.

“We are entrepreneurs hoping to reward our shareholders who invested in our business of amassing spectrum,” Lowell Paxson, chairman of Paxson Communications, wrote to the editor of *Barron's* earlier this year.<sup>20</sup> Paxson's “business of amassing spectrum” is about to snatch billions from the pockets of taxpayers, thanks to the FCC. After a massive lobbying effort by broadcasting firms, the FCC announced a decision on September 17 that gives a second windfall to broadcasters. Twenty-one broadcasting companies with

138 stations will be able, in effect, to sell their analog spectrum directly to the wireless industry. Rather than the public auctions anticipated by Congress, the FCC apparently will allow the incumbent licensees to pocket as much as two-thirds of the \$20-to-\$30 billion expected to be bid at next year's FCC auction. Although the FCC's original rationale was that this would compensate the stations for the loss of their over-the-air analog audience, the FCC order also allows broadcasters that sell one channel to delay indefinitely their promised conversion to digital television and to continue broadcasting in analog until 70 percent of U.S. homes can receive digital signals.<sup>21</sup> Since fewer than 3 percent of households own digital tuners now, the conversion to digital used to justify the extra channel broadcasters received just five years ago is delayed indefinitely.

Of course, while TV and radio broadcasters occupy the most valuable "beachfront" spectrum, other industries also enjoy rent-free use of the airwaves. Prominent among these are satellite services, the fixed wireless industry (sometimes called "wireless cable"), and private land mobile services, which are two-way radio services shared by firms in a variety of industries, including petroleum, taxicabs, forest products and utilities. The original analog cellular telephone licenses given away during the 1980s have never been auctioned and boosted their recipients' stock market values by about \$46 billion as of 1991, according to a U.S. Department of Commerce estimate.<sup>22</sup>

### *Internalizing costs promotes efficient use*

On top of the equity concerns – some industries pay, others don't, and the public receives only a partial return – are efficiency problems. When any input to production is freely available, users have no incentive to use it efficiently. If forced to pay a market price – and if allowed to sell or sublease licenses – incumbents would have strong incentives to seek the most cost-efficient solution.<sup>23</sup> This will lead some incumbents to invest in more spectrum-efficient equipment, others to substitute wireline or public commercial services (e.g., utilities using cell phones instead of private radios), and still others to sell out to new services willing to sublease or buy their license.

Another result will be the formation of a private secondary market for wireless bandwidth, much like we have today for wireline bandwidth. There would be no "crisis" concerning a shortage of spectrum for advanced wireless services, since any new or expanding competitor could bid needed spectrum away from less valuable services.

Two corollary principles, which relate to the dangers of using auctions to raise revenues, should be considered an essential part of a more market-oriented policy that charges all commercial users of spectrum.

### *Spectrum policy is not budget policy*

**First, all frequencies that can be made available for commercial purposes should be auctioned as soon as possible.** Recent auctions for spectrum have raised such startling sums in part because federal industrial policy – and the political influence of incumbents – has exacerbated the shortage and uncertainty surrounding allocations for advanced

wireless services. Former FCC Chairman Reed Hundt opined at a New America Foundation policy forum this year that the record \$16.8 billion bid by wireless phone companies at the auctions that closed in January 2001, constituted a “sin against policy.”<sup>24</sup> We agree. Policy makers should use the market and compensate the public – but not manipulate auctions as an instrument of budget policy. So long as the public maintains its future interest in spectrum rents, then lower initial auction receipts can be beneficial, since it leaves firms with more capital to roll-out new and presumably valuable consumer services.

### *Licenses should be for strictly-defined periods*

**Second, whatever price mechanism is used, it is critical that licenses be issued for a defined period of time and not confer entitlements in perpetuity.** If society’s common ownership of the airwaves is inalienable, then the public’s future returns and flexibility to alter today’s regulatory regime should not be overly constrained. One problem with recent auctions of spectrum to wireless phone companies is that they appear designed to maximize current revenue by giving winning bidders presumptive rights of renewal – and thus implying (though not stating) that no additional rent will be charged. This stands in contrast to European 3G auctions that explicitly state licenses revert to the government after a longer (e.g., 15-year) initial license period.

There are several reasons why auctions should not be designed – or even perceived – as a means of collecting today the present value of all future rents. One obvious reason is that the future value of the airwaves is highly speculative. Nobody knows the relative value or appropriate regulatory configuration for spectrum in the year 2030 – let alone in 2130. Unlike grazing land and other tangible assets, we have less than 80 years worth of experience with the best way to organize the social use of spectrum.

### **3. Spectrum “Zoning” Should Be Replaced with Flexible, Market-Based Allocation**

Since the advent of radio in the mid-1920s, each new use for the airwaves (from FM radio, TV and satellite broadcasting, to commercial two-way radio services) has had to apply for its own exclusive and highly restrictive allocation. As each new wireless service emerges, regulators adopt a “band plan” that allocates spectrum *only* for this discrete purpose, and that also often dictates the particular technologies to be used (service rules and technical standards) as well as the number of competitors that will be allowed.

One result is that the spectrum allocation chart looks like a fossilized record of fading services and technologies. As technologies evolve, incumbent industries find themselves squatting on far more spectrum than they need – and far more than they would ever pay to use – while emerging services must mount an expensive political and regulatory battle to operate at all. As then-FCC Chairman Reed Hundt complained in 1995, “incumbents and competitors have incentives to slow down the FCC process and keep their protected status as long as possible.”<sup>25</sup> Comparative hearings are particularly susceptible to costly

delays. One study estimated that regulatory delays in launching cellular phone service cost the U.S. economy more than \$86 billion in economic activity.<sup>26</sup>

Of course, some regulation is essential in this area; Congress and the FCC need to police interference, coordinate allocations with international bodies, and reserve the ability to reorganize spectrum use if technologies or public needs radically change. Nevertheless, spectrum allocations that appeared to make sense decades ago are now frozen in place. While broadcasters and other industries have profited from using spectrum as a zero-cost input, the *quid pro quo* is that licenses are encumbered by eligibility, service and technical requirements, as well as by essentially nontransferable lease rights. So long as incumbents hold “free” spectrum, they face no opportunity costs even when there is scarcity and the spectrum could be put to more productive use.

A recent filing before the FCC by 37 economic professors, most of them former government economists, explained why a more flexible and market-oriented approach would increase efficiency:

The Commission has recognized that regulators have limited ability to plan markets. . . . But auctions for licenses have not changed the underlying system of spectrum allocation. . . . With few exceptions, spectrum continues to be offered to the market only as allocated and no price can be offered to reallocate it from the officially designated use. The situation has led to predictable outcomes: shortage and waste.<sup>27</sup>

In the mid-1990s, the FCC moved consciously toward a more flexible approach when it auctioned licenses for wireless personal communications services (PCS). Auctioned licenses were given a far greater degree of flexibility in responding to consumer demand than the “free” licenses for broadcasting and other purposes. In 1999, after years of rancorous internal debate, the FCC released a statement of guiding principles for its future activities in spectrum management. The FCC said it would:

allow greater flexibility in allocations, . . . to provide regulatory neutrality for similar wireless services; promote new spectrum-efficient technologies, such as ultra-wideband and spread spectrum operations; . . . encourage the development of secondary markets for spectrum (i.e., reselling of licenses to third parties) to ensure full utilization; and seek ways to make more spectrum available, through, for example, assigning user fees or by reclaiming existing spectrum.<sup>28</sup>

One former FCC chief economist described this trend as “the administrative creation of property rights,” observing that “although there are important differences between licensing and ownership, those alternatives are not as discrete as often portrayed.”<sup>29</sup> For example, the old industrial policy of allocating “free” spectrum to firms deemed best qualified to deliver a specific service necessarily entailed restrictions on the ability of a licensee to subdivide bands, to lease frequencies to other parties, or to change its use. If these restrictions were minimized, it would facilitate a secondary market for wireless bandwidth, similar to markets that have developed for wireline bandwidth. “Just as a

building owner can rent out space, a wireless service provider should be able to lease out the use of spectrum assigned to its license,” the 37 economists stated in their FCC filing.

However, in contradiction to its own 1999 statement of principles, the FCC has continued to shape the use of the airwaves on an exclusive service-by-service basis. Indeed, in July 2001, in its first major ruling on spectrum allocation under its new chairman, Michael Powell, the FCC appeared to return to an aggressive industrial policy of “corporate welfare” by giving satellite mobile phone providers 70 MHz of free spectrum over the objections of potential competitors among cellular mobile phone companies that paid billions of dollars at auction for their spectrum.<sup>30</sup>

#### **4. Spectrum Revenue Should Be Reinvested in New Public Assets that Benefit All Americans**

Ideally, revenue from the private use of the airwaves would be rebated directly back in equal amounts to every American, much as the Alaska Permanent Fund pays an annual dividend to every citizen of that state (nearly \$2,000 per Alaskan last year) from income earned on public royalties from North Slope oil. However, spectrum revenue is too small relative to the U.S. population, and too irregular, to justify the administrative cost.

Alternatively, the revenue could offset income tax liabilities by flowing into the general Treasury – which is, in fact, current policy. This is inadequate for two reasons. First, taking income from common assets as a general revenue source is inherently regressive, since it substitutes for income tax obligations based on the ability to pay. Payroll taxes for Social Security and Medicare are similarly regressive, but that is justified by the fact that the benefits received in retirement are very progressive – that is, they flow disproportionately to retirees with a lifelong history of low wages. Second, when our nation monetizes a common asset, it seems preferable to reinvest that windfall in new public assets of broad public benefit. Because each American owns an equal share of the airwaves, a portion should be reinvested in new public assets that update the non-commercial portion of our educational, media and civic infrastructure for the digital era.

Perhaps the most relevant way to think about reinvesting spectrum revenue is for the purpose of fulfilling the “public interest obligations” that originally justified giving broadcasters free monopoly-like access to the airwaves. These unmet needs include quality children’s and educational programming, local public service media, expanded civic discourse, and media time for political candidates. These new public investments could include educational content and innovative software that makes meaningful the federal E-Rate program that has been wiring our nation’s public schools and libraries to the Internet, as well as funding to expand local and national content for noncommercial media that takes advantage of the multi-channel capacity of digital public broadcasting and of the Internet.

A number of recent proposals offer compelling visions of the sort of investments needed to maximize the public benefits of new technologies such as the Internet, software, and broadband networks. For example, former FCC Chairman Newton Minow and former

PBS President Lawrence Grossman have proposed the creation of a “Digital Opportunity Investment Trust” that would support innovative uses of digital technologies for education, lifelong learning, and the transformation of our civic and cultural institutions.<sup>31</sup> Under their proposal, an initial \$18 billion in revenue from upcoming spectrum auctions would be allocated to capitalize the trust fund, yielding a permanent revenue stream of \$1 billion or more for investments. As they note, the United States has a long and highly successful tradition of using public assets to invest in education. In the 19<sup>th</sup> century, for example, Congress passed the Morrill Act, signed by President Lincoln, which granted the states tracts of federal land for the purpose of establishing many of today’s leading universities.

### ***Investing in E-learning and Digital Content***

Preparing all of our children and workers for the digital economy may be the best example of how spectrum revenue could be reinvested in a way that benefits virtually every American. Thanks to the public-private partnerships and the federal E-Rate program, the percentage of classrooms in public K-12 schools connected to the Internet increased to 77 percent in 2000, up from just 3 percent in 1994. The United States has also worked to connect libraries to the Internet, create a national network of community technology centers in low-income neighborhoods, increase the number of multimedia computers in the classroom, and provide teachers with the skills they need to use technology effectively in the classroom.

Unfortunately, we are not realizing the full potential of these new technologies for education and lifelong learning. While our nation’s information highway is nearly paved, there are few ‘express lanes’ (broadband connections) or ‘school buses’ (innovative content and software) capable of realizing its potential for education, training and civic discourse. We need to invest in content and applications to leverage this increased access to hardware and networking infrastructure. These investments could include improving the “state-of-the-art” of digital content, software, and tools for K-12 education and lifelong learning. For example, according to the President’s Council of Advisors on Science and Technology, less than 0.1 percent of expenditures on elementary and secondary education are devoted to R&D. Collaborations between local schools and public broadcasting stations could also be a valuable resource inasmuch as local PBS stations have already promised to dedicate at least 25 percent of their digital channel capacity to education if they have the resources for programming.

### ***The Current Debate in Congress***

In Washington, policy makers are desperately seeking a “deal” that will free up sufficient spectrum for advanced wireless services (3G). Broadcasters, satellite services, the Pentagon, universities and even Catholic Television Network are battling either to hold onto all of the spectrum licenses they received free, or to capture for themselves the tens of billions of dollars in potential auction revenue that rightfully belongs to the public.

Rep. Charles Pickering (R-MS) recently proposed a politically appealing way to break this stalemate. He suggests paying the military, which has long used a band designated internationally for 3G, to migrate to less commercially valuable frequencies. The spectrum would be auctioned in advance of the military's move, but unlike past auctions, revenues would be earmarked for a trust fund designated exclusively for military modernization. Based on recent auctions here and in Europe, the military band assigned for 3G (1710-1850 MHz) should generate \$50-to-\$100 billion.<sup>32</sup> Since the Pentagon estimates it will cost less than \$10 billion to relocate, modernizing military systems should be the first – but not the only – public purpose funded by a spectrum trust fund.

However sensible as spectrum policy, the Pickering proposal follows from the false assumption that the Pentagon “owns” the airwaves and is entitled to any revenue gained by “selling” it to industry. Far more consistent with the principles described here is an alternative proposal by Rep. Edward Markey (D-MA), based on the idea that modernizing military communication systems should be the first – but not the only – public purpose funded by a spectrum trust fund. Markey would also earmark some revenue to ensure the military state-of-the-art communications equipment on new frequencies. However, he suggests using the remainder to capitalize a “Digital Dividends Trust Fund.” The Fund’s annual interest income would be dedicated to new investments in digital education, training, rural broadband Internet access and the conversion to digital public broadcasting.

Because each American owns an equal share of the airwaves, it is inadequate to say that the economy overall will benefit from 3G services. Even if this Congress limits spectrum reform to the urgent task of freeing up spectrum for 3G wireless services, it should take this opportunity to reinvest the auction windfall in new public assets that update the non-commercial portion of our educational and civic infrastructure for the digital era.

### **Getting from here to there: Charging incumbents**

As noted above, there is an emerging consensus that spectrum licenses should trade freely and allow users more flexibility, but there is no consensus on how to get from here to there. The new deregulated licenses would presumably be more valuable, since they would allow the highest bidder property-like rights for the term of the lease. The vexing economic and political problem is: how can the public collect a fair “rent” from incumbent license holders who were given their spectrum for free?

One option is to simply set a date when incumbent licenses will be auctioned rather than automatically renewed. This is particularly justified if rules constraining currently assigned licenses are to be redefined to allow licensees flexibility to change the service provided on that spectrum, or to resale or sublease their spectrum.<sup>33</sup> Although incumbent licensees presumably would have a greater incentive to make the winning bid, since they have on-going business revenue and investments tied to those frequencies, incumbents argue that the risk of losing their license is unfair and would have a chilling effect on investments in new equipment. Broadcast stations, for example, have sunk costs in transmission facilities and valuable franchises that consumers associate with a particular

location on the “dial.” Incumbents also argue that they have already paid for the scarcity value of their spectrum to the extent that they purchased TV stations or other businesses that held licenses they assumed (contrary to the specific terms of the license) would always be available to them at no cost.

At the other extreme are proposals for Congress to simply give incumbent license holders permanent private property ownership rights. One leading proponent of “propertizing” the spectrum asserts “these licenses should simply be assigned, as is, to their incumbent holders in perpetuity, with the existing protections against interference.”<sup>34</sup> However, as noted above, deregulation and defining property-like rights for licensees can achieve market efficiencies without the need for a politically untenable “giveaway” of a public asset worth hundreds of billions of dollars.

Since both a massive giveaway and an immediate free-market auction of incumbent frequencies appear politically impractical, policy makers need to find a middle-ground solution that minimizes disruption to on-going services, while also transitioning all commercial users into a market-based rental regime.

One such proposal, by former FCC General Counsel Henry Geller, would impose an airway “right of way” fee similar to the franchise fee typically paid by cable companies to local governments for terrestrial rights of way. Under the Cable Act of 1984, most municipalities charge cable operators a franchise fee equal to 5 percent of “gross revenues” derived “from the operation of the cable system.” In addition, a separate fee in addition to the 5 percent rental fee can be levied to pay for the capital costs of public, educational or government access (PEG).<sup>35</sup> Federal courts have recognized that the cable franchise fee is not a tax, but a cost of doing business that is “essentially a form of rent” for using the public streets, sewers and other conduits to run cable.<sup>36</sup> This means that although cable and broadcast TV are direct competitors, the federal government heavily subsidizes broadcast TV (both with free access to the airwaves and with must-carry rules requiring cable operators to carry all local over-the-air stations), while cable TV operators pay between \$1 and \$2 billion annually in access fees to local governments.<sup>37</sup>

Another option would combine a future auction date with escalating interim fees. While the date to auction incumbent spectrum may need to be set a decade or more in the future, fees can at least recover a portion of the rental value due to the public and internalize incentives for incumbents to give up, or use more efficiently, under-utilized spectrum. Both the Clinton and Bush administrations proposed user fees for analog TV spectrum that broadcasters are obliged to return to the government after they convert to digital transmission and at least 85% of U.S. households can view digital broadcasts. These proposals recognize that unless broadcasters pay for spectrum, they have incentives to delay – rather than to accelerate – the nation’s transition to digital broadcasting. A user fee would give the broadcasters an incentive to use spectrum more efficiently and to return more quickly the extra channel each station received free in 1996, ostensibly for the purpose of converting to HDTV. Broadcasters now hold more than *ten times* as much spectrum as they need to deliver a standard definition digital TV signal to the roughly 15 percent of households who still rely on over-the-air TV.

Lease fees also could be an option where auctions are undesirable or impractical for other reasons. For example, the U.K. uses “administrative pricing incentives” to set fees for small business users (such as taxicab and other private radio services) and even for public sectors users. While Congress may not want to risk dislocating certain incumbents by conducting a truly open auction, it might decide to authorize the FCC to employ some type of “shadow pricing” system to determine appropriate leasing fees – much as the FCC did when it imposed a 5 percent of gross revenue fee on non-broadcast use of digital TV spectrum that was otherwise given away free to the industry in the 1996 Act.

## Conclusion

The traditional, industrial-era regulatory model has created the worst possible situation: a spectrum policy that is grossly inefficient and inequitable to both industry and the public that owns the airwaves. The nation needs a new, more coherent national spectrum policy that is premised on the public’s inalienable ownership of the airwaves, and that also promotes both efficient allocation and a level playing field between industries and companies seeking to use spectrum. A more fair, efficient and long-term solution would change current policy in two fundamental respects. First, Congress should replace its policy of rigidly “zoning” the spectrum with a more flexible and market-based allocation mechanism. And second, auction or fee-based revenue from licensing the public’s airwaves should be reinvested in new public assets that update the non-commercial portion of our educational and civic infrastructure for the digital era. The bottom line is a better return to the public – as both owners and consumers -- for use of this common asset.

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## Endnotes

<sup>1</sup> Recent auctions in the U.S., Germany and the U.K. attracted winning bids equivalent to \$1 billion per national MHz of spectrum. The weighted-average prices paid at the January 2001 re-auction of PCS licenses in the U.S. was \$4.18 per MHz per capita on average, according to the FCC, while the bids across the five European nations that auctioned 3G licenses averaged \$3.51 per MHz per capita. See John Bensch, Courtney Kelleher, Andrew Gardiner, “U.S. Spectrum Auction Guide: A Look at the Changing Landscape of Spectrum Licensing,” Lehman Brothers, Feb. 14, 2001, p. 22. The countries included in their calculation are the U.K., Germany, Netherlands, Austria and Switzerland.

<sup>2</sup> Council of Economic Advisers, “The Economic Impact of Third-Generation Wireless Technology,” *The White House* (October 2000), citing estimates by Brookings Institution economist Jerry Hausman.

<sup>3</sup> International Telecommunications Union, “The Next Generation of Mobile Communications,” *ITU-2000 Conference* (October 10, 2000) ([http://www.itu.int/imt/what\\_is/3rdgen/index.html](http://www.itu.int/imt/what_is/3rdgen/index.html)).

<sup>4</sup> At the 2000 World Radio Conference (WRC-2000), the ITU adopted Resolution 223, which states that approximately 160 MHz of additional spectrum will be needed in the U.S. to meet projected 3G system requirements in high-traffic areas by 2010.

<sup>5</sup> Tom Wolzien, “Whose Bandwidth is it Anyway?” Speech, National Association of Broadcasters Futures Summit, Bernstein Research (April 2001).

<sup>6</sup> Senate Joint Resolution 125, 69<sup>th</sup> Cong. 1<sup>st</sup> Session, signed into law December 8, 1926. The legislative history of the Radio Act repeatedly refers to “public ownership of the ether,” 68 CONG. REC. 2573 (1927), and recognizes that “either is the inalienable possession of the people,” 68 CONG. REC. 2872 (1927). See also Thomas W. Hazlett, “The Wireless Craze, The Unlimited Bandwidth Myth, The Spectrum Auction Faux Pas, and the Punchline to Ronald Coase’s ‘Big Joke’,” *Harvard Journal of Law and Technology* (Spring 2001, forthcoming) (<http://www.aei.org/scholars/hazlett.htm>), at 88-106, for useful historical references. Hazlett notes that Senator Dill stated later, in his treatise *Radio Law*, that “[t]he purpose of

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Congress from the beginning of consideration of legislation concerning broadcasting was to prevent private ownership of wave lengths or vested rights of any kind in the use of radio transmitting apparatus.”

<sup>7</sup> 47 U.S.C. Sections 301, 304 (license applicants must waive “any claim to the use of any particular frequency or of the electromagnetic spectrum...because of any previous use of the same”).

<sup>8</sup> 395 U.S. 367, 393 (1969). See also *FCC v. Sanders Bros. Radio Station*, 309 U.S. 470, 475 (1940), where the Court confirmed “the Act is clear that no person is to have anything in the nature of a property right as a result of the granting of a license.”

<sup>9</sup> See Yochai Benkler, “Overcoming Agoraphobia: Building the Commons of the Digitally-Networked Environment,” 11 *Harvard Journal of Law & Technology* 287 (Winter 1998). See also Yochai Benkler, “The Commons as a Neglected Factor of Information Policy,” *Telecommunications Policy Research Conference* (September 1998) (<http://www.law.nyu.edu/benkler/commons.pdf>). Some even predict technology will allow all spectrum to be unlicensed by eliminating spectrum scarcity. See George Gilder, “Auctioning the Airwaves,” 153 *Forbes ASAP Supplement* 8, 99-112 (April 11, 1994).

<sup>10</sup> See Gerald Torres, “Who Owns the Sky?” 18 *Pace Environmental L. Rev.* 227 (2001) for an excellent overview of the legal status of common assets and the application of the public trust doctrine to federal management of the atmosphere and emissions trading. On Roman law and the common law evolution of the public trust doctrine, see Lynda L. Butler, “The Commons Concept: An Historical Concept with Modern Relevance,” 23 *William & Mary Law Review* 835 (1982), and Carol M. Rose, “Roman Roads and Roman Creators: Traditions of Public Property in the Information Age,” Paper presented at Conference on the Public Domain, Duke Law School (Nov. 10, 2001) (<http://www.law.duke.edu/pd/papers.html>).

<sup>11</sup> *Illinois Central Railroad v. Illinois*, 146 U.S. 387 (1892).

<sup>12</sup> Richard A. Epstein, “The Public Trust Doctrine,” 7 *Cato Journal* 411, 419 (1987) (Epstein’s emphasis). For a more general description of the public trust doctrine in U.S. law, see Joseph L. Sax, “The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention,” 68 *Mich. L. Rev.* 471 (1970).

<sup>13</sup> See R.H. Coase, “The Federal Communications Commission,” 2 *Journal of Law & Economics* 577 (1959) and Hazlett, *supra* note 5.

<sup>14</sup> See note 8, *supra*, and David P. Reed, “Why Spectrum Isn’t Like Property,” presentation to Open Spectrum Working Group, May 18, 2001. Reed, a former professor of computer science and engineering at MIT, argues that spectral capacity can scale with demand by using “cooperative” wireless architecture interconnected with wired/fiber networks.

<sup>15</sup> Paul Baran, “Visions of the 21<sup>st</sup> Century Communications: Is the Shortage of Radio Spectrum for Broadband Networks of the Future a Self-Made Problem?” Keynote Address, 8<sup>th</sup> Annual Conference on Next Generation Networks (Washington, DC, November 9, 1994) (available online at [http://www.eff.org/GII\\_NII/Wireless\\_cellular\\_radio/false\\_scarcity\\_baran\\_cngn94.transcript](http://www.eff.org/GII_NII/Wireless_cellular_radio/false_scarcity_baran_cngn94.transcript)).

<sup>16</sup> Lawrence J. White, “Propertizing’ the Electromagnetic Spectrum: Why It’s Important and How to Begin,” in J.A. Eisenach and R.J. May, eds., *Communications Deregulation and FCC Reform: What Comes Next?*, 9 *Media Law & Policy* 19 (2000).

<sup>17</sup> FCC, Letter from Robert M. Pepper, Chief, Office of Plans and Policy, to Sen. Joseph Lieberman, September 6, 1995. The lower value was based on the sale of recent television stations, while the upper value was based on results of auctions for spectrum licensed for wireless communication services.

<sup>18</sup> Stephen Lebaton, “The Battle of the Bandwidths,” *The New York Times* (August 11, 2000) (<http://www.nytimes.com/2000/08/11/technology/11spectrum.html>). As New York Times reporter Joel Brinkley revealed in his book, *Defining Vision*, the race to develop HDTV was primarily a lobbying strategy by broadcasters to prevent wireless telephone companies from acquiring unused tracts of spectrum adjacent to analog broadcast frequencies. See Joel Brinkley, *Defining Vision: The Battle for the Future of Television* (New York: Harcourt Brace, 1997).

<sup>19</sup> William Safire, “Spectrum Squatters,” *The New York Times* (October 9, 2000). A brief history of the capture of spectrum by private broadcasters can be found in David Bollier, *Public Assets, Private Profits: Reclaiming the American Commons in an Age of Market Enclosure*, New America Foundation (Spring 2001) and in Hazlett, *supra* note 5.

<sup>20</sup> Lowell W. Paxson, “Mule Kicks Back,” Letter to the Editor, *Barron’s Online*, March 26, 2001. Paxson’s letter to the editor came in response to an article by Thomas Hazlett, “Hostage Stand-off,” *Barron’s*, March 19, 2001, suggesting that “[d]istasteful though it is, the efficient solution is not to shoot the mule [viz., Paxson and broadcasters squatting on frequencies needed for wireless services] but to bribe it to saunter along.”

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<sup>21</sup> FCC, “Order on Reconsideration of the Third Report and Order, September 17, 2001. The FCC states: “Our underlying policy premise is that voluntary agreements can provide supplemental resources to broadcasters that will both expedite their transition to DTV and strengthen their economic viability, as well as enable earlier delivery of new wireless services, ...”. *Id.*, at p. 3.

<sup>22</sup> US Department of Commerce, *U.S. Spectrum Management Policy: Agenda for the Future*, NTIA, D6 (1981).

<sup>23</sup> This rationale underlies the U.K.’s Wireless Telegraphy Act of 1998, which authorizes auctions, administrative fee setting and trading. See David Hendon, Chief Executive, UK Radiocommunications Agency, “The Challenges of Dynamic Radio Spectrum Management,” National Telecom Agency of Denmark (February 2001) (<http://www.tst.dk/dk/publikationer/jubileumsskrift/kap05.htm>).

<sup>24</sup> Mark Wigfield, “Former FCC Chairman Calls Wireless Auction ‘A Disaster’,” *Dow Jones Newswires* (February 14, 2001).

<sup>25</sup> Reed E. Hundt and Gregory L. Rosston, “Spectrum Flexibility Will Promote Competition and the Public Interest,” *IEEE Communications Magazine*, 40 (December 1995).

<sup>26</sup> J.H. Rohlfs, C.L. Jackson, and T.E. Kelly, “Estimate of the Loss to the U.S. Caused by the FCC’s Delaying Licensing of Cellular Telecommunications,” National Economic Research Associates (1991).

<sup>27</sup> FCC WT Docket No. 00-230, “Comments of 37 Concerned Economists” in response to FCC 00-402, “In the matter of Promoting Efficient Use of Spectrum Through Elimination of Barriers to Secondary Markets,” (February 7, 2001). They concluded that the FCC should eliminate four categories of restrictions on licensees – eligibility requirements, service rules, technological standards and build-out requirements – that are not related to interference or anti-competitive concentration.

<sup>28</sup> FCC 99-354, “In the Matter of Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium” (November 22, 1999).

<sup>29</sup> Howard Shelanski and Peter Huber, “Administrative Creation of Property Rights to Radio Spectrum,” 41 *Journal of Law & Economics* 581, 583 (October 1998).

<sup>30</sup> On July 17, 2001, the FCC authorized eight new mobile satellite service systems to provide service using the 2 GHz band; see FCC DA 01-1631 through 01-1638, issued in response to FCC 00-302, “In the Matter of the Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2GHz Band” (August 25, 2000).

<sup>31</sup> Newton Minow and Lawrence Grossman, *Digital Promise* (New York: Century Foundation Press, 2001).

<sup>32</sup> See *supra* note 1. Recent auctions in the U.S., Germany and the U.K. for spectrum allocated to 3G services attracted winning bids equivalent to \$1 billion per national MHz of spectrum.

<sup>33</sup> See John Peha, “Spectrum Management Policy Options,” 1 *IEEE Communications Surveys* 1 (4<sup>th</sup> Quarter 1998) (<http://www.comsoc.org/livepubs/surveys/public/4q98issue/peha.html>), for a discussion of policy options for assigning and governing spectrum licenses.

<sup>34</sup> Lawrence J. White, *supra* note 14, at p. 97. Hazlett, *supra* note 5, similarly proposes granting permanent private property rights to bands based on “priority-in-use,” and replacing the FCC with a Spectrum Court to adjudicate claims of wrongful interference (spectral “trespass”).

<sup>35</sup> Section 622(b) of the Cable Communications Policy Act of 1984 allows municipalities to charge cable operators a fee up to 5 percent of “gross revenues” derived “from the operation of the cable system.” In addition, a fee above 5 percent can be levied to pay for the capital costs of public, educational or government access (PEG) ([http://www.fcc.gov/Bureaus/Cable/Orders/1996\\_TXT/fcc96188.txt](http://www.fcc.gov/Bureaus/Cable/Orders/1996_TXT/fcc96188.txt)). For example, Time Warner cable agreed to pay the city of Milwaukee, WI, \$5 million for PEG programming as part of a 17-year franchise renewal contract (<http://www.ci.mil.wi.us/citygov/council/cable/2000.htm>).

<sup>36</sup> *City of Dallas v. Federal Communications Commission*, 118 F.3d 393, 397-398 (1997).

<sup>37</sup> The vast majority of cities and towns charge the full 5 percent of gross revenue fee allowed under the Cable Communications Policy Act of 1984. This suggests that total nationwide payments well in excess of \$1 billion last year, since total U.S. cable service revenues were \$41 billion in 2000, nearly \$30 billion of which from subscriber fees, according to a study by Paul Kagan Associates cited by the National Cable and Telecommunications Association, [http://www.ncta.com/industry\\_overview/indStats.cfm?statID=9](http://www.ncta.com/industry_overview/indStats.cfm?statID=9).