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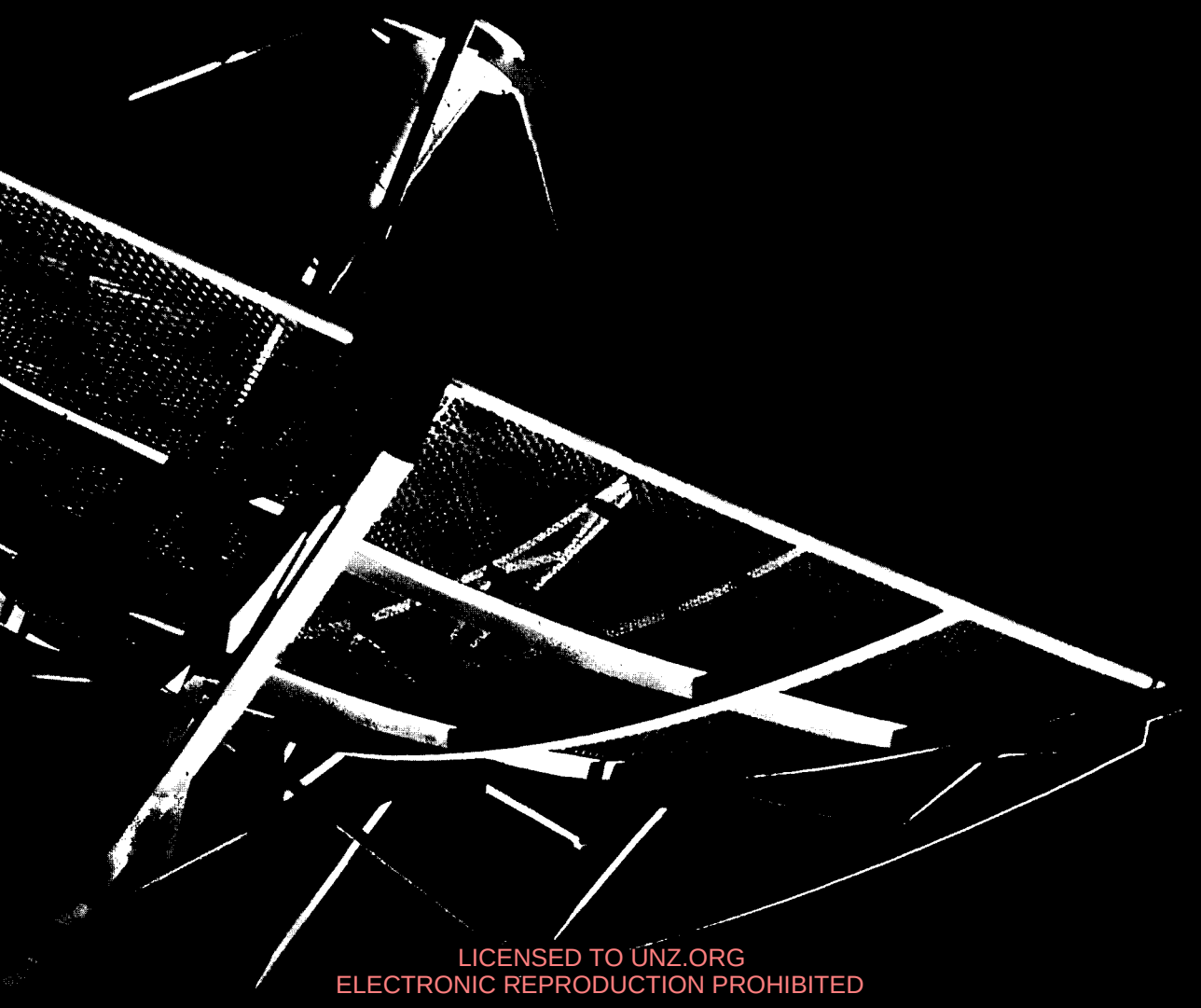

TRUM For Sale

By Lawrence J. White

The electromagnetic spectrum can't be seen, tasted, touched or smelled – though a few zillionaires like Craig McCaw, Ted Turner and Sumner Redstone apparently detected the faint scent of money some years ago. Nor is the spectrum high on most people's lists of pressing concerns. But its use will strongly influence the direction and impact of modern telecommunications technology – notably the "broadband revolution" of information dissemination and retrieval that has the potential to change (well, almost) everything.

Unfortunately, spectrum use is mired in layers of federal regulation, whose consequences sometimes make the former Soviet Union's Ministry of Agriculture and Pencil Erasers look like a paragon of efficiency and good sense. No doubt, you've already guessed that I think that spectrum policy is long overdue for fundamental reform. I have coined a new word – "propertyzing" – for what is needed: applying real-estate-like property rights to the spectrum.

SOME BASICS

The radio spectrum covers the range from 30 Hz (cycles per second) to 300 GHz (billion cycles per second). In essence, these are the "airwaves," which are used for an ever-expanding array of over-the-air communications, including radio and television broadcasting, cell phones, mobile radio, walkie-talkies, satellite communications, radar, microwave transmission of data and even such mundane

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electronic signals as the one that tells the garage door to open. While huge amounts of information will be carried by copper wire and glass fiber, a large part of the broadband revolution will be facilitated by over-the-air technologies.

Different frequencies of the spectrum have different characteristics that make them better or worse for various uses. For example, some are better at long-distance transmission through the atmosphere, others at penetrating solid structures.

Spectrum capacity is, in respects both subtle and unsubtle, limited; one person's use at a specific time, place and frequency can interfere with another's. Interference in the transmission of information also occurs from incidental spillovers and from extraneous sources like sunspots, lightning, poorly shielded electric motors and power transmission lines. The potential for interference is readily apparent to anyone who has ever had her garage door accidentally opened by someone else's CB radio or contended with static while driving under high voltage electricity lines.

When interference threatened the nascent broadcasting industry of the 1920s, Congress chose a Soviet-style central planning solution to the problem: the Feds would prevent interference by making all spectrum allocation decisions. President Coolidge – he of "the chief business of the American people is business" – signed the legislation.

Consequently, for the past 74 years the spectrum has been the "property" of the American public, with the federal government as its steward. Explicit private ownership claims to the spectrum do not exist. In their absence, the Federal Communications Commission is charged with managing the spectrum "in the public interest."

But there was a better solution then, which is as appropriate today as it was in 1927. To see why, consider the problematic history of government spectrum management.

HOW THE FEDS DO IT NOW

First, the FCC decides the use – say, broadcasting or cell phones or walkie-talkies – to which a range of frequencies will be assigned. Next, it sets the technical rules – transmitter power, location and the like. Then, it parcels out licenses to chunks of the defined spectrum that meet somebody's idea of the greater good. Finally, its engineers enforce the rules, mostly to minimize interference.

In the 1920s, this process was (arguably) tolerable because the practical uses of the spectrum were limited, the early users were genuine risk-takers investing their own capital, and the spectrum itself wasn't all that valuable. First-come, first-served was an acceptable method of assignment.

Since then, however, the stakes have escalated substantially. There were multiple applicants for new parcels of spectrum that an expanding economy interacting with innovative technologies made increasingly valuable. So, from the late 1920s until the late 1970s, if the FCC decided that, say, an additional AM radio station should be allowed to broadcast hog belly prices in Dubuque, the agency held comparative hearings ("beauty contests") to decide which party would best serve "the public interest" and thereby receive the FCC's free renewable license.

This process, already badly strained by the rise of television, collapsed of its own weight in the early 1980s, as the FCC prepared to assign licenses for cell phones. The agency was swamped with applicants and appealed to Congress to allow other allocation meth-

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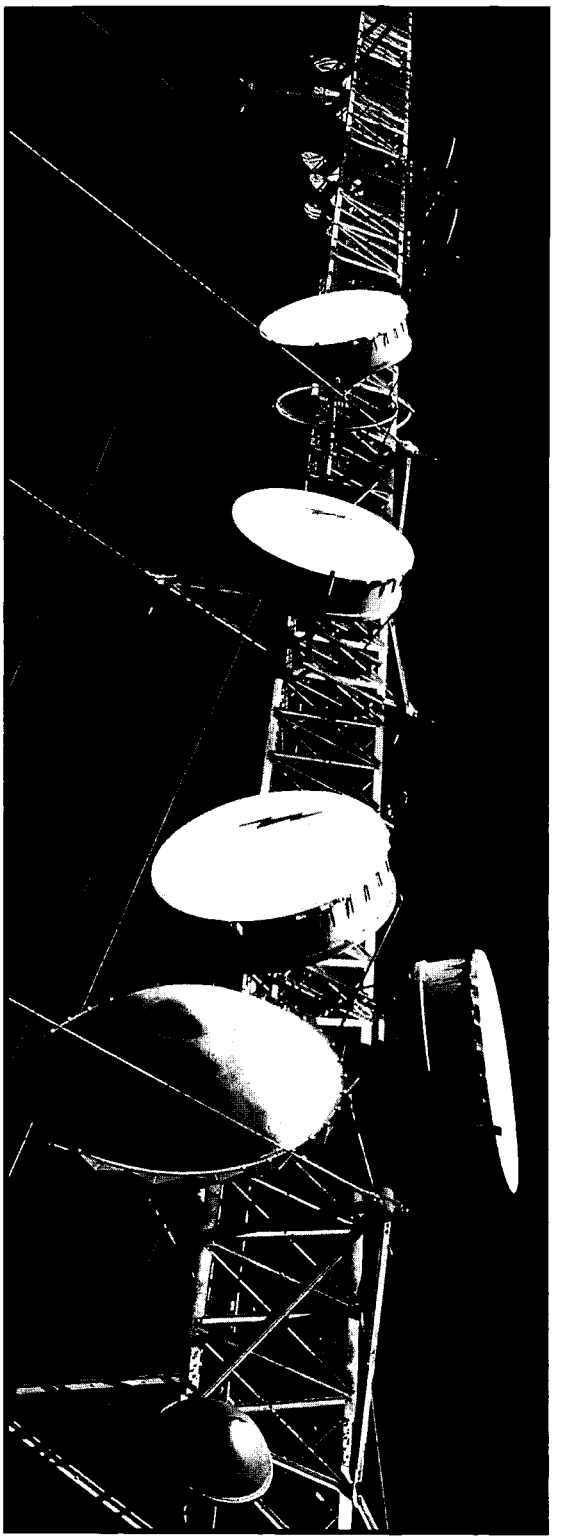
ods. Congress responded by authorizing lotteries for the free licenses, setting off a process that made the 1848 California gold rush look like a Victorian tea party.

The subsequent realization that the redistribution of property through the lottery was arbitrary (even more arbitrary than the FCC's comparative hearings) and that many winners were simply "flipping" their licenses for millions of dollars, led Congress to consider other alternatives. Auctions seemed a natural alternative, especially to economists, who had been suggesting this approach since the 1950s. But incumbent radio and TV broadcast license holders – those nice folks who so naturally deserve the free right to bombard the nation with ads for everything from Cadillacs to Cocoa Puffs – feared that auctions for new spectrum might someday be the precedent for auctioning their spectrum parcels and fiercely opposed the change.

Nevertheless, the transparent logic of selling valuable property, combined with the Congress's desperate need to raise revenue in the deficit-ridden 1990s, led the Congress to authorize auctions in 1993. As of February 2001, 32 auctions had been held, many of them for cell phone spectrum use, raising $42 billion in revenues. Despite some glitches – a few bidders couldn't come up with the cash – the auctions have been a success. Cell phone use has exploded; more than a third of total United States telephone "lines" today are cell phones. Yet despite the success of the auctions, they have affected only a small fraction of the useful spectrum.



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THE CONSEQUENCES OF MUDDLING THROUGH

Consider the sheer hubris of Congress's vision: For the entire geographical area of the United States and for the entire range of the spectrum, the Congress expects the FCC to

know exactly the right uses of the right bands of spectrum in the right places using the right technologies and by the right parties. Wait, there's more: As new technologies arise, the FCC will naturally recognize their worth and unerringly allocate, or even re-allocate, the right amount of spectrum to accommodate them. Of course, if Congress finds that the FCC does not have some of the pieces properly placed, our elected public servants will set things right in the blink of a lobbyist's eye.

To comprehend the challenge implicit here, imagine that private ownership of real estate were not permitted in the United States and that the entire land mass of the United States were subject to the decisions of a government commission as to the specific uses to which specific land parcels could be put, the technologies that could be used and who would be allowed to use the land rent-free, with indefinitely renewable leases.

As you awaken from that nightmare, consider the consequences of the conscious application of this "model," day after day by the Congress and regulators. All too often the FCC has discouraged competition, has favored incumbents over entrants and innovators, and has been slow to embrace new technology – all the while claiming that its decisions and actions were "in the public interest." Its decisions have sometimes taken years; court appeals have stretched them yet longer. Competing claimants have spent large sums trying to convince the FCC and the Congress of the wisdom of their positions. Indeed, a whole industry of lobbyists, forensic engineers and litigators stands ready to help.

The public has been the biggest loser. For example, in the name of encouraging local orientation for television in the early 1950s, the FCC assigned channels in a way that made it nearly impossible to form national networks beyond the three incumbents. In the 1960s and 1970s, again in the name of localism (really the protection of incumbent local television stations), the FCC impeded the expansion of cable television, which would have brought more programming. Then in the 1980s and 1990s the FCC and the Congress impeded the expansion of locally based ("wireless cable") and satellite-based ("direct broadcast satellite") alternatives to incumbent local cable companies.

The FCC delayed the initial rollout of cellular telephone service by 10 to 15 years and then licensed only two carriers per region. Further, the FCC insisted that one of the two carriers in the large metro areas (where the service was initiated in the early 1980s) be the incumbent wire-line telephone company, which reduced the competitive pressures that cell phones would bring to good old Ma Bell and her heirs. By a conservative estimate, this delay reduced national productivity by a cumulative $86 billion.

The FCC's national allocation patterns of spectrum for mobile radio uses have meant that forestry communications allocations have lain idle in New York City, while its allocation of spectrum for taxicab communications has been idle in Idaho. The agency has an unerring instinct for really knowing how to spread around the waste; a large swath of spectrum is assigned to the nation's public schools and has largely lain unused.

The FCC's management process, combined with the free licenses that have characterized most of the FCC's allocations and assignments, have (not surprisingly) yielded "shortages" of spectrum for current uses. (If Rolls-Royces were free, they, too, would be in short supply). It is now common for FCC officials to speak of a "spectrum drought." And, ironically, the FCC's mismanagement has created a second rationale for continued

government regulation: with the airwaves in such great demand, you obviously need really, really smart federal bureaucrats to figure out where and how to use it.

For First Amendment zealots, there's another downside to the FCC's allocations: the spectrum "shortage" provides a justification (unfortunately upheld by the Supreme Court) for the FCC and the Congress to impose content obligations on radio and television broadcasters that would be considered outrageous violations of the Bill of Rights if applied to print media.

Ironically, clumsiness or incompetence has not been a significant source of these policy errors and implementation gaffes. The FCC has been staffed by knowledgeable, hard-working individuals, and much of the leadership has been highly capable. But the tasks assigned by Congress, helped by its good friends in the telecommunications biz, are impossible to perform well. Gathering all of the necessary information, processing it and making the right decisions expeditiously – and then doing it again and again, as technology and economic conditions change – is simply not something that government is built to do.

The FCC delayed the initial rollout of cellular telephone service by 10 to 15 years.

A BETTER WAY

Real estate provides an instructive parallel. In principle, one person could easily "interfere" with another's use of real estate by trampling the grass or simply wandering around uninvited. Our system of property rights is so ingrained, however, that we naturally think of such "interference" as trespassing or burglary. As a consequence, such transgressions don't occur often. Occasionally, we may have to sue a neighbor to trim a spreading oak tree or call the police to deal with an intruder. But such exceptions only prove the efficacy of the rules.

Or think of pollution. Again, these are "interference" issues, usually exacerbated by multiple emitters, like cars, and multiple receptor households. Accordingly, enforcement of property rights to have clean air around one's home is more difficult. But reasonably effective legal and administrative mechanisms do exist to "internalize" the costs of interfering with other people's property.

More generally, with well-established property rights in real estate, owners can easily buy, sell, lease or rent and adapt to changing economic and technological conditions. It is a market-based system that few – Proudhon is long gone, after all – would want to change.

PROPERTY RIGHTS IN SPECTRUM – A FRESH START

Imagine the following "clean slate" regime:

The property right (in perpetuity) would be expressed as the right to transmit over a specified spectrum band, so long as the signals do not exceed a specified strength beyond specified geographic boundaries during a specified time period. As part of that property right, owners would have the right to be free from interference from "adjacent" spectrum. Owners, including government agencies, would be free to subdivide, buy, sell or rent parcels to create aggregations over geographic areas, spectrum bands or time periods, so long as their actions were consistent

with the other laws that affect business transactions, like the antitrust laws.

Owners would also have the right not to use their parcels, as is true for owners of real estate. Nonuse might make sense if, for example, spectrum use requires investment in complementary facilities and the owner expects that technological change or uncertainty about technological standards could render current investments obsolete.

An interim "expert" agency would be necessary for configuring the initial set of property parcels, which would then be auctioned. Even if the expert agency's initial configurations weren't ideal, the winning bidders could subsequently buy and sell in order to reconfigure their parcels. As new technologies opened new possibilities and as economic demands for spectrum changed, owners would be free to reconfigure – presumably with the help of brokers who would make markets in spectrum.

A claim that another transmitter was interfering with transmission rights of a parcel holder could be addressed through negotiations or through the courts. In light of the technical aspects of the issues, there might even be a role for specialized government arbitration. If the numbers of interferers or encroached-upon parcel holders were large enough that private enforcement through negotiation or the courts was too burdensome, alternative mechanisms – government enforcement of the private transmission rights, administrative methods for dealing with "polluting" transmissions from multiple incidental sources (like high voltage lines or car motors), perhaps even "zoning" of bands or areas – might evolve.

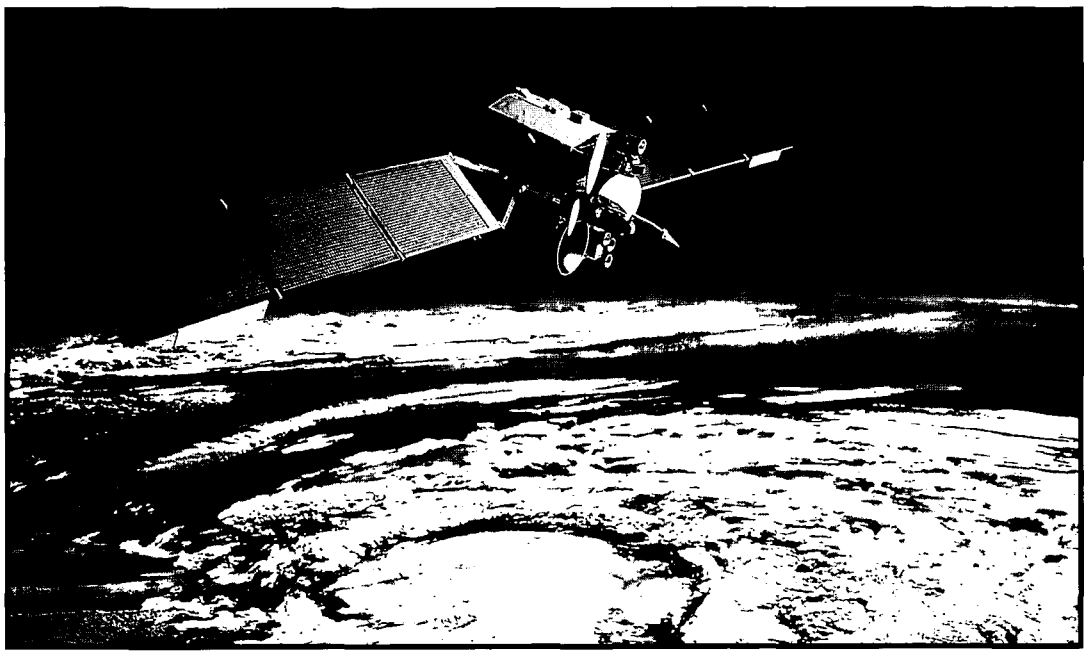
Government agencies could bid for and become owners of spectrum, just as they currently own real estate. Current public uses of spectrum – public radio and TV broadcasting, defense and public safety communications, emergency communications channels, open forum ("citizen's band") channels, radio astronomy – could continue, so long as taxpayers found these uses sufficiently valuable that they were willing to pay, just as they now pay for schools, parks, emergency safety services and the like.

HOW TO GET FROM HERE TO THERE

Imposing this clean-slate structure from scratch would be politically impossible. There are tens of thousands of incumbent holders of FCC-issued licenses. Despite the formal absence of private property rights in spectrum, virtually all license holders treat their licenses as property. Indeed, many bought their licenses indirectly by purchasing companies that already owned licenses. Hundreds of billions of dollars of investments in facilities, equipment, personnel and brand-name reputation are intertwined with those licenses.

But we could accept the reality of what started as an arbitrary property distribution and then build on it in the name of the greater good of economic efficiency. The FCC's licenses constitute a set of de facto properties, with protections against interference. Unfortunately, the licenses are often defined in terms of inputs (the power of a transmitter, the height of the transmitting tower) rather than in terms of a signal's strength beyond a territory perimeter. Nevertheless, these licenses could simply be assigned in perpetuity, as is, to their incumbent holders, with the existing protections against interference.

The owners of these licenses could then subdivide, sell or rent their parcels. Further, they could adjust their input combinations so long as they did not violate interference restrictions, or they could negotiate arrangements with transmission "neighbors." These



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adjustments would transform the input-based license system into a beyond-boundary signal-strength limit system of true property. The FCC could hasten this process by redefining the input-oriented licenses into roughly equivalent output-oriented licenses. After the transition period, disputes would be referred to the courts rather than to the FCC, and the FCC would transform itself into a "pollution (read: interference) control" agency, with economic efficiency as its goal.

Government agencies would receive the same property rights to their current spectrum licenses. But Congress could insist that the agencies realistically evaluate their needs and auction the surplus. The government currently holds a claim on about a third of the (currently) usable spectrum, which is substantially in excess of what's justified. The Congress partially succeeded in the late 20th century in legislating disposals of surplus military real estate. With fewer jobs at stake it might well have an easier time disposing of surplus spectrum in the early 21st. The market prices for spectrum that emerged would provide a valuable benchmark for the Congress and spur disposal decisions.

Some additional (modest) intervention – a national registry for spectrum ownership – would help buyers and sellers identify potential counterparties and help property owners identify sources of interference. (Surprisingly, despite the FCC's stewardship model, it does not maintain a roster of all licensees.)

THE BENEFITS

In a property rights regime, the owners of spectrum could flexibly adapt their uses – for broadcasting, telephone, data transmission, mobile radio and any new uses that might arise – to new technologies and new economic demands. A spectrum "drought" would be impossible; markets would clear through price rather than government fiat. The scarcity justification for the First Amendment restrictions on broadcasting would vanish.

Of course, entrepreneurs would make some mistakes. But any objective reading of the FCC's seven-decade stewardship of the spectrum suggests that markets could hardly

do worse. For one thing, markets for spectrum would be far less likely to discourage innovation than a system where incumbency and stasis were intertwined.

With the FCC (and the Congress) removed from the processes of spectrum allocation and assignment, radio and television over-the-air broadcasting, cable transmission, local microwave (wireless cable) transmission and satellite-based transmission would be unleashed to compete. Similarly, cellular telephone and other mobile communication services would be freed from regulatory shackles; an even greater cornucopia of competitive innovations would surely follow.

THE DOWNSIDE?

Objection 1: With spectrum as private property, the "public interest" would no longer be served and public uses of the spectrum would be eliminated.

The "public interest" is a vague, ill-defined concept. Under the "public interest" banner the Congress and the FCC have established far too many protectionist, anticompetitive, anti-innovative, inflexible, output-limiting regulatory regimes and have unnecessarily infringed on the First Amendment rights of broadcasters. Governments would still have the ability to own and use spectrum in ways that taxpayers felt were worthwhile, including national defense, public safety and public broadcasting in the same way (and subject to the same constraints) that public agencies can own and use other forms of property.

Objection 2: The scheme would mean a giveaway of a vast, valuable national resource.

This barn door has been open too long to care; it is unrealistic to believe that incumbent holders of licenses could be induced to give them back. This is especially true since many spectrum licenses have already turned over in private markets for gigabucks.

Auctions of relatively vacant spectrum could still yield revenue. But the myth that the spectrum is still effectively owned and controlled by the federal government is just that: a myth. It is possible, however – though far from certain – that more efficient use of a fully propertyzed spectrum could yield some tax revenue.

Objection 3: Under a property rights system, only the wealthy would own and use the spectrum.

The current holders of FCC licenses – including large corporations like GE (NBC), Viacom (CBS), Disney (ABC), Sprint, Verizon and SBC – are not exactly the meek and the poor. The FCC stewardship and licensing system has in fact meant severe limitations on general access to spectrum use, and the limitations have favored rich individuals and sizable companies.

By contrast, a system of spectrum property rights would look more like real estate; smaller units of spectrum would be available to anyone who could pay the market price. Though spectrum ownership would surely mimic the unequal distribution found for other kinds of property, a property rights system would mean some democratization of this valuable resource.

Objection 4: Large corporations would buy large blocks of spectrum and acquire monopoly positions in telecommunications.

The antitrust laws, including prohibitions on mergers that create or enhance market power, would apply to spectrum markets, just as they apply to most other markets in the United States.

Objection 5: Since the spectrum is finite and scarce, government management and allocation is necessary.

Virtually all useful resources are scarce. The United States economy is organized

around the general principle that private ownership and decision-making with respect to resources yields the best outcomes. Spectrum is fundamentally no different.

The past policies of the Congress and the FCC have meant that zero prices have been charged for the licenses to use the valuable spectrum resources. It is not surprising that there are "shortages" or "droughts" of spectrum at zero price. But these false shortages, created by misguided policies, aren't a justification for continuing those policies.

Objection 6: The interference problems of spectrum use can be solved only through government management of the spectrum.

This is semantics. Government would still play a secondary role, through individuals' use of the courts to enforce their property rights. Government would also play a role in dealing with more widespread "pollution control" and "zoning" issues as they might apply to spectrum – albeit a far more limited role that would be guided by efficiency and benefit-cost principles. If the government can prevent somebody from building a slaughterhouse next to the Plaza Hotel in New York, it can also enforce efficiency-based rules on private spectrum use.

Objection 7: Since spectrum uses extend across national boundaries, government management of spectrum is necessary to achieve coordination and harmonization.

Much spectrum use involves local transmissions that have minimal consequences across national boundaries. For those spectrum uses that could have international consequences, some international coordination is needed to minimize interference problems. But that coordination does not require Uncle Sam to dictate use.

Objection 8: Since the FCC is already auctioning spectrum and easing restrictions on its use, further action is unnecessary.

Though the auctions and eased restrictions of the 1990s were welcome improvements, the changes have applied to only a small fraction of the usable spectrum. The remainder is still encumbered within the FCC's "public interest" regulatory regime. And even for the slivers of spectrum that have been auctioned, use and service restrictions still apply; a full system of property rights is not in place.

ANYONE FOR PIE IN THE SKY?

Plainly, any change in a decades-old public policy that affects every American in some way and some influential Americans in very big ways would be hard to change. But converting the now-uncertain rights of current de facto spectrum owners into real property rights could change the political equation. If – and this is a big "if" – a wider constituency could be convinced that the productivity gains associated with more efficient use of spectrum were large enough to offer widespread benefits reasonably rapidly, change might be possible.

So, how do we get from here to there? For the short run, a major ingredient of the recipe is clear: auctions, auctions, auctions. In addition, the FCC should do everything that it can do endow spectrum parcels with flexibility, fungibility and transferability. If we are lucky, enough stakeholders will see the advantages of – or at least not resist – a more competitive propertyzed spectrum. For the longer run, Congressional action will be needed to bless this brave new world of property rights in spectrum.

One thing is clear, though: Unless our society finds ways to adapt and allocate spectrum flexibly and continuously to the new realities of technology, the rapid technological progress in telecommunications that we have recently taken for granted will be at risk.

The Economics of Wolf

By Erwin A. Blackstone, Simon Hakim and Uriel Spiegel

At then-President Clinton's behest, Congress appropriated funds to hire an extra 100,000 police officers. But one might ask whether the money was well spent; the police provide many services, like response to burglar alarms, that on first glance seem public but are really private in nature. If the police could shed the nuisance of responding to false alarms, some 35,000 officers could be freed to chase alleged perpetrators.

Nearly a half century ago, Paul Samuelson elaborated on the idea of goods and services that would not be created in optimal quantities by free markets – for example, national defense. Without government to force all to share the cost, each person would have a strong motive to become a "free rider" who got to hide behind all those Abrams tanks, F-14 Tomcats and Patriot missiles free of charge.

Another Nobel Prize winner, James Buchanan, elaborated on Samuelson's idea by defining a "club good," a narrower sort of public good. For pure public goods, the size of the consuming group is the entire society. In the case of a club good, the group is smaller and the value of the good to individuals declines with the size of the population