Partenia is a lonely place. Strewn across the sands of the Sahara, it is formally located in Tunisia, or Algeria, or Libya, depending on to whom you talk or which way the winds are blowing. It is an ancient place, Partenia, a remnant of a world that hardly anyone can even remember. Yet in a very strange way Partenia is coming back.

In 1995, the Vatican dismissed an outspoken French bishop named Jacques Gaillot. Arguing that Gaillot had been far too liberal for the Church’s doctrine, Vatican officials removed him from his diocese outside Paris and sent him to Partenia. Clearly it was a symbolic move, for the Church never expected Gaillot to preach to the empty drifts of the Sahara. They simply wanted to defrock him gently, pushing the unruly bishop to one of the several jurisdictions reserved for retired, aging, or unwanted
priests. Gaillot, however, wasn’t prepared to go quietly, or to renounce the liberal views that had angered his superiors in Rome. So he went to Partenia—virtually.

One year after his dismissal, Gaillot launched the world’s first “virtual diocese.” Named Partenia, it is a site for liberal Catholics, a “place of freedom,” according to Gaillot, where Catholics can discuss the issues that Gaillot had come to stand for: the problem of homelessness, the spread of AIDS, the evils of nuclear testing, and the wisdom of married priests. In the first six weeks of 1996, Partenia registered 250,000 hits. The Vatican, presumably, was not impressed with Gaillot’s move and spent a good deal of time trying to concoct a strategy for dealing with this unsettling cyber-priest. But there really wasn’t much that they could do, so they left Gaillot and his liberal site alone. Partenia had won.

In cyberspace, Partenia is everywhere. Dotted along the Internet’s web are millions of places where rebels like Bishop Gaillot reside. There are pornography sites accessible to straitlaced Singaporeans, Liberian gambling dens, and secluded banking services run from the tiny island of Anguilla. There are networks of Burmese dissidents, collecting information on the dictatorial regime in Rangoon and e-mailing it to thousands of supporters around the world. There are bootleg copies of academic papers and Snoop Doggy Dogg’s latest hits. In cyberspace, even solemn corporations indulge their rebel side, slipping around the real-world laws that govern things such as export controls and truth in advertising.

If we look at cyberspace from the viewpoint of Partenia, then, it looks very much like a frontier town—like California of the 1890s, or the Indies to which Europe scrambled in the seventeenth century. There are the usual hordes of rebels and rogues, plus scores of pioneers and gold-diggers, each scrambling to carve out new territories and stake their claims in them. There are people like Marc Andreessen and Jerry Yang (the respective founders of Netscape and Yahoo!), who ventured west to test their mettle and made incredible fortunes virtually overnight. There are prophets who scream of a brave new world and traveling salesmen hawking IPOs instead of snake oil. (The connection, of course, may not be that distant.) As on any good frontier, there are not a lot of rules or marshals in town, so justice is rough and the winners grab whatever they can. There are, to be sure, some remote authorities (the U.S. Federal Communications Commission, the European Commission’s DG IV) who claim to be patrolling the area, but everyone knows that their guns are not loaded. For cyberspace, it seems, is a lawless realm, a place where unruly bishops can confound the Pope and Jerry Yang can start a multibillion-dollar industry before turning thirty.

This sense of anarchy permeates the farthest reaches of the Net. In Silicon Valley, along Route 128, and in the samisdat cafes of Beijing and Rangoon, there is a palpable sense of excitement, a prevailing belief that authority is dead and that digital technologies have killed it. And to some extent this is true. Digital technologies have created a revolution of sorts. They have allowed entrepreneurs to build empires out of fiber and thin air and to establish these empires in a realm without rules. They have challenged governments and their traditional authority—not by design or intent, but purely as a result of technological accident. Because digital technologies allow information to flow seamlessly and invisibly across national borders, they make it very difficult for governments to do many of the things to which they have grown accustomed. Governments can’t patrol their physical territories in cyberspace; they can’t easily enforce property rights over ephemeral ideas and rapidly moving bits; they can’t control information flows; they even may not be able to collect taxes. Such is the nature of politics along the technological frontier.

Yet even in the midst of all this tumult, it is useful to maintain a sense of perspective, and of history. Cyberspace is indeed a brave new world, but it’s not the only new world. There have been other moments in time that undoubtedly felt very much like the present era, other moments when technology raced faster than governments and called forth whole new markets and social structures. Other entrepreneurs sensed that they, too, were standing on the edge of history, bending authority to their will and reaping fabulous profits along the way. Some of them
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succeeded beyond their wildest dreams. Pioneers such as
Thomas Edison and Guglielmo Marconi, for example, saw the
fantastic opportunity of technology and ran nimbly along its
curve. They built empires where none existed and wrote rules
to serve their own advantage. Other pioneers, however, were far
less successful. Even if they had path-breaking technology, and
even if they flourished for some time in a period of blissful
chaos, many entrepreneurs eventually found themselves caught
by a system that bit back—by markets that reassessed their old
ways or governments that outraced the technological frontier
and claimed it for themselves. The new world in these cases fell
back into the old, leaving the pioneers stranded on what once
seemed to be the future.

This is a book that tries to yank the Internet out of the spot-
light of the twenty-first century and back to its older and dim-
mer roots. It argues that while cyberspace is new and sparkling
with opportunity, it is not that new and that much sparklier
than other technologies were on the eve of their creation. We are
undeniably living in a revolutionary period. We see this revolu-
tion every day and feel it crack the structures of our lives. We
see it in the rush toward Silicon Valley; in the euphoria that
drove Internet stocks to unbelievable heights; in the intrusion of
e-mail and surfing and “dot.com” everything. At a more pro-
found level, it is also clear that this revolution will seriously af-
fect both business and politics. It will open vast new vistas for
commerce and, in the process, will challenge relations between
private firms and the governments that seek to regulate them.
The information revolution is alive and well. It will change the
way we work, they way we play, and the way in which we order
our societies. It will change in particular how we think about
governments, because cyberspace is a realm that seems inher-
ently to ignore traditional authorities. Cyberspace, in fact, is a
truly global phenomenon, something that spans borders irre-
pressibly and imperceptibly. Purely by accident, the Net shat-
ters our notions of what a “state” does or what a “national
economy” is. For cyberspace is bigger than any state and well
beyond traditional powers of enforcement. What can the Pope
do if Bishop Gaillot uses his site to condemn celibacy in the
priesthood and encourage the use of condoms? Not much. How

can Singapore stop its citizens from pecking at Hustler on their
laptops? Or the U.S. government prevent American firms from
using high-powered software in their overseas affiliates?
Again, they essentially can’t. Silently, cyberspace challenges the
power of government by going where it, by definition, cannot:
across national borders.

Theoretically, this shift in geography should be a tremen-
dous boon to firms, just as it is a rather terrifying prospect for
states. Freed from governmental control, firms in cyberspace
should be able to operate freely and without rules. They should
be able to write their own terms and strike their own deals with-
out having to pay any heed to bureaucratic whim or regulation.
This, after all, is the political thrill of the Net. Yet this is also
where history suggests a certain amount of prudence. Other
technologies have challenged government’s authority; other pi-
oneers have gleefully declared the death of the state. What their
stories show us, though, is that while technology can gravely
wound governments, it rarely kills them. Instead, governments
survive because, ironically, both society and entrepreneurs want
them. Governments provide the property rights that entrepre-
neurs eventually want, the legal stability that commerce craves,
and the stability that society demands. For in the end, even
pirates and pioneers want order. Once they have staked their
claim or claimed their loot, they want someone else to protect
it. And that someone else is usually the state.

Consider what happened during the first round of the Infor-
mation Revolution. Up until the fifteenth century, information
was a highly guarded, tightly controlled commodity. The Cath-
ocian Church, which essentially performed a quasi-governmental
function at that time, sat at the center of all information flows.
Only priests and a handful of scholars could read; only monks
were permitted to write and copy the manuscripts that formed
the backbone of knowledge in the Middle Ages. All informa-
tion then was written (aside, of course, from knowledge passed
through the oral tradition) and the Church controlled the writ-
ning process. Indeed, one of the major tasks of the Catholic
Church during this period was to act as a kind of labor-intensive,
multinational publishing operation. Across Europe, monks spent
their lives huddled over exquisite manuscripts, painstakingly

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redrawing each letter, each sketch of just a few texts. The technology of the period was pen and parchment, and it survived for hundreds of years.

And then a young silversmith named Johannes Gutenberg came along. In 1450, after years of tinkering with typography and dies cast from various minerals, Gutenberg devised a rudimentary printing press. The technology was rather straightforward: blocks etched with different letters were simply inserted into a shallow box, inked, and then pressed against sheets of paper to leave a written imprint. But the implications wreaked slow-boiling havoc on Europe’s established social order. Initially, the Church welcomed Gutenberg’s machine, describing it as a supernatural invention that would enable priests to read more easily to their congregations. As the medium spread, though, the Church grew wary, seeing in moveable type the makings of a revolution. The more Bibles were printed, the more people wanted to read them and to interpret the Church’s doctrine for themselves. The more access people had to printing technologies, the more freedom they had to challenge the Church and to break its monopoly on priestly information. Thus the technology—a simple mix of ink and metal—became political. It created a space in which rebels could play and ignored the structure of existing rules.

Before too long this radical potential erupted. In 1517 a young German priest named Martin Luther used a Gutenberg-type press to publish copies of his “95 Theses,” a list of arguments that directly challenged the Church and its practices. By themselves, the theses were not really all that radical; for centuries, disgruntled clerics had made similar arguments and compiled similar lists. But Luther had technology on his side. Rather than staying tucked to the door of a single local church, Luther’s theses circulated widely around Europe, creating excitement just by virtue of their circulation and the renown that soon accompanied them. They stirred a priestly buzz, to be sure, but a buzz all the same. And the implications were dramatic. Luther’s theses let loose the Reformation and the rise of Protestantism, the first sustained crack in Catholicism’s religious control of Europe. Simultaneously, the expansion of printing technology made it easier and easier for laypersons to read, and thus to challenge the vested authority of the Church’s priestly elite. By 1534, when King Henry VIII declared Catholicism illegal in Great Britain and made his subjects members of the newly created Church of England, the Catholic Church had been dealt a formidable blow. Printing technologies didn’t cause this shift of power, of course, but they certainly facilitated it. Without Gutenberg, Luther would have remained a local hero—a thorn in the side of the Church, perhaps, but not the founder of an entirely separate structure. This, again, is the nature of power along the technological frontier.

But even Luther’s victory was not complete. Technology challenged the Church, forcing it to change in some ways, but it certainly did not kill it. On the contrary, once Vatican officials realized the power of printing, they scrambled to use it for their own purposes. They established Catholic publishing houses to foster a Counter-Reformation, circulated the Bible and other key texts, and learned how to reach out to a growing mass of literate followers. While they undeniably lost the informal monopoly over printing that the monks had provided, they managed to control key forms of information and the power that accompanied them. Rules changed, and power shifted, but the patterns that had dominated before Gutenberg’s time remained solidly in place.

An equally striking dynamic surrounded the development of radio, another major stage in the information revolution. In 1896, Italian inventor Guglielmo Marconi brought a small black box with him to Britain. It was an early prototype for a radio: a makeshift device that transmitted Morse code via electromagnetic waves. As soon as he crossed the border, customs officials smashed the box to pieces, fearing that it would inspire violence and revolution. So Marconi went home and continued to work on his invention, eventually creating a firm designed to develop the radio for commercial use. Before long, though, the government reappeared and declared a security interest in Marconi’s device. By the start of the first World War, the Marconi Company had become a full-time contractor for the British government and the British Navy controlled the fledgling technology of radio transmission.

If we apply the patterns of printing and radio to today’s information revolution, they imply an outcome strangely at odds with the view from Partenia. They suggest that there is a certain
give-and-take along the technological frontier, a dance of regulation that moves power back and forth between firms and governments, between pioneers and bureaucrats. In this view, even the most radical technology will not necessarily force any particular authority to disappear, or even to change its fundamental mission. Instead, technology challenges authority for some period of time, but then, ironically, seems to invite this authority back in: the Church embraced the printing press in the end, the British government absorbed the company it once saw as dangerous. Perhaps the Internet is different. Perhaps it is so revolutionary, so international that it will disrupt the patterns that have prevailed in the past and dispel the myths we have built around them. Perhaps it really will deal governments a fatal blow and usher in new forms of social organization. Perhaps the future of power will be a world of Gaillots and cybercafes, circles of communication or commerce without any central authority. But perhaps not. Certainly history suggests that we have been here before and come out largely where we started. Without new rules, to be sure, and new forms of commerce, but still with a basic structure of authority and a recognizable state.

If we view cyberspace from history, therefore, rather than from Partenia, we see a more complex vision. Instead of a one-way scramble to a brave new world, it is a journey of twists and turns, a movement along a frontier whose boundaries shift and stumble and collide. It is a view filled with the normal characters of a frontier town: there are still the pirates and the pioneers, the tinkerers and the traveling salesmen. Only in this view, the pirates and the pioneers aren't necessarily the winners. Instead, once the technological frontier has moved beyond a certain point, power—and profits—seem to shift away from those who break the rules and back to those who make them.

Ruling the Waves is essentially a book of frontier stories. It begins with Portuguese explorers of the fifteenth century, follows the development of telegraph and radio in the middle of the nineteenth century, and then turns to the advent of satellite television and the Internet in the twentieth. Part of the book's intent is simply to tell these stories, for they are fascinating in their own right and little known outside of academic enclaves. The broader intent, though, is to use these stories to link current developments along the technological frontier back to their rightful ancestors: to show how Rupert Murdoch and Bill Gates are descended in many ways from Prince Henry and Samuel Morse, and to think about what Murdoch and Gates might be able to learn from these older pioneers.

The stories that are presented here were not chosen with scientific precision. Indeed there are dozens of other technologies and hundreds of other pioneers whose stories are just as intriguing and important: Edison and electricity, Bell and telephones, Watt and the steam engine. There are also dramatic developments outside the western world—particularly in China and the Islamic states—that fell beyond the research scope of this book. All the stories that are here, however, contain some common themes and parallels. All involve, for example, a sharp movement along the technological frontier—a moment in time when innovation leapt suddenly outward, creating new opportunities for commerce and tremendous enthusiasm among aspiring entrepreneurs. In each case, moreover, the technological leap also created a political gap. Innovation, in other words, enabled firms to play in some new sphere of activity, free from the rules or regulations that might bind them in another, more established realm. Finally, all of the stories presented here are about a particular type of technology. They are all about communication, about bringing information from one spot to another. There is nothing unique about these technologies, of course, and the patterns that emerge here might well apply across the technological spectrum. But communications technologies have a certain force to them, and a particular import. For communication is the sinew of both commerce and politics, the channel through which information—and thus power—flows. Ever since God warned Eve to resist the apple, authorities have tried to control information flows. And ever since Eve took that first bite, pioneers have resisted these controls and tried to find ways around them. This is a book about their stories—about life on the technological frontier and the pirates, prophets, and pioneers who struggle to build their empires upon it.

This is also a book about ideas. In particular, it is a book about how markets get established and how firms and governments together shape their creation. Frequently, the worlds
of business and politics are described as belonging to wholly different spheres. There is business on one side, following the laws of the market and the dictates of competition, and government on the other, pulled by the demands of power and the desire to maintain it. This book takes a very different tack. Business, I argue, is inherently political and politics is—and has always been—marked by the interests of commerce. This overlap is everywhere: in trade policy, defense policy, and the politics of procurement or privatization. But it is particularly strong along the edges of the technological frontier. For it is here that markets are actually created, where industries spring to life and then settle, eventually, into some kind of ordered existence. As this process unwinds, power is distributed and structures are established. It is a hugely political enterprise, even if governments are not actively calling the shots or regulating commercial activity.

In fact, it is precisely the lack of established regulation that makes the technological frontier so political. In order for commerce to grow in any uncharted territory there need to be rules. Not regulation necessarily, or even governments—just rules. There need to be property rights, for example, and some sense of contracts. In higher technology areas, there need to be rules for intellectual property (who owns the operating system? under what terms?) and provisions for standardization (how do different products work together? which technical platform becomes the norm?). Without these rules, commerce may still emerge, but it will not flourish. There may be bursts of commercial activity and a handful of pioneers who cherish life on the edge, but wide-scale commerce will remain elusive. This is a powerful lesson of history and a tragedy that still affects large swaths of the global economy. Without rules, and particularly without rules of property and exchange, markets simply do not grow. Just look at Russia in the 1990s, or some of Africa's more chaotic regions. A similar dynamic prevails along the technological frontier. New markets need new rules if they are to flourish, and their creation is a distinctly political act.

This connection between politics and business, rules and markets, unwinds slowly along the technological frontier. At any particular point in time, it is difficult to see how politics is shaping markets, or why entrepreneurs might want to do anything other than expand their empires and push technology's edge. Which is why history is so critical. It provides a sense of perspective that can't possibly exist in the present; it displays patterns that can appear only once the dust of the frontier has settled and the pioneers have moved on. And these patterns are strong. Indeed, it appears from the stories presented here that life along the technological frontier moves through four distinct phases: innovation, commercialization, creative anarchy, and rules. Each has its own rhythm and speed, a movement that shifts with the tenor of the times and the nature of technological change. Yet there are clearly patterns and lessons to be drawn from them.

Phase One: Innovation

In the beginning, of course, there is innovation. This is the stage of tinkerers and inventors, a stage marked by laborious exploration and the sudden thrill of discovery. It is the sexiest phase along the technological frontier, a time that sparks the imagination and provides motivation for the next generation of dreamers and planners. It is not a phase in which lots of commerce occurs. Instead, most of the excitement that surrounds a technology during its earliest days is from fellow enthusiasts—people who treasure innovation simply for what it does, rather than for any commercial potential. Others tend to ignore technological breakthroughs or even disdain them. Telegraphy, for example, was derided for years as a worthless game, a newfangled obsession with invisible communication. When Samuel Morse demonstrated his machine before Congress in 1838, people just laughed, comparing the contraption to mesmerism or "animal magnetism." Likewise, when the radio arrived at the turn of the twentieth century, most people saw it as a hopelessly complex machine, good, perhaps, for military functions but without any broader appeal. Early users of radio were almost entirely amateur mechanics, people who were much more interested in the workings of the set than in anything that might be transmitted across it. Even the Internet was distinctly noncommercial at the outset. It was a security tool, a means of communication among a small and specialized
group. But a mass market? An instrument of commercial revolution? No one saw it coming.

During this first phase, there are no rules because none are needed: innovation hasn’t developed to the point where property rights are critical; there are no questions yet of access or unfair competition; and the societal impact of the new technology is minimal. Indeed, because the technology is still so experimental at this stage and confined to such a small group of users, there simply will not be many people outside this community who either understand the technology or have any concerns about its use. Even if concerns do arise, moreover—if, say, military officials suspect that the new technology has incendiary implications—then governments can generally still rein things in at this stage, imposing or establishing rules before a commercial market has had time to develop. Such was the case with television, which emerged out of radio technologies in the early twentieth century and was instantly besieged by governments wary of its social intent.

So long as governments do not suspect the potential for subversion, though, the innovation phase remains relatively free, open, and uncluttered. The scientists labor in their labs, the tinkerers work in their basements or garages, and innovation occurs. It’s the most important phase of the technological frontier but also in many ways the most peaceful. It often ends abruptly.

**Phase Two: Commercialization**

Once technology is out of the labs and in the public eye, a whole new cast of characters moves onto the frontier. These are the characters usually associated with the frontier: the pioneers, the pirates, the marshals, and the outlaws. They are the ones who define the new territory and bring it to life. In this second phase, the commercial benefits of innovation have become clear. People can now see how the technology will transfer to a mass market and what kinds of profits can be made from it. When the technology is truly revolutionary, they can also see how it carves out new spheres of commerce, spheres that exist beyond the realm of existing markets and beyond the reach of existing authorities. This potential ignites the frontier and draws more people toward it. And thus the familiar scramble ensues. Tempted by the dual visions of anarchy and wealth, entrepreneurs of all sorts rush onto the frontier to stake their claims. Speed is essential during this phase, as is a certain ability to see beyond the confines of established business practice. Not surprisingly, then, most of the pioneers who rush along the technological frontier are young: Marconi was twenty when he brought his black box to London; Marc Andreessen was twenty-three when he founded Netscape. These are the entrepreneurs who can see the opportunity that technology creates and are eager to build their own empires upon it. They also tend to be free spirits, individuals who delight in building their own worlds and operating by their own rules. Their interests during this early phase are largely territorial. Like all pioneers, they want to grab land, to stake a claim and call it their own, even if the property rights to this land are not yet fully secure and the commercial prospects are uncertain.

Pioneers, though, are not the only free spirits who move out to the frontier. Pirates come too, following naturally in the footsteps of the pioneers and often blending in easily with them. In the seventeenth century, pirates mingled indistinguishably with merchants, trailing ships across the Atlantic and strangling the trade that technological advances in navigation had created. In the nineteenth century, pirates plagued the nascent telegraph industry, “borrowing” patented technology to create their own competing systems. And in our own times, pirates wielding satellite dishes and smart cards have invaded the waves of the digital age, stealing television signals from the skies and encryption codes from the Net. Like their predecessors in the Caribbean, these pirates have a certain romance to them. They are rebels who delight in flouting society’s rules: when they hang, they hang proudly.

The funny thing about pirates, though, is that they seem to adhere to a certain historical rhythm. When technology is new, it doesn’t attract too many rogues. It’s simply too technical in the first phase of evolution, too specialized and uncertain. Once technology slips into the commercial realm, however, and begins to generate the extraordinary profits that can occur during
this second phase of expansion, the pirates flock. They follow the pioneers along the technological frontier, shadowing their gains and borrowing their technology. Because rules during this period are inherently ill defined, pirates can operate almost without restriction. If there are no rules, after all, no one can break them. This was the case during the heyday of ocean piracy, when states such as Britain and Spain simply were not able to draw any kind of workable distinction between pirates, privateers, merchants, and admirals. It is also the case today. How are we to define the teenager who downloads her favorite party music from an Internet site and sells copies to her friends? Is she a pirate of the digital age, or an aspiring entrepreneur? What about people such as Philip Zimmermann, the mathematician who created one of the world’s most sophisticated encryption algorithms and posted it on his web site? Is he a mathematical genius trying to share his knowledge, or a renegade intent on violating the security of the United States? It’s hard to tell. During these times of technological flux, the rules are just too flimsy.

What accounts for this flimsiness is the ability of new technologies to slip through the lines of existing law. It’s not that governments lack the interest or wherewithal to govern new areas of technology; rather it’s just that the old laws are unlikely to cover emerging technologies and new ones take time to create—time that, initially at least, seems to favor the pirates and pioneers. For even as governments begin to understand the implications of telegraphy or hypertext, pioneers such as Morse or Andreessen are already forging ahead, grabbing territory and creating industrial structures. Unless governments manage to nip technology in the bud of innovation (as occurred with television), it’s very difficult for them to control this same technology once it has entered the expansionary period. Things are simply moving too quickly, and entrepreneurs are consciously trying to avoid the long arm of regulation. Then, as these entrepreneurs get wealthier, they have more at stake in this new realm and more resources available to protect themselves. So when the marshals show up, the entrepreneurs tend to outrun them, or outgun them, or simply ignore their protestations. When Rupert Murdoch began satellite broadcasts into the British market, for instance, the British gov-

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government really could not do much to stop him since he was operating, quite literally, above their heads. Likewise, there are many aspects of the Internet economy that, at the turn of this century at least, remain far beyond the reach of any national government, such as content that streams in from foreign sources and information that hides under disguised names and slips across invisible borders. In this phase of technological development, therefore, the politics of the frontier are decidedly libertarian. Markets take over, individuals steer their own fate and governments retreat. It is a period of wild expansion and even wilder expectations, of instant fortunes and dreams of anarchy. It is in many ways the defining moment of the frontier economy, and certainly the most romantic spot along technology’s arc.

Phase Three: Creative Anarchy

But this phase doesn’t last forever. For before long, problems begin to crop up along the frontier, compromising the commerce that has already emerged and threatening its long-term development. These problems are not the same for every technology; they appear with varying ferocity and after different gaps of time. Almost certainly, though, they will develop. And the pioneers that now people the frontier will demand their resolution.

Consider, for example, the issue of property rights. During the early phases of the technological cycle, ownership is a secondary and occasionally even irrelevant concern. Innovators don’t necessarily have much to own at this stage and many of them—though admittedly not all—are untutored newcomers to the world of formal rights. Many of the telegraph’s early inventors, for instance, never received either fame or credit for their work; and much of the modern Internet was created by enthusiasts who simply distributed their breakthroughs for free. A lack of property rights during the innovation phase, therefore, is seldom a constraint upon innovation itself. When commercial pioneers join the innovators, of course, this calculus changes: people like Henry O’Rielly, who built one of the first commercial telegraph systems in the United States, and Jim Clark, who
founded Netscape along with Marc Andreessen, have a much more instrumental view of technology and a more explicit interest in controlling it. Yet even as they yank the technology into its commercialization phase, many of these entrepreneurs are not particularly concerned about ownership. Instead they simply want to attack the frontier as quickly as they can, staking a claim and creating a market before others have had time to arrive. Certainly this was the case with O’Rielly, who threw himself into the nascent U.S. telegraph market in the late 1840s, determined to wire the entire eastern half of the country. A century and a half later, the infant Netscape adopted essentially the same strategy, storming into an unformed market and planning, in less than a year, to dominate it. In both cases, the pioneer’s hold on technology was tenuous—O’Rielly had “borrowed” freely from the patent held by Samuel Morse, and Netscape’s core technology was owned, at the time of its creation, by the University of Illinois—but ownership at this stage was less important than speed. The pioneers saw the allure of the new frontier and were determined to be there first.

As the technology matures, however, and markets widen, a demand for property rights is liable to emerge. Having carved out positions along the frontier, the more established pioneers no longer want to work in chaos or cavort with pirates. Instead they want to own the market they now consider theirs, to control the dominant technology and keep interlopers at bay. They want property rights, in other words, and some means of enforcing them. This is one of the most common demands voiced during the phase of creative anarchy, and one of the most important. For if property rights are not established, the pioneers will tire of their labors before long and hopes of large-scale commerce will tumble back toward anarchy.

In some cases, the concern for property rights is complicated by what economists term the “problem of the commons.” In these cases, the creation of a new market rests with the use of a particular resource, one that, like the oceans or the airwaves, is large but far from infinite. In the early stages of development, the resource is plentiful enough to serve all comers. Every radio enthusiast in the 1920s, for example, could transmit signals to his heart’s content, just as the first settlers in New England could pull endless streams of cod from the banks of Newfoundland.

The more people who arrive on these frontiers, however, the harder it becomes for any of them to flourish, for the airwaves get congested over time and the fish run out. In these situations, the more established settlers will again petition for property rights, seeking to regain the solitude that success demands.

Meanwhile, two other problems tend to lurk along the technological frontier. These are problems of coordination and competition, and each can foster anarchy.

Consider first the problem of coordination. When a technology is initially evolving, bursts of innovation will tend to produce multiple devices and systems. Each individual inventor will produce his or her model of a telegraph, or his or her particular software package. And for some period of time, these disparate versions can happily coexist: customers simply use whichever model makes most sense for them, or is easiest or cheapest to employ. Eventually, though, this buffet of options breaks down and customers begin to value standardization over specificity. For what good is a telegraph, after all, if it receives messages only from certain sources? Or a mobile phone that can call only a discrete set of numbers? If these technologies are to develop into full-fledged markets, they need to develop some set of common standards, some means of coordinating their systems and allowing users to migrate freely among them. The problem, though, is that standards do not emerge by themselves. And thus as the pioneers race into a new market, each armed with his or her own technology and vision of the future, they may actually exacerbate the coordination problem that they desperately need to solve.

A final problem of the frontier concerns competition. Suppose that in the midst of anarchy a single pioneer manages—through law, guile, or sheer ingenuity—to control the key technologies for a given market. Then suppose that the same pioneer also manages to impose his own technical standard across this market. At this point, the problems of property rights and coordination will have been solved. The dominant firm can now banish outlaws from its field, spread a single technology across an unfolding market, and reap the financial benefits of scale. But the price of this solution is monopoly—putting the levers of a new and potentially vast market under the control of a single firm. And even if such a solution makes economic sense, it is
bound to be a political and commercial disaster. Every pioneer will resent this intrusion; every erstwhile pirate will seek revenge. Even consumers are likely to join the fray, protesting against an undue concentration of power and seeking some formal means of redress. To the aggrieved parties, then, monopoly is not a solution to the problems of anarchy but a problem all its own. It is a problem of dominance and control; a problem of innovation (for monopolists are not supposed to innovate); and a problem, at its heart, of justice. And like all good problems, it creates chaos in its wake and demands an appropriate solution.

If commercialization is the most romantic stage along the technological frontier, then, creative anarchy is the most frustrating. The technology is maturing, the market is widening, but the nascent industry is caught by the inevitable struggles of its own success. Resolving these problems becomes the next and final phase of the frontier.

Phase Four: Rules

This last phase is the most difficult to imagine from the viewpoint of Partenia. When a technology is new, it usually looks so radical, so untamable, that those closest to its creation can’t conceive of it being governed. This is particularly true—as with oceanic trade, radio, or cyberspace—when the technology reveals a space that, for practical purposes at least, hadn’t been there before. How could anyone in Europe ever hope to impose order on the vast and unruly seas? How could anyone own the air? Or patrol the reaches of cyberspace? During the innovation and commercialization phases, the very idea of governance seems absurd. What occurs during the phase of creative anarchy, though, is critical; for it is here that even the pioneers begin to realize the costs of chaos. And once they realize these costs, once they understand that a lack of rules can diminish their own financial prospects, they begin to lobby for what they once explicitly rejected. Admittedly, it is not always the pioneers who clamor for rules. Sometimes it is the state, and sometimes a coalition of societal groups affected by the new technology and the market it has wrought. In general, though, rules get created because private firms want them.

In many ways, therefore, Ruling the Waves is a book about rules. It is a book about why rules get established along the technological frontier, and who plays the greatest role in their creation. The book does not suggest that there is a single path along this frontier. On the contrary, all of the stories that are presented here suggest that rules get made in different ways and by different people, depending on where the technology is developing and what kinds of problems emerge during its evolution. In some cases, the state steps in during the earliest days of anarchy, writing rules to control the new technology before it has time to develop. When the power of radio became clear, for example, state officials in Germany, France, and Russia scrambled at once to channel and constrain it. They sponsored the work of chosen pioneers, linked the newly formed companies directly to the state, and then used a series of international conventions to parse the radio spectrum and establish technical standards. The rules worked, for the most part, to the advantage of Europe’s radio firms, but they were set incontrovertibly by the state.

In other cases, firms play a much bigger role in setting the rules that bind them. Frequently, for example, firms resolve the problem of coordination by forming industry associations or standards arrangements. These are private groups, composed of erstwhile pioneers, who get together to pursue what eventually becomes a political agenda. They craft rules and technical standards because their businesses demand them, and because governments, operating at their less-than-breakneck pace, may not yet be able to provide them. This, for instance, is how the U.S. telegraph firms tried to address the mass of incompatible wires that had emerged by 1850, and how music firms today are approaching the threat of MP3 technologies. Note that none of these standard-setting exercises is overtly political. They don’t involve governments or voting or lobbying. Yet they are all about politics—about who gets power and sets the rules. By setting standards, firms begin to define what is permissible in a certain industry and what is not. They write rules and draw lines without the intervention of the state.

Eventually, though, governments tend to reenter the scene. There is nothing necessarily malicious in their reentry, nor anything inherently anti-business. It’s just that the time and technology are ripe for their return. During the third phase of
technological development, firms are content to regulate themselves and generally competent to do so. They can form associations and join standard-setting bodies and create some basic rules for their members to follow. As the industry evolves, however, these governance functions become increasingly unwieldy and unproductive. Firms don’t really want to waste time dealing with associations of more and more members, nor do they want to police unruly counterparts or erect cumbersome voting structures. Most critically, firms don’t have the ultimate ability to punish misbehavior or create property rights, for these are things that only governments can legitimately do. Firms can establish the rudimentary rules of their game. They can lay out technical standards and norms of business practice; they can consider issues of intellectual property and create common platforms. But they can’t enforce these rules, since enforcement—at least in the modern era—is one of the few tasks explicitly reserved for government. It is also something that can be hugely important for business.

Consider, for example, the trials that befell the British East India Company. Chartered by Queen Elizabeth I in 1600, the company was given responsibility for British trade with the spice-laden islands of the Indian coast. It was a tremendous job, and the company profited handsomely from it. As part of its mission, however, the company also encountered the pirates who then plagued the Indian Ocean. Company officials tried for a while to deal with the pirates on their own; like legions of traders before them, they sailed with guns and in convoys and engaged in their own forms of piracy. Yet unlike many of the earlier traders, the East India Company was by this point a significant organization, with a myriad of deals and details to contend with. Its officers simply did not want to add defensive military action to their already large portfolio. So they went back to the British government and demanded protection. And the government, which for centuries had dealt half-heartedly with the pirates, eventually complied. It expanded its naval presence and upheld a firmer definition of illegal behavior, and finally cut the pirates out of the Indian trade. A private firm in this case thus used the state to preserve its own commercial empire.

This is a fairly common pattern along the technological frontier. We see it in the telegraph industry, where Britain’s Eastern Telegraph Company relied on the state to protect its overseas interests and discourage new entrants, and in radio, where Telefunken, a leading German firm, grew to global prominence on the back of state protection and support. We see it already in cyberspace, too, as firms that otherwise decry government involvement scurry to secure whatever rules support their own interests. The very same encryption firms that have circumvented U.S. export controls, for example, have also lobbied the U.S. government to protect their intellectual property in foreign markets. Likewise, Netscape and Oracle, prominent pioneers of the information economy, have lobbied fervently for the U.S. government’s antitrust suit against Microsoft. One firm’s constraints, after all, are its rivals’ competitive edge.

This relationship is the central irony of politics along the technological frontier. When technologies first emerge, there is a rush away from governments and a surge of individualism. Pioneers want to live along the cutting edge, forging a path away from the state and building empires in the air. Like Gallowlot they are rebels, using technology to escape from authority and create their own versions of Partenia. Over time, however, the rebels tend to return to the state—not because they change their minds or lose their nerve, but simply because the state can secure the empires that they’ve built. The state can defend firms’ property rights; it can regulate their interaction with a demanding consumer market; and it can help to keep the pirates at bay. And in fact, if we look at the cycle that prevails along the technological frontier, we see that even many of the original pirates eventually jump to the side of order, prospering from the same rules they once disdained. Sir Francis Drake, for example, was a privateer long before he became a knight (Queen Elizabeth I fondly referred to him as “her pyrate”), and Rupert Murdoch was commonly referred to as a pirate during his early years of traitorous dealings and legal gymnastics. The trick for pirates, it appears, lies in knowing when to jump, and to whom. Drake and Murdoch both became considerably more conservative once their business empires were well secured. They both also had powerful political patrons: Drake his Queen Elizabeth
and Murdoch, Margaret Thatcher. There are lessons here for other pirates.

In the spring of 1997, a lively fight broke out during an otherwise sedate Harvard conference. The conference concerned Internet governance, and the participants ran the spectrum of political and commercial views. Early in the day, one of the speakers, an Internet entrepreneur and sometime philosopher, gleefully pronounced the end of governments. In cyberspace, he argued, there would be no way for governments to track illegal activity, no way for them to print the money that defined their control, and no way for them to collect the taxes that permitted them to exist. In cyberspace, therefore, people like him could do whatever they wanted, and there was nothing government could do to prevent it. This speech incited the usual round of academic harumphing and noticeable unease in the audience. Then another of the speakers erupted—a gentleman who worked as one of the U.S. government's top Internet policymakers. "You," he bellowed, "are completely wrong. 'Cause we still have black helicopters!" Matters disintegrated from there on, with neither the bureaucrat nor the entrepreneur willing to concede the other's argument or back away from the fight. It was a good fight, in many ways, and an intriguing one. For essentially both men were right. Governments are more limited in cyberspace than they are in the physical world; in the short term, at least, governments will not be able to regulate, or even track, the information that flows across the Internet's myriad paths. That's why Partenia is such a powerful place. But as the Net matures, and as its technologies march further along their own frontiers, governments are likely to return—not only with black helicopters, but also with standards, and property rights, and the order that even the unruliest of pioneers is eventually bound to desire.

That, at least, is the lesson that history appears to offer. The frontier is a wild place, a land of anarchy and endless dreams. It draws pioneers and emboldens pirates and often showers riches on them both. In the end, though, power doesn't flow necessarily to those who stake their claims or guard their turf: it goes to those who make the rules. History shows us how this process unfolds along technology's edge.
CHAPTER 2

The Codemakers

Canst thou send lightnings, that they may go, and say unto thee, Here we are?

The Book of Job

Until the middle of the nineteenth century, information didn't move all that much faster than man. It moved the way it had nearly since biblical times, hastened only by sporadic improvements in transportation: stirrups for horses, for example, or sails for ships. In 1830, a message sent from London to New York or Bombay took almost as long to reach its destination as it had in the days of Vasco da Gama and Magellan. It still had to be written by hand, taken by coach to the nearest port, and then shipped across the globe. Along the way, just about anything could happen—either to the message itself or to the circumstances it was supposed to report. As a result, the world of 1830 was still very much a local one. People focused for the most part on the news of their town or village, and concentrated on business that could be conducted within several days' jour-

ney of home. To be sure, the oceangoing revolution of the late Middle Ages had opened vast new territories to Europeans' grasp, and the development of steam technologies presaged rapid gains in transportation by the end of the eighteenth century. But in communication terms, the world of 1830 differed only slightly from the world of 1380: it was unfathomably big, and it took seemingly forever to send information across it.

All of this changed in the course of less than two decades. In 1838, Samuel Morse presented the U.S. Congress with a prototype of his electric telegraph—a machine, he claimed, that could instantly send messages across the nation and potentially around the world. Most members of Congress laughed. Yet by 1852, only fourteen years later, twenty-three thousand miles of telegraph wire had been laid across the United States and the industry was booming. By 1880, almost 100 thousand miles of subterranean cable stretched under the North Atlantic, across the Red Sea, and beneath the Caribbean. The same message from London to New York that had taken weeks or months in 1838 could now be transmitted in minutes. Suddenly, the world had become a great deal smaller.

As telegraph use expanded, it generated the same kind of excitement that surrounds the Internet today. Observers argued that it was the greatest invention of all time, the crowning glory of technological innovation. "Of all the marvellous achievements of modern science," wrote two contemporary authors, "the Electric Telegraph is transcendently the greatest and most serviceable to mankind. It is a perpetual miracle, which no familiarity can render commonplace."1 When the first transatlantic cable was constructed in 1858, celebrations broke out in England and the United States. "Since the discovery of Columbus," the Times of London gushed, "nothing has been done in any degree comparable to the vast enlargement which has thus been given to the sphere of human activity."2 It was, echoed U.S. President James Buchanan, "a triumph more glorious, because far more useful to mankind, than was ever won by a

conqueror on the field of battle."³ The pioneers of telegraphy, both scientific and commercial, were feted around the world for their achievements and their contribution to global society. Telegraphy, many presumed, would change the face of both business and politics. It would shrink the world, widen commerce, and further the cause of world peace.

And to some extent it did. Telegraphy was indeed a phenomenal innovation—more dramatic, in many ways, than the Internet of today. It made irrelevant distances that had once seemed unbreachable, and widened the perspective of nearly all the world’s people. Before the telegraph, there really was no such thing as international news; afterward, there was hardly any way of escaping it. Before the telegraph, both business and government were constrained by the limits of their own geographical reach: it simply was unrealistic for a central office in Boston to relay detailed instructions to an agent in Moscow, or for a central government in Paris to keep a watchful eye over its diplomats in Buenos Aires. After the telegraph, by contrast, information could flow easily and almost constantly between even the most far-flung outposts. The world shrank, and both business and government grew larger.⁴

These shifting dimensions pushed the curve of the technological frontier and caused a rupture within existing norms and rules. Like most technological breakthroughs, telegraphy brought a certain amount of chaos in its wake. It led, first of all, to commercial chaos, with dozens of inventors clamoring for recognition and suing each other over patent rights. It created confusion in the military, since commanders feared that enemy

³Quoted in Standage, The Victorian Internet, p. 81.


The Codemakers spies would instantly transmit their plans abroad, and despair in the news industry, because most observers assumed that telegraphy would make newspapers obsolete. It also created a massive problem of coordination, as entrepreneurs stumbled over one another to erect competing lines, very few of which were even marginally compatible.

For roughly twenty years, these concerns and this confusion held sway. There were no rules in the industry, only a heady sense of potential and the whiff of impending riches. Revealing in their newfound industry, pioneers raced to catch the "lightning" and pirates, armed with competing patents and often indistinguishable from their more legitimate counterparts, followed close behind. Governments watched the industry or supported it, but few—in the beginning, at least—tried to impose any order upon it. It was simply too new and too chaotic.

As the technology emerged, however, and as the most successful pioneers carved the beginnings of an industry upon it, the costs of anarchy became increasingly evident and the progression toward order set in. Rules were established, rates set, and provisions made to connect the expanding web of separate lines and make them speak the same language. Great institutions, both public and private, were created that welded the industry closer together and hammered out procedures to stabilize and regulate it. Few of these institutions attracted the kind of fanfare that had greeted the innovators and pioneers; none evoked the euphoria that surrounded the industry in its earlier, wilder years. But in the final analysis, it was these institutions and rules that allowed telegraphy to slip beyond its initial chaos and become a vital part of modern commerce.

A Brief History of Signals

Since the Middle Ages, dreamers and tinkerers had been trying to sever the link between information and physical movement, between the message and the cumbersome messenger who carried it. They realized that any system would have to consist of two main components: first, a way of replacing the complexity of written language with some kind of shorthand or
code; and second, some means of sending these signals through the air, using sound or sight instead of transportation. These basics had been recognized even by the early Greeks, who experimented with complicated systems of fire signaling—lighting fires on adjacent mountaintops in order to warn of enemy advance or herald victory. Yet because none of these systems ever achieved a decent measure of accuracy, important messages were still carried the reliable way: by hand.

The first real breakthrough came in 1791, when two French brothers named Claude and René Chappe sent messages to each other using a rudimentary system of copper pots and synchronized clocks: each set of clongs on the pot corresponded to a number on the clock face, which in turn was translated according to a prearranged code. The system was loud and chunky, but it worked. After centuries of little technological change, the Chappes had at last broken the land barrier, sending messages by sound (which moves at twelve miles a minute) rather than by foot.

Their next innovation was in some ways even simpler, but more dramatic. Realizing that the sound of a clanging copper pot could travel only so far, the brothers turned next to light, replacing the pots with a five-foot-tall wooden tower equipped with adjustable arms. By rotating the arms into various positions, the Chappes could form ninety-eight different combinations or symbols. Sight thus replaced both sound and foot, and symbols could be transmitted almost instantaneously.

From the start, the Chappes’ device had political implications. When the brothers first demonstrated their new télégraphe outside Paris, a mob rallied and destroyed the machine, worried that it might be used to communicate with jailed royalist sympathizers. Shortly thereafter, France’s revolutionary National Assembly formed a committee to investigate the telegraph’s military potential. Before long, the convention authorized the construction of three identical telegraph towers, spanning a total distance of about twenty miles. By 1798, France boasted telegraph lines stretching from Strasbourg to Dunkirk, and news of military victories was regularly relayed across the expanding network.

Once the French system was in place, other European nations rapidly followed suit, constructing their own wooden towers and experimenting with different sets of codes and symbols. By the mid-1830s, nearly a thousand telegraph towers were in operation. Compared to earlier means of communication, this wooden network was extraordinary. It was simple to construct, easy to use, and dramatically faster than any method that had preceded it. Yet it also was plagued by a number of obvious, frustrating problems. First of all, even though the system was so much faster than any of its predecessors, it still remained relatively slow, since all messages had to be retransmitted at the end of every line of sight. It was also inherently cumbersome and subject to disruption, relying as it did upon both skilled operators and clear weather.

What promised to solve telegraphy’s problems was electricity—a stream of energy that, potentially at least, could instantly relay signals across any length of conducting wire. Since 1729, when Stephen Gray of England first discovered that electricity could be conveyed across wires, inventors had been fiddling with various ways of using electronic impulses to replace the clanging pots and whirling arms of existing telegraphs. Theoretically, the translation was relatively simple: an electronic impulse sent from one end of a wire would activate some kind of receptacle at the other end. Variations in the number or duration of the impulses would act just as the different clangs or arm positions, signaling different letters or numbers that could then be strung together into a recognizable message. In practice, though, the application of electricity proved immensely frustrating. For decades, inventors across the United States and Europe experimented with a wide range of techniques and permutations—with suspended balls, and decomposing water, and multiple conducting wires, one for each letter of the alphabet. Nothing was ever fully developed. And then Samuel Morse came along.

An artist and professor by trade, Morse was an unlikely candidate to pioneer the modern telegraph. Born Samuel Finley Breese Morse in 1791, Morse came late and ill-prepared to the emerging field of telegraphy. He had no technical background,

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9The story of telegraph’s early history follows the excellent account in Tom Standage, The Victorian Internet, pp. 6-14.

and only learned of recent work on electromagnetism in 1832. Bored with painting and his students at New York University, however, Morse was seized almost instantly by the idea of transmitting information via electricity. For the next several years, he toiled to learn the mechanics of this emerging science and then to transform his newfound learning into a practical device. He also worked with chemists and engineers, and found a powerful financial backer in Alfred Vail, a recent graduate of NYU who came from a family of well-to-do manufacturers. After several rounds of tinkering, Morse settled upon a distinctive approach. Words in his system would be coded as numerical digits, which would then be transmitted as electrical pulses along a wire to a receiving station. There, a lever triggered by an electromagnet would record the pulses onto paper. Later, dots and dashes—the familiar Morse code—would take the place of numerical code. By 1835, Morse’s idea had taken physical and ingenious shape: he built a telegraph that used electricity to convey and record messages.7

Morse was by no means alone in his struggle to construct a telegraph, or even in his conviction that electromagnetism offered the most efficient means for harnessing electricity’s power to the service of information. Indeed, as of 1838, no fewer than sixty-two people had already claimed recognition for having invented the first electrical telegraph.8 Morse, however, was the first to push his invention out of the laboratory and into the realms of business and politics. He spent six years perfecting his rudimentary device, testing and trying it and finally subjecting it to public scrutiny. Then he spent the rest of his life dealing with the implications of his new machine.

Mr. Morse Goes to Washington

From the outset, Morse realized that the telegraph was more than a fancy new way of sending messages. It was, he understood, a radical new way of transmitting information—of hastening the reach and speed of global communication, racing faster than any established authorities. It was also a way of creating vast wealth, since nearly all business enterprises would presumably want the ability to move and gain information at the lightning-fast pace that Morse could now offer. Morse saw all these implications and acted upon them—acted, in fact, nearly before his invention was even out of the lab. What is even more remarkable, though, is that Morse responded to his own foresight in a distinctly noncommercial fashion. Having seen the future, his initial response was to hand it over to the U.S. government. As he argued in 1838:

It is obvious, at the slightest glance, that this mode of instantaneous communication must inevitably become an instrument of immense power, to be wielded for good or for evil, as it shall be properly or improperly directed. In the hands of a company of speculators, who should monopolize it for themselves, it might be the means of enriching the corporation at the expense of the bankruptcy of thousands; and even in the hands of Government alone it might become the means of working vast mischief to the Republic.

In considering these prospective evils, I would respectfully suggest a remedy which offers itself to my mind. Let the sole right of using the Telegraph belong, in the first place, to the Government, who should grant, for a specific sum or bonus, to any individual or company of individuals who may apply for it, and under such restrictions and regulations as the government may think proper, the right to lay down a communication between any two points for the purpose of transmitting intelligence, and thus would be promoted a general consideration…9

Morse wasn’t being entirely patriotic, of course: he went to Congress in large part because he wanted Congress to fund

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commercial development of his telegraph. But he also seems to have believed seriously in the ill that could surround telegraphy, and particularly in the ill of monopoly. "The Government," he later wrote, "will eventually, without doubt, become possessed of this invention, for it will be necessary from many considerations; not merely as a direct advantage to the Government and public at large if regulated by the Government, but as a preventive of the evil effects which must result if it be a monopoly of a company." Hardly the stuff of your average pioneer.

Congress, meanwhile, was still several decades behind Morse, convinced that electrical transmission was a tinkerer's dream and that the future of telegraphy lay with wooden signaling stations. Morse's first demonstration won few supporters, and so the inventor trudged off to Europe, hoping that governments there would prove more forthcoming. They weren't. In England, rival inventors persuaded the British attorney general to not even grant Morse patent rights to his telegraph, and in France he received patent rights but no financial backing. Things went even worse in Russia, where Tsar Nicholas I feared the new machine as an "instrument of subversion" and forbade even any writings about telegraphy to appear in his country. Dejected, Morse returned to the United States and his students at NYU.

In all his spare time, though, Morse continued to toil away at the telegraph, refining its mechanics and trying to raise support for its prospects. In 1842 he returned to Congress and proceeded to string wires between two committee rooms. After he succeeded in relaying a string of messages between the two rooms, Congress was at last impressed. In February of 1843, Morse was granted $30,000 and the authorization to build a U.S. telegraph line from Baltimore to Washington, D.C. Overjoyed, Morse wrote to his brother Sidney that:

Such is the feeling in Congress that many tell me they are ready to grant anything. Even the most invertebrate opposers have changed to admirers, and one of them, Hon. Cave Johnson [a Congressman from Tennessee], who

10Letter from Samuel Morse to the Honorable W. W. Boardman, August 10, 1842. Reproduced in Morse, Samuel F. B. Morse: His Letters and Journals, p. 175.
11Harlow, Old Wires and New Waves, p. 80.

ridiculed my system last session by associating it with the tricks of animal magnetism, came to me and said: "Sir, I give in. It is an astonishing invention."12

By August 1843, Morse had manufactured 160 miles of cable wire and begun construction of the line; on May 24, 1844, he sat at a telegrapher's desk in Washington and transmitted the message "What hath God wrought!" to an associate in Baltimore. One year later, the line became open for business—the world's first commercial telegraph operation. Quickly, however, its operation seemed to confirm Congress's worst fears. In its first three months of public operation, the Baltimore–Washington line had expenditures of $1,859.05 and revenues of only $193.56. The story for the second quarter was equally dismal.2 Saddled with what appeared to be a losing business, Congress decided to abandon its interest in the Baltimore line, and Morse and his backers were forced to return to private capital. From that point on, telegraphy in the United States remained almost entirely a private affair.

In retrospect, the commercial failure of the Baltimore–Washington line was due to a simple and obvious cause: although the general public was fascinated by the technology of telegraphy, most people saw no practical use for it. Like mesmerism or telepathy, it seemed to be a freak occurrence, something to be marveled at but not utilized. In the first four days of the telegraph's operation, only one person actually paid to use it. Slowly, though, both telegraph wires and telegraph usage began to spread. In 1845, Morse and a group of his supporters (including Amos Kendall, a former postmaster-general, and Ezra Cornell, an entrepreneurial inventor) formed the Magnetic Telegraph Company with a capital subscription of $15,000. Their plans were ambitious and straightforward: to build a network of telegraph lines radiating along the major commercial routes of the United States. Doggedly, Morse remained convinced that if the lines worked, customers would eventually see them as a service rather than a technical oddity. Supply, in other
words, would generate its own demand. And to a large extent, he was right. As the lines expanded, and as people grew more accustomed to their presence, business began slowly to experiment with telegraphy. The first customers were heavy users of information: newspapers, stockbrokers, and organizers of lotteries. Then came governments and general businesses, and finally private citizens.

In each case, the applicability of the technology was slightly different. For information-intensive industries, the telegraph was truly revolutionary, since its speed created possibilities that simply had never existed. For the first time, news could be reported as it occurred and across a fairly wide region. Similarly, stock prices could immediately reflect the interaction of market forces, and people with information about one market could parlay this information into commercial advantage in another.

For other industries, the telegraph was less revolutionary but almost equally important. It took the same information that these businesses had always employed, such as price lists and word of new products, and markedly increased the speed at which they were communicated. The effect was dramatic. Suddenly, business that used to occur at a leisurely pace was telescoped into minutes or hours of time. Merchants in Boston could place orders in Atlanta overnight; farmers in Ohio could check the daily price of hogs in Chicago. It was the same old business, but conducted at a pace that changed the very tenor of commercial exchange. For once even a segment of the business community began to rely on the telegraph, all of the other businesses that fed into this one were compelled to follow along, demonstrating one of the first examples of a true network effect. By the early 1850s many individual firms, and particularly those clustered on Wall Street or in other financial centers, were sending six to ten messages a day along the “lightning.”

Government’s relationship with the early telegraph was more complex. When Morse’s original hopes for partnership soured

with the fate of the Baltimore–Washington line, the U.S. Congress retreated from the commercial side of telegraphy. But government remained an active user of the telegraph, and political news was one of the major components of early transmissions. In fact, one of Morse’s first successes came in May of 1844, when the Democratic National Convention rejected its leading presidential candidate, Martin Van Buren, in favor of the upstart James Polk. To win Van Buren’s supporters, the convention nominated his friend Silas Wright as vice president. Stationed at the two ends of their new telegraph, Vail and Morse managed to convey this news to Wright, and receive word of his decline, before anyone outside the convention building had even heard the news. From this point on, the U.S. government saw the telegraph as a vital technology and an efficient means of communicating across an increasingly far-flung state. They weren’t quite sure what to do with it (that would come later, during the Civil War of 1861–65), but they realized, at least, that the lightning had power.

A similar awe and confusion characterized the public response to telegraphy. In the 1840s, the cost of sending a telegraph was roughly twenty-five cents a word, far too high for average people or everyday use. People regarded the telegraph, therefore, more as a technical marvel than a useful tool; it was viewed as a feat of magnetism that was destined to be witnessed rather than employed. In the earliest days, in fact, people would line up at telegraph offices just to “say they had seen it,” not even caring, as Vail grumpily reported, “whether they understood or not.” They often had strange reactions to the machine, such as that of the woman who insisted on sending sauerkraut across it, and even odder notions about how it worked. Over time, however, even private citizens began to see the personal potential of telegraphy. They realized that telegrams could carry vital news—of death, or illness, or change of plans—and that the speed of

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14For more on the general commercial impact of the telegraph, see DuBoff, “Business Demand and the Development of the Telegraph,” pp. 459–79.
15For more data regarding early business use of the telegraph, see Alexander Jones, Historical Sketch of the Electric Telegraph: Including Its Rise and Progress in the United States (New York: Putnam, 1852).
16The figure is from the original rates charged by the Magnetic Telegraph Company on its New York-to-Philadelphia line, as written in a letter from Amos Kendall to prospective customers, and contained in the O’Rielly Manuscript Collection, II, in the New-York Historical Society Library. Cited in Thompson, Wiring a Continent, p. 44.
17Letter from Vail to Morse, June 3, 1844. Quoted in Thompson, Wiring a Continent, p. 25.
18For stories of these reactions, see Standage, The Victorian Internet, pp. 66–68.
this information could be worth the cost of sending it. They realized, too, that the value of even personal information was itself dependent on time, and that the real power of the telegraph lay in its ability to shrink time and provide fast, pertinent, and personally critical news. By 1851, according to one contemporary survey, “social” messages (as opposed to business messages) accounted for 9 percent of telegraph traffic in the United States.19

Even once this shift of attitude had occurred, however, the cost and constraints of telegraphy restricted its private use to all but the richest customers and most pressing matters. In the 1840s, telegraphy was still on the edge of the technological frontier. It was a plaything for inventors, a growing curiosity for business enterprises, and a development that governments were eager to watch. But it wasn’t a mass market, or even the stuff of which such markets are made. For that progression to occur, innovators like Morse had to be succeeded by the next wave of pioneers—by entrepreneurs who extended and standardized the technology and then wove it into the everyday lives of millions of users. Which is, of course, precisely what happened.

**Commercial Expansion**

In the United States, the commercial telegraph industry began in 1845 and sprang, as one might expect, from a cluster of entrepreneurs who had begun to hover around Morse. The hub of this group was the Magnetic Telegraph Company and its driving force was Amos Kendall, the former postmaster general who had left his position to join forces with Morse.20

Having convinced Morse that private telegraphy would succeed where public telegraphy had failed, Kendall and his associates formed the private Magnetic Telegraph Company (or Magnetic, as it was generally called) in 1845 and proposed a most aggressive plan of wiring the entire United States. The obvious problem, though, was that Magnetic by itself couldn’t possibly hope to raise all the capital that its founders’ dreams required. And so the founders conceived of an equally ambitious commercial structure, one that would keep control within Magnetic’s grasp while pushing the costs and risk of expansion onto a new group of investors. Specifically, Kendall and his associates conceived of the Magnetic Telegraph Company as a holding company of sorts, the backbone for what would become a national web of independent but linked firms. Magnetic would retain the patent rights to Morse’s technology and 50 percent of the stock in all linked companies, but individual promoters would raise capital for each of the regional lines and connect them to Magnetic’s central trunk. Explicitly, Kendall’s notion was that all the telegraph companies would be part of the same “family,” joined by compatible technology and sharing in the benefits of an ever-expanding (and thus ever more valuable) network. “Whatever we do,” urged Kendall, “we must concert our plans and go on together. It is only by harmony in action that we can do anything, and to preserve it we must make concessions where we cannot agree in opinion.”21

From the beginning, therefore, Magnetic was an exercise in cooperation, an attempt to grow the telegraph market by pooling funds and patent rights among several independent firms. And in the beginning, it worked. In the very first year of the company’s operation, Francis Smith, a longtime Morse supporter and partner in Magnetic, formed his own firm, the New York and Boston Magnetic Telegraph Association, to extend telegraph service between those two cities. Kendall followed suit, launching the Albany and Buffalo Telegraph Company with a capital subscription of $200,000. Then other pioneers joined the game: John Butterfield, for example, a stage-line operator from central New York, purchased the rights to extend service from Massachusetts through to New York, and Henry O’Rielly, an Irish immigrant with a legendary entrepreneurial streak, agreed to extend the network all the way from the eastern seaboard to the Great Lakes region. Over the next five years, O’Rielly would go on to launch seven separate telegraph companies, stringing a web of wires that reached from Philadelphia to Chicago.

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20Formally, Kendall became the agent for three-fourths of the Morse patent, leaving one-fourth in the hands of Francis Smith, Morse’s long-time business associate.
21Amos Kendall to Francis Smith, August 12, 1845, quoted in Thompson, *Wiring a Continent*, p. 40.
So far, so good. By 1850, Magnetic's network was up and running, and dozens of entrepreneurs were racing to connect their individual lines to the growing web of compatible wires. No sooner had the system established itself, however, than two sets of problems occurred. One was born of external competition, the other of internal rivalry. But both soon pushed the infant market toward chaos.

The first problem stemmed from the many contenders to Morse's supposed throne. Though Morse had beat all other inventors of electrical transmission devices to the commercialization phase, once technology had reached this critical bend, others jumped eagerly into the fray. And the pioneers—and pirates—weren't far behind.

Two variations on Morse's theme proved particularly successful. One, invented by Scotsman Alexander Bain in 1840, recorded electrical signals on a chemically treated paper that changed color when electricity passed through it. The other, designed in 1844 by a New England inventor named Royal House, took Morse's device a step further by converting electrical signals directly into letters of the alphabet. Both systems, to be sure, had their operational drawbacks. While the House system reduced the need for messages to be retranslated, it relied on a cumbersome hand-cranking mechanism that was very difficult to repair. And the Bain system, while faster than those of both House and Morse, was liable to receive false signals if other telegraph lines were nearby. On average, however, both systems worked roughly as well as Morse's. Which meant that entrepreneurs who didn't want to accept Magnetic's terms or its vision of a Morse-dominated empire were able to use the Bain or House technologies to strike out on their own, building rival systems on the basis of proprietary technology. Because each of these systems was explicitly incompatible with Morse's, though, each new Bain or House line actually reduced the operational size of the U.S. telegraph market, fragmenting it into growing but unconnected chunks. Ironically, then, as the competing systems proliferated, the quality of wire service actually deteriorated and the "lightning" was reduced to snail mail, traveling once again over the nation's postal networks.

Meanwhile, even within the Magnetic "family" relations quickly soured. By the latter half of the 1840s, early investors such as Smith and Ezra Cornell had been joined by a flood of new entrants, the promoters and financiers that Kendall had envisioned as so critical to telegraphy's success. They were joined, as it turned out, by hundreds of enthusiastic investors, many of whom were dizzily innocent of either technical or managerial knowledge. Entranced by the telegraph's commercial prospects, they raced to construct their part of the network, looping lines haphazardly around trees, rowing messages across rivers, and feebly trying to insulate their wires with beeswax. None of these companies had any great capital behind it; many of them had insecure patent rights; and all were moving as fast as they possibly could.

By the mid-1850s, then, just as the "lightning" was making its way across the middle section of the United States, some of the boldest companies began to falter. In the north, two great rivals (the Lake Erie and the Erie & Michigan lines) were both barely able to cover their costs; in the Ohio Valley, O'Rielly's extensive Ohio, Indiana and Illinois Telegraph sank slowly into bankruptcy. And there were dozens, probably even hundreds, more: little firms that never even got off the ground, as well as larger ones that managed to cover their construction costs but never returned a cent of profit to their shareholders. During this time, in fact, nearly every telegraph firm in the United States was teetering on the edge of bankruptcy and a great number of them succumbed, leaving their lines fluttering uselessly across treetops and their promoters in search of other pursuits.

Part of what plagued these early firms was their own enthusiasm. Gripped by the vision of a telegraph empire, many had simply strung their lines too quickly and too sloppily. They had financed their operations as they went, raising capital from local communities and hoping, apparently, that profits would just come pouring in. They didn't. While telegraphy was definitely becoming an accepted mode of communication at this time, it was still too new and too crude for the majority of would-be users. It was also too expensive, especially since many operators compensated for their lack of technical knowledge by trying any method that sounded feasible. Not for a few more years would the technology of telegraphy become truly reliable—and while they waited, patching their wires and searching for insulators, some of the earliest pioneers just ran out of luck.
An even bigger problem than sloppiness, however, was competition. In the minds of Kendall and Morse, the whole purpose of the Magnetic Telegraph Company was to foster a controlled growth of the telegraph—a profitable growth, to be sure, but also a growth that was cautious and connected and technically sophisticated. "If we manage with prudence and act in concert the revenues of a nation are within our reach," Kendall urged. "If we are divided in counsel or raise the public against us, we jeopardize everything and shall live in constant turmoil." Even without public funding, Kendall and Morse still saw the telegraph as a public servant, a tool to foster communication and economic growth. Others, however, including many of their own partners, had sharply different ideas. Telegraphy for them was simply a financial opportunity. They wanted to wire the continent, too—but quickly, and on their own terms.

Before long, these divergent objectives had split the Magnetic "family" into warring kin. Tired of O’Rielly’s relentless self-promotion and envious of his extensive network, Kendall and Smith launched a bitter and public feud that would drag on for years, leaving all of their companies burdened in the end with construction debts and shrunken funds. Then the two original partners erupted in a passionate clash, each accusing the other of violating the terms of the Morse patent and both periodically refusing to engage in even the smallest act of cooperation. Other firms complained of messages being lost or garbled as they crossed the system, or even being changed by competing firms. Fights broke out at some of the busiest offices and reports of bribery plagued others. What the network needed, of course, were some basic rules of engagement. But with the rivals biting at each other’s heels, no one in the industry was in the mood for engagement, much less cooperation.

Indeed, by 1850, fights over patents and contractual rights had brought several of the telegraph pioneers into pitched courtroom battles. In one of the most stunning defeats, a judge in Kentucky ruled that O’Rielly’s entire line was illegal, since it used equipment that "borrowed" far too closely from Morse’s patent. Going even farther than the case demanded, the Kentucky judge declared that Morse had the exclusive right to all electromagnetic telegraphy, implying that even the House and Bain systems were technically in violation of patent law. Although this extension was subsequently reversed by a higher court, O’Rielly took a major hit—especially after the Kentucky judge ordered a marshal to destroy his local line. Meanwhile, the Morse group of patentees brought suit against House, against Bain, indeed against anyone they could find who was creating a competing line of telegraphs. In their eyes, all these second-stage pioneers were simply pirates, scoundrels who had stolen (or at best, copied) Morse’s patent and were now trying to compete unfairly against him. To the "pirates," however, it was Morse and his associates who were the thieves, trying to monopolize a vital industry and steal credit for efforts and innovation that rightfully belonged to others. Matters grew so contentious that when Mr. Bain planned to bring his family from Scotland to America in 1849, one newspaper cautioned that "He may be restrained from doing so by the fear that Amos Kendall will claim his wife and children as inventions of Professor Morse."

By this point, the inventors and investors were all at each other’s throats, vying for recognition and patent rights and racing to construct whatever might become the dominant system of telegraphy. All of them understood the deleterious effects of their rivalry, but no one was in the mood for cooperation. The fights were far too personal by this point, and the prospective profits appeared almost unfathomably large. In a letter to one of his partners, Francis Smith captures some of the mood of the time and the almost obsessive desire for speed: "I don’t want to be humbugged anymore," he begins.

Out with the plan of our campaign. Show that our Lake lines are to be the great receptacles of the Western intercourse with the Atlantic, and that the connecting lines are open to the people of the West, almost without money and without price, to accomplish this end...

21Kendall to Smith, October 6, 1848, Smith Papers XI. Quoted in Robert Luther Thompson, Wiring a Continent p. 85.

22Quoted in Harlow, Old Wires and New Wires, p. 163.
Whenever you can get money enough raised to get a line up, start it, and Patents will not hurry for their part, and your share of the benefits shall be made satisfactory. I want no pusillanimous, or doubting movements made—but, dash on with all the battery and thunder and lightning you can command.

Time saved is everything now... We will determine whether we or the other party make the best lightning. Again I urge you, don't hesitate—go ahead—and open your fire everywhere—set all the West in a light blaze with your proposals, and keep boldly in view the cheapness of the lines offered and the magnificence of the main arteries.24

This was not a man interested in the details of his business strategy or the technical intricacies of his product. Rather Smith, like many of his peers, was a true pioneer, forging into new territory, pushing stakes as fast as his crews could haul them. “Delays,” he urged in a postscript, “are ruinous.”

Continental Cables

While American entrepreneurs were racing to wire their expanding continent, a similar process was unfolding in Europe. The players, of course, were different and the game was tilted more toward the government’s side, but the basic process and problems were largely the same.

In Europe, the dominant innovators were Charles Wheatstone and William Cooke, British inventors who joined forces in 1837 to string an experimental telegraph wire between Euston Square and Camden Town—a distance of about a mile and a quarter. Individually, Wheatstone and Cooke had both been working for several years on the same kinds of problems that had captured Morse and his colleagues: how to send electrical signals across longer wires and how best to record the messages that emerged. When they learned of each other’s experimentation, the two men formed a commercial partnership and quickly patented a five-needle telegraph that signaled the letters of the alphabet by moving the needles into various tilted positions. The system was clunky, but it worked.

From the start, the two men made an unlikely pair. Wheatstone, a professor of experimental philosophy at King’s College in London, was a true scientist, propelled by a quest for knowledge and largely uninterested in commercial applications. When Cooke first approached him, Wheatstone proclaimed that scientific men should do nothing more than publish the results of their experiments for others to use.25 (He did get over this stumbling block rather easily, though, demanding a half-share of the partnership’s profits.) Cooke, by contrast, was a born entrepreneur who saw telegraphy as the best route to a quick fortune. To Cooke, Wheatstone was a haughty, head-in-the-clouds academic who had no idea how to use—much less sell—the fruits of research. And to Wheatstone, Cooke was a rank amateur, a novice who had somehow managed to stumble into telegraphy without any sense of the science that lay behind it. Yet, somehow, both men were able to swallow their personal distaste and realize the benefits of partnership. Wheatstone made the technological breakthroughs and Cooke figured out how to apply and profit from them.

Perhaps because Cooke was driven by such clear commercial motives, he was one of the first of the telegraph pioneers to grasp the extraordinary importance of railroads to telegraphy, and telegraphy to railroads. While Morse was petitioning Congress and others were working with military officials, Cooke went directly to Britain’s expanding network of railroads, urging executives there to see the possibilities: of sending messages as fast as trains, of using the existing right-of-way for a brand new purpose, and of facilitating rail transport by giving conductors and engineers immediate information about what was happening on the tracks.26 In 1838, Cooke and Wheatstone convinced the Great Western railway company to install a thirteen-mile


link between Paddington Station and West Drayton; in 1840
they installed another system on London’s Blackwall Railway.
Soon the system crept northward and west: a new line between
Edinburgh and Glasgow was completed in 1841, and an exten-
sion of the Great Western line to Slough in 1842. By 1845,
Wheatstone and Cooke were so enthusiastic about their possi-
blilities that they formed a new company, the Electric Telegraph
Company, to perform contractual work for the railways. A
patent suit from a rival inventor soon forced Wheatstone to re-
sign from the company, but Cooke continued and Electric
flourished. By 1848 nearly half the country’s railroad tracks had
telegraph lines strung beside them.27

In a comparison that would persist into segments of the dig-
tal age, the British system focused on quality rather than price.
While Americans such as O’Rielly were stringing haphazard
wires in a race to expand, the British entrepreneurs went more
slowly. With little competition to worry about, Cooke could affor-
d to build the best technical system and pass the costs along
to his consumers. Which was exactly what he did. In the early
1850s, a twenty-word message could be sent five hundred miles
across the United States for $1. In the United Kingdom, the
same message traveling a shorter distance would cost $7. As a
result, few members of the British public actually used the tele-
graph for anything but the gravest emergencies. It was instead a
more confined technology, used primarily by big businesses and
the state.

This British picture was echoed—with several important dif-
fences—across the European continent. In each of the major
countries, telegraphy developed roughly around the same time
and along similar lines. A series of local innovators passed their
ideas along to local entrepreneurs who built their own version of
the telegraph across the dominant paths of communication, such
as Brussels to Antwerp, and Moscow to St. Petersburg. In most
of these other countries, though, governments moved much
more quickly than they had in either the United States or the
United Kingdom. In France, the telegraph was controlled by
the government right from the start; in Belgium, Russia, and

27Sundage, The Victorian Internet, p. 61.

elsewhere, governments followed rapidly on the heels of the
original entrepreneurs, taking over the early lines and then
using them as a starting point for much broader state-run ef-
forts. The arguments in each case were largely the same: be-
because the telegraph had such an obvious and crucial potential,
it needed to be nurtured by public funds and tied to national
concerns; because it was expensive and important, it needed to
be overseen by the state. “Like the Post Office,” one observer
stressed, the telegraph, “cannot be so well conducted by a pri-
ivate Company as by the Government. The latter alone can en-
force regularity, and make it accessible to all.”28 It was the same
argument, of course, that Morse had tried to apply in the
United States; but in Europe, it found a much more receptive
audience. By the mid-1850s, every major continental power had
its own telegraph service, linked to the state and subservient to
its wishes.

Because these entities were public, they also had a host of
rules attached to their basic operations. Governments in most
European countries reserved the right to inspect messages sent
across their wires, censoring content that was deemed to be
offensive or injurious to the state. They forbade their citizens,
therefore, from transmitting messages in code or using unap-
proved foreign languages. They also developed elaborate sys-
tems of taxation, with tariffs based on the length of words, the
number of words, and the distance sent. Ironically, it was the
very complexity of the tariff system that often compelled users
to write their messages in a shorthand style, which then got
them into trouble with the restrictions on codes or foreign lan-
guage! Not surprisingly, public use of the telegraph remained
relatively rare in continental Europe.

Still, in Europe, as in the United States, the 1840s and 1850s
were a time of tremendous growth in telegraphy. From a past-
time of hobbyists, telegraphy expanded to become a major in-
dustrial enterprise, a “servant of commerce” in many respects.
Once again, however, the very success of the enterprise revealed
its flaws. In the States, these flaws were largely the result of what
Europeans might label “excessive competition”: there were

simply too many firms with too many different systems racing haphazardly after the same business. In Europe, the problem was that too many governments with too many differences were establishing separate networks. As of 1852, for example, every major European country had its own relatively sophisticated system, its own set of tariffs and transmission charges, and its own rules and prohibitions. (Not to mention, of course, its own unit of currency and its own language.) None of these systems was connected to, or even compatible with, its neighbor's. And so even when users were located close to one another, as in the various German or Italian states, they often had to rely on a hodgepodge of antiquated connectors, such as runners or horses or boats. Sending a telegram between France and its neighbor, the Grand Duchy of Baden, for example, required a veritable fleet of slow-moving intermediaries, described by one historian as follows:

[A]n employee of the Baden telegraph administration was posted in the telegraph office at Strasbourg. When a telegram arrived from France destined for Baden, the French clerk handed it to the Baden clerk, who translated it into German, carried it across the river, and retransmitted it on the Baden lines.29

The system worked, to be sure, but just barely.

Before long, such obvious inefficiencies led to demands for consolidation and connectivity. Users didn't care so much which system they used, or whose; they just wanted to send their messages as quickly and inexpensively as possible. As these demands made their way through the political systems of Europe, most states had a simple and intuitive response: they sat down with one another and signed agreements that provided, at least, for the free flow of messages across their borders. In 1849, Prussia and Austria took the first steps, providing for wire service between Berlin and Vienna. Under the terms of the agreement, government messages would have top priority on the new line, with telegrams from Austria going first on even days and those from Prussia taking the odd days. The rate due was a simple sum of the rates in both countries. This treaty was soon followed by similar agreements between Prussia and Saxony in 1849 and Austria and Bavaria in 1850. Later in 1850, Austria, Prussia, Saxony, and Bavaria forged the Austro-German Telegraph Union, a consolidation of their separate agreements. Other states, including the Netherlands, quickly joined as well.

Meanwhile, the basic idea behind the Austro-German union began to spread across Europe, revealing the underlying calculus of cooperation. By agreeing to a few common principles, nations (and their businesses) could reduce the emerging chaos of telegraph transmission and thus increase the efficiency of their communication. Like the members of Amos Kendall's proposed Magnetic "family," they could improve the market for everyone by linking their systems and standardizing their technology. Once this logic was made clear, telegraph agreements in Europe multiplied nearly as fast as the telegraphs themselves: France signed with Belgium in 1851, with Switzerland in 1852, and with Spain in 1854. In 1855, these countries formed the West European Telegraph Union, a clear copy of the Austro-German Union and a frequent, though informal, partner with it. France and Belgium also signed a separate convention with Prussia, agreeing to construct uninterrupted lines across international frontiers, to guarantee the secrecy of all information sent over the wires, and to provide efficient and reliable service, including refunds where necessary, to every potential customer. By 1861, eleven additional countries had signed on to this convention.

Together, this series of treaties and conventions helped to solve many of the problems that were already plaguing Europe’s early telegraph industry. Governments acknowledged the need to connect their various systems and to provide some baseline assumptions upon which users from across Europe could rely. But still communications did not flow easily or painlessly. Writing in 1869, one observer noted that:

The great impediment to [the telegraph's] early development was undoubtedly the high rate at which the tariff had been fixed. But, another obstacle, which acted as a restriction in its free use, consisted in the endless confusion in the transmission of international correspondence... [E]ach State, it appears, had views of its own in

regard to constructing and managing a line. In every corner of the country improvements were invented, suggested and consequently experimented on. There exists even to this very day an endless variety of patents for insulators and other appliances. Again, every State had a separate system of counting the number of words, fixing a message variously at 15 or 20 or 25 words, while others counted the address extra and so forth.30

Clearly, what was baffling this author and frustrating his contemporaries was the lack of what we today would call standards. In the mid-nineteenth century, entrepreneurs had used a breakthrough technology (electric signaling) to create an immediate commercial application. As commercial use of the technology increased, however, business users—indeed all users—began to suffer from the fact that this technology had sprouted up so quickly, so randomly, and so variably. Telegraphy, like the Internet, is inherently a long-distance medium: its value lies largely in its Superman-like ability to leap great distances in a single and relatively inexpensive bound. But because each of the regional systems had its own rules, the value of leaping was sharply reduced. If messages between France and Prussia still had to be carried across rivers and translated by hand, they didn’t save their senders as much as they should have. And if messages between London and Rome incurred high tariffs in each of the countries along the way, then they didn’t save their senders that much money. What the technology demanded was a common set of standards—rules that would apply across all transactions, reducing costs and providing users with a certain amount of predictability and stability.

In the United States, as shall be seen, standardization was largely the child of cooperation and consolidation. Firms came together to form private associations and hammered out their own sets of common standards. In Europe, by contrast, standardization was largely the work of the state.

In 1865, Napoleon III of France called an international conference on the telegraph, determined to push his European neighbors toward a more efficient international system. It wasn’t a particularly difficult goal. Indeed, there was a surprising consensus among European states that cooperation was essential in the world of telegraphy and that, in this arena at least, the individual demands of governments would have to bend before the benefits of coordination. Some states even took the logic a step further, arguing that technical cooperation on telegraphs would lead over time to political cooperation and perhaps even to peace. Accordingly, when the states of Europe sat down to discuss the technical details of telegraphy, they moved with a surprising speed and vigor. By the conference’s end, all the participating countries had agreed to adopt the Morse-style apparatus as their technical standard and employ the gold franc as their common currency. They all pledged to use blocks of twenty words as the standard for calculating costs and to formally codify their schedules of tariff and transit costs. Additional agreements covered the hours of operation for telegraph centers, the priority of messages (with government telegrams receiving top priority), and rules for the transmission and delivery of telegrams, for the maximum number of letters that a word could have, for counting words, and for collecting fees. Almost as an afterthought, the conference also created a new organization to oversee the rules it had just laid forth. Remarkably, this organization, the International Telegraph Union, is still alive today.

Like most international documents, those written at Napoleon’s conference have a dry and dusty feel. They reek of endless meetings and tactful compromises, of tedious technical provisions and carefully arranged sentences. Yet behind them stands a dramatic turning point in the history of the telegraph. Before 1865, telegraphy in Europe was still a motley collection of individual networks. It was perhaps somewhat tamer than in the United States, somewhat more manicured and more tied to diplomacy than to commerce. But it was still based on webs of independent systems and on competing, and complicating, sets of rules. After 1865, telegraphy in continental Europe settled down. There were still great battles to be fought and territories to be claimed, but these, for the most part, now stretched beyond Europe, across the Atlantic and down into Africa and

30Sauer, The Telegraph in Europe, pp. 11-12.
Asia. On the continent, telegraphy became more of an established industry, with rules and regulations that quashed much of the earlier uncertainty and helped to transform the telegraph from a technical oddity into a mainstream tool of communication and commerce.

**Crossing the Atlantic**

In 1858, Britain’s Queen Victoria sent a cable across the Atlantic to U.S. President Buchanan. In literary terms, it was not particularly interesting; diplomatically, it was irrelevant. But in the history of technology, the message was immense. And at the time, the very fact that it could be sent at all was seen as perhaps the most amazing thing on earth.

It is difficult, at the start of the twenty-first century, to capture the excitement that greeted this nineteenth-century moment. Until the very instant that Queen Victoria’s cable was received in Washington, the idea of transmitting messages under the ocean was widely dismissed as preposterous. “Fancy a shark or a swordfish transfixing his fins upon the insulated wires, in the middle, perhaps, of the Atlantic, interrupting the magic communication for months,” mused one critic. “What is to be done against the tides, when they deposit their floating debris of wrecks and human bodies? Even supposing you could place your wires at the lowest depth ever reached by plumb line, would your wires, even then, be secure?”

While governments on both sides of the Atlantic had entertained the idea of submarine communication, and even initially funded it, they quickly withdrew from the plan after a series of expensive and embarrassing failures. Meanwhile, many scientists still scoffed at the very idea of underwater transmission, and most entrepreneurs were unwilling to invest the time or capital that it would so obviously entail. And so while land-based telegraphs grew like so many weeds, underwater technology remained the stuff of dreams.

Then, in 1850, some of these dreamers actually set out to sea. The first were John and Jacob Brett, brothers from Bristol who were determined to string a cable beneath the English Channel. Without any formal scientific training, the brothers really didn’t know what they were doing, and their first foray was unpropitious. The thin wire they had dropped out from behind their boat had simply floated along behind them, and when they repeated the experiment with weights attached to the wire, a French fisherman pulled it out of his net and brought it home as seaweed. Yet the Bretts persevered, eventually raising money for a new, more sophisticated cable and enlisting the help of more seasoned engineers. In 1852, the brothers successfully sent a message from London to Paris.

Over the next few years, a slew of pioneers raced to lay cable along some of the world’s most strategic crossings: the Irish Channel, the North Sea, and the Mediterranean. These ventures incited even greater interest, and a newfound interest in subterranean lines. The problem, though, was that there clearly was a relationship between distance and transmission: the farther the distance, the more difficult it was to keep the cable whole and the signal distinct. For really long distances, such as across the northern Atlantic, there wasn’t even a boat large enough to carry the requisite cable. Many pioneers therefore moved on, especially since routes to Africa seemed more promising at the time. Then Cyrus Field got involved. Field, a thirty-three-year-old self-made millionaire, had just retired from the paper trade. He knew nothing about telegraphy and had never been interested in it. But like Cooke, and O’Rielly, and the Bretts, he saw the commercial prospects and drew the technology along.

In 1854, an English engineer named Frederic Gisborne came to New York looking for money. For several years he had been struggling, alone and without much support, to construct a telegraph line across Newfoundland, a barren and sparsely populated land with fierce winters and a desolate interior. On its own, Newfoundland was hardly an attractive market for telegraphy. But its location—at the eastern tip of America, stretching far out into the northern Atlantic—was strategic. If Gisborne could wire Newfoundland, he reckoned that he could receive information directly from ships sailing across the northern Atlantic, replacing Boston as the first port of call for information and cutting a day or two from the time it took messages to flow

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between New York and London. And in a world that had already become increasingly addicted to speed, time translated easily into money. With modest backing from Newfoundland’s legislature, Gisborne thus set out to construct a new line across Newfoundland and southward to Cape Breton, from whence messages could be transmitted across existing land lines. After nearly three years of intensive labor, he had managed to survey the territory and construct thirty or forty miles of road across it. Then he went bankrupt and, determined not to abandon the project, set sail for New York.

There he stumbled quite fortuitously upon Cyrus Field, who apparently was looking for something new to do. It’s not quite clear just who hatched the idea for an Atlantic cable. Gisborne claimed that this had always been his intention, but that fear of public ridicule had forced him quiet. Already, he argued, “I was looked upon as a wild visionary by my friends, and pronounced a fool by my relatives... [H]ad I coupled [the Newfoundland connection] with an Atlantic line, all confidence in the prior undertaking would have been destroyed, and my object defeated.” Field’s brother and biographer, however, asserts that the grandiose scheme belonged to Cyrus: “After [Gisborne] left,” he recalls,

Mr. Field took the globe which was standing in his library and began to turn it over. It was while thus studying the globe that the idea first occurred to him, that the telegraph might be carried further still, and be made to span the Atlantic Ocean... He cared little about shortening communication with Europe merely by a day or two, by relays of boats and carrier pigeons! But it was the hope of further and grander results that inspired him, and gave him courage to enter on a work of which no man could foresee the end.  

Bombast aside, the two men quickly agreed to work together and to stretch Gisborne’s plan all the way across the northern Atlantic to Valentia Bay, Ireland, a distance of nearly seventeen hundred nautical miles. Up until this point, no undersea cable had run successfully for more than three hundred miles, and nothing had ever been laid on a body of water as deep and unpredictable as the North Atlantic. Field, however, was not a man to let practical issues get in the way—especially since a handful of eminent innovators, including Morse, were becoming convinced that long-distance undersea transmission was at least theoretically possible. With a handful of other New York capitalists, Field thus proceeded to get the Atlantic operation underway. He hired electricians, compiled sea charts, and even convinced the British and American governments to back his project with an annual subsidy and to provide the vessels that would be necessary to lay the Atlantic cable. In exchange, Field promised that his new firm, the Atlantic Telegraph Company, would carry all official messages for free. Thus was the transatlantic link an appropriate hybrid of American and European development styles: private entrepreneurship backed—only in part—by public money.

In retrospect, Field’s Atlantic cable was a technical disaster. It broke several times during installation, had a close encounter with a large whale, and then, less than a month after its triumphal inaugural, slowly ground to an unintelligible gurgle. Yet, somehow, it didn’t really matter. Queen Victoria had, in fact, sent a telegram to President Buchanan. He had telegraphed back. And Cyrus Field had proven that it was both technically and commercially possible to wire the seas. On both sides of the Atlantic, there was profound jubilation and a newfound sense that technology could cure the ills of mankind. As one contemporary history of the telegraph crowed: “The completion of the Atlantic Telegraph, the unapproachable triumph which has just been achieved in the extension of the submarine electric Cable between Europe and America, has been the cause of the most exultant burst of popular enthusiasm that any event in modern times has ever elicited. So universal and joyful an expression of public sympathy betokens a profound emotion that will not immediately pass away. The laying of the Telegraph Cable is regarded, and most justly, as the greatest event in the present century...”

33 Field, History of the Atlantic Telegram, pp. 26–27.
34 Briggs and Maverick, The Story of the Telegraph, p. 11.
one hundred guns were fired on the Common and the city's bells rang out for an hour; in New York, massive celebrations culminated with a torch-lit parade that accidentally set City Hall on fire.

Just as with the telegraph conference of 1865, the sentiment that surrounded the Atlantic cable had a distinctly political and utopian hue. Analysts saw a technological revolution and presumed it would provoke a positive political reaction; they truly believed that the ability to communicate would reshape the political order, easing national rivalries and causing states to come together in some seamless electronic cocoon. Soon, predicted some of these prophets, “the whole earth will be belted with the electric current, palpitating with human thoughts and emotions.”35 It would become, promised another, “the nerve of international life, transmitting knowledge of events, removing causes of misunderstanding, and promoting peace and harmony throughout the world.”36 And they prophesied: “How potent a power, then, is the telegraphic destined to become in the civilization of the world! This binds together by a vital cord all the nations of the earth. It is impossible that old prejudices and hostilities should longer exist, while such an instrument has been created for an exchange of thought between all the nations of the earth.”37 The parallels to some current strands of cyber-speak are too blatant to ignore.

In many ways, the crossing of the Atlantic (even with faulty technology) brought the technology of telegraphy into mainstream life. Before this point, telegraphy had still been a fairly restricted tool. Some businesses used it extensively; governments relied increasingly upon it; but the vast bulk of citizens, both in the United States and Europe, were still somewhat suspicious of the “lightning” and not entirely sure what it meant for them. Throughout the 1850s, stories still proliferated about people who tried to send food through their local telegraph offices or thought men delivered telegrams by running along the wires. The Atlantic cable changed that. Suddenly, the technology ripped

into popular consciousness and became too big to ignore. It was technology as symbol, technology as power to change the social structure—even the world. “This,” proclaimed one U.S. senator, “is a triumph of science—of American genius, and I for one feel proud of it, and feel desirous of sustaining and promoting it.”38 Once again, the parallels to cyberspace ring clear.

Eventually, of course, the fervor that surrounded the Atlantic cable died down—not because it didn’t work at first, but rather because it had, in fact, become mainstream. By the time Cyrus Field strung a second (and much improved) line across the northern Atlantic, businesses on both sides of the ocean simply presumed that they couldn’t function without it. On its first day of operation, the new cable generated the princely sum of £1,000. And by 1867, just thirteen years after its launch, the Atlantic Telegraph Company was able to pay off all its debts.

Ruling Britannia

It would be tempting to end the tale of telegraphy at the spanning of the Atlantic, for it is here that the story is at its wealthiest, brawniest peak. But just as Field and his associates were reaping the proceeds from their venture, and as telegrams were becoming a vital component of social and commercial intercourse, political objectives slammed back onto the scene, and governments—in both the United States and Europe—began to play an expanding role in the telegraph industry.

As one might expect, political intervention proceeded along different paths on the two continents and manifested itself in very different forms. But as the nineteenth century drew to a close, nearly all governments were heavily involved with telegraphy.

During the 1850s and 1860s, European governments had primarily been occupied with domestic affairs, struggling to maintain their authority in the face of a revolutionary enthusiasm that swept across the continent. Nationalism became a potent force during this period and, once the radicals had been defeated,

36Edward Thornton, British Ambassador, quoted in Standage, The Victorian Internet, p. 91.
37Briggs and Maverick, The Story of the Telegraph, p. 22.
38Senator Benjamin of Louisiana, quoted in Field, History of the Atlantic Telegraph, p. 128.
helped newly emboldened leaders to cement the growing power of the state. This trend culminated, in 1871, in the scattered states of north central Europe joining to form Germany, and creating a sudden power at the very center of Europe. They were followed in due course by the Italian states, which formed a union of their own along Europe’s southern flank. Meanwhile, around the periphery of Europe the tussle for colonial possessions in Africa had erupted into a full-scale race, with states vying to control ever-growing slices of the world’s southern regions. Suddenly, politics in Europe became a fluid, fast-moving game—the perfect arena for high-speed telegraphy. And European governments, which had scoffed not so long ago at telegraphy’s prospects, now wanted wider networks and enhanced control.

Until this point, Britain’s relationship with the telegraph industry was marked by a certain degree of schizophrenia. The government was not involved with Cooke and Wheatstone’s early projects and had rejected the Bretts’ request to subsidize an Atlantic crossing. They resisted supporting the systems that quickly spread across the island and thus were not even present at the 1865 international convention. Yet neither was the government totally aloof from the telegraph industry or unconcerned about its development. As the American government had with Morse, they did eventually subsidize a portion of Field’s first foray across the Atlantic and then, on their own, provided backing for an equally ambitious Red Sea cable. When both these ventures ended in failure, the British government vowed never again to allocate public money for the pursuit of undersea telegraphy. But, nearly at the same time, it also moved to extend its control over land-based networks and, somehow, to construct a link to India.

In 1868, the government of Britain formally announced its intention to nationalize the telegraph infrastructure of the British Isles. It was a contentious move that drew the ire of industrialists across the country. The government’s perspective, though, was

that the telegraph had simply become too important to be left in private hands. It was a public service and a natural monopoly, something akin to the post office and best organized along similar lines. And, as the Chancellor of the Exchequer explained, “The cost of working the telegraph system is greater than it would be in the hands of the State. If telegraphing were made the monopoly of the post office it would be able to work at much lower rates than the companies.” To compensate investors, the government spent £8 million—funds that, in many cases, were reinvested in subsequent overseas projects.

It was India, though, that really captured British policy and contributed to its schizophrenia. Since the early years of the nineteenth century, India had been the obvious focus of England’s expanding colonial realm—the famous “jewel in the crown” that provided the empire with resources, trade routes, and an inestimable dose of prestige. To maintain relations with this far-flung possession, Britain traditionally had relied on a combination of arm’s-length measures: on mastery of the ocean corridors that linked the British Isles with India, on diplomacy with those states (such as Persia) that lay between Britain and India; and on the bureaucratic might of the British East India Company. Together, these measures had proven quite effective, allowing the British government to administer the Indian subcontinent from afar. But in a world of shrinking times and distances, the traditional routes began to feel too sluggish. Britain wanted to wire India, and to ensure that this Indian network was firmly and securely connected to London. As Lord Dalhousie, Governor General of India, complained in 1852:

Everything, all the world over, moves faster now-a-days than it used to do, except the transaction of Indian business. What with the number of functionaries, bards, references, correspondences, and several Governments in India, what with the distance, the reference for further information made from England, the fresh correspondences arising from that reference, and the consultation of the several authorities in England, the progress of any

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great public measure, even when all are equally disposed
to promote it, is often discouragingly slow.\textsuperscript{41}

To hasten matters along, Dalhousie authorized a local inven-
tor, William O’Shaughnessy, to build a five-thousand-kilometer
network linking Calcutta, Agra, Bombay, Peshawar, and Madras.
Despite a whole series of technical challenges posed by build-
ing in the tropics—termites tended to eat wooden poles, for
example, and monkeys attacked copper wires—construction con-
tinued apace, and by 1856 India had seventy-two hundred kilo-
metros of telegraph line and forty-six telegraph offices.\textsuperscript{42} Even
before the system was completed, Dalhousie converted it to a
government monopoly, making clear his opinion that the tele-
graph was almost purely an instrument of political control.

Politically, though, the Indian network suffered from a critical
flaw: there was no high-speed link to London. Just how serious
this gap was became evident in 1857, when rebellion broke out
across the north of India. From Lucknow, Sir Henry Lawrence,
an official with the British East India Company, sent an urgent
telegraph to the governor general in Calcutta.\textsuperscript{43} “All is quiet here,”
he reported, “but affairs are critical; get every European you can
from China, Ceylon, and elsewhere; also all the Goorkas from
the hills; time is everything.”\textsuperscript{44} This hasty message arrived
in Calcutta on May 10 and reached Bombay on May 27. From
there, it was rushed on a steamer bound for Suez and then
shipped from Alexandria to Trieste, from whence it finally was
telegraphed to London. The journey had taken forty days—time
enough for Lawrence to die of cannon wounds and for large
parts of India, including Calcutta and Delhi, to spin out of British
control. Parliament needed no further convincing. When the
Red Sea cable failed the following year, leaving the government
with roughly £1,800,000 in losses, policymakers scurried to find
some other means of securing a direct line to India. All of these

d\textsuperscript{41}Quoted in Sir William Brooke O’Shaughnessy, The Electric Telegraph in British India: A
Manual of Instructions for the Subordinate Officers, Artificers and Signallers Employed in the
Department (London, 1855), pp. 21-22, and reproduced in Headrick, The Invisible
Weapon, p. 51.
\textsuperscript{42}Headrick, The Invisible Weapon, p. 52.
\textsuperscript{43}Quoted in Headrick, The Invisible Weapon, p. 19.
\textsuperscript{44}Parliamentary Papers 1866 (428) IX, pp. xv-xvi. Also cited in Headrick, The Invisible
Weapon, p. 22.
were best left to private investors. This, as it turned out, was a very wise move. For in the early 1870s, two private firms rose to the challenge and independently constructed full-scale, integrated lines between the Indian subcontinent and continental Europe. Werner von Siemens, a powerful Prussian industrialist, built an overland line from London to Teheran operated solely by company employees (no prying foreign clerks!) and dedicated to Anglo-Indian communications. Then John Pender, a British investor, built a series of three undersea lines connecting England to Malta, Malta to Suez, and Suez to Bombay.

In the history of telegraphy, John Pender stands as one of the most powerful and influential players. Like Cooke, Field, and O'Rielly, he was a true pioneer, wrestling technology out of the laboratory and forcing it into the commercial realm. He built an international empire, one that at its peak stretched nearly as far as Britain's own and was instrumental in keeping this more formal empire afloat. Pender was also a man blessed with a finely tuned sense of politics and of his own political power. In the end, the rules of British telegraphy became his rules, and they worked to advance a finely tuned set of commercial and imperial goals.

Pender started life as a cotton merchant, rising from the middle classes of Scotland to earn a considerable fortune from both trade and speculation. In his thirties he began, like other wealthy industrialists at the time, to dabble in the burgeoning but high-risk business of telegraphy: he was an early investor in the English and Irish Magnetic Telegraph Company and contributed £1,000 to Field's first transatlantic project. Unlike many of these other early investors, though, Pender decided to move all of his assets into the world of telegraphy. When Field's first project failed, Pender became a moving force behind the second attempt, eventually being named a director of the Atlantic Telegraph Company and committing £250,000 of his own money to the next round of experimentation. When the Atlantic cable at last went through, Pender decided to take his experience to the other side of the world and to again pursue Britain's objective of an undersea connection to India. Thus in 1869 he launched a new company, the British-Indian Submarine Telegraph Company, with the ambitious goal of laying a cable from Suez through the Red Sea and then on to Aden and Bombay. Before this project was even underway, Pender launched a second company, the Falmouth, Gibraltar and Malta Telegraph Company. He then added a third (the Marseilles, Algiers and Malta Telegraph Company) and a fourth (the China Submarine Telegraph Company). Clearly the man intended to wire the world.

Over the next twenty years, John Pender built one of the largest commercial enterprises the world has ever seen. His consolidated firm, the Eastern Telegraph Company, controlled at its peak more than a hundred thousand kilometers of cable strung across India, Australia, and Africa. A subsidiary, the Western Telegraph Company, controlled large swaths of the Latin American market. Although there were other immensely successful telegraph firms, and even other immensely successful British ones, Eastern was in many ways the core of Britain's overseas network, the eyes and ears of the empire. Yet it was also throughout this time a completely private, hugely profitable firm. Unlike the national telegraph service or the British-Indian network, the Eastern Company wasn't tied to the British government in any way or hobbled by any particular regulatory restraints. It didn't seem to obey any rules but its own, or to follow any guidelines other than those dictated by its own self-interest. Rather, on the surface at least, Eastern looked like a devously independent firm, free from either government intervention or political motive.

If one probes more deeply into Eastern's structure and conduct, however, a different picture begins to emerge. Yes, Eastern was a private firm, and an immensely profitable commercial enterprise. But it also worked very closely—at times almost suspiciously closely—with the British government.

Part of this connection was purely personal. Having been elected to Parliament in 1872, Pender was himself a part of government, and he socialized frequently with Britain's political...
Ruling the Waves

elite. He also appears to have mixed social and political desires freely, asking commercial favors from high-placed political friends and peopling his corporate boards, as one historian has noted, with a “disproportionate number of aristocrats with connections in the Foreign Office and the Colonial Office.”

Pender maintained an active correspondence with officials in various arms of the British government, and seems to have had no qualms about securing their aid and support.

The real connections, however, ran even deeper and related to the fundamental mission of Pender’s company. At one level, of course, Pender was nothing more than a successful entrepreneur. He built a big business, made lots of money from it, and then used his resources to facilitate an entrepôt to Britain’s commercial and political elite. At another level, however, Pender’s business was itself a political enterprise, and one that provided the British government with a key set of services. Merely by running his own business empire, Pender was keeping global communications in British hands and in impeccable working order. He was supplying the British government with a crucial communications infrastructure—a system that stretched to all corners of the British Empire and allowed British diplomats to communicate in their own language, at reasonable cost, and with only minimal fear of unfriendly eavesdropping. Using Eastern’s backbone, British officials could communicate faster and more securely than any of their rivals across a network whose reach surpassed any other on earth. Indeed, by the end of the nineteenth century, as Tables 2.1 and 2.2 show, two-thirds of the world’s cables were British, and nearly 80 percent of these belonged to Eastern and its affiliates.

Presumably, Pender didn’t build his global network to wrest favors from the British government; he did it to realize a vision, or reap munificent profits, or some combination of both. But once the network was in place, Pender had a significant amount of political leverage, most of which he appears to have used to keep foreign competitors from encroaching on his markets. An 1897 letter from the Treasury Chambers of the British government to the Under Secretary of State at the British Colonial Office makes this relationship quite explicit. It concerns a proposed telegraph between Canada and Australia and is worth quoting at length:

Reference has already been made in general terms to the competitive character of the new undertaking. But there is one aspect of this competition to which My Lords wish to draw special attention.

Almost the whole of the traffic which will pass over the Cable will have to be won from the Eastern Extension Telegraph Company and its allies.

Those companies represent a real British interest, and one entitled to great consideration from the Imperial Government. They have been the pioneers of Cable communication with the most distant parts of the Empire, and it is to their enterprise and skill that the establishment of those communications is due.

In times of emergency they have always been ready to render to the Government any services which were in

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<table>
<thead>
<tr>
<th></th>
<th>Number of cables</th>
<th>Length (km)</th>
<th>Percent of world total</th>
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<tr>
<td>British cables</td>
<td>508</td>
<td>165,619</td>
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<td>American cables</td>
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<td>French cables</td>
<td>74</td>
<td>21,859</td>
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<tr>
<td>Danish cables</td>
<td>82</td>
<td>13,201</td>
<td>5.3</td>
</tr>
<tr>
<td>Other</td>
<td>335</td>
<td>9,206</td>
<td>3.7</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>1,226</td>
<td>246,871</td>
<td>100.0</td>
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TABLE 2.2 Private Undersea Cables in 1892

<table>
<thead>
<tr>
<th></th>
<th>Number of cables</th>
<th>Length (km)</th>
<th>Percent of world total</th>
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<tr>
<td><strong>Eastern and Associated Companies</strong></td>
<td></td>
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<tr>
<td>Eastern Telegraph Co.</td>
<td>117</td>
<td>50,843</td>
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<tr>
<td>Eastern Extension</td>
<td>27</td>
<td>13,597</td>
<td>5.5</td>
</tr>
<tr>
<td>Eastern and South African</td>
<td>12</td>
<td>12,358</td>
<td>5.1</td>
</tr>
<tr>
<td>Brazilian Submarine Telegraph Co.</td>
<td>6</td>
<td>13,647</td>
<td>5.5</td>
</tr>
<tr>
<td>West African Telegraph Co.</td>
<td>12</td>
<td>5,594</td>
<td>2.3</td>
</tr>
<tr>
<td>African Direct Telegraph Co.</td>
<td>7</td>
<td>5,086</td>
<td>2.1</td>
</tr>
<tr>
<td>Western &amp; Brazilian Telegraph Co.</td>
<td>10</td>
<td>7,341</td>
<td>3.0</td>
</tr>
<tr>
<td>West Coast of America Telegraph</td>
<td>7</td>
<td>3,147</td>
<td>1.3</td>
</tr>
<tr>
<td>Black Sea Telegraph Co.</td>
<td>1</td>
<td>624</td>
<td>0.3</td>
</tr>
<tr>
<td>River Plate Telegraph Co.</td>
<td>3</td>
<td>256</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>202</strong></td>
<td><strong>112,721</strong></td>
<td><strong>45.8</strong></td>
</tr>
<tr>
<td><strong>Other British Companies</strong></td>
<td></td>
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<tr>
<td>Direct Spanish Telegraph Co.</td>
<td>4</td>
<td>1,311</td>
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<tr>
<td>Halifax and Bermudas Cable Co.</td>
<td>1</td>
<td>1,574</td>
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<tr>
<td>Spanish National Submarine</td>
<td>7</td>
<td>3,098</td>
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<td>Anglo-American Telegraph Co.</td>
<td>14</td>
<td>19,261</td>
<td>7.8</td>
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<td>Direct United States Cable Co.</td>
<td>2</td>
<td>5,741</td>
<td>2.3</td>
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<td>Cuba Submarine Telegraph Co.</td>
<td>5</td>
<td>2,778</td>
<td>1.1</td>
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<tr>
<td>West India &amp; Panama Telegraph</td>
<td>22</td>
<td>8,440</td>
<td>3.4</td>
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<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>55</strong></td>
<td><strong>43,103</strong></td>
<td><strong>17.3</strong></td>
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<tr>
<td><strong>Total of British Companies</strong></td>
<td><strong>257</strong></td>
<td><strong>155,824</strong></td>
<td><strong>63.1</strong></td>
</tr>
<tr>
<td><strong>Non-British Companies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great Northern Telegraph (Den.)</td>
<td>27</td>
<td>12,838</td>
<td>5.2</td>
</tr>
<tr>
<td>Cie. Fr. Du Télégrafe Paris</td>
<td>4</td>
<td>6,475</td>
<td>2.6</td>
</tr>
<tr>
<td>Soc. Fr. Des Télégraphes Sous-Marins</td>
<td>14</td>
<td>6,953</td>
<td>2.8</td>
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<tr>
<td>Western Union Telegraph Co.</td>
<td>8</td>
<td>14,340</td>
<td>5.8</td>
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<tr>
<td>Commercial Cable Co. (U.S.)</td>
<td>6</td>
<td>12,849</td>
<td>5.2</td>
</tr>
<tr>
<td>Mexican Telegraph Company (U.S.)</td>
<td>3</td>
<td>2,821</td>
<td>1.1</td>
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<tr>
<td>Central &amp; South American Tel. Co.</td>
<td>10</td>
<td>8,997</td>
<td>3.6</td>
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<tr>
<td>Canadian Pacific Railroad Co.</td>
<td>5</td>
<td>78</td>
<td></td>
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<tr>
<td><strong>Total of Non-British Companies</strong></td>
<td><strong>77</strong></td>
<td><strong>65,350</strong></td>
<td><strong>26.3</strong></td>
</tr>
<tr>
<td><strong>Total of All Private Companies</strong></td>
<td><strong>334</strong></td>
<td><strong>221,174</strong></td>
<td><strong>89.4</strong></td>
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</table>

Source: Adapted from Headrick, *The Invisible Weapon*, p. 38.

their power; and the advantages which have been secured from their cooperation could not in many cases have been obtained from any other body or in any other way.

It is therefore a matter of no small importance that the Government should continue to maintain friendly relations with them.

But this could hardly be expected if the Government were to take an active part in the establishment of a cable in direct competition with the Eastern Company's system...

This competition would not only result in the diversion of traffic from a British Company to an undertaking which would be largely in Colonial hands; but it seems likely that some of the diverted funds would be held to swell the receipts of a foreign company... It should also be borne in mind that any reduction in the gross receipts of the Eastern Telegraph Company might make it more difficult for the latter Company to reduce its rates to India...

So no help should be rendered to any potential competitor to Eastern. Likewise, when British settlers in South Africa began to clamor for a land line from the Cape Colony to Khartoum, Pender instead proposed a submarine cable from Durban (on the east coast of South Africa) up through Zanzibar and Mozambique. After eight hundred British soldiers were killed in eastern South Africa by members of the Zulu tribe in 1879, the Colonial Secretary accepted Pender's offer and even agreed to subsidize the African submarine cable. Several years later, Pender won a similar bid for cable stretching between the Cape Verde Islands and Accra, this time because his lone competitor was linked, according to the Colonial Office, "rather too closely...to a Spanish-owned cable company." Again and again this pattern was repeated. Pender went wherever the British government needed cable to go and once he was there, the government was happy to protect him.

It was, to be sure, a rather odd relationship. Eastern was a distinctly private enterprise, and an enormously successful one. Upon his death in 1835, John Pender left a company with a share capital of £6 million and assets that spanned the globe. Pender had never worked for the British government, nor even worked with them in any formal sense. Yet his assets were also Britain’s; and it was on the back of these assets, together with her own growing naval power, that Britain maintained control over her far-flung empire. Unlike the situation in the early United States or Europe, there was little confusion in the British cable realm over how to connect the lines or determine rates. There was only one set of rules, and they all belonged to John Pender.

**Stateside Rules**

In the closing years of the nineteenth century, there was only one other telegraph company in the world that looked anything at all like the Eastern Telegraph Company and that had anything like Eastern’s clout or capital or global reach. Its name was Western Union, and it emerged from a wholly different process. While Eastern had grown as an accepted monopoly, Western Union was a scrappy upstart. While Eastern was the product of naval expansion and military needs, Western was the child of landlocked railroads and commercial demands. Eastern’s prominence was an accepted thing, supported by the British government and respected by would-be competitors. Western Union’s, by contrast, was highly contentious, scorned by competitors and nearly destroyed by government dictate. Yet in the end the two firms were remarkably similar. Each shaped the rules that surrounded their industry and then built an empire upon them.

Western Union wasn’t one of the original telegraph firms. It had no great founder or innovator at its helm, no breakthrough technology in its pocket. It arose, rather, from the chaos that had engulfed the U.S. telegraph industry by the early 1850s and the consequent need for some kind of order and stability.

In 1853, when telegraph rivalries and lawsuits were spinning out of control, Amos Kendall invited all the Morse-related companies to a grandly dubbed American Telegraph Convention. At this time, competition among the young American firms was threatening the livelihood of many lines and casting a sinister shadow across the entire industry. Fights between rival operators and systems had become front-page news, as editors gleefully took sides in commercial races and customers lined up, like fans, to support “their” telegraph company. Battles were pitched, and occasionally even described in military terms. “My men are well armed,” one rival reported to Morse, “and I think they can do their duty.” Meanwhile, messages transmitted across the lines were routinely garbled, lost, or “delayed,” and customers were growing frustrated.

Kendall’s 1853 Telegraph Convention was designed to ease these problems, at least among the Morse companies. By coming together, Kendall reasoned, these firms could standardize their business practices and ease the flow of information along their lines. In the process, they could also become more competitive. It was the same logic that Kendall had been preaching since his earliest days with Morse, only couched now in a different kind of language and approached through a different kind of organization.

Kendall held his convention, appropriately enough, in Washington, D.C. Sixteen firms attended, and after several days they agreed to lay out some common rules of engagement, including rights of priority among messages, standardization of signals and abbreviations, and the mutual responsibilities that the lines had to each other. They formalized certain language (such as “OK” rather than “II” to signify a correct message) and dealt with the complicated issues of tariffs and rate-cutting. The firms also agreed to come together as the American Telegraph Confederation, and to elect an executive committee that would pursue the interests of the telegraph industry as a whole. This, as it turned out, was the first formal movement toward consolidation.

Meanwhile, as Kendall and his colleagues were inching slowly toward cooperation, a new form of consolidation was emerging from the West. In 1851, a group of Rochester investors had formed the New York and Mississippi Valley Printing Telegraph Company. It was one of the dozens of telegraph firms
emerging at that time, and nobody paid it much interest—including potential investors. By 1854, short of funds and running out of time, the company was looking for some other way to enter the telegraph industry. At this point, Hiram Sibley, a former sheriff who had cast his fortune with the company, decided that rather than construct new telegraph wires, he would simply buy up all the telegraph firms that were already dying across the New York and Great Lakes region. To investors, this was further foolishness—proof, indeed, that there was no money to be made from telegraphy. When one friend at last agreed to lend Sibley money, he apparently did so only under a promise of great secrecy. "I'll loan you $5000," he said. "[T]hat means give it to you, for you'll lose it, of course—but you are never to tell that I was such a fool. I believe in you, Sibley, but I don't believe in this telegraphy."

Sibley, though, did believe—not only in telegraphy, but also in the power of consolidation. Like Kendall, he saw that telegraphy would be profitable only once it was organized and orderly. He just chose to go about this organization in a very different way. With only $90,000 in subscribed capital, Sibley began to lease, and then buy, the lines of faltering telegraph firms. First he took the Lake Erie Telegraph Company, weakened by competition with the Erie & Michigan, after which he took the Erie & Michigan itself. He then changed his company's name to the Western Union Telegraph Company and proceeded to buy others' telegraph lines, often for pennies on the original dollar. As Western Union grew, even more prosperous companies quickly came under its sway, joining with Sibley's firm to prevent him from buying a formerly weak competitor. By the time the Civil War broke out in 1861, Western Union's system stretched from the eastern seaboard across to the Mississippi, and from the Great Lakes southward to Ohio.

By this point, Kendall and Morse felt their American Telegraph Confederation to be under direct attack from Sibley and Western Union. And it was. Already, several of the major Morse firms (including Cornell's) had joined with Western Union, adding to its power and weakening the earlier and looser confederation.

Meanwhile, another pioneer had emerged from along the coast. Flush with the prospects of his Atlantic telegraph, Cyrus Field was beginning to hatch an even bigger dream: a telegraph empire that would link directly to the commercial centers of the eastern United States. In 1855, just as his Atlantic Telegraph Company was beginning to lay cable across the Gulf of St. Lawrence, Field also launched the American Telegraph Company, planning to forge the two systems into an all-embracing transcontinental network. While others in the industry still doubted Field's ability to cross the Atlantic, they didn't doubt the strength of his vision. If Field could cross the ocean, and if he could link his oceanic line to a land-based system, he would control the most powerful communications network in the world. This prospect was simply too much for the others to bear—and too expensive for them to compete against. And thus, nearly two decades after Kendall and Morse first touted the benefits of cooperation, the major U.S. telegraph companies decided to blunt the edges of their brutal competition. It wasn't that they no longer liked the competition, or that anyone forced them to the negotiating table. Instead, they simply decided that the costs of competition had become too steep.

In 1857, representatives of four U.S. telegraph companies—the New York, Albany & Buffalo; Atlantic & Ohio; Western Union; and New Orleans and Ohio—met with American Telegraph to agree on joint procedures and rules for competition. Conspicuously absent from the meeting were some of the older telegraph pioneers such as Morse and Kendall, largely due to the personal bitterness that years of competition had bred. Ironically, it had been Kendall, once again, who had pushed for the meeting and urged his competitors to "devise a plan for harmonizing all interests and protecting existing lines." But when the actual plan was laid out, Kendall—"Amos the pious" to his rivals—was explicitly excluded. The new generation of empire builders, it seemed, had no further patience for the aging pioneers.

Shortly after the initial round of meetings, a sixth company
(the Illinois & Mississippi) was drawn into the alliance and a formal "Treaty of the Six Nations" formed. Its terms were stunning. Henceforth, each participating wire company was to be the sole provider of telegraph services in a particular area of the country. Western Union, for example, was given the exclusive right to provide telegraph services to Ohio, Indiana, Michigan, most of Wisconsin, and some smaller sections of the east coast. American won the rights to nearly the entire eastern seaboard, and the other firms split key portions of the Midwest and South. All parties to the contract agreed not to compete in each other's territory and to submit any commercial disputes before an impartial arbitration panel. As a final part of the deal, the costs of patents for a new breed of telegraphy, the Hughes system, were to be shared among all members of the group.

The implications of this alliance were profound. It took six of the nation's most prominent firms and brought them into a formal and tightly regulated association. It demanded that these firms renounce competition in favor of cooperation, and bound them to a series of specific, enforceable rules: rules on territory, on expansion, and on patent rights. Most notably, after years of rivalry and fragmented growth, the Treaty of the Six Nations aimed at coordinated, direct control over the U.S. telegraph industry. As Robert Thompson, an insightful historian of the industry, notes: "[T]he new alliance aimed at nothing less than a monopoly of the nation's telegraph business..."[3]

Of course, industry insiders such as Kendall and Morse saw these implications as well, and were predictably outraged. In 1857, members of the Magnetic Board (the old conglomerate of Morse companies) decided to renew their alliance and wage an all-out commercial war against the Six Nations. In a remarkable role shift, they planned to compete directly and ferociously with their new rivals, building a second cable line between the major cities of the east coast, as well as a new cable between Europe and North America. The group also intended to lay a series of connecting lines across the South. Their attitude was uncompromising; in an 1857 letter to Morse, Kendall wrote, "I feel a zeal to punish this perfidy even if my own interests suffer in the process."[4]

While the Six Nations were larger by this point than the Morse group, and considerably more powerful, they still did not cherish the prospect of an expensive and draining competition. So they pursued cooperation with the fervor that had once belonged to Morse and Kendall, floating a series of peace proposals in 1858 and offering to buy patent rights and lease lines directly from Magnetic. Kendall and Morse, though, would not be appeased. Together with the ever-stubborn Smith, they continued to extend their lines and demand exorbitant prices for any possible settlement. Finally, after months of fruitless negotiation, it became clear that the only workable solution was an outright merger between the Magnetic Company and the Six Nations. On October 12, Field's American Telegraph Company, acting on behalf of the North American Telegraph Association, purchased all the patent rights, stocks, and claims of the Morse patent holders. For all practical purposes, there was now only a single organization running the U.S. telegraph industry.

By 1860, then, the situation in the United States was oddly parallel to that of Europe. The anarchy and enthusiasm of earlier days was almost entirely gone, replaced by rules and institutions and a handful of powerful firms. In Europe, most of the key institutions were linked closely to the state: they were the ITU and the state-run companies and the protocols they had hammered out together. In the United States, by contrast, all the firms and nearly all the rules were completely, wholly private. And yet the functions they performed and the ways they behaved were startlingly similar. Across both continents, the leaders of telegraphy had realized—slowly, perhaps, and only after a painful dose of trial and error—that chaos in this business simply didn't work. If there were too many small firms in the industry, or too many competing connections, communication was stymied and commerce halted. To be successful, telegraphy needed to rest on a common set of rules and standards:


there had to be easy and reliable connections between various lines, cheap and predictable rates across the entire system, and a shared language. If "OK" meant "yes" on one line, it had to mean "yes" on all connecting lines. Otherwise, the message might easily be garbled to the point of inefficiency.

In a characteristic split, the Americans and Europeans chose to solve these problems in very different ways. The Europeans defined the problem in terms of broader goals—what telegraphy could do for society, what it meant for diplomacy or the military—and generally abandoned market solutions in favor of the state. Where there were private firms in Europe, such as Pender's Eastern Telegraph, they were closely tied to the state and generally responsive to its demands. In the United States, by contrast, the government withdrew from the market in its earliest stages, leaving the field wide open to self-funded pioneers such as O'Rielly, Field, and Sibley. Compared to Europe, there was relatively little concern for public service in the United States, and little interest in telegraphy's public uses. Instead there was an implicit belief that private firms would themselves solve the coordination and regulation problems that were destined to befall their industry. Which they did.

The upshot of this solution, though, in both Europe and the United States, was the emergence of a select group of very powerful companies. In Britain, of course, it was Pender's Eastern Telegraph; in the United States, it became over time Western Union. This was not a wholly predictable outcome, since in 1858, when the Six Nations absorbed the old Morse system, it looked as though Cyrus Field's American Telegraph Company was destined to be the power behind American telegraphy. But the Civil War intervened in 1861 and, as luck would have it, most of Field's assets were strung north to south across the warring states. Western Union, with lines that ran primarily east to west, was in a much safer position. It emerged from the war unscathed and soon became the leading contender for monopoly control. In 1864, Western Union controlled roughly forty-four thousand miles of wire and had a capital stock of $10,066,900. Just one year later, buoyed by an almost insatiable demand for its stock, its capital had risen to $21,063,400. "Nothing else in all business history," one writer proclaimed, "is comparable to the mushroom expansion of this company's capital." Between 1857 and 1867, it grew by roughly 11,000 percent. Meanwhile, the other American companies were groping to find some means of accommodation with this growing giant. But there weren't any. In 1866, Western Union absorbed the United States Telegraph Company (a wartime upstart that had enjoyed a brief meteoric rise) and then merged with the American Telegraph Company. It now possessed a network of nearly one hundred thousand miles of wire and a capital stock of over $40,000,000.

Such size, clearly, had its rewards. Like the Eastern Telegraph Company, Western Union by the 1860s was a company to be reckoned with. It had a virtual empire under its control, and the power to impose its own rules upon customers and competitors alike. Freed from the bloody competition that had marked its earliest years, Western Union was now making a huge profit: its net receipts in both 1867 and 1868 were nearly $3 million. Its founders had reaped tremendous rewards, and early investors built monuments that littered the outskirts of Rochester—Cornell University, for example, was the bequest of Ezra Cornell, who had abandoned the Morse group early on to cast his fortune with Sibley. But size, as the company was about to discover, also has its disadvantages. Once Western Union became a commercial behemoth, it began to draw the scrutiny that thus far had escaped the telegraph industry. It became the topic of opposition and of politics. And it began to be subjected to a whole new range of rules.

**Attack on the Union**

Ever since the U.S. Congress withdrew from Morse's Baltimore–Washington line in 1845, the telegraph industry in the United States had been resolutely private. While Congress had passed a number of laws regarding telegraphy (prohibiting vandalism on lines, for example, and promoting

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59Harlow, Old Wires and New Waves, p. 259.
the secrecy of messages), its basic position toward the industry had been one of friendly, hands-off support. There was little concern under U.S. law for the social implications of telegraphy, or the military potential, or even the commercial development, of telegraph firms. Instead, Congress’s only mission was to protect the property that surrounded telegraphy: the patent rights of the technology and the sanctity of physical assets. It was a standard laissez-faire approach, and one that facilitated the frontier spirit of the early telegraph pioneers.

The first crack in this cheerful veneer came during the Civil War, when governments in both the North and South seized telegraph offices and used their facilities for the duration of the war. An even larger crack, though, came after the war, when the undeniable force of Western Union became, for the first time, a subject of popular concern. Suddenly, average citizens were worried that the company had too much power, that it controlled the newspapers and the nation’s budding communication industry.\(^\text{57}\) They worried about links to the railroads and the financial prowess of Wall Street. They worried—in a chorus that repeats across the technological frontier—that this firm had simply become too big and too profitable. And this, apparently, was not a good thing. By the late 1860s, segments of popular opinion had moved harshly and aggressively against Western Union. As one historian recalls, the company was now “regarded by liberal and reform opinion and by a considerable segment of the public, with fear, suspicion, even abhorrence. Its enormous capitalization, its merciless elimination of competition toward the close of the Civil War, brought growls of protest, which swelled into a roar of demand that the Government take over the telegraph service and operate it for the benefit of the people.”\(^\text{58}\)

It is difficult to determine exactly what drove this change in attitude. Part of it was clearly related to a broader shift across the American landscape—a wariness of large corporations and


an urge to beat them back into a more familiar, more manageable size. Only forty years earlier there hadn’t been any big businesses in the United States, only local farms and retail shops, and a handful of larger trading companies and financial concerns. Now, in only a few decades, massive enterprises had sprung alive. There were railroads that crisscrossed the country, express companies like Wells Fargo, and the glimmerings of major industrial concerns, such as Procter & Gamble and Carnegie Steel.\(^\text{59}\) Telegraph companies were some of the most obvious of these new giants and among the most profitable.

Telegraphs had also slipped by this point into the very mainstream of American life. In 1873, Western Union alone carried more than twelve million messages, a quantum increase over the trickle that had begun only two decades earlier. This growth meant that telegraphs were no longer just the plaything of the rich or an indulgence of Wall Street firms. They were a staple—the backbone, even—of the U.S. communications infrastructure. Businesses used telegraphs to communicate with their suppliers and customers; newspapers relied on “wire services” for an increasingly large share of their news; railroads used the telegraph to conduct operations across their own expanding networks; and average citizens used it to pass along family news. It was this growth, of course, that pioneers such as Morse and Field had predicted and upon which they had bet their careers; it was this growth that had handed Western Union its incredible profits. But such dramatic growth also thrust the telegraph squarely into the public realm. Because once people began to depend upon it, once they saw the telegraph as a necessity rather than a novelty, it suddenly became worthy of policy. The average citizen now cared about Western Union and the fate of the telegraph industry, about telegraph rates and coverage. And so what were once obscure business decisions rapidly became the topic of public discussion and a kaleidoscope of competing demands. Such is the nature of politics along the technological frontier.

Ruling the Waves

The attack on Western Union began quietly. It grew out of a growing murmur of popular discontent, a string of nasty newspaper articles, a cause adopted by groups such as the National Grange and the Prohibitionists, and a belief on the part of numerous government officials that the telegraph should be taken out of the hands of private “monopolists” and converted to a government service. In 1866 these concerns slowly made their way to Washington, where they resulted in a cautious piece of legislation that formally held private telegraph companies to three conditions: first, that they not interfere with travel on rivers and roads; second, that they give precedence, when necessary, to government messages; and third:

[that the United States may at any time after the expiration of five years from the date of passage of this act, for postal, military, or other purposes, purchase all the telegraph lines, property and effects of any or all of said companies at an appraised value, to be ascertained by five competent, disinterested persons, two of whom shall be selected by the Postmaster General of the United States, two by the company interested, and one by the four so previously selected.]

Like many laws, this one was a hedge—echoing public concerns, promising to review them at some distant time, but essentially leaving the industry untouched and unregulated. Once the five-year period drew to a close, however, the same crowd of voices began to clamor for intervention—only this time more loudly, and with the force of growing public sentiment behind them. Criticism during this period focused on several key aspects of Western Union: its size, its profits, and its apparent appetite for devouring would-be rivals. According to the company’s opponents, telegraph rates in the United States were considerably higher than they were in Europe: 1½ to 4 times higher, in fact, and twice as high as in England. This financial gap, they argued, was proof of Western Union’s monopoly position and evidence of the benefits that government ownership could bring. If the telegraph were a public concern, rates would be reduced and telegraph operators would focus on the public aspects of their mission: extending facilities to all regions of the country, transmitting weather and other reports, and ensuring that information flowed as freely and easily as possible. As a report by Postmaster General John A. J. Creswell put it:

The necessity for an efficient and cheap mode of telegraphic communication, which shall be beyond the control of private monopolies, and within the means of all, is daily becoming more apparent. Under the present management the use of the telegraph by the masses of the people is almost prohibited, by reason of arbitrary rates, unnecessarily high charges, and a want of facilities...A Government postal telegraph is the only means by which the full advantage of this great invention can be secured; for, wherever the telegraph is under Government management, it is operated at its minimum cost, and the people receive the benefit in low rates of transmission and greatly extended facilities.

A subsequent report presented before Congress was even blunter:

It is an outrage upon civilization that one of the greatest inventions of all ages should be permitted to be captured by corporate greed, kept out of reach of the great mass of the people, and reserved for uses in which the business of gamblers forms the chief part...Think of it—50 years

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61The evidence regarding relative rates was highly contentious at the time, and Western Union argued vigorously against the government estimates. For the government position, see Senate Committee on Postoffices and Postroads, Sen. Report 242, 43rd Congress, 1st session, April 2, 1874. The debate is also well covered in Parsons, The Telegraph Monopoly (Philadelphia: C. F. Taylor), pp. 25-38.

62Report of Postmaster General Creswell, 1873, in U.S. Senate, Doc. No. 399, 63rd Congress, 2nd session, p. 22.
since the lightning was harnessed to language and literature, and the people cannot even yet avail themselves of the discovery; 50 years, and gamblers are still the main beneficiaries; 50 years, and Wall Street is still in possession... It is time the telegraph were taken from the gamblers and given to the people. 63

Similar sentiments appear in a remarkably frank correspondence between William Orton, the president of Western Union at the time, and Joseph Medill, publisher of the Chicago Tribune and an avid supporter of public telegraphy:

The telegraph is a quicker method of sending the mails; a method which annihilates time and distance, and, with the cooperation of the press, "makes all men kin." It is the noblest of all human inventions, and, while it is a common carrier, it carries nothing more material than thought. The lightest of tolls should be charged for its labors, for it is one of the great educational instrumentalities of the nation and world. Its services should be as nearly free to the whole people as possible. 64

But Western Union, according to Medill, stood in the way of this public service. Rather than working for wide access and low rates, the company objective was to "perform the least service for the most money." Even worse, it was a company that was "practically a monopoly," a company with the power to "crush out, absorb or control all rivals, and exact its own terms from the public." This frustration with monopoly was a constant theme among telegraphy’s reformers, and a potent one. According to Western Union’s critics, the company’s sole objective was domination. It was a conscious monopolist, determined to destroy any other player in the field and willing, as the postmaster general expressed it, “to use any device which the strong can employ against the weak.” 65

Another line of criticism was subtler but potentially even more damaging. According to many of the company’s critics, the real danger of Western Union’s position lay in its longtime relationship with the Associated Press, a hugely successful news service that had grown up along the backbone of the telegraph industry. For years, everyone in the industry had realized how tightly these two major players cooperated. The Associated Press, which lived from its ability to spread news quickly and reliably across the telegraph network, relied almost exclusively on Western Union. 66 It was a loyal customer, and a mammoth one, accounting by 1872 for nearly 12 percent of Western Union’s total receipts. 67 In exchange for this business, Western Union provided the Associated Press with what might now be called a higher level of service—preferential rates, speedier transmission, and a guarantee that its dispatches would get through. When the occasion arose, Western Union also helped to cement its partner’s business by denying its lines to competing wire services, or at least tending to lose or garble competing dispatches at a suspiciously coincidental rate.

Such a tight relationship between Western Union and the Associated Press made great commercial sense, but it was also fraught with obvious dangers. Without competition from other wire services or telegraph providers, an alliance between these two giants meant that they could essentially control the flow of news across the United States. Which, apparently, was exactly what they were doing. Any rival to the Associated Press was denied access to Western Union’s lines, and any news hostile to Western Union was simply not reported by the Associated Press. According to one congressional report, the Associated Press even cut off its news flow from papers that dared to voice editorial criticism of Western Union. 68 This same report describes a straightforward relationship between the two firms: "The understanding between the telegraph company and the press association secures to the latter low rates and the power of

63Parsons, The Telegraph Monopoly, p. 37.
65Quoted in Harlow, Old Wires and New Wires, p. 333.
excluding new papers from the field, and to the former a strong influence upon press dispatches, the support of the papers in such associations, and the right to transmit and sell market quotations.”

Congressman Sumner of California was more direct: Western Union, he declared, “has a twin connection with another incorporated thief and highway robber known as the Associated Press. They are banded together in the strong bond of mutual plunder and rapacity against the people.”

It was a powerful combination, indeed, and one that infuriated those who stumbled upon it.

Between 1870 and 1873, two bills were put up for congressional consideration: the Washburn Plan and the Hubbard Plan. Both aimed for governmental control over the telegraph industry, though through very different channels. Under the terms of the Washburn proposal, the U.S. government, like that of the British before it, would simply buy up all existing telegraph lines and place them under the authority of the postmaster general. Under the Hubbard plan, existing telegraph companies would remain in place but would be joined by a new firm, the Postal Telegraph Company, which would be funded partially by the Post Office and dedicated to providing telegraph services at specified rates.

Western Union was outraged. Seeing itself as a beacon of free enterprise, it attacked both plans as political patronage and mounted a full-fledged offensive against Washington. In a series of pamphlets and public debates, officials from the corporation openly mocked the government’s efficiency and questioned its motives; they spoke of “despotic” interests in political espionage and the opportunities for political manipulation of information. In 1873, the company even commissioned a special study to chart the progression of the telegraph industry and investigate the proposals before Congress. Not surprisingly, the study’s author found that the telegraph was more extensive and more efficient in the United States than in any European country. Telegraph receipts contributed heavily to the government’s tax coffers and telegraph rates, contrary to government reports, had actually declined over time. No, the report concluded, the question of a government telegraph had little to do with either cost or efficiency. What was really at stake was freedom. “Will the people consent to the inauguration of a policy,” the author asked, “which revives the old Medieval doctrine of the necessity of State interference with the pursuits and business of the people, and every step in the carrying out of which is a departure from Republicanism and an approach towards despotism and monarchy?”

Will they adopt a policy “in direct antagonism with and destructive of the fundamental principles upon which the Government itself has been established”? With the argument put that way, it was rather difficult to argue in favor of the government’s schemes.

In the end, Western Union won. It didn’t win cleanly, but it won. Both the Washburn plan and the Hubbard plan were defeated, and Western Union continued to run its business precisely as it always had: devouring competitors, aggressively expanding, and building a telegraph network that stretched across the United States. The concerns that had led to the Washburn and Hubbard proposals, however, didn’t disappear upon their defeat. Instead, they continued to plague the telegraph industry—and particularly Western Union—for at least another fifty years. By 1900, seventeen separate legislative committees had recommended government ownership of the telegraph industry. None of these bills, however, was ever passed into legislation.

Echoes and Refrains

Compared with the history of oceangoing trade, the story of telegraphy seems small and well defined. It begins with a precise moment—Morse’s 1838 presentation to Congress—and ends roughly a century later, when piggyback developments in radio and telephony eroded the telegraph’s monopoly over fast and efficient long-distance communication. There were

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96Quoted in Harlow, Old Wires and New Waves, pp. 332–333.
97Quoted in Harlow, Old Wires and New Waves, p. 334.
only a handful of true pioneers in the telegraph industry, and a much less colorful crop of pirates.

Within this refined context, however, telegraphy still exhibits the classic attributes of a frontier technology. It emerged from an early phase of innovation, peopled largely by inventors (Morse, Wheatstone, Bain and House) who revealed the technology for its own sake and figured out how to make it work. Then, once the technology was proven effective, a new cast of pioneers moved in, men such as Cooke, Field, O'Reilly, and Pender, who saw the commercial potential of the "lightning" and fashioned a market upon it. This was a time of empire building and creative anarchy, when there were no rules governing telegraphy and no great demand for them.

As the telegraph market developed, though, it gradually encountered the familiar problems of the technological frontier. Here, the greatest problem was coordination: the problem of too many disparate lines and different codes; of mismatched signals and incompatible languages; of incompatibility that reached such proportions by the 1850s that it threatened to topple the industry. At this point, even the staunchest individualist realized the nature and extent of the quandary. For if the sprouting web of telegraph lines were not made compatible, the value of every strand would be reduced; and if users could not communicate seamlessly and confidently, they might not communicate at all. To ensure the success of their industry, the telegraph pioneers had to create rules of engagement—norms, standards, codes, and prices that enabled them to link their networks and speed the messages across.

In both the United States and Europe, therefore, the problem of coordination created both a demand for and supply of rules, the third and fourth phases of the technological frontier. But the problem manifested itself differently on the two continents and generated a strikingly different kind of response. In Europe, national governments stepped in shortly after the problem of coordination was identified. They realized the issues that incompatibility had already created, foresaw the difficulties that were likely to emerge over time, and recognized that in Europe at least, the core of the problem lay with interstate boundaries and international variation. Accordingly, they crafted a solution that attacked coordination head-on, imposing common rules and technical procedures across nearly the entire continent. Because most of the European telegraph firms at this point were either owned by state governments or closely related to them, this kind of top-level state-sponsored agreement essentially solved the coordination problem in Europe. After the telegraph conference of 1865, the European telegraph industry was stable, orderly, and linked distinctly to the European governments and the newly created ITU.

In the United States, by contrast, the state pulled out of the market well before the problem of coordination even arose. Private firms were left, as a result, to deal with anarchy on their own terms and craft a private solution for it. Between 1845 and 1860, the largest and most entrepreneurial U.S. telegraph firms fashioned themselves into a series of constantly shifting alliances: the Magnetic Telegraph Company, Kendall’s American Telegraph Convention, the "Treaty of Six Nations." Despite the lofty language that surrounded these efforts at the time, and despite their different membership lists and structures, each of these groups had essentially the same purpose. They were all designed to impose some kind of order on the unruly world of telegraphy and to set some common standards across separate, often rival, firms. They were efforts, in other words, at private governance, and to some extent they worked. By 1860, coordination problems no longer plagued the U.S. telegraph industry and anarchy had given way to order.

As a first cut, then, it appears that the U.S. telegraph firms addressed their industry’s growing pains in a novel and efficient way. They joined forces, they created common standards, and they set rules in the absence of the state. A perfect solution, perhaps, for a frontier industry, since it avoided the regulation that characterized the European market, and perhaps constrained it, nearly from the start. Certainly this is the kind of private governance that prevails in many cyber-markets and appeals to these markets’ most zealous prophets.

The problem with this type of solution, however, is that it puts governance in the hands of what essentially becomes a cartel. And because cartels are themselves so fragile, it leaves governance vulnerable to a whole new set of concerns. Most
dramatically, any private arrangement, like any cartel, is susceptible over time to the warring interests of its members. In a cartel, after all, members come together to pursue a common goal, something that will benefit all those who choose to participate in the arrangement. Yet beneath this cooperative umbrella, members generally continue to compete with one another and contend for each other’s markets. If the scope of their cooperation is narrow enough (focusing, say, on government affairs or response to an external threat), then the members may be able to sustain this delicate balance between cooperation and competition. The wider and more important cooperation becomes, however, and the closer it moves to the core of an industry, the harder it will be for even the most devoted participants to sacrifice individual interests to the common good.

Certainly this was the case in the U.S. telegraph industry. Even though the members of each agreement realized how vital cooperation was, and even though they acknowledged the difficulties of coordination and were determined to resolve them, they still weren’t able to restrain their own competitive tendencies. The Magnetic Company, for example, suffered from the ruinous rivalry between O’Rielly, Smith, and Kendall; the American Telegraph Confederation was doomed once its members began to defect to Western Union; and the Treaty of Six Nations was dagged from the outset by Morse and Kendall’s hostility. In each of these cases, the industry thus destroyed its own governance mechanism. Private firms could set the rules, it appears, and they could organize their market for some period of time, but in the end cooperative governance was killed by competitive feuds.

The implications of this progression are profound. For if private governance is always subject to the rifts that appeared in the telegraph industry, then private rules will be, at best, a short-term solution on the technological frontier. If private firms can regulate themselves for only some period of time, and if their regulation is ultimately liable to their own competitive interests, then private rules must yield at some stage to other types of governance. They must either be supplanted by formal rules—government regulation of some sort or another—or by the dominance of a single private player.

In the case of the U.S. telegraph industry, both of these solutions eventually appeared. After the Treaty of Six Nations dissolved, a single private firm began to dominate the industry—a firm so big and so powerful that it was able, by itself, to complete the piecemeal efforts of the cooperative groups. Through sheer market force, Western Union managed to create the kind of order that in Europe came only from the state. It consilidated a tumultuous industry, set technical and commercial standards, and presided over what quickly became a seamless network of communication. Or, as the president of Western Union proclaimed to his shareholders in 1869: “Practical men saw that there was but one remedy [for the telegraph industry’s ills]... and that was by a consolidation of all the rival interests into one organization.”

Theoretically, then, Western Union crafted a nearly perfect solution to the problems of commercial anarchy. It was private; it was effective; and there was no government involved.

The problem with this solution, though, was that it essentially created a monopoly. And Americans, much as they like effective private solutions, have a deep-seated dislike for any firm that resembles a monopoly. This dislike is not necessarily connected to an underlying economic rationale. Indeed, in the telegraph industry—as in telephony or postal services—there are many elements of natural monopoly involved and many reasons why, economically at least, a single firm may be the most efficient provider of universal service. In Europe, where such reasoning predominated, governments created national monopolies from

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the start, organizing the telegraph industry like the postal service, and ceding it to a single, national firm. In the United States, by contrast, the government decided not to enter the industry or even to treat it as a natural monopoly. When monopoly emerged, therefore, it was a private monopoly, a creation of the market rather than of the state. And it ignited a fierce storm of demands. Defeated competitors wanted constraints placed on Western Union’s power; newspapers lobbied for regulation of rates and business practices; and consumers chafed at being beholden to a monopoly. All of these demands, ironically, involved government’s intervention—public rules, in other words, to fix a private problem.

In the end, therefore, public rules found their way back to telegraphy. In 1910, the U.S. Congress passed the Mann-Elkins Act, giving the Interstate Commerce Commission authority to review telegraph rates. Two decades later, it passed the Communications Act of 1934, which formally transferred regulation of the telegraph industry to the newly created Federal Communications Commission.

By this time, though, the technological frontier had moved on. Radio and telephony were now the waves of the future, the technologies that prophets were trumpeting and pioneers were scrambling to commercialize. Telegraphy remained, of course, as did a considerably diminished Western Union and Britain’s Cable and Wireless, the nationalized heir to Pender’s great Eastern Telegraph Company. But the energy and anarchy that had characterized the industry in its earlier years was gone, replaced by a stable group of firms and a predictable framework of rules.

In the United States and Europe, therefore, rules emerged fairly rapidly in the telegraph industry and governments played a significant role in their creation. To be sure, private rules played a much larger role in the United States than they did in Europe, and private regulation proved, for some time at least, to be a viable alternative to formal governance. Once private governance fell prey to the internal constraints of cartels and external complaints against monopoly, however, even the U.S. government stepped back into the void, providing a basic regulatory structure for what had become a stable and orderly market.

The U.S. government also played a subtle but critical role in the earliest days of telegraphy. In the 1840s, when the telegraph industry was engulfed by anarchy, U.S. courts aggressively defined who held the key telegraph patents and the rights to commercialize them. It was the courts that struck down O’Rielly’s line for borrowing too freely from Morse’s patent, the courts that upheld Morse’s patents against hordes of contenders and yet also protected the validity of House and Bain’s rights to separate, albeit competitive, designs. In the United States, therefore, the problem of piracy was curtailed by the clarification of property rights—a clarification that only the state could provide. While rivals in the industry were loose with their terminology and quick to label each other as pirates, the U.S. court system clearly laid out who had patent rights, and thus property rights, in the market. As a result, pirates in the telegraph industry were always more of a nuisance than a threat. They never attacked the fundamental economics of the industry, or questioned its underlying property rights. And without pirates to worry about, pioneers such as Cyrus Field and Hiram Sibley were able to move aggressively into this bold new space, creating an industry that was once considered the most amazing thing on earth.
CHAPTER 7

Space Music

A change to a new type of music is something to beware of as a hazard to all our fortunes. For the modes of music are never disturbed without unsettling of the most fundamental political and social conventions.

Plato, The Republic

Chuck D is an unlikely hero of the digital age. With hit albums such as Yo! Bum Rush the Show and Fear of a Black Planet, the founder of the rap group Public Enemy would seem to inhabit a world far removed from the more conspicuous pioneers of cyberspace, from the Netscapes and Yahoos! and AOLs. In 1998, however, Chuck D stormed into cyberspace. Rather than giving his latest songs to Def Jam, the label that had produced his music for over a decade, the rap artist instead released his music directly onto the Internet, at www.public-enemy.com. It shouldn’t have been such a big deal, really: one artist, a handful of songs, and a funky distribution method that probably reached several thousand fans. But in the music business this was very big news. For Chuck D had taken one of the industry’s most sacred practices and thrown it, quite literally,
into space. With just a couple of songs, he challenged how music was sold and, even more fundamentally, how it was owned. "This is the beginning," proclaimed the rapper, "of the end of domination."1

As far as Chuck D was concerned, putting music online was a matter of power, of using new technologies to right old wrongs and give recording artists the influence and money that was rightfully theirs. To the recording industry, however, it was heresy. For decades, companies such as EMI and Polygram had operated under a traditional and lucrative set of rules. They signed long-term contracts with the artists they deemed most attractive, and then managed the business side of the artists' careers—recording the albums, distributing them, handling all marketing and publicity. The artists would receive the fame that came along with their work, of course, plus a prearranged portion of the proceeds. The studio, however, retained both the remainder of the proceeds and the legal rights to the music. Ownership of the property, in other words, rested with the studios rather than with the artists.

This was the system that Chuck D challenged. By putting music directly on his web site, he effectively circumvented the entire legal and commercial structure that the studios had so carefully erected. He took his music, which had traditionally been their property, and made it his again. And the studios were not pleased.

Had Chuck D been an isolated case, the studios most likely could have looked the other way. They could have dismissed Chuck D as a simple renegade, a rapper gone bad, and forgotten him and his web site. But the problem was that Chuck D, potentially, was everywhere. In cyberspace, any recording artist could distribute his or her music online; any musician could become a mini-studio, circumventing the record labels and their complex, chunky rules. Even worse, the advent of digital technologies such as MP3 meant that the entire legal foundation of the old recording system was thrown into confusion. Legally, the record companies owned the right to distribute and reproduce their artists' music; no one else could distribute or perform these works unless he purchased a license directly from the company.2 But what if an artist wrote a new song and simply posted it to a web site? What if a college student then downloaded this computer file into a hand-held machine or e-mailed it to a group of her friends? Because these practices were so new in the late 1990s, the law was simply silent on them: there was no regulation of MP3 technology, no system of property rights that explicitly applied to online music.

Matters reached a head in 1999, when a nineteen-year-old college dropout named Shawn Fanning joined Chuck D in storming the frontier. Backed by his uncle in Boston, Fanning created Napster, a revolutionary system that allowed thousands—even millions—of users to trade their music online. Within months of its release, Napster had become a social phenomenon and a massive commercial threat. Universities complained that Napster was suddenly consuming huge chunks of their Internet bandwidth, and the music industry condemned it as piracy of the most blatant sort: "STEALING," as one music lawyer described it, "in big letters."3 Ironic foes such as Prince and the rock band Metallica joined the labels in pursuit of these new pirates, while prophets predicted the death of the recorded music industry. "A revolution has occurred in the way music is distributed," wrote one observer, "and the big record companies are in a state of panic."4 Chuck D, as usual, was even blunter. "Our whole notion," he recalled, "was to come into the music business and destroy it."

For a while chaos mingled with euphoria, and it seemed as if cyber music might really be able to destroy the established

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2 As described in Chapter Three, radio is one important exception to this rule. Under the terms of an agreement initiated in 1922, radio stations agreed to make a small yearly payment to ASCAP (American Society of Composers, Authors and Publishers) which covered their use of all ASCAP-controlled music. Record labels, by contrast, have traditionally used radio as a conduit for promotion rather than sales. For more on this history, see Russell Sanjek, American Popular Music and Its Business: The First Four Hundred Years, Volume III: From 1900-1984 (New York: Oxford University Press, 1988), pp. 74-90, 159-211.


recording companies. But then quietly, inevitably, old questions started to nag. How would cyber music develop if artists and manufacturers used different standards of recording and transmission? How could artists be protected from the pirates who would steal their songs? And how, most basically, could anyone make money if property rights in music disappeared? By the year 2001, industry groups and legal experts had coalesced around these issues, creeping slowly and often painfully towards some kind of more orderly framework. No one wanted government regulation of the music business. No one (except the record companies, of course) wanted to cede power back to the record companies and their established system of property rights and royalties. But neither did any of the players want to perpetuate a truly anarchic state of affairs. They wanted rules, as it turns out, and they wanted property rights, and they wanted someone or something to enforce them. Such is the nature of business along the technological frontier.

Making Music: The Old-Fashioned Way

For those who grew up in the golden days of rock 'n' roll, it is natural to associate music with rebellion. Music, and especially recorded music, has long been the stuff of sex and indiscretion, of forbidden longings and illicit lust. And so indeed it still is. Yet the music industry itself is a fortress of conservatism, dominated by five long-standing corporations and run, according to Chuck D at least, “by lawyers and accountants who don’t give a fuck about the creative process.”

Perhaps. In any case, however, the recording industry has always been small and tightly controlled, run by just a handful of firms with an iron grip on the global market. Like the light bulb, the recording industry began with Thomas Edison, who invented the phonograph in 1877. For nearly a decade, Edison was the only manufacturer of his “talking machine,” a fragile device that played songs etched onto tin foil and appeared to have no commercial value. In 1887, though, Alexander Graham Bell designed a more sophisticated device and formed the American Gramophone Company to compete with the Edison Speaking Phonograph Company. Edison then responded with his own upgraded machine, and the two firms were soon selling phonographs across the United States—most of which were used either in coin slot machines or to provide the voice for “talking dolls.” After Bell’s machine faltered in the market, Edison encountered new (albeit limited) competition from Columbia, a former distributor of Edison’s own machines, and then from Victor, a firm that pioneered the use of recorded disks. By the turn of the century, these three companies—Edison, Columbia, and Victor—were the only major players in the global phonograph industry. They controlled the key patents, signed exclusive contracts with popular performers, and they pushed “talking machines” out of arcades and into their customers’ homes. They also won critical legal victories in 1902 and 1909, when first Great Britain and then the United States carved out formal structures for protecting musical property rights.

Henceforth, any company could record copyrighted music so long as it paid a royalty fee (initially two cents per reproduction in the United States) to the original copyright holder. The record companies, in other words, owned rights to the music they recorded, and to any proceeds that might be made from this music. The legal framework of the industry was now in place.

Over the next forty years, control over the recorded music industry remained tightly in the grasp of a tiny group of firms. When the stock market crash of 1929 forced Edison out of business, a new firm, Decca, migrated from the British record market and quickly edged its way into Edison’s old position in the troika. Then, in the wake of World War II, two upstarts named

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6Brett Atwood, “Chuck D: The Billboard Interview,” Billboard, July 17, 1999, p. 82.
Mercury and Capitol began to nudge Columbia and Victor from their decades-old perch, riding the rising tide of singers such as Frank Sinatra and Peggy Lee and the newfound popularity of jukeboxes. Together, these firms presided over the music industry, signing exclusive contracts, wooing radio stations, and releasing new formats such as the LP and 45. Until the mid-1950s, just four labels (Capitol, Mercury, Victor, and Columbia) jointly controlled roughly 70 percent of the titles on the *Billboard* charts, the leading indicator of music sales.

In 1955, however, rock 'n' roll suddenly burst onto the popular scene, catching even the record companies by surprise. It began quietly enough, in the jazz clubs and urban radio stations that had long been showcasing music by African American performers—music that the industry had always segregated under the thinly veiled categories of “sepia” or “race” songs. Slowly, though, this music had begun to slip out of its narrow niche and into the mainstream of American music, where it was christened by *Billboard* magazine as rhythm and blues (R&B) and rapidly copied—illegally—by a growing range of white artists. This was the era, then, of hits such as “Bo Diddley” and “Maybellene,” of original R&B music that was rerecorded by white performers and sold to an increasingly interested white audience.

Then, just as this trend was getting underway, two events hit the music world. The first was the release of Bill Haley's “Rock Around the Clock,” a突破 song that soon became, to quote Frank Zappa, “the Teen-Age national anthem.” And the second was Elvis Presley, whose hip-rattling southern sound turned the world of music on its head. Though both Haley and Presley released their music with the major labels, it was their kind of music—deeply tied to R&B, worlds away from the crooning of Frank Sinatra and Pat Boone—that inspired an ecstatic embrace of what had become rock 'n' roll. Demand for new titles soared, giving independent labels—and particularly small rhythm and blues labels—a rare opportunity to grab sales away from the Big Four. By 1958, independents such as Atlantic and Imperial had captured 76 percent of the *Billboard* charts, propelled by the success of artists such as Fats Domino, Muddy Waters, and Ray Charles.

In retrospect, though, the first wave of rock was also the peak of power for the independents. For ironically, once rock and R&B blazed across the mainstream of American music, it became harder and harder for these more specialized labels to compete with the major firms. They didn't have the financial clout to offer star salaries; they didn't have the marketing arms to reach a growing international audience; and they didn't have the resources to spread over hundreds of artists and albums, only a small percentage of whom would ever hit it big. And thus even as their music became more successful, many of the independent labels either formed larger firms or were bought by them. In 1964, for example, upstart Warner Brothers Records acquired another independent, Reprise. It then bought still another independent, Atlantic, in 1967, and yet another, Elektra/Asylum, several years later. In 1979, United Artists, one of the largest labels, merged with Capitol and A&M joined RCA Victor. Arista and Ariola followed suit in 1983, adding their own labels to RCA’s burgeoning fold. By the 1980s, the record industry was again down to a handful of giants, each of which now owned a cluster of ostensibly independent labels. Ten years later, the field had shuffled only slightly, with the addition of several non-American firms and a market that now covered the globe. The “Big Six”—BMG, EMI, Polygram, Sony, Universal, and Warner—controlled an estimated 70 to 80 percent of global recorded music sales in 1996 and nearly all of the world’s most popular musicians.

Like their earliest counterparts, the record labels that predominated at the turn of the twenty-first century were large and well-diversified firms. Warner Music, for example, was a division of the powerful Time Warner Entertainment Company, owner of twenty-four magazines, theme parks, book publishers, cable concerns, and cinemas, in addition to its several record

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9In 1929, the Radio Corporation of America (RCA) bought Victor through a stock deal and the company was reorganized as RCA Victor.
labels. Universal was likewise a division of MCA, a vast conglomerate that includes Universal Studios, Decca, and Geffen Records, and was itself purchased in 1995 by Seagrams, the wine and spirits company. BMG was a unit of Bertelsmann A.G., Germany’s largest media company and a powerhouse in the publishing world. And so on.

Over time, of course, each of the companies—and each of the “independent” labels within them—developed its own style and focus. Some specialized in particular genres, such as classical music or rap; most were tied to a handful of particularly popular artists. EMI, for example, controlled the work of the Beatles, Beach Boys and Rolling Stones; Warner Music had Madonna, Led Zeppelin, and the Eagles. In general, though, all of the companies ran their business along remarkably similar lines. They signed a large number of promising artists, held them to fairly restrictive contracts, and then managed the marketing and distribution for the artists’ music. In a typical relationship, then, an artist like Chuck D would sign with a label such as Polygram’s Def Jam Records, agreeing to give Def Jam rights to an album or series of albums in exchange for a royalty based on the album’s sales. For Smash Mouth or Bruce Springsteen or Luciano Pavarotti, it would be nearly the same: output over some period of time, with property rights vested in the label and a certain percentage of the proceeds paid back to the artist. To the labels, this was the only way of recouping the bottom-line profits that their own corporate owners demanded, of realizing returns from a diversified portfolio of young, generally untested and often unproductive talent. To many in the industry, though, it was a kind of musical bondage, ownership of the artist’s soul in exchange for a measly share of the proceeds.

Consider the matter of royalties. In general, mid-level artists earn between 14 and 16 percent of the suggested retail price of their albums. If they make a hit, say a “gold album” that sells a half million copies in the U.S. market, they would then earn around 15 percent of the total retail sales—or roughly $1,198,500, assuming that the album is a standard CD with an average retail price of $15.98. Not bad—especially if the artist happens to be a sixteen-year-old rocker with her very first album. But in practice, the math turns out to be trickier. First, recording companies typically deduct the cost of packaging from the artist’s royalty base—approximately 25 percent for CDs and 20 percent for cassettes—arguing that the packaging shouldn’t be counted as part of the product’s “real” cost. Then, they also deduct any albums that they give away for free, arguing once again that these sales shouldn’t be considered as part of the artist’s base. Fair enough, except that these promotions often account for up to 15 percent of an album’s total “sales.” Finally, artists are also expected to cover their own “re cou ple” expenses, including recording costs, video production costs, equipment rental, travel, and salaries for a producer and, often, a promoter. In practice, most of these costs are deducted from the album’s proceeds, rather than being paid by the artist up front.

Once these various costs are factored into the equation, the artist’s payout begins to look very different, as expressed in Exhibit 7.1 below.

At $261,490 our sixteen-year-old ingenue is still not doing too badly, but her proceeds from even a best-selling album are

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### Exhibit 7.1 Breakdown of Typical Royalty Payment

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD, suggested retail price</td>
<td>$15.98</td>
</tr>
<tr>
<td>(25% packaging)</td>
<td>$3.99</td>
</tr>
<tr>
<td>Royalty base</td>
<td>$41.99</td>
</tr>
<tr>
<td>Royalty rate (15% – 3% for producer)</td>
<td>$1.44</td>
</tr>
<tr>
<td>Units</td>
<td>× 500,000</td>
</tr>
<tr>
<td></td>
<td>$791,400</td>
</tr>
<tr>
<td>(15% free goods)</td>
<td>$107,950</td>
</tr>
<tr>
<td>(Recording costs)</td>
<td>$611,490</td>
</tr>
<tr>
<td>(50% of promotion costs)</td>
<td>$875,000</td>
</tr>
<tr>
<td>(50% of video costs)</td>
<td>$875,000</td>
</tr>
<tr>
<td></td>
<td>$261,490</td>
</tr>
</tbody>
</table>

Source: Adapted from Passman, p. 114.

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\(^{11}\)The following section is based on the description provided in Daniel S. Passman, *All You Need to Know About the Music Business* (New York: Simon & Schuster, 1994), pp. 88-115.
quite a bit lower than the original figure of nearly $1.2 million. What's more, in practice the record label pays only a fraction of these royalties in the early stages of an album's release, holding on to a reserve of 35 to 50 percent in case the album's sales were suddenly to drop off. The label also retains all rights to the artist's master recordings and to any duplication of these masters.

Not surprisingly, this system of contracts and accounting has generated a fair amount of criticism. When, for example, Warner Brothers refused to let Prince release albums as frequently as he would have liked, the popular singer-songwriter changed his name to an unpronounceable symbol, scrawled "SLAVE" on his face, and declared both himself and his contract deceased. This was in 1993, less than a year after signing a new contract that the artist had claimed could have been worth as much as $100 million. "Warner wanted a record only every 18 months," said The Artist Formerly Known as Prince. "I could release a record every seven months. I could not record when I wanted to." After months of battling with Warner, The Artist began to record for his own label, NPG Records, and to experiment with the CD-ROM format; several years later, back with Arista Records, he was still singing that "Heavy rotation never made my world go round / Commercialization of the music is what brought it down." He is echoed by others such as Chuck D, who raps,

If you don't own the master
Then the master owns you.
Dollar a rhyme
But we barely get a dime.17

To a large extent, of course, the tension between artists and recording labels is a natural result of a complicated symbiosis. Throughout the history of their industry, the artists and the labels have relied almost entirely on one another: without the music, the labels had nothing to sell; but without the labels, the

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9Ibid.

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musicians had no efficient way to reach their audience. It was a thorny relationship, but an essential one. Neither partner could make music—or money—without the other. Yet, throughout this relationship, the power had seemed indelibly glued to the labels' side—to the much-maligned "accountants" or "suits" who controlled the artists' gateway to the fame and the fortune and the fans. And because the number of artists (and would-be artists) always exceeded by far the number of labels, the artists were essentially at the mercy of the labels. They could argue about contractual terms, of course, and leverage whatever fame might come their way, but it was still the labels who called the shots; it was the labels who maintained connections with retail stores and radio stations, and thus with the fans who were the ultimate consumers of any musician's product. But then something new hit the scene, a novel technology that was called MP3.

The Birth of MP3

Like many digital technologies, MP3 began life as an esoteric project of scientists and inventors. Ever since computers had become practical devices, researchers had been tinkering with ways to play and transmit music on them—to enable the computer to "read" digitized music just as it could already read text and mathematical notation. In 1983, members of the electronic music community took the first step, devising an interface known as MIDI that stored musical information almost like a player piano and allowed synthesizers, samplers, and specialized computers to communicate with one another. Eight years later, when personal computers had become popular and affordable, IBM and Microsoft built upon this standard to create the Waveform Audio File format (or WAV), which actually recorded sound waves through a microphone and then encoded them into digital signals. In 1992, all versions of the popular Windows 3.1 software were equipped with the ability to read this jointly concocted format.

Despite having slipped so easily into the popular market, though, the WAV (pronounced "wave") file format was too chunky to be practical. A two-minute song used 20 megabytes of
disk space and, on the average modem, might take more than two hours to download. As if that were not enough to discourage casual use, the sound quality was not particularly good, and certainly nowhere near the level of traditional CDs or cassettes.

Yet a small band of scientists was still convinced that computers could play music and that users, given the right equipment, would want to listen. One of the leaders of this band was Leonardo Chiariglione, a mild-mannered Italian engineer who was captivated by the prospect for standards. In 1987, while working for Italy’s CSELT (Centro Studi e Laboratori Telecommunicazioni SpA) telecommunications laboratory, Chiariglione attended a meeting of the Joint Photographic Expert Group (JPEG), an industry group convened under the auspices of the International Standards Organization (ISO). Like all ISO groups, JPEG was a voluntary consortium of private firms and government officials, a venue for experts from around the world to cobble together common technical or operational standards. Chiariglione, who had never attended this type of meeting before, was hooked. Within months, he had approached the chairman of JPEG and won approval to launch a new ISO-linked group, MPEG, which would devise standards for the digital coding of motion pictures.

On the surface, MPEG looked like a standard standards group. It was convened under the joint auspices of the ISO and the IEC (International Electrotechnical Commission) and had the normal mandate of developing a common standard for a particular branch of technology—in this case, for the way moving pictures and audio could be translated into digital code. Like other ISO or IEC groups, it was composed of delegations from national standards bodies across the world, and shared a common mix of academic experts and corporate engineers. What made MPEG different, though, was Chiariglione. For to Chiariglione, standards weren’t just standards, and multimedia wasn’t just any technology; they were instead the core of human communication, the very platform on which societies could either progress together or decline alone. Or, as he put it:


\[\text{http://www.cselt.it/leonardo/paper/standardisation/html}\]

Communications standards are at the basis of civilised life. Human beings can achieve collective goals through sharing a common understanding that certain utterances are associated with certain objects, concepts, and all the way up to certain intellectual values. Civilisation is preserved and enhanced from generation to generation because there is an agreed mapping between certain utterances and certain signs on paper that enable a human being to leave messages to posterity and posterity to revisit the experience of people who have long ago departed. It’s not clear whether other members of the MPEG group shared Chiariglione’s grand vision. Yet they apparently were captured by his enthusiasm, and by his remarkable ability to smooth corporate or national squabbles in pursuit of a common goal. By 1994, MPEG had grown from its original twenty-five members to encompass more than 150 delegations from national standards bodies and interested firms, many of whom controlled proprietary, often competing, digital technologies. With so many participants, industry critics worried that MPEG would break down under its own weight, crushed by technical squabbles or disputes over patent rights. Yet somehow, Chiariglione and his vision prevailed. In 1994, MPEG released its MPEG-2 Audio standard, based on technology created by Fraunhofer Schaltung, a German engineering firm. Though no one really knew it at the time, the era of MP3 had been launched.

Technically, MP3 (an abbreviation of MPEG-1 Layer III) is a standard for coding sound into electronic bits and then compressing those bits into easily manageable files. Using it, or technology based upon it, programmers can take ordinary recordings (music, soundtracks, personalized greetings) and convert them into a standardized digital format—a stream of zeroes and ones recognizable to any other device based on the MPEG-2 format. Essentially, then, MP3 is a code: a mathematized, digitized version of Morse’s dots and dashes or the Chappes’ system of clanging pots and synchronized clocks. Like
them, it enables users to take information from one form and translate it, seamlessly and universally, into another.

Practically, MP3 was also a major improvement over the older WAV format. In all of the earlier iterations, programmers had tried to retain and reproduce the exact audio signal, meaning that their files contained huge amounts of data. MP3, by contrast, employed a process known as “auditory masking,” which replicated how the signal would sound to a human ear. By stripping away the additional sounds, auditory masking could compress the encoded signal by a factor of 12 to 14, meaning that fourteen hours of music could suddenly fit in a single CD. This was the breakthrough that drove renegade artists to embrace the new format and embed it in their development plans.

Between 1994 and 1996, MP3 slowly made its way to the world of music. There was no great clamor for the technology itself, and certainly no demand from within the traditional recording studios. But on the fringes, MP3 won a growing band of advocates, mostly among those who either saw the prospects for the new technology or bore an outstanding grudge against the labels. In 1994, for example, Public Enemy released a CD entitled Mute Sick-N-Hour Mess Age. While the album was released the old-fashioned way—via Def Jam Records and retail outlets—it’s message paid direct homage to the emerging world of MP3, warning artists that “We’re talking about a shift in the way this music is distributed.”20 That same year, the rock band Aerosmith posted an unreleased single directly to a CompuServe website, announcing, “If our fans are out there driving down that information superhighway, we want to be playing at the truck stop.”21 They were joined a year later by British rocker David Bowie, who posted his unreleased single to another site, and then by the popular Irish band U2, whose tracks were stolen in Hungary and posted instantly to sites around the world. In the wake of the theft, Marc Marot, managing director of U2’s label, commented, “There is this sense that they [the thieves] were liberating U2 from the clutches of some monstrous record com-


pany regime.”22 To counteract the damage, U2 hastened the release of its new single, and then its new album. “The Internet,” mused Marot, “has changed our lives completely and forever.”23

Pirates, Again

So long as MP3 remained the playground of scientists and the platform for a few disgruntled artists, the recording industry could afford to look the other way. There had always been technological innovations in music delivery, and there had long been pirates of all musical formats. Most of the original radio stations, after all, had been built around “unauthorized” music; most popular artists were regularly available in “bootleg” (illegally recorded) or pirated (illegally copied) form. Yet the record industry had survived all these pirates and thrived among them. MP3, for a while at least, didn’t seem particularly threatening: it was just a new way of capturing sound and storing it in an efficient, standardized format. But then it hit the mainstream.

The first takers were mostly college students, who came online in droves in the late 1990s. Like most people of their age, these students were fertile territory for any kind of music, and particularly for music marked with a radical, anti-establishment twist. They were also, though, armed with a high level of technical expertise—this, after all, was a generation raised on PCs—and with the high-powered Internet connections that many colleges and universities were rushing to provide around this time. Quickly, the students found the music and began to play it, downloading favorite cuts, compiling personal collections, and e-mailing songs to their friends. Like the radio boys who preceded them, some began to spend virtually all their free time online, building networks of invisible friends and sharing tips and songs. Some were even more ambitious and, bitten by the Net bug, began to build small communities around their MP3 downloads.

As these sites and services proliferated, a transformation ripped through the world of MP3. What had been an esoteric

technology became in a matter of months a casual plaything—a way for even relatively unsophisticated computer users to find music and download it to their hard drives. Seizing this potential, a handful of entrepreneurs built official MP3 sites, places where avid listeners could download—for a small fee—the particular songs they chose. Nordic Entertainment Worldwide, for example, debuted in April 1997 with a site described by its founders as “a record store that happens to be selling music online”—a fully legal compendium of older, relatively obscure tracks. Global Music Outlet did the same thing for South African and then alternative music; X-Radio Corp., another small start-up, focused on a small genre of club music known as “techno.” In 1998, two major commercial sites emerged, GoodNoise and MP3.com, both of which were devoted to playing and distributing more mainstream music.

The real action in 1997 and 1998, however, came from the underground sites—from the college students and their supporters who were letting loose an avalanche of free online music. Initially, much of this music was like the Net in general. It was alternative or independent, posted by little-known bands who saw the Net as a novel form of distribution and didn’t have much to lose by giving their music away for free. One of the earliest large-scale free music sites, for example, was the International Underground Music Archive, a self-styled “coffeehouse for 20 million people” that flaunted its alternative leanings and actively supported a network of new and independent bands. As interest in online music rose, however, the music sites quickly moved from the underground into the mainstream. Students copied their favorite pop songs onto their hard drives; industry insiders secretly “released” new music directly to the Net; and pirate sites in far-flung locations such as Bulgaria and China started to post CD-quality versions of Madonna and Bruce Springsteen recordings. By 1998, according to one estimate, more than twenty-six thousand illicit


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music sites had proliferated across the Net, offering roughly two hundred thousand songs. There were 3,462 sites for Nirvana alone, each offering free versions of the band’s popular grunge rock sound. It was Chiariglione’s vision, but with a youthful, radical twist: music for the masses, plucked from cyberspace and behind the backs of the established recording labels.

To the students who remained the largest users of MP3, all of this activity was exhilarating and harmless. For what were they actually doing? Just downloading intangible bits of sound and playing or distributing their favorite music. As one nineteen-year-old sophomore with hundreds of songs on his hard drive, argued, “I feel bad sometimes because I know I’m making a mess for the music companies. I know it’s technically a crime, but anyone can say copies are being made for back-up purposes.” Or, in the blunter words of another online fan, “It may be illegal, but, hey, it’s free.” To the record companies, however, this was theft pure and simple—digital piracy cloaked in the ill-fitting coat of personal entertainment. “With a touch of a button,” complained one executive, “any 13-year-old can make music available to millions of people around the world. We’re talking about a whole new dimension of piracy.” As word of the music sites seeped out, the record companies began to fight back, working through the Washington-based offices of the RIAA (Recording Industry Association of America), the industry’s major trade association. There, in a windowless room, a handful of investigators began to surf for pirates, scrounging college servers and music sites in search of illicit recordings. They weren’t hard to find. In its first eighteen months of operation, the RIAA investigation found thousands of copyrighted songs floating freely around the Web and sent formal warnings to 350 “pirate” sites. It seized 23,858 unauthorized CD-Rs (recordable

CDs) and brought suit against three of the most egregious online music sites, charging them with violation of copyright law.

The three offenders were not commercial entities; they either offered music free of charge or followed a "ratio" system, asking that visitors upload a certain number of songs in exchange for those that they downloaded. Legally, then, their position was ambiguous, since none of the named sites was actually realizing a commercial benefit from its downloaded music. To the RIAA, however, the principle remained the same: copyright was property, and abrogation of copyright—even without commercial gain—was theft. "We want a decision," said Hilary Rosen, president and Chief Operating Officer of the RIAA, "affirming the rights of copyright owners." According to the RIAA, one of the named sites was already receiving more than twenty-nine thousand visits a month.

Eventually, the recording industry triumphed in court. In each of the three cases, the RIAA won damages of $100,000 from the site operators, and then, in exchange for waiving the fines, won a promise that the defendants would not repeat their bad behavior. It was a fairly straightforward victory, with the court determining that the operators had indeed engaged in illegal copying. Yet it was also an ephemeral one, denounced across the online community and widely described as unenforceable. What made matters even worse—or better, depending on one's perspective—was that the technology of digital compression was evolving as rapidly as the online music industry. The files themselves were becoming easier and easier to download and a new generation of players, such as Nullsoft's Winamp and RealNetwork's Real Jukebox, recreated the feel of a traditional stereo system—only hipper now, and fed by an ever-growing stream of music. By 1998, anyone with a compact disc, a CD-ROM, and a computer was fully able to send CD-quality music over the Net.

And so, even as the record companies were basking in their legal victory, a new wave of artists were gleefully ignoring the legal issues and rushing to deal directly with their fans. Inde-

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pendent labels, such as Rykodisc, Sub Pop Records, and Parasol Music, began catering to the MP3 format and releasing new music in it. By March of 1998, the online music retailer Music Boulevard had sold more than four thousand songs from these labels at ninety-nine cents a piece. It didn't add up to all that much money, of course (only $3,960 in sales for Music Boulevard), but the threat to the music industry was clear.

An even bigger blow, though, came from Napster, the web service launched in 1999 by college freshman Shawn Fanning. Like Chuck D or Chiariglione, Fanning was in many respects an unlikely pioneer. The son of a single mother from the working-class town of Brockton, Massachusetts, Fanning had a tough childhood and an unremarkable academic record. He entered Northeastern University in 1998 as a computer science major but spent most of his time at his uncle's nearby office, fiddling with the computers there and trying to build a cache of MP3 files. Eventually, while trying to find a more efficient way of accessing and downloading music, Fanning stumbled upon what is now known as "peer-to-peer" technology—a way for Net users to copy and exchange files without necessarily being aware of each other's presence. In most of the older models of file exchange, one user would deliberately send her copy of, say, Ricky Martin's "Vuelve" directly to her six best friends. In Fanning's system, by contrast, once this user had logged on to a central site, any MP3 files located on her computer would automatically be available to anyone else logged on to the site. Which means, of course, that the potential number of "Vuelve" downloads had now become immense—any Ricky Martin fan could simply copy the song, for free, from any other fan who happened to be online.

To Fanning, the goal of the technology he quickly dubbed Napster was just to extend the music community that had already assembled online. It was a way to share more efficiently, to get the songs that he and his buddies craved. "I didn't see us turning into a business," he recalls. "I just did it because I loved

8Quoted in Don Jeffrey, "Downloading Songs Subject of RIAA Suit," Billboard, June 21, 1997, p. 3.

the technology." \(^3\) To Fanning’s uncle John, though, who had already launched an online gaming site, Napster was a commercial breakthrough waiting to happen. And to the industry, of course, it was hell.

In January of 1999, Shawn Fanning dropped out of college with his uncle’s approval. He launched Napster on June 1, and had between three and four thousand “customers” in just the first few days. John Fanning then began raising money in earnest, meeting with some of Silicon Valley’s most respected venture capitalists and touting Napster’s revolutionary potential. “We all knew from the beginning,” he remembers, “that this would be huge.” \(^34\) Certainly, college students bore out this prediction in full force. Within months of its launch, Napster was raging across U.S. universities, consuming in some cases up to 30 percent of the schools’ total bandwidth capacity. \(^35\) And then, because Fanning’s technology was so easy to use, Napster slammed even faster than other MP3 technologies into the musical mainstream, reaching everyone from suburban dentists searching for classical tracks to professors with a taste for German folk songs. By the fall of 2000, Napster claimed to have more than thirty-eight million users. \(^36\)

For the labels, of course, this was a nightmare. For it wasn’t just that the technology had created a new threat—there had been piracy, after all, ever since the days of sheet music—but rather that the breadth of this technology created whole new kinds of pirates: people who wouldn’t dream of stealing but simply didn’t equate the use of Napster with theft. The problem, in other words, was that the Fannings’ technology had redefined the very notion of property rights in music. Under the existing law, after all, consumers had the right to share their music with friends; this was a provision known in the United States as “fair use” and enshrined in such practices as lending libraries. What Napster had done—or at least what the Fannings and their supporters claimed—was only to expand the

\(^3\) Quoted in Anst, “Inside Napster,” p. 115.
\(^34\) Ibid.

fair use provision over a wider, but still noncommercial, community. So was this a violation of copyright, or a perfectly legal practice that just happened to undermine copyright’s intent? As is usual along the technological frontier, the answer depended on one’s perspective. And the old rules did not easily apply.

During this period of flux, however, the sheer weight of activity seemed to favor Napster and the host of new services, such as Gnutella, FreeNet, and Napigator, that rapidlyaped its technology. For if the record labels could not physically stop these services, then all of their markets would soon be awash in free music, “owned” now by consumers who saw no need to pay. And if music were free, how could anyone make money from it? Accordingly, prophets at the turn of the twenty-first century were quick to paint Napster as the grim reaper of the recording industry: the technological blow that would at last reveal the labels as both stupid and doomed. “The power of the cartel,” wrote one observer, “is doomed. And for that, the major labels deserve no sympathy at all.” \(^37\)

Return of the Labels

In retrospect, however, the record companies’ initial response to MP3 and Napster was at least partially understandable. They did, to be sure, move exceedingly slowly. They were cocky and stubborn and were scared to embrace anything that might challenge their own comfortable position. But they did in the end take action, challenging the new breed of pirates and trying—through whatever means—to impose old rules on what even they were forced to admit had become a new world.

Initially, the record labels clustered their forces and concentrated on their strengths. Banding together behind the RIAA, they brought suit against a growing slate of offenders, expanding their arguments to include other industries that might be similarly threatened by MP3 technologies and explicitly refusing to acknowledge that technology had changed either the structure of property rights or the definition of piracy. Late in
1998, for example, the RIAA brought suit against Diamond Multimedia Systems, a California start-up company that planned to produce a hand-held gadget known as the Rio. Like Sony’s breakthrough Walkman, the Rio was designed to be both sleek and functional, a hip, portable device that would play MP3 files at near-CD quality. Potentially, at least, Rio was a big technology: if it could mimic the Walkman’s performance in a new format, it could thrust MP3 directly into the mainstream of the music market and create, along the way, a whole new branch of consumer electronics.

To the recording industry, though, Rio hit too close to home. For by taking MP3 out of the underground market, it essentially legitimized it beyond the point of no return. Once Rio hit the shelves of Radio Shack or Circuit City, they feared, there was no going back: MP3 would flow out of the dorms and grunge-rock sites and smash into the musical mainstream. Or, as Hadrian Katz, a lawyer for the RIAA, expressed it: “[T]he expansion of the MP3 market from just those of us who like to spend our lives in front of the computer to people who actually have lives, is really going to create a new level of demand for the product.” Jim McDermott, vice-president of new media technology at Polygram, was even blunter: “The Rio,” he argued, “is like walking into a head shop and buying a bong, and it says, ‘For use with tobacco products only.’ They fucking know it’s going to be used for piracy.”

Accordingly, the RIAA began a formal assault on Rio, charging in an echo of its earlier suits that the company was “facilitating” and “encouraging” the unauthorized copying of copyrighted music. This time, though, the argument fell on less sympathetic ears. In a biting reversal, Judge Audrey Collins denied the RIAA’s request for a preliminary injunction against Diamond Multimedia, arguing first that because the Rio had no output capacity (that is, one couldn’t copy from it) it did little to facilitate unauthorized use, and second that “[b]ecause the Rio is capable of recording legitimate digital music, an injunction would deprive the public of a device with significant beneficial uses.” Diamond thus pressed ahead with its production plans, and the RIAA was stunned.

As might be expected, prophets of the new economy were quick to seize Diamond’s victory as proof of an impending power shift. “This is a win for consumers and a win for musicians,” exclaimed Ken Wirt, Diamond’s vice-president of corporate marketing. “The big record companies could do great if they got on this train instead of just standing in front of it trying to stop it.” Normally conservative BusinessWeek dismissed the RIAA’s actions as “Luddite folly,” scoffing that “[N]o amount of litigation can put the digital genie back in the bottle.” And others were downright nasty. “It’s bad enough,” suggested one observer, “that the RIAA doesn’t get it… But the RIAA doesn’t just not get it—they refuse to get it, in their dogged determination to take cluelessness to new depths.”

In the next round, however, the record companies did begin to get it—or at least to address the technology of online music on their own terms. In 1998—and then more boldly in 1999, they transferred their efforts from the courtroom and back towards the market, venturing onto the Net and gingerly testing prospects for their own online distribution. Early in 1998, for instance, Polygram, Sony, and Warner Music launched similar retail web sites, inviting customers to listen to digital clips of new songs and order CDs online. The sites weren’t particularly radical; users couldn’t download music directly and they couldn’t buy music that wasn’t already available at standard retail outlets. It was at least a start, though, and a whispered admission that the Net might be more than some squabbling pirates’ lair. In April, Atlantic Records (a subsidiary of Time Warner) edged slightly further ahead, allowing customers who purchased a new Tori Amos CD from Tower Records to download an additional

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song from the artist's web site. Others followed suit: Sony allowed fans to download thirty-second clips from recently released albums from its web site; EMI agreed to make the majority of its catalog available for digital distribution in the Liquid Audio file format, a secure digital download system.

To the hard core of MP3 fans, these tentative steps only proved that the labels still didn't understand the new rules of music; that, as one insider put it, they "had taken their heads out of the sand but still had their feet in the concrete." But then, in a move that recalled their earlier plunges into rock and R&B, the labels got more serious. Rather than denying the new world that was already on their doorstep, and rather than trying to compete with a bunch of younger and hipper new entrants, the "suits" simply went back to their own deep pockets and bought the competition. Time Warner and Sony, for example, each purchased 37 percent of CDnow, a leading online music retailer; EMI purchased 50 percent of MusicMaker, a producer of customized music compilations; and BMG and Universal established their own online commercial sites, GetMusic.

So far, so good. By 1999 the labels had begun to establish some kind of online presence and had acknowledged the possibility of new distribution methods. They had not, however, grappled with the central issue of the digital frontier—with the ease of piracy let loose by technology and the pressure this placed on existing rules of property. As the spread of Napster yanked this issue to the fore, the labels realized that they had to become more aggressive. They had to reconstitute some structure of property rights in cyberspace and some means—either technical or legal—of defining pirates and stopping them. Obviously, though, these were exceedingly difficult tasks. And as the record companies gradually realized, the only way to accomplish them was by working together, not only with each other this time, but with all the other players who had some claim to property along the digital frontier.


45CDnow was subsequently purchased by Bertelsmann in July 2000.
companies would drown and artists would find other, perhaps more sympathetic, channels for distributing their music. The problem, though, was that by 1999 Chuck D was drowning too. For every time that a fan downloaded, say, “Burn, Hollywood, Burn,” he wasn’t only depriving the labels of money; he was depriving Chuck D as well. Not to mention the marketers, and promoters, and even commercial sites such as EMusic.com (successor to GoodNoise), which were still about selling songs rather than giving them away for free. In the initial flush of excitement, new players to the MP3 game had seen the lack of rules and property rights as the source of freedom. As the game wore on, however, they quickly saw the other side of chaos—the side that meant no control and little cash. And quietly, begrudgingly, they began to embrace the record companies’ agenda.

Part of this agenda was about formal, legal rights. In 1997, the major labels had rallied behind passage of the No Electronic Theft Act, which made it explicitly illegal to reproduce or distribute copyrighted works (including digital recordings) in cyberspace. In 1999, they joined forces to promote three new pieces of legislation: a U.S. Digital Millennium Copyright Act, which would actually expand copyright holders’ rights in cyberspace; an EU Copyright Directive, which would extend similar rights across the European Union; and a treaty under the auspices of the World Intellectual Property Organization (WIPO), that would—officially at least—stretcher these same kind of copyrights across the global music industry. They also launched another major flurry of suits: against MP3.com; against Scour (an online service that finds music or movies already posted on the web); and, most famously, against Napster.\(^6\) While the RIAA or individual labels were the major movers in all these cases, they were joined increasingly by members of the artistic community, who saw their own property rights reflected in the industry’s push. The issue, these artists claimed, was not about music or money—it was about property, and about the legal rights that adhered to this property even when it was flung into cyberspace.

A second part of the artists’ agenda, and in many ways a more important one, concerned the informal standards that prevailed within the music industry. During the first wave of MP3, many artists had responded to the technology with either enthusiasm or disinterest; they either ignored it entirely or, like Chuck D and his admirers, embraced it as the wave of a better future. If David Bowie was posting on his web site, people reasoned, and Chuck D was rapping rhapsodically about it, how bad could the thing be? As the online industry evolved, however, many of these same artists began to see the underside of digital distribution and the ill effects it could have on their own careers. Yes, for obscure groups like Slug Oven, the Net offered an unparalleled chance to reach listeners more directly and perhaps, even, to drive sales of the group’s music. But for Bowie or Springsteen or any of the more established groups, free downloads were just a hit on legitimate sales. And thus many of these artists began to speak more directly against online music, or at least against the practice of copying and distributing unlicensed tracks. In 1998, Prince (or The Artist Formerly Known as Him) did a remarkable turn-around, threatening to sue his fan sites for illegal distribution only months after announcing that he would distribute music only over the web. Oasis, a popular British band, also threatened to sue fans for offering online music, and Metallica led a high-profile charge against Napster in 1999 and 2000. Led by Lars Ulrich, the band’s scruffy and hardly establishment drummer, Metallica filed its own suit against the online site, presenting Napster with a list of 317,377 users that had allegedly violated the band’s copyright.\(^7\) Less famous artists also started to complain that the much-touted benefits of Internet distribution had yet to materialize. “I’ve sold a total of one CD online,” griped an independent musician who posted her songs on MP3.com, “and I think that’s pretty typical.”\(^8\) Indeed, in August of 1999, MP3.com sold a total of

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15,600 CDs on behalf of 26,700 artists—or about half a CD per artist and roughly $3 a month. Such desultory results prompted one representative of the American Federation of Musicians to complain, "The bottom line is that these companies want to distribute recordings without even attempting to compensate the artists. We're very concerned."54

Meanwhile, a similar commercial impetus was also dragging the new music companies, such as EMusic.com and RealNetworks, closer to the record companies' camp. On the one hand, online distribution gave these companies their entire reason for being: EMusic.com rose to prominence as one of the leading distributors of online tracks, and RealNetworks grew on the back of powerful technology that enabled listeners to play (or "stream") their online music in real time. On the other hand, though, the proliferation of free music and the absence of online property rights also squeezed the profit potential of these firms and many like them. So long as property rights remained fuzzy, it would be difficult for any online music site to gain access to the vast libraries that the labels still controlled, or even to control the newer music that they themselves were rapidly throwing online. In the early stages of e-commerce, when companies such as EMusic.com and RealNetworks were soaping on their own stock valuation, they didn't need to worry so much about revenue models. But as the Net evolved and early business movers looked increasingly like established giants, the absence of property rights and established procedure became more obvious. And in pursuit of some semblance of rights and procedure, many of the "new" music companies began to sidle closer to the old ones, seeking, as one executive with RealNetworks explained, to "reduce chaos" and be in the vanguard of a "legitimate online market."55

A final player in this strange coalition were the consumer electronics firms, such as Samsung, Hitachi, and Diamond Multimedia, which made the devices that served the music industry. Even more than the new media companies, their interest lay in standardization, in creating some common platform that all

users and distributors of music would eventually share. To some extent, of course, MP3 was already this platform. It was an official standard of the MPEG group and the unofficial standard of online music community. Yet because the record labels loathed MP3 and feared its widening spread, they had refused, of course, to convert their own libraries or cutting-edge music to the MP3 format. And until they did, the market for any kind of MP3-related hardware was going to be severely limited. Yes, there were the hordes of students and underground fans of Slug Oven and such; but the bulk of the market, the core of the conservative, mainstream, music-listening public wasn't there yet. Which meant that it was considerably riskier for any consumer electronics firm to invest in a mass-market gadget—particularly if it feared that the standard it chose would eventually be overturned by something else. This is exactly what had happened in the early days of video cassette recorders, when the reluctance of the movie studios to release movies in any video format had prolonged a battle between VHS and Betamax and hurt, in the process, all companies who rushed to the soon-to-be-obsolete Betamax. Nobody wanted that to happen again, and the best protection was some kind of common standard, some platform that would ease the fears of the record labels and convince them to convert the mainstream content that was still so critical to the entire industry's success. The electronics companies didn't care so much what the standard was; they just wanted one that would have some permanence and allay the labels' fears.

And thus, over the course of 1999, Leonardo Chiariogione presided once again at a series of endless meetings and hotly contested debates. From the start, SDMI set itself a swift and ambitious target. The goal was to create a new standard for digital music, something that would enable listeners to access online music while still protecting the copyrights that adhered to this music. The standard had to be based on an "open architecture"—that is, it had to allow all sorts of programs and devices to communicate seamlessly with one another. It had to be pirate-proof. And it had to be done by Christmas of 1999, when most analysts predicted that the market for Rio-like devices would explode. To achieve these targets, members of SDMI divided their work into two tranches. First, they planned to create a preliminary specification for portable devices, something that

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Footnotes:

4Bid.

5Quoted in Vander Veer, "Singing the MP3 Blues."

6Interview with author, Seattle, Wash., October 1999.
would enable machines such as the Rio to play digital music files in a more secure format. Initially, this specification would still allow users to listen to any kind of digital file, including both legitimate and illicit MP3 files. Then, in Phase II, a new set of specifications would enable music providers to release their songs in an advanced, SDMI-compliant format, one that would prohibit users from copying a song more than a certain number of times. To hear this newly secure music, users would have to upgrade the software in their hand-held devices. And once they did so, the device would refuse to download any music that it recognized as being pirated.

Technically, crafting such specifications was exceedingly tricky, since they entailed a considerable amount of interoperability and overlap with previous formats. Politically, it was even worse, since the SDMI remained a large coalition of very strange bedfellows, many of whom were competing against each other and nearly all of whom still resented the record companies’ dominance. Yet somehow, Chiariogone prevailed once again; and on June 28, just two days before its self-imposed deadline of June 30, SDMI released its Portable Device Specifications. From here on in, proclaimed the SDMI in its official press release, portable devices such as the Rio would “respect the usage rules embedded in music by its creators.” “This,” they predicted, “will enable new business models that will provide consumers with new ways to enjoy the latest music.”

But then, even as the industry was gearing up for the promised Christmas rush, SDMI appeared to slow down. It pushed ahead with its working groups, and selected a firm to create the digital watermarks that would differentiate SDMI-compliant files, but it didn’t develop the full Phase II specification. Christmas of 1999 came and went, without either a new set of specifications or the much-promised rush to hand-held players. By the spring of 2000, the music community was abuzz with doubts about SDMI and complaints—once again—about the record industry’s motives. “If one thing is certain in the battle over Internet music,” declared an editorial in the Industry Standard,

“It’s that the Recording Industry Association of America’s new audio format, the Secure Digital Music Initiative, is doomed. The RIAA’s attempt to head off the MP3 juggernaut with a standard that no one is using—and a standard from which many of its members are already diverging—will go away quickly, as do most RIAA attempts to bend technological advances to fit its antiquated notions about copyright.” Going even further, one of the founders of EMusic griped in a public forum that because SDMI had failed to deliver its proposed specification, the initiative was now “dead as a doornail.” SDMI, of course, denied all reports of its demise and disputed any undue allegiance to the established recording industry. “The notion that SDMI is a Satanic conspiracy of special interests is hyperbolic,” said one participant. “It’s a very inclusive process.” The RIAA’s Rosen also defended the process, noting that before SDMI, “the music and technology industries had spoken completely different languages.” “Now,” she commented, “at least they have each other’s glossaries.”

Meanwhile, as SDMI was being torn from within and battered from without, members of the coalition began to grope for some other kind of standard—something that would achieve the technical objectives of SDMI without being dragged down by its increasingly massive weight. In January of 1999, for example, even as it was participating in SDMI, Liquid Audio, a leading developer of online audio systems, simultaneously created the Genuine Music Coalition, a group of hardware and software vendors, independent record labels, rights societies, and others, who were also trying to cobble together a common system for digital audio. With fewer members on board, and apparently less tension, the Coalition rapidly created its own standard—a sort of interim SDMI that allowed content providers to mark their music with a tamper-proof stamp and thus guarantee that certain songs had been obtained and recorded.

54Panel Spurs Over Need for SDMI,” Webnoise, November 17, 1999. (news.webnoise.com)
55Talal Shamoon of InterTrust Technologies Corporation, quoted in “Panel Spurs over Need for SDMI,” Webnoise, November 17, 1999 (news.webnoise.com).
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Fast Forward: The Possible Paths of Online Music

Unlike the cases of encryption and antitrust, the story of online music does not yet have an ending. As of mid-2003, there has been no clear resolution to the issue of online piracy, to Napster and SDMI, or to the fate of traditional labels in a digitally distributed world. Will the pirates kill the suits for good? Will the music industry shatter into tiny shards of commerce? Will music even be sold in an online world? It’s simply too early to tell. The industry is still only less than a decade old and the technology is still evolving. By 2002, MP3 may well be an obsolete format, superseded by something more powerful and even less understood.

Amidst all this uncertainty, however, one can still discern the outlines of a pattern—faint lines of the progression we have already seen in telegraphy and radio and other key junctures along the technological frontier. Like these other new markets, online music began with the innovators. It began with the engineers and scientists who crafted MIDI and WAV and then MP3. It began, too, with the work of Chiariiglione and the MPEG group and with the conviction that standardization could make computers sing. This was the first phase of online music, when technology preceded commerce and the general public had no idea what was underway. It lasted roughly from 1983, when MIDI was created, to 1994, when MP3 was formally adopted by the MPEG group.

The next phase was dominated by a familiar group of followers: the pirates, prophets, and pioneers who flocked to cyberspace in the late 1990s and reveled in the prospects of online music. As is common along the frontier, the pirates paved the

players. And that, of course, was precisely what many observers were predicting. To quote Chuck D again: “MP3 is like an asteroid—it’s deep impact. And when it hits, it’s going to knock out all the dinosaurs. They may come back in some form, but this time, they’re gonna be salamanders.”

Conceptually, the labels clearly understood that their strength lay in numbers, and in a collective response to the impending crush of digital distribution. For despite the vast change that had already roiled through the music industry, the labels still possessed some of the industry’s most valuable assets. They had the artists, the distribution muscle, and the rights to hundreds of thousands of songs. Or, as one top executive phrased it: “We may be slow and stupid, but we still own the business.” If the labels could join forces with one another, and then with the other facets of the industry that shared their underlying faith in copyright, stability, and profits, they could conceivably establish a new set of rules to protect their old kind of property. This was the brilliance of SDMI and the momentum that drove it forward. Practically, though, SDMI was a treacherous venture to pull off. It involved too many interests, too many animosities, and a staggering level of technological change. If the industry could somehow manage to hold this ragtag coalition together, then the shift to online music might well play out like the shift to rock ‘n’ roll. There would be an explosion of creativity and a raft of new players, but then, slowly and quietly, the power would return to the established companies—to the deep-pocketed labels who still knew better than anyone else how to make and market recording stars. But if SDMI fell apart, then each of the labels would be forced to rely on its own resources, struggling to stake some claim in the newly chaotic world of music. The old world of music would be forever changed, and the powers and rules replaced by a different set of

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way to this second phase, exploring the possibilities let loose by technological change and prodding at the shifting limits of the law. They were joined in due course by two waves of pioneers: artists such as Chuck D and David Bowie, who saw the new space as a way to circumvent the established structures of the music industry; and then commercial pioneers such as Mike Robertson of MP3.com and the founders of RealNetworks, who built towering commercial ventures on the back of all this change. And in their wake, of course, came the prophets, who saw the flow of change and predicted a revolution.

At the turn of the twenty-first century, online music was lunging into the third and most chaotic phase of its evolution. This was the phase of creative anarchy, a phase marked by a continued roar of enthusiasm and a notable lack of rules. During this phase, power seemed to veer almost palpably from the record companies to the pirates, creating a vacuum of control and uprooting even some of the industry’s most sacred tenets: copyright law, for example, and the basic notion that music was something to be sold rather than shared. This phase began sometime in 1999, when digital distribution moved out of the college dorms and into the mainstream. It is still underway in the year 2001.

In music, however, as in all the other industries we’ve seen, this period of anarchy seems unlikely to last for long. If the arguments of this book hold true, in fact, we should expect a certain level of order to return to the music industry before long, and a restoration, or perhaps a rewriting, of its underlying rules. To be sure, many observers of the digital music scene claim that technology has already dealt a death blow to order, eliminating the need for property or any kind of intellectual property rights. In a 2000 Wired article, for example, John Perry Barlow of the Electronic Frontier Foundation wrote that “the future will win; there will be no property in cyberspace.” He is echoed by scholars such as Harvard Law School’s Charles Nesson, who suggests, “The whole structure of intellectual property, and the value of it, is changing... The technical barriers are dropping almost to zero, and... law itself is going to get embarrassed or weakened.”

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Space Music

Such arguments have a lofty, end-of-millennium feel. They are inspiring in many respects, and desirable. What music lover, after all, wouldn’t like an endless stream of easily accessible, totally free music? Who could disagree with the vision of some great global meetinghouse of wholly public ideas? The problem, however, is that despite the massive technological change to which Barlow and Nesson refer, and despite the attractions of online listening and the undeniable proliferation of downloadable music, the fundamental drivers of the music industry remain largely as they were in the dark ages of CDs. There are still a relatively small number of people who record music, and a relatively large number who like to listen to them. There are still more artists than the average listener can attend to, and preferences that vary with age, location, and personal taste. Most important, there are still commercial motives lurking only barely beneath the surface of all this art. True, some musicians, like Chuck D, see their work primarily as a social vehicle and don’t seem to care about giving it away for free. Others can give it away and still make enough money from T-shirts or concert tickets. Yet both of these groups are relatively small; most artists still make most of their money from the sale of recorded music. If these sales go away, then so too will the artists’ proceeds. Moreover, simply producing this music demands a large and hungry infrastructure—not just the lone artist with her guitar, but also the songwriter, the backup musicians, the video producer, the independent promoter, the radio station, and so forth. Each of these players contributes to the final product and none, presumably, is willing to work for free.

If we assume, then, that online music will not necessarily mean the end of commercial music, then some system of property rights must be maintained or recreated. There must be some way for artists to own the property they create, or at least to earn proceeds from it. Accordingly, as the pioneers begin to stretch their muscles and voice their demands, the distinctions between property and piracy are likely to be clarified. The established labels will pressure both courts and politicians to extend the reign of copyright into the realm of cyberspace, and the politicians and judges, it appears, are likely to comply. Already, this trend is underway. In April of 2000, for example, a federal judge ruled that MP3.com had violated copyright law by
compiling a huge database of downloadable music; in August, another judge prohibited a web site from publishing programs that allowed users to copy digital video disks (DVDs) by breaking their encryption codes; and in December, the U.S. Copyright Office ruled that radio stations that broadcast over the Internet had to pay licensing fees for the songs they played. In the most high-profile case, meanwhile, the RIAA won a powerful victory against Napster in July of 2000, when Judge Marilyn Patel sided with the recording industry in the case of A&M Records et al. v. Napster and issued a preliminary injunction that essentially ordered Napster to halt its operations. A federal appeals court upheld this ruling in February 2001, adding that Napster was also potentially liable for copyright infringement.

To be sure, critics such as Barlow can still argue that any judgments against digital downloads are both irrelevant and doomed. They can predict that the public at large will simply ignore these provisions or rulings, opening a gap between law and practice that will, in the end, prove unsustainable. And perhaps they’re right. Yet the evidence thus far suggests otherwise. When Metallica and two record labels sued Indiana University for copyright infringement, for example, the university immediately banned its students from accessing Napster. Oklahoma State University likewise seized one of its student’s computers after the RIAA alleged that he was using the school’s server to offer free music; and more than two hundred colleges had followed suit by the fall of 2000, banning Napster on campus. Similarly, after AOL executives discovered that programmers at their Nullsoft division had created a serverless version of Napster called Gnutella, they instantly pulled the program from their web site; and in April of 2000, one high-speed cable ser-

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vice provider told its users that they would lose their cable modem accounts if they continued to use Napster. The implications of such cases are clear: so long as there are some physical choke points on the web, and some mass of essentially law-abiding citizens, the problems of enforcement may not be half as severe as many prophets foresee. For in this case the object of theft is not covert information or banned masterpieces, it is Britney Spears’s latest hit, available down the street for $15.99 and soon, in an authorized online format, for even less.

Which brings us to the final force for order on the frontier. In the heady days of the late 1990s, online music ventures were among the darlings of the red-hot NASDAQ. MP3.com, for example, went public in July of 1999, and was soon trading at $48.50 a share. Launch.com, another online music site, was selling for $27.50 a share in February of 2000, and Napster raised $15 million in venture capital in May. By late 2000 and early 2001, however, it was becoming increasingly clear that most of these firms were not making any money and had little prospect of ever doing so. Launch.com fell steadily throughout 2000, hitting $3.12 by November; MP3.com slipped to $3.81, and Scour filed for Chapter 11 bankruptcy protection in October. As the prospects for these companies continued to unravel, the situation in the digital music industry became eerily reminiscent of the old British East India Company. The pirates were important now; they had proven their threat and potential; but they were also in fairly desperate financial straits. And thus, just like the British traders, they turned back to the establishment as the spoils of their craft began to run dry. On October 31, 2000, Napster announced that it had signed a deal with BMG, a subsidiary of media giant Bertelsmann. Under the arrangement, the two newfound partners would use Bertelsmann’s money and Napster’s technology to develop a fee-based

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63Harmon and Sullivan, "Music Industry Wins Ruling."

In the final analysis, then, the story of digital music harkens back in many ways to Prince Henry and the pirates of yore. Like them, it is a story of adventure and exploration; of pioneers who charted new worlds and trumpeted great promises upon them. Like the old explorers, many of digital music’s pioneers were men of great conviction,\footnote{With a handful of exceptions, the current pioneers—in online music, at least—were once again predominantly male.} who saw their mission in religious as well as commercial terms: to enlighten the natives as well as steal their gold. As events developed, however, these missionaries ran into the same problems that confounded their ancestors. There were too many pirates afoot in the new territory and not enough property rights, too many players and not enough profit. During the great age of navigation, these problems of anarchy were solved, slowly but surely, by the creation of property rights: following the chaos of the sixteenth-century conquests, order was eventually established in the New World and pirates were banished from the seas. A similar logic is liable to hold sway for digital music, and indeed for digital content in general. Yes, digital distribution fundamentally shifts the underlying rules of the music industry. It challenges the established system of property rights and threatens the survival of the world’s leading record labels. But what the prophets of digital nirvana forget is that unless the music industry abolishes its capitalist urges completely (an unlikely proposition), people who make the music will still need some way to make money as well. And to do so, they, like the trading companies before them, will need to carve out a system of property rights and a way of differentiating themselves from the pirates they may closely resemble.

What distinguishes the digital music industry from some of its ancient forbears, however, are the methods by which property rights are likely to be established and secured. In the seventeenth century, the trading companies turned first to the method they knew best. This was physical force, of course, a primitive (albeit quite successful) mode of private regulation.

When the force fell short or grew too expensive, they then turned back to the state, and to its growing coffers of self-defense. In digital music, by contrast, both individual efforts and state intervention have been relatively limited. Firms have relied instead on technological solutions to their property concerns, and on a novel blend of cooperation and standard-setting. They have experimented with cutting-edge technologies such as digital watermarks and cryptography, trying to stop piracy by physically impeding it. They have played with wide-reaching standards, such as the proposed second phase of SDMI, and with more narrow proprietary formats. In all of these cases, the firms involved have rebuffed formal regulation in favor of a more private approach. Borrowing a page, perhaps, from BSkyB, they are trying to use one form of technology—encryption again—to outwit the implications of another. Unlike Sky, however, most of the music industry’s efforts have been collaborative. And they have been spearheaded not by the newest pioneers, but rather by the more established firms that the pioneers hope to replace.

In many respects, therefore, the digital music industry continues to dance to its own tune. For there is quite a lot of cooperation among the leading music firms—more, perhaps, than we’ve seen in any other industry—and more reliance on formal \textit{private} solutions such as SDMI. Even among established firms such as EMI and Polygram, there is still a certain aloofness from government and a reluctance to get too deeply involved in state-led legislation. This pattern suggests several things. First, it implies that in the much-trumpeted new economy it may indeed be possible for firms to use technology as an implement of governance, a way to protect themselves without having to resort to either force or the state. If this is so, it may lead over time to a very different configuration of power in the global economy, one that has been feted by prophets such as John Perry Barlow and described in some quarters as “the new medievalism.”\footnote{See for example Stephen J. Kobrın, “Back to the Future: Neomedievalism and the Postmodern Digital World Economy,” \textit{Journal of International Affairs} 51, no. 2 (1998), pp. 361–86.} Second, the pattern of evolution suggests that private firms can, perhaps, cooperate in the creation of new technical
standards and that these standards can serve both to advance an industry and to protect it.

Finally, the story to date of the music industry raises interesting questions about the relative power of new and established firms—the pirates and those from whom they would hope to steal. In most of the stories we've seen, it is the pirates who morph over time into establishment figures, shaping the rules of their new game and redefining the terms of engagement. Certainly this was the case with Sir Francis Drake, with the British East India Company, with Bill Gates, and Rupert Murdoch. In the digital music industry, by contrast, matters seem to have run in the opposite direction. If BMG absorbs Napster and converts it to a fee-for-service model, or if EMI and Sony continue to pursue start-ups such as CDnow and mimic their operations, then the established firms may wind up swallowing the pirates before they can do that much damage. To be sure, the ease of online piracy means that illicit downloads will always occur in teenagers' bedrooms and college dorms. Large-scale pirates will flourish in their usual offshore lairs and renegade musicians will flaunt their independence by circumventing the labels. But the labels themselves will also evolve, purchasing the rebel players as their venture capital begins to dissolve and developing new models of online commerce.

In the end, therefore, the online music industry may well be regulated by a combination of private and public forces. Firms will set industry standards; governments will enforce them; and even diehard music fans will eventually accept some revised notion of property rights in a digital age. This isn't the future that Chuck D has touted, of course; it isn't a world where music is free and record labels fade into commercial oblivion. It is, however, a world that aligns with what the political history of technology suggests. Markets need rules if they are to survive, and power—slowly sometimes, ironically perhaps, and often unfairly—flows to those who make the rules.