

INTRODUCTION

On Friday, November 16, 1984, the world witnessed what was, at that time, the largest stock flotation in history. Margaret Thatcher's Conservative government had privatized the UK's national telecommunications provider, British Telecom, for approximately £3.6 billion.¹ BT's sale was not just any privatization. It was *the* privatization, paving the way throughout the world for privatization of not just digital infrastructure, but of infrastructure in general. BT's sale turned privatization into a core policy not only for the Thatcher government but also for other emerging neoliberal governments, which aimed to shrink the state and create new markets by selling state assets to the private sector.² Margaret Thatcher called privatization "one of Britain's most successful exports," boasting that it had trebled Britain's number of individual shareholders and "put a stop to the idea that inefficient management would always be subsidized by the taxpayers."³ Kenneth Baker, Thatcher's minister for information technology, later wrote that BT's privatization "made possible all other public utility sales."⁴ Thirty-five years after BT's privatization, Jeremy Corbyn's 2019 Labour Party manifesto vowed to reverse this change, renationalizing British Telecom and delivering free full-fiber broadband to all by 2030. This plan, however, was treated as shockingly radical. Boris Johnson called it a "crazed communist scheme," while Neil McRae, BT's chief network architect, tweeted that "labour [sic] plans broadband communism!"⁵ Rejecting public broadband ownership naturalized the idea of private digital infrastructure, a legacy of Margaret Thatcher's government, while making public ownership appear alien. BT's privatization thus illustrates how private infrastructure ownership, one of the key features of neoliberalism, took shape.

But BT's sale was more than just a proof-of-principle for neoliberal economic policy. It also pushed the idea that digital infrastructure is best done by the private sector. When Patrick Jenkin, Thatcher's secretary of state for industry, announced the plan to sell BT in 1982, he told the British Parliament that "we need to free BT from traditional forms of government control" and linked this to digitalization, asserting that "British Telecommunications is already leading the information technology revolution in the United Kingdom. It could become a major world force."⁶ That same year—which the government had christened Information Technology Year, also known as IT-82—Margaret Thatcher gave the keynote at an information technology conference at the Barbican Centre, London. Thatcher proclaimed that information technology required "free enterprise," and that this would soon include BT.⁷ Kenneth Baker also gave a speech on the "information economy," arguing that privatization would stop the totalitarian "electronic state" from abusing information technology.⁸ These remarks responded to the digitalization of Britain's telecom infrastructure. Since the late 1950s, scientists, engineers, and managers at the British Post Office, which ran the nation's telecommunications service until 1981, had been researching, planning, and building a new digital infrastructure for Britain. When James Merriman, the senior director of engineering at the Post Office, had announced his plans for digitalization in 1967, he proposed a public digital infrastructure that would allow every citizen to receive voice, video, and data communications to their home.⁹ BT's sale, however, meant that Britain's digital infrastructure would look very different from Merriman's original plans.

This book recovers these lost horizons of nationalized digital infrastructure, showing engineers' and managers' plans for digitalization and how these plans collided with privatization. Communications infrastructure will always involve a mix of public and private ownership, with the shares of public and private in that mix constantly changing. In recent years, public and private advocates have pushed their visions of faster, fairer coverage for all. In the private sector, both Elon Musk's SpaceX and Jeff Bezos's Amazon are building global satellite internet infrastructures. On the public side, more national, earthly solutions hold sway. Since 2009, Australia has been building a national broadband network, touted as the largest infrastructure project in Australian history.¹⁰ Bernie Sanders's Green New Deal pledged \$150 billion to build public broadband networks across the US. This question of public or private ownership, however, is not just about the future but also about the

past and present. Private US telecom monopolies have already raised prices and furthered inequality, while national laws governing the internet, such as the Great Chinese Firewall, reveal that the internet is not the private, borderless world that it seems.¹¹ This book is about a key moment in this history of public and private digital infrastructure, the moment when communications infrastructure became both significantly more private and significantly more digital.

This history of the digitalization and privatization of Britain's telecommunications infrastructure offers a way to understand how these changes were connected. Digitalization and privatization now seem two sides of the same coin. But this appearance is a historical construction, and neither digitalization nor privatization were things that merely happened to Britain's telecom infrastructure, or any other communications infrastructure. Digitalization began decades before privatization, and so, in the UK, was at first shaped by national ownership, only later turning from monopoly to market. These were changes that telecom engineers and managers made happen. In doing so, these engineers and managers not only changed how they understood digitalization, nationalization, and privatization but also changed how politicians, policymakers, and the public understood the relationships among digitalization, regulation, and infrastructure ownership. This book takes these engineers and managers as the central characters in this history and looks at how, starting in the 1950s, they began to think, plan, and enact the digitalization of British communications. Then, from the late 1970s, they began to alter course as they anticipated the end of their monopoly and the eventual privatization of their network. This book shows how, in doing so, monopoly and national ownership influenced digitalization, and vice versa, and how these associations changed with liberalization and privatization. The book argues that these changes in technology, ownership, and regulation cannot be understood in isolation, but must be understood together. First, however, this means understanding the wider histories of privatization and digitalization, and thus the relationship between technology and politics.

PRIVATIZATION: PRAGMATISM, IDEOLOGY, AND TECHNOLOGY

In the *longue durée* history of European infrastructure, regulatory and ownership changes seem to have been chiefly pragmatic. In the nineteenth century, neither municipal socialism nor anticapitalism played a great role in local

and national governments taking over infrastructure.¹² Instead, state and municipal ownership in the nineteenth and early twentieth centuries across Europe met various political goals, such as mitigating private-sector cartelization and other market failures, or geopolitical and security concerns about information and resource flows. In the late twentieth century, privatization had its ideologues, such as the Austrian American management theorist Peter Drucker, who advocated privatization to reduce “government overload,” and in members of the US New Right, who believed that it would create a property-owning democracy.¹³ But for Margaret Thatcher’s Conservative Party, elected in 1979, privatization was a way to balance the books after Britain’s 1976 bailout by the International Monetary Fund, which imposed limits on how much money Britain’s nationalized industries could borrow.¹⁴ The British Treasury’s shift to monetarist economics, aiming to lower inflation by limiting borrowing and reducing the budget deficit, further incentivized privatization.¹⁵

Privatization under Thatcher first took shape as sales of smaller government assets, like council houses, oilfield assets, and public-sector land, although council house sales were still quite radical.¹⁶ The drive to find larger assets to sell meant that, by 1981, the Conservatives began to consider privatizing the state utility monopolies.¹⁷ At this point, privatization’s main goals were reducing the budget deficit by selling public assets and freeing state-owned enterprises from external financing limits so that they could borrow and invest. In October 1982, the Central Policy Review Staff, the Cabinet’s “think tank,” recommended bringing privatization to this next level, and, two years later, the government sold British Telecom. The government, however, did not present BT’s sale as purely pragmatic but used it to promote individual choice and freedom over state ownership. The government explicitly targeted the British public as potential BT shareholders through an advertising campaign that included slogans such as, “You can share in BT’s future” and “A public service goes public.”¹⁸ By early September 1984, the BT Share Information Office had received more than 300,000 requests for more information.¹⁹ Between Friday, November 16, and Wednesday, November 28, 1984, when share applications for BT opened, underwriters in the City of London received two million applications from the British public, more applications than the number of individual shareholders in the entire nation before BT’s sale. Recalling this popular enthusiasm, Nigel Lawson, then chancellor of the Exchequer, later heralded BT’s sale as “the birth of people’s capitalism.”²⁰

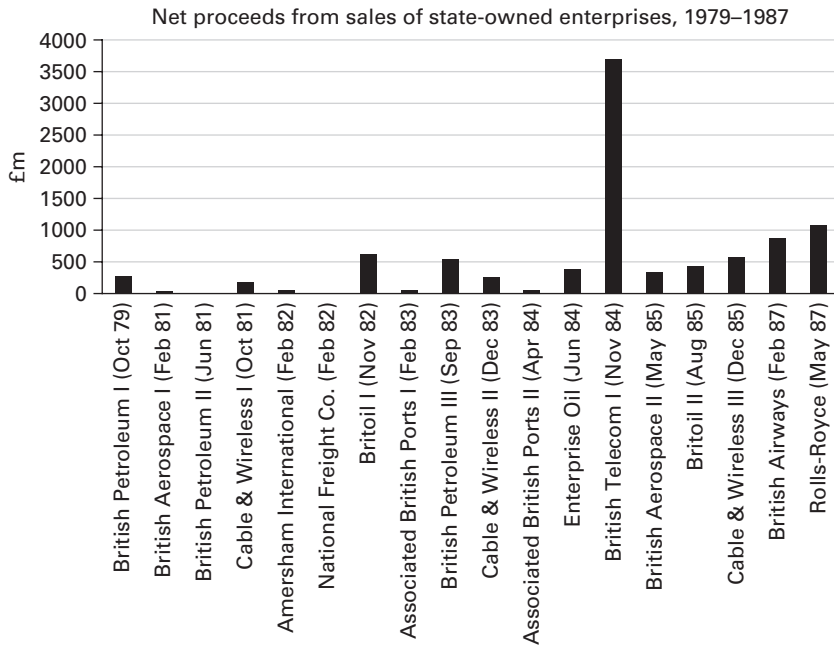


FIGURE 0.1

The proceeds from BT's privatization far exceeded those from any of the privatizations preceding it, as well as all of those in the three remaining years of the second Thatcher government. Source: Data taken from Parker, *The Official History of Privatisation: Volume 1* (2005).

To see privatization, particularly BT's privatization, as purely pragmatic thus misses its radical influence on the Thatcher government and Thatcherism. BT's unexpectedly successful share offer (figure 0.1) turned privatization from an economic to an ideological project, emphasizing "popular capitalism" and "share-owning democracy."²¹ Wider share-ownership became a central policy for Thatcher's government, and so, alongside council house sales and the 1981 monetarist tax budget, BT's privatization became one of Thatcherism's "three pillars."²² BT's privatization typifies Thatcherism, which included both pragmatic and ideological elements.²³ At first more reactive and antisocialist, and not self-consciously neoliberal, Thatcherism became, after BT's sale, a more prescriptive and market liberal project that oversaw the retreat of the state from public ownership, one of the most significant changes to the structure of the British economy in history.²⁴ In short, Thatcherism would not have existed without BT's privatization.

BT's privatization influenced politics abroad, not just domestic politics. Thatcher's privatization program was, "without question," the most significant privatization program in history.²⁵ BT's sale persuaded other countries to sell their state-owned enterprises, and privatization established new ways of thinking about the demarcation between the public and private sectors.²⁶ Privatization was a popular policy export, as British politicians and think tanks toured the world, especially Eastern Europe, promoting and implementing privatization in the late 1980s and 1990s.²⁷ Histories of privatization have highlighted its role as a core neoliberal policy.²⁸ BT's privatization was thus a key moment in the "market turn" that started in the 1970s.²⁹ This market turn is thus an important topic for this book, as understanding it helps better place BT's privatization within changes in British and global political economy. The market turn is generally taken as a shift away from social democracy and toward neoliberalism, but both these terms suffer overly generalized and contested definitions, which can reduce their analytical value, and so they require elaboration.³⁰

There are two broad approaches to neoliberalism. The first focusses on neoliberalism as a transatlantic intellectual movement and doctrine that became prominent after World War II, mainly associated with the Mont Pelerin Society, founded in 1947, whose thinkers promoted the free movement of capital and sought to construct competitive markets as a superior mode of economic governance, compared with the nation-state.³¹ The second approach explores "actually existing" neoliberalism, investigating privatization, deregulation, and other local and various neoliberal practices from the 1970s onward, a trend called both "neoliberalization" and "market liberalism."³² Critiques of neoliberal scholarship argue that, while there are significant connections between these practices and the neoliberal intellectual movement, these connections are not linear and sometimes exaggerated.³³ BT's sale also complicates this dualistic, linear understanding of neoliberalism. The sale radicalized Thatcherism, demonstrating that neoliberalism was never a purely top-down project that moved linearly from ideation to ideology to policy, but that policies such as privatization helped create neoliberal politics.³⁴ In other words, neoliberalism is "embedded" in socio-material conditions—institutions, industries, and infrastructures—that were important to its success.³⁵

While neoliberalism is complex, social democracy is potentially more problematic as an analytical term for this history. Social democracy originated

in early twentieth-century Europe as a democratic alternative to revolutionary socialism. Social democrats sought to use the democratic state to promote social solidarity and to institutionalize policies based on progressive taxation, guaranteeing economic security by funding social insurance, education, healthcare, housing, and infrastructure.³⁶ But it would be wrong to assume that postwar, pre-neoliberal UK political economy was social democratic. Britain's twentieth century, especially after World War II, was defined by the rise and fall of a nationalist political economy.³⁷ In this period, Labour was more the party of economic nationalism than of social democracy, while the Conservative Party mixed competing interests in empire, nation, free enterprise, and free trade. From the 1940s to the 1970s, this nationalist political economy most defined the ownership and governance of Britain's economy, and from the 1980s, the Thatcher governments swapped economic nationalism for internationalism, with privatization as one of their chief methods.³⁸

This means that, for most of the period that this book covers, from the 1950s through to the 1980s, British telecommunications was not a social democratic or welfarist public service, but an instrument of nationalist political economy. This also helps understand privatization as more than merely an act and agent of neoliberal political economy. Multiple politics pervaded privatization. Before it was called "privatization," selling state-owned enterprises was called "denationalization." This term better draws attention to the fact that selling state-owned enterprises also represented the decline of nationalist political economies. With Thatcher's rise to power came a contradictory mixture of waning nationalism and burgeoning neoliberalism. Alongside this, international finance asserted itself more in the British economy by purchasing state-owned enterprises, as happened with BT, approximately one-third of which sold to foreign investors. Privatization was more a move away from a nationalized political economy than it was a move away from social democracy.

Privatization is thus best understood "from an eclectic perspective," wherein the whole is more than the sum of its parts.³⁹ Studying its history solely from the perspective of pragmatism, Thatcherism, neoliberalism, or nationalism misses the analytical richness that it offers as a case study of how all these political economies intersected. Infrastructure privatization and deregulation have a complex history, which promoters and policy analysts tend to miss in favor of promoting simplistic narratives.⁴⁰ In particular, the role of technology is either overlooked or treated superficially. From the late

1980s and 1990s, policy scholars studied telecom privatization and deregulation in Britain, Europe, and the United States.⁴¹ Their accounts saw deregulation and privatization either as ideological or as enabled by exogenous technological change—or as a combination of the two. They also often cited national institutional factors to explain the routes that different nations took toward telecom deregulation and privatization. This mirrors a key move in histories of neoliberalism, which have recognized how national institutional conditions shape ideology, showing how “policy creates politics.”⁴² BT’s sale is a quintessential example—a policy that radicalized Thatcherism. But these histories and policy studies have too restrictive a view of the diverse institutions that shaped privatization and neoliberalism. These infrastructures are themselves socio-material institutions, and technology was not an exogenous pressure on national infrastructure, but rather something that engineers developed and innovated through these infrastructures.⁴³ Infrastructures “act like laws” in setting the limits of possibility, meaning that scholars must pay more attention to how engineers, technocrats, and their material contexts shaped the political economy of privatization.⁴⁴ This means understanding the technological landscape before privatization, requiring a longer history of what digitalization looked like under national ownership.

DIGITALIZATION AND NETWORKING: BUSINESS, POLITICS, AND CONVERGENCE

The digitalization of communications infrastructure was not a process that developed in a vacuum but instead built on telecommunications networks that had existed for a century. Complex public-private relationships had characterized these network businesses long before BT’s privatization. In North America, there was a long and heated debate across the nineteenth and early twentieth centuries over whether telecommunication was an essential public service.⁴⁵ From the 1840s, a state-oriented political economy encouraged competition between private corporations, but in the 1880s, a municipalist political economy that idealized public utility meant that many cities consolidated these corporations into independent public utilities. This was the era of the independent public phone company, showing a viable alternative political economy of telecommunications. At the turn of the century, however, a new progressive political economy, which believed that national monopoly would reduce waste and duplication, undermined

the independent telecom movement. Combined with the political adroitness of AT&T's leaders, who presented their private telecom monopoly as a "universal service" that brought telecommunications to the nation, the independent movement ended. The private Bell System monopoly became the dominant North American telecom provider.

In Europe, there were many different paths to national telecom systems. Some countries, such as Germany, were state-led from the start, while others, such as the Scandinavian countries, had a more open approach that combined private capital and public investment. The United Kingdom, Spain, and Italy took a middle ground, where private firms financed and provided telecom infrastructures, but these were tightly regulated and often nationalized by the end of the nineteenth century.⁴⁶ There was no single path to monopoly, and instead, each nation, when confronted with new technologies, determined the boundary between public and private in different ways.⁴⁷ Regardless of the path taken, however, by the early twentieth century, the dominant organizational model in Europe was the PTT system, where telegraphy and telephony were offered alongside postal services by one business. In the UK, this was the General Post Office (GPO), a Civil Service department.

War and wireless shaped the business and politics of national networks in the first half of the twentieth century. Radio, known as wireless telegraphy, challenged state monopolies by evading the regulatory frameworks governing traditional wired communications.⁴⁸ European states moved to regulate wireless quickly, particularly as radio became the first electronic mass media. Radio unsettled the political economy of communications, with different responses in different nations. The UK created the BBC, while in Germany, international wireless communications became an opportunity to challenge British imperial hegemony over global communications.⁴⁹ World War I also influenced the political economy of communications. Military development laid the groundwork for the interwar European electronics industry, accelerating wireless technology.⁵⁰ Furthermore, the US entry into World War I created exchanges between North American and European political economies of telecommunications.⁵¹ Bell engineers helped build the US Signal Corps' European wartime networks, which AT&T used to reaffirm its commitment to public service, turning sentiment against the brief nationalization of US telecom in 1918. Contact with Bell engineers also empowered French critics of state-owned networks and led to a French-American alliance that gave Bell a foothold in the European telecom industry. Similarly, World War II also

shaped the political economy of European telecommunications, as the cooperative spirit of “technocratic internationalism,” born in nineteenth-century Europe, not only survived but thrived during the war, cementing infrastructural Europeanism after the war’s end.⁵²

Just as World War I matured wireless technology, so World War II stimulated digitalization. Ballistics, code-breaking, and nuclear physics led to computers, the first class of digital machines.⁵³ The growth of a global computing industry took place in several waves, starting from its origins immediately after World War II, followed by its standardization in the late 1960s and 1970s.⁵⁴ Personal computing appeared in the 1980s, followed by the internet and web in the 1990s. This last wave was the era of “digital convergence,” when computing and communications combined to form a global digital network. Digital convergence, however, as this book and others show, has a much longer history. From the 1960s, North American and European users could remotely and simultaneously access computers for various resources, such as processing power, using a service called time-sharing, which was a major sector of the computer services industry.⁵⁵ Alongside important services like time-sharing, various themes characterize this history of digitalization: miniaturization, standardization, systematization, and competition among different technical and national visions of computing.⁵⁶ As this last theme suggests, these were not purely technical issues and intersected with political economy in different ways around the world.

In the US, computer firms were emblematic of the “corporate commonwealth,” a new postwar political economy.⁵⁷ Although many of these firms had roots in the prewar office appliance and electronics industries, after World War II, they both built and thrived on a political economy characterized by Cold War government spending, US engagement with the wider world—not least via state support of US exports—and corporate “welfare capitalist” packages designed to combat unionization. The iconic example of this is IBM, which profoundly influenced both international digitalization and US political economy. IBM dominated the US computer market to such an extent that it was frequently subject to antitrust action, particularly around its practice of “bundling” hardware, software, and computer services, such as training, together. From 1969 to 1982, the US Department of Justice ran the longest antitrust case in US history against IBM over this practice. IBM “unbundled” its software products and computer services preemptively, in 1970. This allowed customers to buy software and computer

services from independent companies, separate from leasing or purchasing IBM hardware, and gave wings to a fledgling software products industry.⁵⁸ The US courts eventually dismissed the Department of Justice's case as without merit in 1982, and the case soon became a symbol of the government's wastefulness and unwarranted intrusion into the private sector, reinforcing the rise of a deregulatory political economy under Ronald Reagan.⁵⁹

Outside the US, digitalization and political economy blended in different ways. Most prominent in Europe was a "national champions" policy, particularly in the UK and France, which sought to create national computing industries and domestic champions to compete with IBM.⁶⁰ In West Germany, on the other hand, IBM had a powerful influence on ideas about productivity, labor relations, and the role of corporations in a capitalist, growth-oriented economy.⁶¹ The national champions policies in the UK and France were not successful. France's national champion, CII, never became successful enough to sustain a domestic electronics manufacturing industry and was bought by Honeywell-Bull in 1975. The growing standardization of international computing and fraught relations with government dampened a defiant British exceptionalist approach in its national computing industry and its champion, ICL.⁶² In the UK, these efforts to centralize and control computing also resulted from and failed because of gendered, classist labor hierarchies within both government and the computing industry. Managers favored large, centralized mainframes that disempowered technical workers, often women, just as the international computing industry was moving away from mainframes and toward minicomputers.⁶³ This relationship between British government and computing went far beyond interventionism. The British "government machine" had long been concerned with information technologies as ways of discreetly centralizing the bureaucratic state.⁶⁴ Technocratic experts so thoroughly wove computing into state bureaucracy that the structure of government itself followed computing trends, from centralized in the mainframe era to outsourced in the era of networked personal computing.

This history is not purely about computing, however. It is also about digital networks. From the 1960s, data communications networks began to appear, particularly in the US, which eventually formed the foundation for the internet.⁶⁵ But while the internet was emerging in the US, other countries were also building alternative digital networks. France created a remarkably successful online digital network, Minitel, using its national telecom

infrastructure. Minitel ran from 1980 to 2012 and showed an alternative model for digital infrastructure based on creative and collaborative public-private partnerships.⁶⁶ The USSR, on the other hand, failed to build a successful national digital infrastructure. Intense competition among different ministries hamstrung the development of OGAS, the All-State Automated System, compared to the “cooperative capitalist” approach that sustained US internet development.⁶⁷ Chile is perhaps the best example of a successful socialist digital infrastructure.⁶⁸ Between 1971 and 1973, the socialist government of Salvador Allende built Project Cybersyn to provide real-time control over the Chilean economy by networking industry and government. Cybersyn helped the Allende government overcome a national trucking strike in 1972. Cybersyn, however, was frequently cast as a form of totalitarian control inside and outside Chile, and the Pinochet government shut it down after the 1973 military coup. Japan’s influential Fifth Generation Computer Systems project represented another alternative political economy of digitalization.⁶⁹ This project, begun in 1982, was the first national large-scale artificial intelligence research and development project free from military influence and corporate profit motives. FGCS was still state-led but, unlike AI research in the US, was oriented to socially responsible innovation rather than Cold War America’s militarist-capitalist ambitions.

France, Chile, and Japan show that alternative political economies of digitalization are possible, but this only reinforces that one mainstream digital ideology has emerged from the US. Utopian narratives about a digital future and the power of systems originated from early US digital research after World War II.⁷⁰ By the 1980s, this had solidified into an “information age” discourse that emphasized information technologies’ centrality to society and the economy.⁷¹ Margaret Thatcher’s labelling of 1982 as IT-82 was one such act that popularized the information age. The information age has also arrived packaged with a utopian ideology about the liberating qualities of digital technology. This ideology’s rise explains how, from the 1950s to the 1980s, the computer as a symbol has moved from big, centralized, and bureaucratic to small, networked, and personal, facilitating freedom of choice and expression for a market economy.⁷² Different labels have emerged for this digital ideology. “Mythinformation” denotes the belief that information technology would lead to more free and democratic societies. The “Californian ideology” describes a US West Coast ideology that saw digital technology as fusing countercultural values of individual freedom with Silicon Valley’s penchant

for economic liberalism. “Digital utopianism,” associated with groups ranging from the New Communalist movement to *WIRED* magazine, promoted digital technologies’ capacity to beget harmony, egalitarianism, and freedom.⁷³ There were some exceptions to these mythologies: for example, from 1965 to 1975, the success of time-sharing networks led to extensive calls in the US for computing as a public utility, idealizing communal, civic values. These values were embedded in various time-sharing networks, such as the Minnesota Educational Computing Consortium, a statewide public computing utility, but were eclipsed by the rise of personal computing.⁷⁴ In general, however, histories of digital ideologies highlight the engineering values and choices that have formed “the defining libertarian mythology of Internet culture.”⁷⁵

These ideologies propagated beyond the US, but it would be a mistake to see them as sovereign. The changes that took place through digitalization were also shaped by national policymaking and the internationalization of telecommunications markets. For example, from the 1970s, digital network builders promoted an “open ideology” that was skeptical of concentrated power in closed systems and instead placed faith in the combined power of market capitalism and technical expertise.⁷⁶ These libertarian values fueled experiments in French networking, and by the 1980s, the principle of openness and open networks became a cornerstone of European telecommunications competition policy as it moved away from the PTT monopoly system.⁷⁷ But while the open ideology was influential, and perhaps even necessary, it was not sufficient for changes in European telecommunications competition policy. These changes also emerged as a competitive response to the deregulation of US and UK telecommunications.⁷⁸ The divestiture of AT&T in the US was not just about breaking up a private monopoly, but also about supporting AT&T’s expansion into international communications markets and services.⁷⁹ In the UK, pressure from organized business, especially finance, for international communications services also motivated BT’s privatization.⁸⁰ In turn, the competitive threat of BT and AT&T expanding into international markets added further incentive for European nations to deregulate.⁸¹ It was thus the intersection of privatization, digitalization, and market internationalization—in other words, policy, technology, and commerce—that made these transformations.

These changes show that neither digital nor neoliberal ideology alone led to the present condition of modern communications infrastructure. Ideological

histories of digitalization can be subverted and complicated by finding the “missing narratives” of digital networks, which should move beyond histories of the internet to consider the broader history of digital networking. For example, there are few “telephonic histories of digital technology.”⁸² These histories should also treat digitalization as an analytical category, particularly during the “early digital,” which means taking seriously the history of digitalization beyond the computer and exploring digitalization in different sectors, particularly state institutions.⁸³ The accomplishments demonstrated by the histories of the Minitel in France, Cybersyn in Chile, and OGAS in the USSR challenge the libertarian ideology of the internet by showing how different actors in different nations enacted digitalization. They show that alternatives were and are possible.

But one final missing narrative requires further investigation, and that is how digitalization has affected major transformations such as neoliberalism.⁸⁴ Illuminating that influence is one of the key goals of this book. Britain’s telecom infrastructure was a non-internet digital network that was shaped by national ownership and yet was profoundly important to the success of privatization as a key piece in the neoliberal policy package. How did its managers and engineers make and remake their network as they turned from their priorities as a national monopoly to new priorities of privatization and market liberalization? Exploring that question requires a finer conceptualization of the relationship between technology and political economy, to which this introduction now turns.

HISTORY, TECHNOLOGY, POLITICAL ECONOMY

The first way to understand the relationship between technology and political economy is to see that technological and infrastructural change can reflect dominant political economies. This chapter already describes numerous examples. The organization of North American telecom infrastructure followed the shift between state-oriented, municipalist, and progressive political economies.⁸⁵ In the postwar US, a strong regulatory political economy led to the unbundling of software and computer services.⁸⁶ Project Cybersyn in Chile followed a democratic socialist political economy, while Japan’s Fifth Generation Computer System followed a state-led public-good-oriented political economy.⁸⁷ Examples extend beyond digital and communications technologies too. The reform of UK postal infrastructure in the nineteenth

century followed a market liberal political economy, while similar US reforms followed a civic nation-building republican political economy.⁸⁸ In the late nineteenth and early twentieth centuries, electrical network construction in Berlin, Chicago, and London followed local political economies.⁸⁹ Berlin's mixed political economy, balancing public interest and private enterprise, led to an advanced private infrastructure that was eventually taken into public ownership. Chicago's ambiguous and weak regulatory regime gave private enterprise much freer reign, while London's devolved, localist political economy created a fragmented electrical network.

But to view infrastructural change as following political economy misses the critical historical insight that infrastructure has co-constructed political economy. Infrastructure inspired some of the earliest theories of political economy. The development of London's water supply influenced J. S. Mill and Nassau W. Senior's theories of ownership and market structure, while US economist Richard T. Ely's concept of natural monopoly was inspired by his understanding of rail and other network infrastructures.⁹⁰ In the US, rail influenced more than just public economy theory. Rail infrastructure also led to new trade associations and cooperative industry agreements that bypassed the existing open market patent system, thus becoming the basis for a new corporate political economy that displaced a market economy.⁹¹ Not just in the United States, but also in Sweden, rail became a "paradigmatic system" that influenced political and economic thought about infrastructure ownership and governance.⁹² In Britain, the birth of modern infrastructure, in the form of road building in the eighteenth and nineteenth centuries, created an engineering elite, a modern national bureaucracy, a new national political economy, and the political philosophies of J. S. Mill and Adam Smith.⁹³ Even at the supranational level, this has been this case. For example, there could be no political economy of Europe without the transnational transport and communications infrastructure that made Europe an economic unit in the first place.⁹⁴

This co-construction of technology and political economy has defined the twentieth century. The first modern social insurance systems in Germany and Switzerland, central to the formation of the welfare state, developed in mutual relationship with actuarial science as a "technology of trust" that made social insurance possible.⁹⁵ In the US, the New Deal and the construction of a federal highway infrastructure relied on an ideology of technical expertise. Planning tools from the Cold War military-industrial complex,

such as computer simulation and satellite reconnaissance, shaped welfarist postwar urban planning.⁹⁶ In the UK, 1970s urban infrastructure projects demonstrated the dynamism of late social democracy before contesting and adapting to the market turn.⁹⁷ Neoliberalism appears to be a political economy that thrives off a mutually productive relationship with science and technology.⁹⁸ For example, computers and information theory influenced neoliberal economists' view of the market as an information processor.⁹⁹ The West's transition from coal to oil as its main energy source also saw a shift away from the mass politics associated with the coal industry's labor force and toward a liberal market politics based on the apparently unlimited growth gifted by foreign oil.¹⁰⁰ Similarly, nationalist political economies have often been techno-centric. Technologies such as nuclear power and airplanes have fueled nationalist politics, and techno-nationalism pervades state-oriented political economies of innovation.¹⁰¹

These examples show the "technopolitics" of the modern age.¹⁰² Technopolitics views technological and political life as mutually constitutive, describing the ways that technology can both reflect and enact political goals and, furthermore, conceal these goals' material origins. Politics often draws a hard line between human and nonhuman, presenting the material world as subject to human intentions rather than something that can shape human politics.¹⁰³ Technopolitics can thus show alternative political economies of technology, but it can also produce an "anti-political economy," meaning that, as technology sets limits to politics, so technopolitics can close the space of political and economic possibilities.¹⁰⁴ This is something that histories of infrastructure privatization miss by not exploring how the technopolitics of infrastructure have shaped nationalization and privatization. This book therefore demonstrates, first, how digitalization shaped and was shaped by national ownership, and second, how this process changed with liberalization and privatization.

Focusing on digital infrastructure rather than a specific digital technology helps achieve these goals. Infrastructure history is a history neither from above nor from below, and as a subject that exists at all social scales, it can challenge the tinted lenses of histories at the micro, meso, or macro scales.¹⁰⁵ It offers an understanding of the messy, technical complexities of national ownership, privatization, and digitalization beyond politics and ideology. This approach is an example of how infrastructure history "inverts" traditional historical narratives. Paying attention to the low-level technical

practices that compose infrastructure, such as standardization, gives greater insight into the changes that preceded and enabled apparent technopolitical transformations, such as digitalization and privatization.¹⁰⁶ BT's privatization is one such breakthrough narrative, cast as a landmark moment for neoliberalism and used in the UK to tie market practices to the "information age." In contrast, infrastructural inversion highlights the need to explore the practices that preceded and enabled BT's sale. By drawing attention to the practices that have been central to anticipating and enacting broad social, political, and technological change, infrastructural history can recover the technopolitics that "breakthrough" narratives such as privatization overwrite.

Focusing on these practices means focusing not on a monolithic infrastructure, but on the actors that made and ran that infrastructure. The history of technology has deep roots as a history of engineers and "system builders."¹⁰⁷ Likewise, the study of management and managers has been foundational for business history.¹⁰⁸ But what these histories often show is that managerial and technological changes are interdependent.¹⁰⁹ Clerical technologies, such as typewriters and computers, shaped new administrative theories and practices in US business and British government.¹¹⁰ Similarly, the success of system-builders in various infrastructures was contingent not just on their technical vision but also on their managerial prowess and ability to mobilize political and financial resources.¹¹¹ The mutual dependence of managerial and technical expertise has had wider implications for modern history. The systematization of management in the late twentieth century has been labeled the "new spirit of capitalism," while technoscientific expertise has supported the material and administrative integration of Europe and the "locationless logic" of colonial administration.¹¹² These technocrats, especially those in the public sector, are thus best seen as "heterogeneous engineers," combining innovation, management, and government into a greater practice, a practice that requires the engineering not just of artifacts but also of people, institutions, and ideas.¹¹³

British telecom infrastructure offers an ideal case study of these people and practices that made and remade digitalization, nationalization, and privatization. Britain's market turn was an international moment, both in the ways that global processes contributed to it and in the ways that it traveled around the world.¹¹⁴ BT's privatization exemplifies this, a proof-of-principle for a privatization movement that went global, creating opportunities for international finance and challenging Europe to deregulate or be

left behind.¹¹⁵ Britain's telecom infrastructure was local, a public infrastructure run for, by, and within Britain, and yet also networked, both materially and socially, to a wider world of telecom infrastructure and ideas about how to run that infrastructure. Its history can thus give new insight into the late twentieth century's political transformations. Furthermore, Britain provides an alternative history to those histories of digitalization that mainly focus on the US and the influences of libertarianism and the Cold War's "closed world" on the histories of early data and internet infrastructure.¹¹⁶ Britain's telecom infrastructure ran on the European postal, telegraph, and telephone (PTT) model, and so this history provides an opportunity to expand on the European model of integrating new data infrastructures into the existing infrastructural pattern of national ownership.¹¹⁷ Just as histories of digitalization in Chile, France, and Japan offer insights into alternative political economies of digitalization, so can a history of the digitalization of Britain's telecom infrastructure. But in this case, this history also shows how digitalization intersected with British Telecom's privatization, one of the most politically significant moments in the global twentieth-century history of infrastructure.

BRITAIN'S TELECOM INFRASTRUCTURE

The existing historiography of Britain's telecom infrastructure neglects technology for political and economic questions about monopoly and market, public and private. In this narrative, the British government, especially the Treasury, stifled infrastructure through spending restrictions, trying to have its cake and eat it by operating a public utility without providing the necessary costs of upkeep and investment. This narrative of conflict between the "dead hand" of Treasury "restrictionists" and the Post Office "expansionists" echoes an old historiography of modern British state spending, which focused on how much money the state spent, rather than on what the state spent its money.¹¹⁸ This history is dangerous for two reasons. First, it reinforces an outdated picture of the "dead hand" of the Treasury, a stereotype that has less basis in reality and more in twentieth-century Britain's politics of "declinism," and misses that the Treasury was far more dynamic than remembered, especially when it came to information technology.¹¹⁹ Second, it flattens the history of nationalization and privatization into a calculus of capital, where neoliberal fiscal restraint waited in the wings to

replace an expansive but investment-starved welfare state. In the case of the Post Office, a key unanswered question is not whether the Post Office struggled with the Treasury's fiscal restraint, which is already clear, but how the Post Office directed its resources, in both money and personnel, to some technologies and not others.¹²⁰

When this story starts, around 1950, the British telecommunications infrastructure was a state-owned monopoly run by the British Post Office. The Post Office had run telegraphy since the 1869 Telegraph Act, written in response to a telegraphic price-fixing cartel. The 1869 act gave the Post Office an indefinite monopoly over electrically carried communications, but did not expand into telephony because the Treasury refused to authorize spending and, apparently, because Thomas Edison failed to impress the Post Office's engineer-in-chief, William Preece, with a demonstration of the telephone.¹²¹ By 1912, public and political dissatisfaction with the National Telephone Company (NTC), a private monopoly, led to the Post Office purchasing the NTC's assets, completing the British state's takeover of telecommunications.¹²² The Post Office inherited a system suffering from chronic underinvestment, but Treasury spending controls slowed investment. Political pressure meant that, in 1932, the Post Office and Treasury negotiated a new financial arrangement whereby the Post Office paid the Treasury a fixed annual sum of £10.75 million (about £73 million today) and could reinvest its excess profits.¹²³ This arrangement lasted until World War II, when the Treasury resumed direct control of the Post Office's finances and refused to revert to the former arrangement after the war ended.

By the beginning of the 1960s, the waiting list for a telephone connection had ballooned.¹²⁴ Harold Macmillan's Conservative government thus passed the 1961 Post Office Act to reinstitute the prewar fixed annual payment arrangement, which had been back on trial since 1956. This arrangement had little effect, as successive Treasury capital restrictions in 1962 and 1963 limited Post Office borrowing. The Labour prime minister Harold Wilson's 1966 July measures, created to avoid sterling devaluation, further cut telecom investment.¹²⁵ Through the 1960s, calls therefore came for more freedom and a more commercial attitude in telecommunications. Perhaps loudest was Tony Benn, appointed as a young, modernizing postmaster general in October 1964 after Labour's election victory.¹²⁶ Benn's top priority was turning the Post Office from a Civil Service department into a public corporation, known as the "break," and separating telecoms from post, called

the “split.” In August 1966, Edward Short, Benn’s replacement as postmaster general after Benn was appointed minister of technology, announced the “break,” but the “split,” believed impractical, never happened. On October 1, 1969, the Post Office Corporation was formally created and, as this book will show, this shift to a more corporate structure, attentive to commercial trends, particularly in business and finance, would shape the Post Office’s plans for public digital infrastructure.

The 1970s brought tension between the Post Office’s commitment to building this digital infrastructure and the turbulent political and economic environment. Spiraling inflation in the early 1970s meant that the Post Office had to balance high wages, voluntary price restraints set by the Confederation of British Industry, and raising postal and telephone charges to meet the government’s financial objectives.¹²⁷ Alongside this, the Treasury used the Post Office as an “instrument of macro-economic management,” cutting spending by £150 million, followed by further reductions in 1975–1976 as telephone demand dropped because of the 1973–1975 recession, and another cut followed the Winter of Discontent in 1979.¹²⁸ Despite this, telecom was one of the nationalized industries’ better performers across the 1970s, but increasing waiting times and the burden of subsidizing the postal business meant calls for the split grew, including from William Ryland, the Post Office chairman, and the Post Office board. In 1975, Harold Wilson’s new Labour government thus initiated a review, the Carter Committee, into the Post Office’s structure. This committee recommended in 1977 that the government separate post and telecom.¹²⁹ The Labour government, however, rejected this recommendation, instead using the Post Office for an experiment in industrial democracy that added trade union and external industry representatives to the Post Office board.¹³⁰ This particularly aggrieved the Post Office’s new chairman, William Barlow, appointed in 1977 under the assumption that he would oversee the split and take charge of telecom.

Shortly after the Conservatives won the 1979 election, Barlow thus attacked the new government on two fronts, threatening his resignation and openly calling for privatization.¹³¹ Keith Joseph, the secretary of state for trade and industry, quickly announced an end to the industrial democracy experiment, the split of post and telecoms, the creation of BT, and a review of the telecom monopoly, setting the stage for liberalization.¹³² The government introduced the Telecom Bill in 1980 to turn BT into a separate corporation, leaving the monopoly mostly intact but granting the government powers

to license new operators and launching competition in customer equipment and private exchange supply and maintenance.¹³³ The bill gained royal assent in July 1981, and BT formally opened for business on October 1, 1981. Meanwhile, the government also commissioned a report into telecom liberalization. This report, published in April 1981, recommended that BT should lease circuits to competitors to resell voice telephony; that the government liberalize value-added network services, where third parties could lease lines for non-voice services like electronic funds transfer; and that the government should license new competing telecom systems with separate physical infrastructure.¹³⁴ Strong BT opposition and Home Office security concerns meant that the government chose a compromise in which it accepted proposals for a single alternative network, which eventually formed in June 1981 as Mercury Communications, creating a duopoly system that lasted until 1991.

Telecom underinvestment and performance was also, alongside the government's monetarist budget, a significant factor behind BT's privatization.¹³⁵ Telecom's self-financed investment had risen from the mid-1970s, but the Post Office's projected costs for a public digital infrastructure meant that it would need external financing. These costs alarmed the Treasury, given both the new Thatcher government's objective to lower the budget deficit and the external financing limits placed on nationalized industries since the 1976 IMF bailout. The Post Office added further pressure by threatening to add a surcharge to telephone bills to stay within the external financing limits. This pressure only grew as Post Office Telecom became BT, raised prices in November 1981, and exceeded its 1981–1982 external financing limits by 30 percent. This incensed Thatcher, and consumers, who had some of the highest telephone charges in Europe. The government thus began to explore new ways to finance telecom, including privatization, which gained support from BT's chairman, George Jefferson, who had tired of Treasury restrictions. By summer 1982, this had turned from studying a minority sale into a majority flotation that would free BT from the budget deficit and Treasury controls. In July 1982, seventy years after the Post Office took over the British telephone infrastructure, Patrick Jenkin, the secretary of state for industry, announced that the government would privatize BT so that it could raise private capital free from government interference.¹³⁶ Two years later, in 1984, BT became a privately owned corporation with a new agenda for its nascent digital infrastructure.

This history of Britain's telecom infrastructure gives some insight into the changes that happened, from nationalization to corporatization to

privatization. It is, however, only a partial history, because technology remains invisible. As this chapter has argued, however, the history of technology, particularly digitalization, in Britain's telecom infrastructure has played a crucial role in the history of both the telecom business and the wider political economy. The birth of plans for public digital infrastructure in the late 1960s suggests that, while the British state may have been cash-strapped, it was not bereft of new ideas and projects. These plans also motivated the Post Office board's support for telecom independence in 1976 and its search for external financing in the 1980s. These moments show how the traditional narrative, which reduces the history of telecom infrastructure to a story of government spending, flattens digitalization and national ownership's histories and horizons. BT's sale was not just about public and private, nor just about monopolies and markets. BT's sale also overwrote a history of nationalized digital infrastructure, a history that can enliven the present.

OVERVIEW

This book draws on sources from British Telecom Archives, the British Postal Museum and Archive, the UK's National Archives, the Bank of England Archives, the Smithsonian Institution, and George Washington University's Special Collections Center. The book has three parts. Part I, "Plans," investigates how the British Post Office created and sustained its plans for a new national digital infrastructure. Part II, "Projects," explores how engineers and managers built those plans into the network. Part III, "Places," explores how Britain's telecom infrastructure connected local and global through three different sites.

Part I's first chapter begins with the birth of plans for a national digital infrastructure in the late 1950s and 1960s. The chapter explores the "information age" discourse that forged these plans and the influence of cybernetics and information theory on the Post Office. In doing so, it links work on the influence of cybernetics and information theory with scholarship that highlights plans, visions, and expectations as rich evidence for the dynamism and persistence of specific ideas.¹³⁷ Chapter 2 continues this theme by tracing the history of the Post Office's Long Range Planning Department, the telecom infrastructure's visioning and forecasting unit, from its founding in the late 1960s to its role in BT's liberalization and privatization in the early 1980s. Founded during a broader trend for futurology and futures studies in business

and government across the Western world, this department sustained the Post Office's plans to "invent the future" for digital infrastructure.¹³⁸ Chapter 2 follows these practices through liberalization, as the department went from inventing digital futures to forecasting market futures, using corporate modeling and simulations, which informed BT management's plans to use predictive computing to surveil and simulate customers' total information needs. In doing so, this chapter shows how "prediction technologies" have been crucial to marketization.

Part II turns to how, from the 1960s, the Post Office and BT embedded these plans into infrastructure. This part looks at two basic features of a telecom network, switching and transmission, and how digitalization affected these components. Part II first looks, in chapter 3, at switching's automation and computerization, and how that influenced the Post Office's monopsony over its equipment suppliers and telephone exchange labor pools. Chapter 4 looks at the myth that Margaret Thatcher killed BT's plans for a national fiber-optic network. The discussion sets this myth in the context of the Post Office's vision of an "integrated" digital network that carried both telecommunications and video services, including television. The Post Office searched for both transmission technologies and standards that would support this vision. Chapter 4 shows how, in this search, Post Office and BT engineers were developing more for their expectation that they would inherit TV broadcast responsibilities, rather than for the reality of their actual national responsibilities. Thatcher's "killing" of the national fiber-optic network was more about blocking BT's expansion into the private broadcasting market, than it was about defunding telecommunications.

Part III looks at British telecom infrastructure's local and global sites through chapters on its rural Suffolk telecom laboratory, transatlantic infrastructure, and financial users in the City of London. Chapters 5, 6, and 7 build on approaches that emphasize privatization and infrastructure as both local and global and that show how material and ideological networks are made global through local processes.¹³⁹ By studying these sites, this book shows how the digital and market turns of Britain's telecom infrastructure resonated globally. Chapter 5 investigates the Post Office's new research laboratory in Martlesham Heath, East Suffolk, from the late 1960s. The chapter shows the transformation of a modern state-owned research site, influenced by trips to US corporate research campuses, into a postmodern privatized information technology park, alongside the construction of an anachronistic "new

village” around the research site. The relationship between local and global at Martlesham Heath reveals how privatization and digitalization invoked both spatiality and temporality. Chapter 6 looks at how the Post Office and BT collaborated with AT&T to lay submarine communication cables and how this effort was threatened by communications satellites. It situates this infrastructure-building within the Post Office and BT’s ambitions to expand into international markets, showing how these ambitions prefigured BT’s liberalization and privatization under Thatcher. Chapter 7 explores the role of financial users in the City of London in BT’s privatization. It shows how the Bank of England and City users formed a lobbying group in the late 1960s to secure priority for the financial sector in Britain’s telecom infrastructure, and how the Post Office and BT became initially reluctant, but later willing, players in the ambition to develop London as the world’s capital of finance. Altogether, this section shows how rural Suffolk, the City of London, the Atlantic Ocean, and even outer space became contested sites for the market turn and the information age.

The book concludes by returning to its overarching aims of recovering alternative political economies of digitalization that existed under national ownership and showing how that changed with privatization and liberalization. This book shows new ways to understand the digital and market turns, but more than that, it offers lessons for new plans to build public digital infrastructures.

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Market and Monopoly in British Telecommunications

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