

CONCLUSION

This book began with what was once the world's largest stock flotation, the 1984 privatization of British Telecom. While BT's privatization was central to Thatcherism and popularized utility sales within and outside the UK, this book has shifted the focus from that single moment to ask, more broadly, how national ownership and privatization mattered to digitalization, and vice versa. The history of Britain's telecom infrastructure, from the middle of the 1950s to the early 1990s, captures this intersection in a way that no other example can. This book argues that these processes were central to each other. Nationalization and privatization shaped digitalization, and this is perhaps not a surprising finding. It follows intuitive understandings of the relationship between politics and technology. Margaret Thatcher's Conservative government privatized BT in 1984, and this changed the trajectory of Britain's digital communications infrastructure from public to private, monopoly to market. But digitalization also shaped national and private ownership, and that is this book's more important finding. Digitalization constrained what was and was not possible and, in doing so, shaped how managers, engineers, and politicians enacted nationalization and privatization.

Britain led the way in privatization during the 1980s. The Thatcher government began with the oft-forgotten council house sales and continued by selling smaller state-owned enterprises such as British Aerospace and Cable & Wireless. Between 1979 and 1984, the government sold its stake in sixteen enterprises that were either wholly or partly state-owned. None of these sales breached £1 billion until November 1984, when BT sold for £3.6 billion.¹ But when the government sold BT, privatization was not a uniform policy that

the government understood and applied in the same way for all state-owned enterprises. As chapter 7 showed, Conservative politicians recognized what scholars have not: that privatization was not general, but specific, formed in dialogue with the material and technological nature of the industries and infrastructures being sold. BT's privatization was not just the sale of a state-owned enterprise, but the sale of a digital infrastructure, and so it shaped and was shaped by technological change, not just by political and economic change.

In BT's case, its privatization was as much a part of digitalization as digitalization was part of privatization. Understanding one requires understanding the other, so this book turned to the history of digitalization in Britain's telecom infrastructure. This book's first key finding was the importance of visions and plans under national ownership to digitalization. In the early 1960s, after the analogue failure of Highgate Wood, engineers eyed digitalization's potential. They created a totalizing vision, influenced by cybernetics and Britain's "government machine," that encompassed voice, video, and data and united information with administration. These were not the only influences. The threat of competition from special-purpose, packet-switched data networks made this vision defensive and monopolizing, and the Post Office's corporatization in 1969 fueled technocratic management. Corporatization also led to a new long-range planning department that sustained and mutated this vision. Post Office futurologists developed computer simulations that chose technologies that supported their digital vision, and they found and spread new ideas about the digital age. Computer simulation also gave new ways to manage liberalization and privatization, imparting new understandings of the corporation and the market. Finally, and perhaps most importantly, futurology helped managers and engineers form new digital visions. With BT's futurology department and its predictive simulations, new visions emerged of the power that digitalization could give over customers and the marketplace.

As the Post Office's projects showed, however, infrastructures do not easily follow master plans such as these.² The Post Office tried to implement its digital vision through computer control and high-bandwidth integrated transmission. Computer control spread throughout administration to influence both switching and transmission. Simulations backed TXE4 as the infrastructure's intermediate electronic exchange, paving the way for the all-digital System X, and backed the waveguide as Britain's high-bandwidth

backbone. But these events showed both the limits and reach of these plans. The Post Office and BT failed more than succeeded in developing for a high-bandwidth, integrated digital infrastructure, in which they would have a monopoly over both television and telecom distribution. The ISDN standard justified an austere approach to public investment in digital infrastructure. Digital integration even gave prospects for competition, offering a way for cable TV providers to compete as telecom companies. Integration, born to shield monopoly, became the spear of the market. On the other hand, digitalization supported the Post Office and BT's monopsonies over suppliers and labor. Automating long-distance dialing with GRACE meant that the Post Office imposed new standards of "friendliness" on its telephone operators. The TXE4 simulation, which first caused a national controversy, ended with the Heath government reaffirming the Post Office's power over its suppliers. System X, launching during liberalization, put technicians and operators out of jobs, and changed the nature of labor for those that remained. It also offered a way to reorganize Britain's electronics industry in favor of BT, even after denationalization. Switching thus shows how digitalization preserved and even extended the telecom business's power across privatization and liberalization, while transmission shows how privatization and liberalization inverted engineers' vision of digital integration.

Computerization and transmission were not the only projects that showed the Post Office and BT's digital vision. One project that this book did not explore in detail was Viewdata. Developed by the Egyptian-born Post Office engineer Samuel Fedida in the early 1970s, Viewdata built on Viewphone to offer interactive information services through customers' television sets.³ Viewdata was an early example of "videotex" systems, a family of two-way interactive media systems developed from the 1970s that converged telephone and television systems. Fedida had an experimental system running by 1972, and Post Office management was very keen, perhaps because Viewdata built on Viewphone, already an icon of the Post Office's integrated digital approach. Viewdata launched in 1979 with a new brand name, Prestel, supplying 100,000 pages of online information to customers. Prestel, however, was a failure. It required an expensive, specialized Prestel TV set, and by the end of 1980, it had only six thousand users. By 1982, this had tripled to eighteen thousand users, but only twenty-five hundred were home users. Rather than bring the digital vision to the home, Prestel was instead most popular with business users, such as travel agents. Prestel proved particularly

inspirational to one of BT's most valued user bases, the financial sector in the City of London. At the London Stock Exchange, engineers built on Prestel to create TOPIC, a "super Prestel" that gave a way to display market information and react to it from a distance. TOPIC "opened the floodgates of market information," giving brokers and jobbers a way to move the trading floor away from physical interactions, and so virtualized the marketplace.⁴ Despite Prestel's committed business users, it was still considered an expensive failure, peaking with ninety thousand users. When BT turned Prestel off in 1991, this number had declined to only twelve thousand users.

Prestel has been called the "most extensive, high profile, and most ambitious online service available to home users in 1980s Britain."⁵ Its failure might thus suggest disinterest in online communication among British home computer users, who were more interested in educational computing and video games. But Minitel's success in France shows a huge appetite among the public for online services, so Prestel's failure is perhaps better understood through comparison with Minitel.⁶ Prestel was expensive and its rollout unsubsidized, whereas the French government supplied every home with a Minitel terminal in place of their ordinary telephone directory. The Post Office and BT played a strong gatekeeping role with Prestel's databanks, hosting all the content on a centralized computer in London called DUKE, whereas Minitel's network was open to private vendors to host data, giving them more autonomy. Prestel's failure thus seems to indicate some of the limits to the Post Office's centralizing, monopolistic, integrated digital vision.

This vision was not the only way that the Post Office and BT worked through digitalization. Digitalization, nationalization, and privatization had various places and spaces, and this book has shown that these places' histories gave greater insight into the local, national, and international histories that co-constructed infrastructure ownership and technological change. The Post Office and BT played a central role in making a new place, Martlesham Heath, which contained an IT park, one of the digital age's quintessential spatial formations. Martlesham Heath began as a social democratic project as government dispersed its work and published the "South-East Study" to develop the region. Martlesham Heath soon privatized and denationalized, however, as the private sector built a new village that evoked English history, while Adastral Park became BT's home node for its international, collaborative corporate ventures. One of the Post Office and BT's key partners through this history was AT&T, and the North Atlantic was central to this partnership.

Through North Atlantic communications projects, AT&T, the Post Office, and BT worked to disrupt the regulation of international communications so that they could carve out a bigger share of this growing market. These international markets were of such particular concern because of their importance to one of the Post Office and BT's most active user bases, the financial sector in the City of London. Through a decade-long lobbying campaign, the City of London's financial sector convinced BT to reorient its digitalization efforts from the nation to the City of London. This forged a political view that the City was, like BT, an information industry and that liberating one, by privatizing BT, would liberate the other, fast-tracking the British economy into a financialized information age. This view, which stretched across engineers, managers, financiers, and politicians, showed the convergence of digitalization with privatization as an act of denationalization and neoliberalism. In doing so, Britain built a new political economy of telecommunications.

One of this book's key goals was to analyze how infrastructural change affects major transitions in political economy, by looking at how digitalization in British telecommunications influenced the "market turn" from a nationalist to a neoliberal political economy. The brief life of British social democracy should not be forgotten here. In the 1970s, declining economic nationalism gave room for social democracy to breathe, and, from finance to urban planning, a range of genuine social democratic alternatives appeared.⁷ But it would be a mistake to assume that postwar experts and technocrats were social democrats, and that holds true for telecommunications.⁸ To be sure, there was a public interest in their plans to build a digital infrastructure serving all forms of information to every home and business, and the principle of uniform service motivated senior management into the 1970s. But uniformity ended, and this vision was only ever partially realized. Labour and Conservative governments alike never pursued the Post Office and BT's offers to build a nationwide infrastructure, via coaxial cables or optical fiber, that would provide voice, video, and data.

Rather than promoting a social democratic vision of digitalization, engineers were most successful in their technocratic, corporate agenda of computerizing communication and administration. Their projects automated labor, computerized management, and distanced users. By the 1980 long-range strategy seminar, computerization offered a new vision of BT's digital domination of customers and the marketplace. Even the vision of an integrated

digital network was never particularly welfarist. Instead, it was a vision, fueled by bureaucratic, cybernetic ways of thinking about administration, that was advanced to defend the Post Office's monopoly, and was entrenched by the Post Office's corporatization. For the Post Office's engineers, the transmission of information was, as Merriman told the Post Office board, simply "PO business."⁹ This motivation stands in contrast to the nationalist and social democratic goals of Highgate Wood and the Post Office Tower, the last two major switching and transmission projects before the digital vision took shape. The nationalist political economy of digitalization was, in fairness, quite resilient, manifesting in the idea of the waveguide as a national export product and the Thatcher government's reorganization of System X procurement. But overall, across its projects and places, from TXE4 to London TeleCity, the Post Office prioritized its corporate business.

Rather than welfarist or nationalist, it is thus more accurate to speak of corporate digitalization. The Post Office's corporatization removed it from the Civil Service and replaced the postmaster general, a government minister, with a corporate board. This act distanced the Post Office from political oversight, which was its intended goal. After all, the Post Office's telecommunications business had struggled with government intervention for the best part of a century. But corporatization did little to prevent this intervention, such as Treasury spending controls, which often happened during the 1970s, nor did it protect the Post Office from the IMF's fiscal restraints after the 1976 bailout. Instead, corporatization merely concentrated power among the technocrats that ran the Post Office. This concentration was not a "bug" but a feature. State-owned corporations have always been quasi-independent cadres of professional bureaucrats that manage and deliver specific goods or services.¹⁰ It is thus always a risk that these bureaucrats run their corporations in ways that do not necessarily align with the public or national interest.

This does not mean that the Post Office's corporatization should be seen as necessarily separating it from national or public interest. The Post Office, for example, was committed to its role as a public service in defending the uniformity principle to the City of London up until liberalization, when BT began the London TeleCity project. Some of the Post Office corporation's actions during public ownership came as part of the UK's wider economic nationalism. For example, the Heath and Thatcher governments deferred to the Post Office and BT as the default leaders of Britain's telecom manufacturing industry during the 1970s and 1980s. But the market also motivated the

Post Office throughout this period, even before corporatization. This was not a sharp turn from nationalized public service to privatized corporation. With corporatization, the Wilson government did not intentionally marketize the Post Office, but it nevertheless became more attentive to certain markets, such as the City of London. This accelerated a trend that had already existed since at least TAT-1, when the allure of international communication markets meant the Post Office advocated for liberalization in the United States. This complicates narratives about a breakthrough neoliberal political economy under Margaret Thatcher, in which BT's privatization was a harbinger of change. Since BT's sale, the West has seen a trend of "neoliberal corporatization," in which governments use corporatization to embed market-based operating mechanisms in public services, preparing them for privatization.¹¹ But the Post Office's corporatization predates this trend. It prefigured neoliberal corporatization and shows that privatization was not a rupture, but something that built on longer and earlier infrastructural change.

This infrastructural change was not just organizational. It was also, via digitalization, forged through technological change. Managers and engineers used computerization to control equipment supply, reorganize labor, and marketize staff. Data networks created new markets, both nationally and internationally, which fiber-optic cables and rooftop satellites helped capture. All these projects helped BT maintain and extend its commercial reach across privatization, by cutting labor and equipment costs and opening new markets. Martlesham Heath, the North Atlantic, and the City of London reveal how much internationalization, in particular, mattered to this changing political economy. These places abetted the internationalization of British telecommunications, shifting focus not just from the government to the corporation but from the national sphere to the international. This doesn't mean that everything went the Post Office and BT's way. The key feature of the digital vision, an integrated digital network, never became a reality. But its failure also shows the limits of economic nationalism. While government was happy to support the Post Office's monopsony over equipment suppliers in the 1970s, for example, it didn't help the Post Office expand its monopoly to television transmission. Instead, digitalization helped the Conservative government in 1991 open telecommunications to competition from cable TV operators. Both in the ways that technology thus supported and undermined the Post Office and BT's monopolies and monopsonies, digitalization, like corporatization, built privatization from the bottom up.

This book does not condemn corporatization or digitalization. Corporatization and digitalization did not determine this history, and both have alternative histories and political economies. Japan, Chile, and France all built alternative political economies of digitalization.¹² Progressive corporatization, rather than neoliberal corporatization, is possible.¹³ For example, *Électricité de France* was founded in 1946 as a public corporation with a strong progressive, left-wing agenda and was dominated by a communist labor union.¹⁴ But this book shows how, in this case, corporatization, digitalization, and privatization combined over three decades to shape a unique history and direction for Britain's telecom infrastructure. It is hard to say how things would have been different if the Post Office, for example, had remained a Civil Service department, closer to democratic, ministerial oversight. Given the power of Britain's government machine among Post Office engineers, remaining a Civil Service department may have only empowered engineers' bureaucratic approach to public digital infrastructure. What is more important to recognize, however, is that successive British governments never gave enough consideration to alternative forms of ownership, whether public, private, or a hybrid of the two.¹⁵ The shift between public and private corporation is but one history of the full range of available alternatives, which is an essential direction for future research. One valuable, untold alternative history is that of Kingston-Upon-Hull's telecom network, the only municipally owned telecom network in the UK. Founded in 1902 as part of the Hull Corporation during a national vogue for municipal socialism, the network remained in public ownership until 1999, and Hull remains the only place in the UK not served by BT.

There is also much work still to be done on a global technological history of privatization. BT's privatization may have been the start, but it was by no means the end. In the UK, British Gas's privatization was also central to "popular capitalism," while privatizing the water supply remains one of the most radical privatizations in history. In Europe, an infrastructural history of privatization can help understand the seeming paradox of how European integration accelerated when the infrastructures that formed the material foundation for that integration were increasingly exiting state ownership. Eastern Europe is a crucial case here, as it became a key destination for the "travelling technocrats" who sold their experience of Western privatizations as advice to new governments after the collapse of the USSR.¹⁶ New Zealand is also a useful case as a country that, like the UK, privatized hard and fast

at first but, unlike the UK, managed to reverse course, renationalizing rail, for example. Denationalization has also been a key economic trend in the global south, where the IMF and the World Bank have played a key role in pressuring for privatization, which they see as a way of not just accelerating economic growth but also mitigating against supposed “state failure.”¹⁷

This book shows, however, that infrastructure gives the state a hidden depth that goes beyond changes in ownership. Understanding how managers, engineers, and technology influenced privatization can help undermine the top-down narratives about privatization told by politicians, think tanks, and international organizations. Whether promulgated by Margaret Thatcher’s Conservative governments, Jacques Delors’ European Commission, or any other national or supranational government or agency, privatization and liberalization are not sharp transformations. To be sure, they are state transformations, rather than simple “hollowing out,” but they are longer and slower transformations that emerge from infrastructural, rather than regulatory, change. Looking to infrastructure as the state’s hidden depths shows how states take new shapes, in both national and international arenas, before and after ownership and market re-regulation. This means that the histories of these transformations, such as the UK’s denationalization, Western Europe’s integration, Eastern Europe’s post-Soviet transformation, and more, can only be fully understood through the history of the infrastructural change within and across the states participating in those transformations.

These histories would be more than histories of the specific materials and technologies that compose these infrastructures, such as water or rail. They would also all be histories of digitalization too. Digitalization acts as a “universal solvent,” and in the period that privatization has dominated global political economy, digitalization gave new ways to model, manage, and control the people and material that composed these infrastructures.¹⁸ Digitalization has also offered key tools that have given new ways for the state to regulate privatized, liberalized infrastructures, from cellular radio spectrum auctions to electricity grid balancing. A global, technological history of privatization and liberalization is thus necessarily also a history of digitalization and its influence on these global transformations.

This book might seem pessimistic in some ways. It shows that there are no shortcuts to transforming infrastructure. Top-down changes in ownership are neither quick nor effective. Instead, the builders and maintainers of infrastructure contest, adapt to, and mutate changes in ownership from

the bottom up in ways that those at the top cannot anticipate. The technological momentum imparted by these builders and maintainers is hard to steer, so any ownership change cannot ignore that momentum but instead must work with it.¹⁹ This is particularly true in mature infrastructure, where momentum accumulates over decades or even centuries. Mature infrastructure is thus a conservative force, not necessarily politically, but in the sense that it conserves this technological momentum and the politics that suffuse it. It is easier to load new infrastructure with politics, just as engineers loaded the nascent internet with an ideology of openness or Chilean technologists loaded Project Cybersyn with democratic socialist values. And yet, the solution cannot simply be to build new infrastructures to replace the old. That is unsustainable.

If there is hope for the future of infrastructure, then the history of Britain's telecom infrastructure shows that hope in two ways. First, while mature infrastructure can conserve old politics, it can also inspire new politics. Britain's telecom infrastructure inspired the "London ideology," born before privatization from the decade-long negotiations between the Post Office and the City of London. Second, engineers were responsive to their economic and intellectual environment. By the time of BT's sale, many senior managers and engineers had already wanted privatization for several years and developed technologies and plans that supported privatization. They were convinced not just by a decade of frustrating corporate ownership and financial restrictions, but also by the new ideas about digitalization and information that appeared from the 1950s to the 1970s, promising an alchemical transformation of society. Mature infrastructures respond to new ideas and technologies and can mutate them into new politics. So long as we recover forgotten ideas and inspire new ones, hope remains to change infrastructure for the better.

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Visions of a Digital Nation

Market and Monopoly in British Telecommunications

By: Jacob Ward

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