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# 'Circuits of Victory': how the First World War shaped the political economy of the telephone in the United States and France

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## Introduction

On 29 July 1914, the Austrian Army shelled the Serbian capital of Belgrade, setting in motion a cascading sequence of events that would lead within a week to the First World War. On the very same day, New York City-based telephone executive Theodore N. Vail talked by telephone with a colleague in San Francisco, demonstrating the practicality of transcontinental telephony, an innovation made possible by the recently perfected three-element high-vacuum tube, the technical advance that marked the birth of electronics.

For the US telephone publicist A. Lincoln Lavine, the fact that these two very different events took place more-or-less simultaneously was highly symbolic. The Central Powers of Germany and Austria-Hungary had set out to dominate Europe militarily through conquest. Vail's American Telephone and Telegraph Company – which was popularly known at the time simply as the Bell Company, or Bell – was peacefully uniting the United States through communications. Thus opened *Circuits of Victory*, a paean to Bell's role in the First World War that Lavine published in 1921 with Bell support (Figure 1).<sup>1</sup> Lavine was no impartial observer. The son of Jewish Latvian immigrants to the United States, Lavine was a recent college graduate who had worked as a lawyer for Bell during the war, an experience that left him with a profound appreciation for the company's technical virtuosity and managerial prowess.<sup>2</sup> In *Circuits*, Lavine celebrated Bell's role in the US military mobilization in France, and, in particular, the establishment by Bell engineers, under the supervision of the US Army Signal Corps, of a joint telephone-telegraph network linking the headquarters of the American Expeditionary Forces with its suppliers, support staff, and soldiers in the field (Figure 2).<sup>3</sup>

This essay contends that the Signal Corps' wartime network had major consequences for the postwar development of the political economy of the telephone in the United States, France, and Europe. Our approach is transnational.<sup>4</sup> In contrast to previous scholarship, which is mostly top-down, nation-centric, and preoccupied with the internal configuration of telephone networks that are typically studied inside the walls of discrete national

containers, we widen the lens to explore a broad array of influences on network evolution, including those that originated from within individual operating companies and beyond national borders.<sup>5</sup> Among the themes that we explore is transnational standard-setting.<sup>6</sup> And among the agents of change that we emphasize is the influence of military conflict on personal networks, technical protocols, and international organizations.<sup>7</sup> From such a vantage point, the First World War emerges as a constitutive moment in the making of the information infrastructure in the modern world.

In the United States, the Signal Corps project helped to de-legitimize government ownership of the telephone by burnishing the reputation of a public-spirited style of corporate management that by mid-century would come to be known as managerial capitalism. In France, it prompted the government to invest heavily in a Bell-backed modernization project to upgrade its telephone equipment and improve its technical protocols, forestalling calls for the network's privatization while blocking German equipment manufacturers from entering the market. What had begun as a wartime marriage of convenience between the French government and the US military became, in this way, a durable industrial alliance between the French government, French industry, and Bell that would have far-ranging consequences for the networking of Europe.<sup>8</sup> None of these outcomes could likely have been anticipated or predicted. Rather, they were the byproduct of a series of circumstances rooted in war.

## Bell goes to France

The construction, operation, and maintenance of a tactical communications network in France during the First World War was widely regarded in both the United States and France as a corporate triumph for Bell. While not entirely false, this impression is misleading. For Bell did not act alone. On the contrary, it built this network in cooperation with the French government and under the supervision of the US Army Signal Corps, the branch of the US military that was responsible for maintaining the communications links essential to the successful prosecution of the war.

Just as Bell was new to the challenges posed by the First World War, so too was the Signal Corps. When the United States declared war on Germany in April 1917, the Signal Corps consisted of a mere 55 officers and just over 1,500 men; by the end of hostilities in November 1918, over 2,700 officers and more than 53,000 men and women had served in its ranks.<sup>9</sup> The Signal Corps, of course, was but one branch of the military: at its peak, it consisted of no more than 4 percent of the total number of men and women in the US Army.<sup>10</sup> Yet its importance to the war effort should not be underestimated. The Signal Corps was the 'nervous system of the body of the Army', declared Chief Signal Officer George O. Squier, with understandable pride, in a report that he published shortly after the war. Should its work be interrupted for as much as a single hour, Squier boasted, with typical Signal Corps panache, the entire US military machine would 'utterly collapse'.<sup>11</sup>

The relationship of the Signal Corps to Bell was highly unusual. In Europe, most telephone and telegraph networks were owned and operated by national governments, almost always in conjunction with the postal network, in a configuration known as a PTT (Postal, Telegraph, and Telephone). In the United States, in contrast, telephone and telegraph networks were owned and operated by private corporations, of which Bell was the largest and the most technically innovative. Bell and its telephonic rivals – the

so-called 'independent' telephone operating companies – provided the Signal Corps with almost one-third of its personnel during the war.<sup>12</sup>

The boundary between public and private was blurred from the outset and would remain so throughout the war. The training of Bell staffers for the Signal Corps was supervised by Bell's chief engineer John J. Carty, and began in the United States many months before the US sent its first troops overseas. Bell managers who worked for the Signal Corps retained their positions at Bell, though, as a concession to military convention, they exchanged their civilian clothes for military uniforms.<sup>13</sup> In this way, the Bell-Signal Corps collaboration deserves to be remembered as an important early chapter in the emergence during the twentieth century of the modern US military-industrial complex.<sup>14</sup>

The Signal Corps played a vital role not only in battlefield communications, but also in the coordination of the global supply chain upon which the military and the civilian population depended.<sup>15</sup> The technical tools at its disposal were by no means confined to the telephone and the telegraph. In addition, it supervised battlefield photography, meteorology, and direction finding for enemy aircraft and artillery, and experimented with wireless telegraphy, that is, radio. Yet its primary mission remained the construction, operation, and maintenance of a tactical communications network to coordinate military communications between the general staff and the armies in the field.

One of the first Bell units to reach France was the 406th battalion, which arrived in August 1917.<sup>16</sup> The 406th was one of 12 battalions of Bell employees; it drew from the Bell Telephone Company of Pennsylvania, one of Bell's several dozen operating companies. Unwilling to reorganize already existing operating companies, the Signal Corps kept them together – giving Bell managers an unusual degree of authority over their staff. To the annoyance of Lavine, who was determined to highlight Bell's contribution to the war effort, these units were officially known as 'telegraph battalions', a problem for Bell insiders, since the US Justice Department had obliged Bell to divest itself of its telegraph network in 1913.<sup>17</sup> Taking advantage of this circumstance to make a political point, Lavine underscored that the US Army presumed that the telephone and telegraph *should* be linked – a point at issue in the 1913 divestiture.<sup>18</sup> The Signal Corps network was, as he put it, 'a *joint telephone-telegraph job*', making it a realization of the Bell managers' dream of a 'universal service' that combined the complementary advantages of the telegraph for long-distance communications and the telephone for short-distance communications.<sup>19</sup>

The telephone-telegraph divorce obliged Bell leaders to highlight the peculiar benefits of the telephone in military communications. Signal Corps officers such as Charles M. Saltzman did not need much persuading. As early as 1914, for example, Saltzman gave a public presentation – duly publicized by the house organ of Bell's New York operating company – in which he underscored the decisive use of the telephone by the Japanese military in the Russo-Japanese War.<sup>20</sup> Bell leaders were quick to echo Saltzman's assessment of the battlefield potential of the telephone, confident not only that they had much to contribute, should the US find itself at war, but also that their involvement in an overseas conflict could do much to burnish their reputation back home. To prepare for such an eventuality, the presidents of several of the largest Bell operating companies met in New York City at the behest of Bell's directors in November 1916 – six months before the US Congress declared war – to devise a plan to upgrade the US domestic telephone network, and to help the US Signal Corps construct, operate, and maintain a telephone network for the US military overseas.<sup>21</sup>

The prioritization that Bell managers accorded the telephone over the telegraph would only grudgingly be followed by the French. In the opening year of the war, for example, French officers prioritized the telegraph over the telephone for the reason that telegrams,

unlike telephone calls, left a physical trace, making it possible to hold their senders accountable for their contents. Within a year, however, military leaders came to recognize the value of the telephone in the facilitation of rapid two-way communication, while devising techniques to record telephoned messages – and, in this way, guarantee that responsibility for orders could be assigned.<sup>22</sup>

The first communications link that the Signal Corps operated in France was a leased telegraph wire between Paris and the first overseas US Signal Corps supply depot, which opened for service in Nevers in August 1917.<sup>23</sup> Almost immediately, it became obvious that the Signal Corps could not rely on pre-existing French facilities: the network was too small, and the demand too great. In the following months, the Signal Corps would transform the rudimentary French telephone infrastructure into a vast wire network that was configured for both telephone and telegraph service. This wire network interlinked the main Atlantic landing ports – Bordeaux, Saint-Nazaire, Le Havre, and Brest – with Signal Corps headquarters – first in Paris and then in Chaumont and eventually in Tours. Before long, the network would be extended to the military depots on the Loire and the US and allied naval command in London. By the end of the war, the US Signal Corps was operating 260 telephone exchanges in a network that consisted of 1,724 miles of permanent new overhead lines on which it had strung 20,708 miles of wire, which it supplemented by stringing 1,984 miles of new overhead wire on existing French lines, leasing 12,333 miles of wire from the French, and operating an additional 15,252 miles of lines that the French maintained.<sup>24</sup> When US operations were at their height in the summer of 1918, the Signal Corps consumed 68,000 miles of wire a month, which it used primarily to build and maintain lines at the front.<sup>25</sup> All in all, Lavine boasted, the network was so large that, if stretched end to end, it would have encircled the globe at the equator four times.<sup>26</sup>

While the Signal Corps sometimes used French equipment, its technical protocols originated in the United States. ‘Any extension to the existing systems’, explained a US military officer after the war, ‘was made *on the basis of American standards throughout*, employing those items of equipment or apparatus which were standard in American practice and which would involve the least difficulty with respect to manufacture and transportation’. Even leased lines were ‘equipped with French instruments remodeled by signal corps personnel for the American type of operation’.<sup>27</sup>

Facilitating the interconnection of the various telephone lines were central offices equipped with switchboards that were staffed, as in the United States, by skilled operators, the vast majority of whom were women. All in all, 223 women – popularly known as ‘Hello Girls’ – worked at switchboards for the US Army. Of these, a high percentage were bilingual in English and French, a valuable asset, given the nature of the work. Female telephone operators have long been celebrated for their tact, ingenuity, and technical mastery: the ‘Hello Girls’ have also been recently hailed as among the first ‘women soldiers’ in US military history.<sup>28</sup>

The Signal Corps’ communications network functioned not only on the inner lines as the nervous system of the ‘army behind the army’, but also on the front.<sup>29</sup> It was here that the operational challenge of maintaining the network was the most intense. On both sides of no man’s land, spies worked feverishly to decipher enemy messages sent by wire or wireless in order to anticipate troop movements and battlefield plans. In addition to having to constantly repair and relocate lines, the Signal Corps devoted considerable effort to ensuring that the messages that passed over its lines remained confidential. Since messages sent via ordinary wires were easily intercepted, the Signal Corps favored twisted pairs of wires, even though they could be hard to obtain.<sup>30</sup>

The Signal Corps earned high praise for its work in France. US expeditionary forces commander John J. Pershing hailed the telephone network as one of the ‘masterful accomplishments’ of the US war effort.<sup>31</sup> Bell publicists were even more expansive, crediting the Signal Corps with the establishment of a ‘perfect system of communication’, operated by ‘American girls’, that was ‘largely responsible’ for the ‘brilliant success’ of the American fighting forces in France.<sup>32</sup> US war correspondent E. Alexander Powell, the author of an authorized history of the Signal Corps that was published in 1919, struck a similar note:

Working under the most trying conditions, in a land with whose customs they were unfamiliar and whose language they did not understand, with equipment and material frequently improvised from whatever was at hand, [the Signal Corps] covered France from the seaboard to the Rhine with the network of their wires; they made it as easy for Great Headquarters to communicate with a remote outpost in Alsace or the Argonne as it is for a brokerage house in Wall Street to communicate with the manager of its Chicago branch, and it established a standard of speed and efficiency which will make the French dissatisfied with their own services for years to come. Their work was, in the words of General Pershing, ‘a striking example of the wisdom of placing highly skilled technical men in the places where their experience and skill will count the most’.<sup>33</sup>

While the US Signal Corps relied primarily on US personnel, it drew in various ways on the French for technical support. For example, the battlefield telephone exchanges, which were extremely compact to ensure their portability – and, thus, limited at 4–12 connections – were of French design.<sup>34</sup> The importance of French technical support was underscored by a US internal military report issued after the war. The ‘generous assistance’ of the French in leasing wires to the US Signal Corps, the report concluded, had been vital to its operations, in the absence of which the ‘communications’ of the American Expeditionary Forces would have been ‘entirely inadequate’ and ‘the results would have been serious’.<sup>35</sup>

Yet in most respects, the Signal Corps network was a product of US operational know-how, US technical protocols, and US manufacturing prowess. The US Army had no choice but to rely on French and British suppliers for helmets, machine guns, cannons, tanks, and planes; when it came to communications equipment, however, it was largely self-sufficient. With the exception of the French-made battlefield telephone exchanges and the radio-telegraph signal stations, which were supplied by the Allies, most of the telephone equipment used in France – including the portable battlefield telephones – was manufactured not in France, but in the United States.<sup>36</sup>

Particularly striking was the utilization by the Signal Corps of vacuum tubes in electronic repeaters – a notable technical advance. Though vacuum tubes had previously been used in Europe to amplify wireless signals, they had never before been used outside of the United States to improve sound quality in a landline telephone network. The Signal Corps had initially envisioned relying on existing know-how, rather than on such still largely untested technical contrivances. Carty disagreed, and he ultimately prevailed: vacuum tubes, he contended, would improve the quality of long-distance transmission. In the end, the Signal Corps installed twelve electronic repeaters in France, making the project something of a landmark in the history of electronics.<sup>37</sup>

The superiority of the US network to the pre-existing French network was obvious to everyone with a first-hand familiarity with the state-of-the-art. In the prewar period, it

took a French telephone operator between 40 seconds and 60 seconds to make a connection; the Signal Corps, in contrast, decreased the on-line call-connection delay to a mere 12 seconds.<sup>38</sup> Though the French military had long been aware of the indispensability in wartime of high-quality military communications, Carty reflected, the Americans had done more in nine months to develop telephonic facilities in France than the French government had in forty years.<sup>39</sup> The US-built network, conceded a French military officer, albeit not without a certain bitterness, had indeed outpaced the pre-war telephone network in France:

It was painful, for the sake of the French telegraphists, to find that the Americans telephoned regularly from Koblenz to Brest for questions of transport or equipment, and that at the same time Mr. Clemenceau in Paris telephoned to Marshal Foch in Kreuznach in a very precarious way, when it was a matter of solving issues of the first importance.<sup>40</sup>

The effectiveness of the network that the Signal Corps built is easily exaggerated. The limitations of wartime communications, as the military historian John Keegan reminds us, were apparent to all.<sup>41</sup> Wire-based networks were easily disrupted by artillery, enemy wire-cutters, and even motorized vehicles. The absence of reliable wireless communications was another serious constraint. Radio equipment was heavy and required special handling. Electrical interference and static was ubiquitous, while relocation of a single 'trench set' might well require the labor of a dozen men. It was, thus, hardly surprising that when soldiers advanced or retreated they routinely lost contact with their commanders. The day of the carrier pigeon had not yet passed. During the three-day battle of Saint-Mihiel the US Army deployed no fewer than 500 carrier pigeons; during its eighteen months in France, the total reached 15,000.<sup>42</sup>

### The legacy of the wartime telephone network in the United States

However significant US Signal Corps' telephone network may or may not have been to the prosecution of the war, it was destined in the postwar period to exert a significant influence on the telephone network in both France and the United States. In each country, its legacy reinforced trends that predated the war in ways that redounded to the benefit of Bell.

In the United States, Bell publicists hailed the Signal Corps telephone network as a case study in the superiority of corporate management over government administration. The shortcomings of government administration were implicit in the contrast that Bell publicist A. Lincoln Lavine drew between the bellicose militarism of the Central Powers and the technical virtuosity of Bell. Governments waged war; corporations promoted the cause of peace. No stranger to controversy, Lavine had underscored the superiority of corporate management over government administration in 1914 in a Bell-commissioned pamphlet entitled *Why Governments Fail in Commercial Enterprises*. 1914 was a challenging year for Bell's management. In addition to having just lost a major antitrust case, it found itself confronted with a large and growing popular movement to nationalize its assets.<sup>43</sup> Today it might seem bizarre that Americans once contemplated the establishment of a government-owned and government-operated telephone network on the model of the French PTT. Yet such a proposal was very

much on the table in 1914. To defeat the proposal, Lavine touted ‘scientific government regulation’ as a superior alternative to government ownership. By scientific government regulation, Lavine meant the public oversight by a constellation of state regulatory commissions of a corporately owned and operated telephone network, the status quo in the United States. This kind of oversight, in Lavine’s view, was far superior to the ‘knife of government ownership’, by which he meant a telephone network owned and operated by a single government agency, the status quo in France.<sup>44</sup>

The brief takeover by the federal government of the Bell System in 1918 buttressed Lavine’s faith in the superiority of corporate management over government administration. The tenure of Postmaster General Albert S. Bursleson as the de facto director of the US telephone network proved to be enormously unpopular not only with business leaders, but also with organized labor, and few lamented the return of the network to Bell following the war.<sup>45</sup> Lavine would return to this theme in *Circuits of Victory*. Though Lavine touched on the contribution of Bell engineers to acoustics, cryptography, and wireless telegraphy, his primary subject was the 12 signal corps battalions, staffed by 4,525 Bell volunteers, that had been recruited to construct a military telephone network in France.<sup>46</sup>

For Lavine, the primary significance of this project lay in its demonstration of the superiority of private enterprise over government ownership. In his view, the level of organization that Bell attained in France would have been inconceivable had it been operated, like the French PTT, as a public agency. The crux of the matter lay not in the failings of government – though Lavine did have a good deal to say about bureaucratic rigidity and red tape – but, rather, in the possibilities of private enterprise (Figure 3).

Private enterprise, and only private enterprise, could coordinate a network as vast as the US telephone network, and, by extension, the network that the Bell battalions had built in France. ‘Organization’ – one of Lavine’s favorite words – and not individuals held the key. French and British engineers were no less ingenious than US engineers, Lavine reflected. Yet only US engineers had ‘*our huge organization reservoir of standardized telephone and telegraph equipment to fall back upon*’ (italics in the original). The absence in the United States of a ‘well developed organization’ in radio – in contrast, for example, to the Marconi Company in Britain – meant that, in this realm, the United States lagged behind: the United States had mistakenly made radio a ‘government affair’ – a ‘matter of bureaucracy rather than business’ – with predictably lamentable results.<sup>47</sup>

The consequences of organization, in Lavine’s view, went well beyond mere short-term considerations of profit and loss. Perhaps most important of all, organization fostered innovation. ‘Never before did the scientist even dream of playing so prominent a part in the stress and strain of daily life’, Lavine observed, ‘as [the scientist] played during – and has played since – the Great War’. Private enterprise, in short, was innovative, while government was not.<sup>48</sup>

Lavine’s idealization of ‘science militant’ – Lavine’s provocative term for the rising power of technical expertise – was doubtless heartfelt.<sup>49</sup> Bell executive Walter S. Gifford served as the director of the Wilson administration’s ‘Council of National Defense’ – an influential preparedness organization that helped mobilize US business for a possible European conflict even before the US formally entered the war. Once Wilson made the fateful decision to send US troops overseas, Bell’s management threw themselves into



the war effort.<sup>50</sup> Yet it should not be overlooked that Lavine's phraseology echoed, and, indeed, owed much to, the unprecedented public relations campaign that Bell corporate leaders launched in 1914 to delegitimize the idea of government ownership, a campaign to which Lavine himself had contributed. In the years immediately preceding the First World War, Bell telephone managers fearful of a hostile takeover by Congress quite literally wrapped their business in the flag.

Once Congress lent its imprimatur to President Woodrow Wilson's declaration of war, Bell's formidable public relations machine went into overdrive. Quick to warn the public about the 'fate of the unprepared' who had failed to invest adequately in military mobilization, Bell publicists urged telephone users to answer the 'nation's call'. In particular, these publicists urged telephone users to subordinate their 'private interests' to the 'Government's need' by cutting down on any 'unnecessary and extravagant use' of the telephone.<sup>51</sup> And above all, they touted Bell's 'spirit of service' in both the US and France. More than 12,000 of Bell's 'members' were in military service, publicists boasted, while the 'weight of war' made it a 'patriotic duty' for telephone users to avoid the 'waste' of unnecessary telephone calls.<sup>52</sup> To tap an audience that could not be expected to have much familiarity with the high-toned magazines in which Bell ran most of its public relations announcements, Bell partnered in 1918 with the US government's Committee on Public Information and the French filmmaker Pathé to make a silent movie documenting the 'Whispering Wires of War'.<sup>53</sup> In this way, Bell's formidable public relations campaign helped to delegitimize government ownership of the US telephone network.

The implications of Bell's anti-government ownership public relations campaign extended well beyond the First World War. By linking corporations not only with the public good but also with science – at the time, a decidedly unintuitive pairing – Bell publicists hastened the legitimation of the managerial corporation as a cornerstone of the twentieth-century US political economy. This progressive ideology goes far toward explaining why Bell invested so heavily in technically advanced money-losing propositions such as the transcontinental telephone link between New York City and San Francisco. The significance of this project was not commercial but symbolic. Henceforth, it would become increasingly common to assume, the protestations of social critics such as Thorstein Veblen notwithstanding, that corporate management could be technically progressive in ways that government administration could not.<sup>54</sup>

The still quite unusual linkage of the corporation with technical advance left open the question of whose interests the corporation was supposed to promote.<sup>55</sup> Still wary of government ownership, postwar Bell publicists took pains to remind the public that the actual owners of the corporate behemoth were, in fact, its many small investors, making it a 'democracy'. To drive this point home, one 1921 public relations announcement went so far as to proclaim, echoing a famous peroration of the Civil War era statesman Abraham Lincoln, that the corporation was 'of the people, by the people, for the people ...'.<sup>56</sup>

For Abraham Lincoln's twentieth-century namesake Abraham Lincoln Lavine, in contrast, the wartime corporation was best characterized not as a shareholders' democracy, but, instead, as a managerial corporation led by a meritocratic elite to promote the public good. By framing his argument in this way, Lavine helped to float the provocative idea that the birthplace of managerial capitalism was to be found not in the United States, but in France. A defining feature of the managerial corporation was the still-novel idea that the shareholder was not the only, nor even the most important, of the

stakeholders to which its managers were beholden, and that corporate success was to be measured not by the maximization of the shareholders' return, but, rather, by the promotion of the public good. By identifying Bell so closely with the war effort, Bell publicists helped to popularize a new rationale for the corporation – a rationale that would remain for the next half century a fixture of American public life.<sup>57</sup>

### The legacy of the wartime telephone network in France

It is commonplace to contend that the French government regarded the postwar period not as a return to normalcy – as, for example, President Warren G. Harding would in the United States – but, instead, as an epoch of continuing strife in multiple arenas: economic, diplomatic and cultural.<sup>58</sup> From such a perspective, it was understandable that many influential French statesmen presumed that France must continue to rely on its wartime allies, including, in particular, the United States.<sup>59</sup> This idea found expression even in the high-tech realm of telephony, extending into the postwar period the close relationship that had existed during the war between the French government, the US Signal Corps, and Bell.

The continuity between the wartime and postwar period is perhaps best symbolized by the incorporation by the French PTT of the wartime telephone network that the Signal Corps had built into the existing (prewar) French telephone network. The rapid establishment by the Signal Corps of a telephonic link that made it possible to connect Paris directly to Strasbourg – a strategically and symbolically important city that France regained in November 1918, after having lost it to Germany in 1871 – symbolized the magnitude of the contribution of US network builders to French postwar reconstruction. Shortly after the war, the PTT would purchase at a highly advantageous price the telephone equipment that the Signal Corps had stocked.<sup>60</sup> In 1923 it would rely on equipment donated by Bell-affiliated equipment supplier Western Electric to establish its first radio broadcasting station.<sup>61</sup>

The postwar French long-distance telephone network relied not only on US telephone equipment but also on US technical protocols, a major departure from prewar norms. To help ensure the most rapid possible expansion of the network between Paris, the northern and eastern border, and the occupied territories – and unwilling to wait for French manufacturers to get up to speed – Marshal Ferdinand Foch's Directorate General of Communications recommended in January 1919 that the PTT purchase telephone equipment directly from Western Electric.<sup>62</sup> To get the ball rolling, Foch met personally with a delegation of ex-Signal Corps staffers and Western Electric engineers headed up by Augustus H. Griswold.<sup>63</sup>

Civilian authorities in France angrily rebuffed Foch in the conviction that he was unduly prioritizing military exigency over French industry. Intent on building up the French telephone equipment industry, they supported, as an alternative to Foch's proposal, a PTT-backed industrial policy to boost French manufacturers. The Chamber of Deputies endorsed the PTT agenda, and the PTT promptly established a new department tasked with the construction of a long-distance telephone network and the establishment of a consortium with US telephone equipment manufacturers. This consortium took shape in 1920 with the formation of LTT (Lignes télégraphiques et téléphoniques), a new French-based equipment manufacturer that was backed by a group of French industrialists allied with Western Electric.<sup>64</sup> This joint venture was the brainchild of Louis Loucheur, the minister of industrial reconstitution under Prime Minister Georges Clemenceau. Loucheur favored a variety of industrial cartels, including several linking French and German firms: in the telephone sector, however, he looked to the United States. Under the leadership of engineer Georges Viard, a graduate of the Ecole Polytechnique who had previously worked in the recently established

research unit of the PTT, LTT won a major contract for the modernization of the Paris-Strasbourg line, which would be equipped in 1926 with one of the first long-distance underground telephone circuits in France.<sup>65</sup>

LTT specialized in transmission equipment. For switchboards, the PTT looked to a number of other companies, including Western Electric subsidiary Le Matériel Téléphonique (LMT), which won a major contract in 1926 to equip Paris's central exchange with their first direct-dial switchboards. This Franco-American industrial partnership led some contemporaries to express concerns about 'American colonization'.<sup>66</sup> Where, they warned, might this all lead? Was it possible that a US corporation might take over the French telephone network, which the government had nationalized and incorporated into its postal and telegraph ministry in 1889? Popular dissatisfaction at the abysmal level of telephone service had long been brewing: as early as 1909, a telephone subscribers' organization had denounced the status quo as a 'national shame'.<sup>67</sup> And with good reason. Compared to its European neighbors – let alone the United States – the French telephone network struck well-informed contemporaries as outmoded, inefficient, and poorly administered. Everyone knew, as French telephone experts proclaimed, echoing a familiar boast of Bell publicists, that there were twice as many telephones in New York City as in all of France.<sup>68</sup> To make the case for reform, the PTT in 1920 proposed an ambitious modernization plan that was so audacious that the Paris illustrated newspaper *Excelsior* treated it as front-page news. 'The French telephone network', the newspaper editorialized, 'is judged, at the present time, absolutely insufficient by the administration itself, which, realizing the importance that the war has given to the telephone, has drawn up the plan of the new great interurban circuits, the construction of which seemed essential to the economic life of France' (Figure 4).<sup>69</sup>

This modernization plan was never implemented, having fallen victim to bureaucratic infighting between the Chamber of Deputies and the PTT. Frustrated by the inability of public authorities to move forward, a respected specialist in industrial management darkly warned of the 'industrial incapacity of the State'.<sup>70</sup> Under the circumstances, it was hardly surprising that in 1921 the Chamber of Deputies actually went so far as to debate, at the suggestion of Louis Dechamps – a former PTT official who had himself taken part in the debate over the 1920 modernization plan – the potential benefits of the privatization of the French telephone network.<sup>71</sup> Had the champions of privatization prevailed, Western Electric would almost certainly have been first in line to make a bid.

That Western Electric was in an excellent position to expand its presence in foreign markets no close observer could possibly deny. To help take advantage of federal legislation that encouraged the cooperation of firms doing business in international trade, the company had set up in 1918 a new, London-based company, International Western Electric (IWE).<sup>72</sup> By visibly strengthening the governance of its operations abroad, Western Electric displayed an appetite for expansion in markets from which its once-formidable German rivals would almost certainly be blocked. This optimistic spirit was nicely captured by Western Electric's president Charles G. DuBois (1919–1926) in a magazine article that he authored in September 1919: 'Can there be any doubt that America, in this hour of her opportunity for economic leadership, as well as moral leadership of the world, will choose what seems the harder, but, viewed in the whole perspective, is both the easier and the greater course?'<sup>73</sup> Four years later, in an internal company document, DuBois was even more emphatic, underscoring that the equipment manufacturer's 'greatest interest is in Europe' – a continent that he had personally visited on three separate occasions since the end of the war.<sup>74</sup>

Should IWE expand its presence in European markets, questions would naturally arise about its intentions. In the United States, Western Electric worked hand-in-glove with Bell: What about Europe? Might it lobby for the vertical integration of network provider and network equipment supplier, shifting government-owned telephone networks to corporate control? Well aware of the apprehensions of European PTTs on this score, Bell Vice President John J. Carty found it necessary to deny publicly that Bell had any intention of taking control of any of the existing national telephone networks in Europe.<sup>75</sup> While Carty intended his disclaimer to mollify European critics of US corporate aggrandizement, he took care to leave open the possible future privatization of the emerging cross-border long-distance European telephone network. To help open up a discussion of this topic, IWE chief engineer Frank Gill in 1922 speculated that the cross-border network might take one of three different organizational forms: a private company, which was the option he strongly favored; a joint venture headed up by nation-based PTTs; or an international committee staffed by technical experts. To Gill's dismay, it was the third of these options that European telephone engineers opted for in March 1923, when, at the initiative of the French – who blocked the Germans from participating – they convened the first European technical conference on long-distance telephony.<sup>76</sup> Among the concrete results of this conference was the establishment of permanent organization to mandate technical protocols in long-distance telephone communications. This organization – the *Comité consultatif international des communications téléphoniques à grande distance en Europe* (later known as CCIF) – would soon become affiliated with the International Telecommunication Union, the organization that has regulated international telephone standards ever since.

The expert committee option was the least advantageous for IWE, since it precluded the possibility that the firm might itself coordinate the emergent European transnational telephone network. In the postwar United States, as in the period before US entry into the war in 1917, corporate management would triumph over government administration; in postwar France, in contrast, the situation was quite different: government administration remained the norm, just as it had been before 1914. Even so, IWE did not do too badly in the end. By establishing technical protocols for international telephony, CCIF created a market for the most innovative equipment, a market IWE was well positioned to serve. All of this was obvious to well informed observers in the United States and France. DuBois himself left little doubt that he regarded his company – in conjunction with its European stepchild, IWE – as a key player in the long-distance European telephone equipment market:

In a way the Western Electric Company is a medium by which this result may possibly be attained. Working in all these countries with a common purpose and a centralized technical direction, our foreign associated companies in Europe are making and selling apparatus of similar standards and also the cable systems by which they may be connected for long-distance service.<sup>77</sup>

Taking the lead in championing international telephony in France was Georges Valensi, the secretary of 1923 conference, and afterwards the longtime secretary general of CCIF (1924–1956). Valensi hailed from the same cohort of public-minded electrical engineers as did Georges Viard, the head of LTT. Immediately following the US declaration of war against Germany in 1917, Valensi traveled to the US to help prepare for the arrival of Signal Corps in France, and, not incidentally, to help smooth the rapid build-out in France of a telephone network dependent on US telephone equipment.<sup>78</sup> Shortly after landing in New York City, Valensi visited John J. Carty's office at Bell – where he experienced first-hand the wonders of transcontinental telephony. Carty extended to

Valensi the further courtesy of entertaining him and several of his colleagues ‘in the privacy of his home’ – establishing a personal bond between the two men that would last long after the war.<sup>79</sup>

The links between French telephone officials and Bell would deepen following Valensi’s return to France. During the war, Valensi served in the French Army as a liaison with the US Signal Corps – bringing him into contact with key members of the Signal Corps’ Research and Inspection Division, including Bell engineer Herbert E. Shreeve. Carty, for his part, knew Europe well. In addition to taking part in an international telephone conference in Paris in 1910, he returned to France in July 1918 at the request of General Pershing to coordinate telephonic communications – where Carty oversaw the installation of a telephone exchange at the Hôtel de Crillon to be used by the US delegation to the peace negotiations.<sup>80</sup>

The connections between US and French telephone engineers persisted after the war. In 1922, for example, Carty hailed French telephone engineer Jean-Baptiste Pomey as an ‘enthusiastic friend of America’ while Western Electric executive Frank B. Jewett boasted to Carty about ‘our enthusiastic friends in France’.<sup>81</sup> Valensi visited the United States on many occasions during this period, where he invariably received a respectful reception from Carty, Jewett, and other senior Bell officials. For Valensi, the foundation on which Bell’s telephone system had been built was more than merely superior to the existing alternatives: it was, in fact, ‘a principle of absolute truth’.<sup>82</sup> When DuBois and Jewett planned a trip to France in the summer of 1921, Valensi reminded them of a plan of some kind that he had previously discussed with Jewett in the United States: ‘I shall then be very pleased to put myself at their disposal if they want me to develop the ideas that I expressed very briefly to Mr. Jewett in his home of Short Hills’.<sup>83</sup>

The high regard with which Valensi and other top-level French telephone engineers held US telephone equipment manufacturers did not go unnoticed by senior management at IWE. In reflecting in 1921 on a recent report that had been issued by the Committee on Public Works of the French Chamber of Deputies, one Bell executive had this to say: ‘in fact the names of the Western Electric and the AT&T appear so often, and are spoken of so favorably, that whole sections might be suspected of being propaganda on our part’.<sup>84</sup> The relationship between the French and the Americans sometimes verged on outright collusion. In the months preceding the 1924 international telephone conference in Paris, for example, Valensi worked together with IWE engineers to plan a one-month trip to the United States to build a case for the superiority of US technical protocols. The rationale for the trip was simple: to counter the arguments of the rival German telephone equipment supplier Siemens & Halske, which had loudly denounced the stranglehold that Bell-affiliated equipment suppliers had acquired over the French.<sup>85</sup>

IWE engineers prudently chose not to openly lobby at the 1924 Paris meeting.<sup>86</sup> Yet they remained well aware of the commercial potential of the cross-border long-distance European telephone equipment market, and, to improve their competitive position, quietly conducted extensive research on traffic patterns and equipment specifications.<sup>87</sup>

Siemens & Halske was not alone in protesting the close relationship between the French and the Americans. The Swedish telephone equipment manufacturer Ericsson voiced similar concerns, as did French equipment manufacturers unaffiliated with IWE.<sup>88</sup> The technical advantage that IWE had come to enjoy, warned the chairman of the board of a newly established French equipment manufacturing company (Société Industrielle de Crédit pour la Télégraphie et la Téléphonie) at around the same time, had enabled its management ‘to establish in an unassailable way a stranglehold on all the world’s telephony’. In such a venture, technical protocols had become a powerful competitive weapon, since ‘it would obviously be

possible to standardize today only according to specifications that have already proved their worth, and hence were foreign, and to impose these specifications, was thus to give the coup de grace to all attempts to emancipate French industry'.<sup>89</sup>

For Valensi, the triumph of the Americans was very much the point. Satisfied with the outcome of the 1924 conference, which had proved highly favorable to IWE, Valensi expressed his satisfaction to his American friends: 'You will conclude undoubtedly that my last mission to the United States has had a first good result. So it was not only a very very pleasant [sic] trip for me (because of the kind hospitality that you have given me in America) but also a useful job indeed!'<sup>90</sup> Valensi had good reason to be pleased. Over the objections of the Germans and Scandinavians, CCIF debated technical

protocols that had been devised by Western Electric, and that were already in use in the United States. These included standards for telephone instruments, loading coils, and repeaters, as well as the measurement units the bel and the decibel.<sup>91</sup> Not all of these protocols were immediately adopted. Yet four years later, CCIF would adopt as the European standard Bell's Master Reference System for Telephone Transmission, locking-in US-based performance norms for telephone equipment. Each of these policies had the effect of strengthening the relationship of French and US telephone equipment suppliers, while shutting out the Germans. For the French statesman Jean Philip, this was a step in wrong direction. Not only did it increase the dependence of the French on the United States, but it also weakened the possibility of an intra-European Franco-German alliance. 'Franco-German economic collaboration was possible', Philip lamented: 'And it is desirable if we want to defeat the American capitalism that seeks to absorb our industries and, as for the telephone, has unfortunately already succeeded'.<sup>92</sup>

## Conclusion

The communications network that the US Signal Corps built and operated in France during the First World War with the assistance of Bell personnel would shape the political economy of the telephone in the postwar period in both the United States and France.

In the United States, the Signal Corps project furnished Bell publicists with a tailor-made opportunity to highlight the contribution of Bell personnel to the prosecution of the war. In so doing, Bell scored points in an ongoing and still unresolved public debate in the United States over the relative merits of government administration and corporate management. Though the communications network had been overseen by a government agency – namely, the US Signal Corps – Bell publicists energetically, if misleadingly, hailed it as a triumph of private enterprise. The influence of specific pro-Bell publications such as A. Lincoln Lavine's *Circuits of Victory* is hard to gauge. It is, similarly, impossible to know for certain how important Bell's pro-corporate, anti-government rhetoric was in turning the tide of sentiment against government ownership. What can be stated with confidence is that the government ownership campaign failed, and that Bell publicity helped to make the case for the inferiority of government administration to corporate management. In so doing, it ingeniously – and, in some ways, perversely – transformed a much-admired government project into an argument against government ownership.

In France, the involvement of Bell personnel in the Signal Corps project provided critics of the prewar French telephone network with a tantalizing glimpse of a political economy in which corporate management had become an effective counterweight to government administration. To be sure, the influence of the US example remained limited: at no point in wartime or in the postwar period did the French military relinquish

its determination to retain control over military communications. Even so, both the military and the PTT recognized the value of gaining access to the most advanced telephone equipment – prompting them both, in the postwar period, to cast their lot with Bell. Ironically, a pillar of the French state – namely, the PTT – revitalized itself by entering into a strategic alliance with a corporate leviathan that originated in the United States.

The close wartime ties between the French military, PTT engineers, and Bell would help to explain why Bell would come to play such a prominent role in the design of the postwar European telephone network, and why American – rather than, say, British or German – telephone equipment manufacturers would loom so large in the setting of technical protocols – beginning with Western Electric and continuing with International Western Electric (IWE), and, after 1925, International Telegraph and Telephone (ITT), which bought out IWE following Bell's decision to concentrate on the US market. It should perhaps not come as a surprise that the cofounder of ITT, Sosthenes Behn, recognized in IWE a potential money-maker: Behn understood European telephone integration from the ground up – having served in the US Signal Corps during the First World War.<sup>93</sup> Like so many Bell managers, he had an intuitive grasp of the power of organizational networks – a power, forged during a moment of crisis, that built on, and would long be sustained by, a nexus of mutually supportive personal relationships between French and American telephone engineers, military officers, and business managers. In the postwar period, these transnational networks would become embedded in technical protocols that would shape the informational environment in the United States, France, and Europe for decades to come.

Figures:

**The Agency of a United People**

A striking comparison between a homogeneous country and a heterogeneous group of countries is obtained by placing over the map of the United States the map of Europe. These represent the same area—about 3,000,000 square miles—if a few of the remote provinces of Russia are omitted.

Europe has the advantage in population, with more than four times as many people as the United States in the number of large cities, with two and a half times as many cities of over 100,000 population.

Yet the United States, a comparatively young country, has outstripped Europe in the diffusion of civilization, because of its wonderfully greater means of communication between all parts of its area. The United States not only excels in transportation facilities, but it has nearly three times as many telephones as Europe, or about eleven times as many in relation to population.

By the completion of the Transcontinental Line we now talk from one end of this country to the other, while in Europe the longest conversation is no farther than from New York to Atlanta, and even that depends on the imperfect co-operation of unrelated systems.

Europe, with twenty-five countries and many different languages, serves as an illuminating contrast to the United States, with one language and a homogeneous people, despite the fact that our population has been derived from all parts of the world.

During the last forty years the steadily extending lines of the Bell System have contributed in no small measure to this amalgamating of different races. The latest achievement—the linking of coast to coast—has given greater force to the national motto, "E Pluribus Unum."

**AMERICAN TELEPHONE AND TELEGRAPH COMPANY  
AND ASSOCIATED COMPANIES**

*One Policy                      One System                      Universal Service*

Figure 1. This Bell 1914 public relations announcement juxtaposed maps of the United States and Europe to contrast the 'agency' of the 'united people' of the United States, as symbolized by the official opening of the transcontinental New York-San Francisco telephone link, with the disunity of a Europe wracked by war. Source: *Boy's Life*, 5 (April 1915): 19.



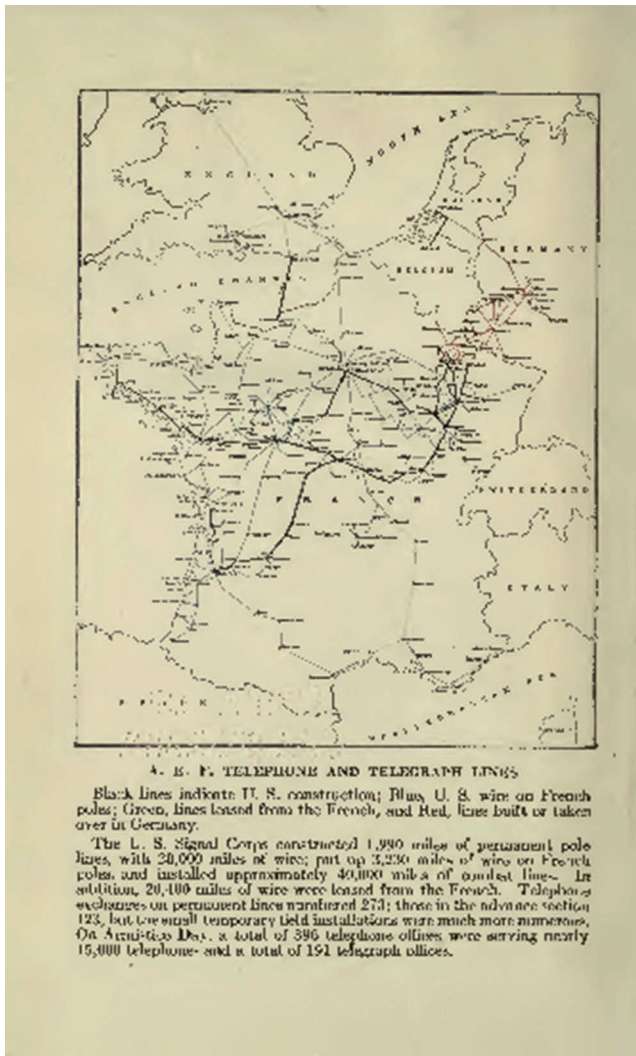


Figure 2. The principal lines of the wartime telephone and telegraph network operated by the US Signal Corps in France are illustrated by this map, which A. Lincoln Lavine included in *Circuits of Victory*, his laudatory history of Bell's role in the First World War. Source: Lavine, *Circuits of Victory*, frontispiece.



### In The Nation's Service

America is sending its best men to fight for freedom, and in their honor the whole land is dotted with service flags carrying the stars of sacrifice.

It is a far cry from the crowded city streets, above which floats our service flag, to the telephone exchange hidden in the front-line trenches. But the actuating spirit of service here and abroad remains unchanged.

The Stars and Stripes is the emblem which unites us in war for human liberty and national honor. The service flag is the emblem which unites us in mutual sympathy for the men who give themselves and for those who give their men.

These flags should inspire all citizens to greater endeavor and greater sacrifice. As one of the agencies of preparation and military support, the Bell System is honored by the opportunity to do its share.



**AMERICAN TELEPHONE AND TELEGRAPH COMPANY  
AND ASSOCIATED COMPANIES**

*One Policy                      One System                      Universal Service*

"Mention the Geographic—It identifies you."

Figure 3. This 1918 Bell public service announcement reminded US customers that the ‘service flags’ that its operating companies were proudly flying at their many US offices symbolized the corporation’s ‘actuating spirit of service’ not only in the United States but also in the ‘front-line trenches’ in Europe. Source: *Nation's Business*, 6 (March 1918): 40.

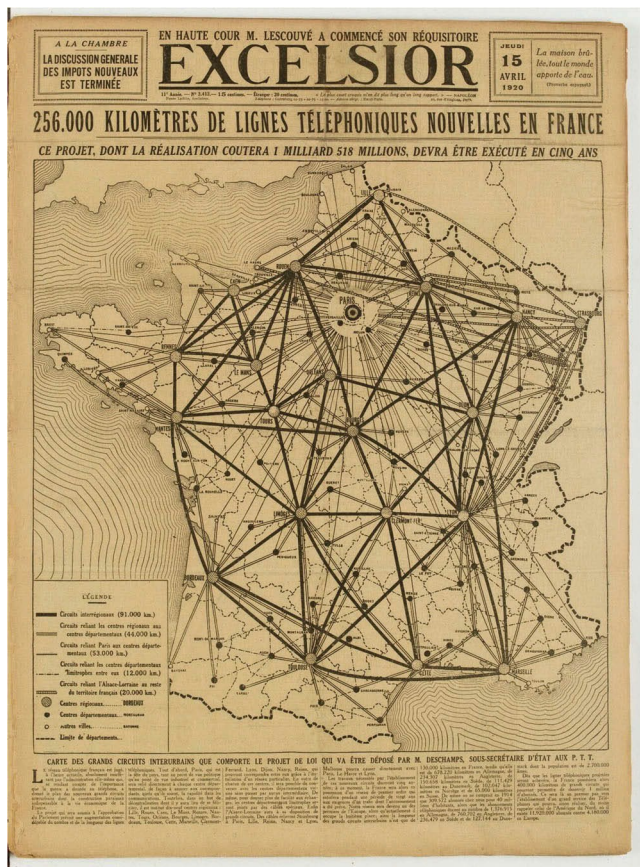


Figure 4. This visionary PTT proposal for the future expansion of the French telephone network marked a radical departure in government policy, which had previously devoted little attention to long-distance connections. The proposal, which was clearly influenced by the wartime network operated by the US Signal Corps, was deemed sufficiently newsworthy by the editors of the Paris-based illustrated newspaper *Excelsior* that they featured it on their front page. Source: *Excelsior*, 15 April 1920. Reproduction: Bibliothèque Nationale de France.

## Notes

1. A Lavine, *Circuits of Victory*, 21–2. For assistance in the preparation of this essay, we would like to thank Gabriele Balbi, Christiane Berth, Daniel R. Headrick, Adam Tooze, and two anonymous referees. For research assistance, we are grateful to Bailey Pierson, Jeffrey Nichols, and Citlalli Contreras-Sandoval.
2. Lavine was born in Riga, and his father is listed on census documents as a rabbi. Lavine's memorial service took place at the interdenominational Ethical Cultural Society in New York City. Biographical information on Lavine has been cobbled together from various sources, including US and New York state census records. An obituary appeared in the *New York Times*, 7 January 1969, 41.
3. Lavine, *Circuits of Victory*, 21–2.
4. The approach that we adopt in this essay is indebted to the transnational turn in the history of technology, a historiographical innovation long associated with the Tensions of Europe research initiative (see [www.tensionsofeurope.eu](http://www.tensionsofeurope.eu)). Of the many publications to emerge from this initiative, the most relevant to our topic is Fickers and Griset, *Communicating Europe*, esp. 28–37. Unfortunately, *Communicating Europe* appeared too late for us to draw on it in our essay.
5. Exceptions to the top-down and nation-centric focus of most telephone scholarship include John, *Network Nation*, which foregrounds the decisive role in the making of the US telephone network of municipal operating companies and municipal franchise regulation;

and Laborie, *L'Europe mise en réseaux*, which locates the French telephone network in a transnational frame.

6. The literature on the political and economic significance of standard-setting – a phenomenon labeled ‘network power’ by historical sociologist David Grewal and ‘soft power’ by political scientist Joseph S. Nye, Jr. – is growing rapidly. Recent scholarship on standard-setting in the information technologies sector includes Jeding, *Co-Ordination, Co-operation, and Competition*; Russell, *Open Standards*; and Murphy and Yates, ‘The Globalizing Governance,’ 550–8. None of this literature places any special emphasis on the First World War.
7. Key monographs on the history of telephone in this period include, for the United States, Lipartito, *Bell System*, and, for France, Bertho-Lavenir, *Télégraphes et téléphones*. Neither placed any special emphasis on the First World War. The influence of the First World War on business, technology, and engineering is the subject of a large and distinguished literature. Among the books that explore this relationship for the United States are Pursell, *Machine in America*, 205–7; Hughes, *American Genesis*, chapter 3; and Noble, *America by Design*, chapters 8–9. Much of this literature explores the consequences for business, technology, and standard-setting of governmental institutions. In this essay, in contrast, we consider a related but distinct topic – namely, the consequences for business, technology, and standard-setting of transnational networks of engineers, military officers, and business managers. Our essay also contributes to the burgeoning literature on the shifting character and significance in the early twentieth century of transnational links between the United States and Europe. On this topic, see Tooze, *Deluge*; and Rodgers, *Atlantic Crossings*. Tooze and Rodgers each show how First World War-era transnational linkages strengthened the relative position of the United States in the international political economy. Yet neither consider the influence of wartime transnational linkages on the post-First World War telephone network in the United States and France.
8. The historical literature on the networking of Europe is vast. For an introduction, see Vleuten and Kaijser, *Networking Europe*; and Vleuten and Kaijser, “Networking Europe,” 21–48.
9. Squier, *Report of the Chief Signal Officer*, 6, 11.
10. Squier, *Report of the Chief Signal Officer*, 7. See also Raines, *Getting the Message Through*, 168. Raines reports a slightly lower total for the Signal Corps (41,000) than did Squier (53,000).
11. Squier, *Report of the Chief Signal Officer*, 7.
12. Powell, *The Army Behind the Army*, 4. For a perceptive history of the non-Bell, or independent, US telephone sector, see MacDougall, *People's Network*.
13. Squier, *Report of the Chief Signal Officer*, 8.
14. Spurlock, “Bell Telephone Laboratories,” 165–215.
15. In emphasizing the role of the First World War in strengthening transnational networks, we build on a central argument of Hughes’s *American Genesis*. For a related discussion, which critiques the presumption that the postwar period witnessed a retreat into isolationism, see Tooze and Fertik, “World Economy,” 214–38.
16. Schauble, *The First Battalion*.
17. John, *Network Nation*, 359–63.
18. Lavine, *Circuits of Victory*, 134, 153, 181–2.
19. *Ibid.*, 182. Italics in the original.
20. “The Telephone Society of New York,” *Telephone Review*, 5 (December 1914): 349.
21. “The Bell System’s Multiple Service to the Country,” *Telephone Review*, 8 (June 1917): 147.
22. *Historique du 8e régiment du génie pendant la campagne 1914–1918* (n. p., c. 1920), 5 ; and Toché, “Les enseignements de la guerre,” 253.
23. “History of the Signal Corps: Beginnings of the Telegraph and Telephone System,” 2041 box 42, RG 120, US National Archives and Records Administration, College Park, Maryland [hereafter NARA].
24. Squier, *Report of the Chief Signal Officer*, 162.
25. Powell, *Army Behind the Army*, 12.
26. Lavine, *Circuits of Victory*, xviii.
27. “Report of the Commanding General, SOS, AEF,” in *United States Army in the World War, 1917–1919*, vol. 15, 114–5.
28. Cobbs, *Hello Girls*, 85.

29. Powell, *Army Behind the Army*.
30. *Ibid.*, 16–23.
31. Lavine, *Circuits of Victory*, 98.
32. *Telephone Review*, 9 (October 1918).
33. Powell, *Army Behind the Army*, 8–9.
34. *Ibid.*, 14.
35. “History of the Signal Corps,” NARA.
36. Powell, *Army Behind the Army*, 14; and Lavine, *Circuits of Victory*, 215–7.
37. Lavine, *Circuits of Victory*, 118–22; and “History of the Signal Corps,” NARA.
38. “The American Woman’s Telephone Unit,” 20.
39. Lavine, *Circuits of Victory*, 121.
40. “Il a été pénible, pour l’amour propre des télégraphistes français, de constater que les Américains téléphonaient couramment de Coblence à Brest pour des questions de transport ou de matériel, et qu’en même temps M. Clemenceau, de Paris téléphonait au maréchal Foch à Kreuznach d’une manière très précaire, alors qu’il s’agissait de résoudre des questions de première importance”. Toché, “Les enseignements,” 254.
41. Keegan, *Face of Battle*, 259–68; and Raines, *Getting the Message Through*, 186–7.
42. Powell, *Army Behind the Army*, 24. On the use of carrier pigeons in the First World War by the British Army, see Phillips, “Pigeons in the Trenches,” 60–80. Recent research has reassessed the contribution of the British Signal Service to the British war effort. While older accounts typically judged Britain’s military communications a failure, Brian N. Hall has recently made the case not only for its success, but also for its influence on the US Signal Service. Hall, *Communications and British Operations*, 16, 20; and Hall, “British Army,” 290–321.
43. John, *Network Nation*, 371–6.
44. Lavine, *Why Governments Fail in Commercial Enterprises*, 16.
45. John, *Network Nation*, 400–4.
46. Lavine, *Circuits of Victory*, 88.
47. *Ibid.*, 216, 130.
48. *Ibid.*, 157.
49. *Ibid.*, 158.
50. On the Council of National Defense, see Pursell, “Engineering Organization,” 259.
51. “The Fate of the Unprepared,” December 1917, and “Answering the Nation’s Call,” September 1917; both in 2061 187 08 02, American Telephone and Telegraph Company Archives, Warren, New Jersey (hereafter ATTA-NJ).
52. “In the Nation’s Service,” March 1918; “When Belgium Stemmed the Tide,” November 1918; “The Weight of War,” August 1917; all in 2061 187 08 02, ATTA-NJ.
53. “Whispering Wires of War,” Pathé, released 21 April 1918; Lavine, *Circuits of Victory*, 372; and Barsam, *Nonfiction Film*, 38, 40.
54. John, *Network Nation*, 389–93.
55. For a related discussion, see Noble, *America by Design*; Hughes, *American Genesis*; and Pursell, “Engineering Organization”.
56. “Democracy,” 1921, American Telephone and Telegraph Company public relations announcement, ATTA-NJ.
57. Of the many books on the rise and fall of the stakeholder model of corporate governance, see in particular Marchand, *Creating the Corporate Soul*; and Carroll, Lipartito, Post, and Werhane, *Corporate Responsibility*.
58. Guieu, *Gagner la Paix*, 8.
59. Soutou, *La grande illusion*, 330–5.
60. “Le matériel télégraphique et téléphonique de l’armée américaine repris par l’Administration française des Postes et Télégraphes,” *Annales des PTT*, 8, no. 4 (1919): 610–3.
61. Charbon, “M. A. Denney,” 54–5.
62. Toché, “Les enseignement,” 257–8.
63. These meetings are documented in a series of reports that Griswold prepared for Bell managers: Carty, 82-03-02, ATTA-NJ.
64. Bouvier, *Connexions électriques*, 228.

65. *L'Épopée des Lignes Télégraphiques et Téléphoniques*, 26–8. While LTT provided much of the equipment for this underground line, it remained reliant on US-based Western Electric factories for loading coils and electronic repeaters. Bertho-Lavenir, *Télégraphes et téléphones*, 301.
66. Philip, *Les téléphones publics français et l'industrie américaine*, 41.
67. Association des abonnés au téléphone, *Une honte nationale*.
68. Valensi, “Le téléphone en France et à l'étranger,” 568.
69. *L'Excelsior*, 15 April 1920. “Le réseau téléphonique français est jugé, à l'heure actuelle, absolument insuffisant par l'administration elle-même, qui, se rendant compte de l'importance que la guerre a donnée au téléphone, a dressé le plan des nouveaux grands circuits interurbains dont la construction paraissait indispensable à la vie économique de la France”.
70. Fayol, *L'incapacité industrielle de l'Etat*. See also Rojas, “Henri Fayol et ‘l'industrialisation’,” 165–86.
71. *Journal officiel de la République française. Débats parlementaires. Chambre des députés: compte rendu in-extenso*, no. 125 (17 November 1921): 4055–68.
72. N. T. Guernsey, Vice President and General Counsel of American Telephone and Telegraph, to Walter S. Gifford, Vice President of Western Electric, 4 January 1922, 126-06-03-32, ATTA-NJ.
73. DuBois, “Perspective – A Glance at the Future of American Business,” 4. See also “Business Ideals Changing,” *Pacific Marine Review*, 17 (September 1919): 86.
74. DuBois, “The Foreign Business of the Western Electric Company,” August 1923, p. 14, 126-02-02-01, ATTA-NJ.
75. John J. Carty, memorandum, 82-03-01, ATTA-NJ.
76. *Comité technique préliminaire pour la téléphonie à grande distance en Europe*.
77. DuBois, “Foreign Business,” 17–8.
78. *Mission aux États-Unis de fonctionnaires de l'administration des Postes et des Télégraphes, mai à juillet 1917*.
79. Georges Valensi, “Le téléphone aux États-Unis,” 339.
80. Lavine, *Circuits of Victory*, 607–9.
81. John J. Carty to H. B. Dwight, 27 March 1922; Frank B. Jewett to John J. Carty, 4 April 1920; both in Carty, 82-03-02, ATTA-NJ.
82. Georges Valensi, “Le téléphone en France et à l'étranger,” 570.
83. Georges Valensi to John J. Carty, 1 April 1921, 82-03-02, ATTA-NJ.
84. M. K. McGrath to F. H. Wilkins, 4 March 1921, 82-03-02, ATTA-NJ.
85. E. S. Byng (IWE), “Memorandum of Conversation with Captain G. Valensi in Paris, February 16th, 1924,” 18 February 1924, 82-03-02, ATTA-NJ.
86. Frank Gill to Frank B. Jewett, 24 April 1924, 82-03-02, ATTA-NJ.
87. IWE, “European International Telephony: Study II,” January 1924, in History of the CCIF Collection, International Telecommunication Union Archives, Geneva, Switzerland.
88. Byng, “Memorandum of Conversation,” ATTA-NJ.
89. François Anthoine to Paul Laffont, PTT under-secretary, 11 June 1923, and “Note,” undated; both in Unions 1950, Archives du ministère des Affaires étrangères (La Courneuve, France).
90. Georges Valensi to Herbert E. Shreeve, 9 May 1924, 82-03-02, ATTA-NJ.
91. Frank Gill to Frank B. Jewett, 18 February 1924, 82-03-02, ATTA-NJ.
92. Philip, *Les téléphones*, 16.
93. Sobel, *ITT*, 32.

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