

Interconnectivity in the European Periphery: Portuguese Telegraphs as Global Links (1855–1939)

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RESÜMEE

Viele Nationen sahen die Telegraphenverbindungen, insbesondere die Unterseekabel, als strategische Faktoren. Portugals Regierung strebte eine „Modernisierung“ des Landes an, indem es 1854 ein Telegraphennetz aufsetzte. Begrenzte Ressourcen zwangen die portugiesischen Politiker, Techniker und Manager, die Reichweite und Effizienz des Netzes zu optimieren, indem sie Telegraph, Telefon und Radio miteinander verbanden. Portugals geographische Lage machte es zugleich zu einer Peripherie und zu einem Zentrum anderer Peripherien, besonders der Atlantischen Inseln und der afrikanischen Kolonien. Dies bescherte portugiesischen Territorien eine Schlüsselposition im globalen Telegraphennetzwerk und machte es zu einem bedeutenden Faktor von dessen Heraufkunft und Kontrolle zwischen ca. 1860 und 1930. Der vorliegende Artikel konzentriert sich auf die Beziehungen dieser Tatsache zu wechselnden geopolitischen Konstellationen und der nationalen Modernisierungsabsicht.

1. Introduction

The big powers have hitherto disproportionately dominated historical sketches of the nineteenth and twentieth century world and globalisation in that period in general, and with regard to the telegraph in particular.¹ The telegraph provides a vantage point that allows a critical examination of the role played by a small, peripheral European country

1 To name just a few C. Bright, *Submarine Telegraphs*, London 1898; D. Headrick, *The Invisible Weapon. Telecommunications and International Politics 1851–1945*, New York 1991; P. Griset, *Les Télécommunications Transatlantiques de la France*, Paris 1996; P. Hugill, *Global Communications Since 1844*, Baltimore 1999; K. Beauchamp, *History of Telegraphy*, London 2001; C. Bertho, *Télégraphes et téléphones*, Paris 1981; C. Fischer, *America Calling*, Berkeley/LA 1992; R. John, *Network Nation. Inventing American Telecommunications*, Cambridge 2010.

in this development, because the extensions global telegraph network dominated by the British placed Portugal at the core of burgeoning global communications. In reinterpreting notions of ‘centre’ and ‘periphery’ in the emerging global telegraph network, this paper spotlights its inherently asymmetrical character. By the 1830s and 1840s, railways and electric telegraphy had already started to change the traditional concepts of space and time, allowing people and information to travel and communicate at what was perceived as unthinkable speed. In the subsequent decades, the world map acquired a different shape and different actors were called on stage. Investigating the interests and functions of Portuguese authorities in this process may help spotlighting the position of a range of often overlooked actors in the birth of the modern world.

Reconstructing such histories is important, because one could think that, because of its geographical location at the edge of Europe, with vast Spain separating it from the rest of Europe, in combination with relatively little industrial development, Portugal would be such a remote place that technological novelties would either be introduced late or hardly appropriated by scientists, technicians and citizens. This paper demonstrates this was not the case.

Based on the Portuguese case, the article also discusses the degree to which the electric telegraph was institutionally and technologically linked to other communication technologies, such as telephone and postal services. The interplay between these forms in Portuguese communication history sheds a different light on globalization than mono-technological histories from the centre.

An important explanation to the swift development in Portugal was that telegraphic connections, and particularly submarine cables, were envisaged as strategic factors determining economic and military competitive advantages by many nations. In fact Portuguese authorities embarked in the endeavour of ‘modernizing’ the country by building a grid of telegraph lines in 1854. Later on, the telephone was also quickly introduced in the country, but the ‘new’ communication technology did not really expel the ‘old’ one. To the contrary a synergetic symbiosis came out of the process of systematically interconnecting telegraph, telephone and radio infrastructures, which were managed as a unified system, in a true “ecology” of communication networks. Scarce technological and economic resources pushed Portuguese politicians, technicians and managers to maximize the scope, efficiency and efficacy of communication networks through interconnection.

It was exactly because of its position that Portugal was simultaneously a periphery and a center to other peripheries, namely the Atlantic archipelagos and African colonies. This, together with the push for interconnection of communication technologies turned the Portuguese territories into hosts for key nodes (relay stations) in the global telegraph networks of, first Great Britain, and later of Germany, the United States, France and Italy. The country became an important player in attempts to create and control global telegraph networks roughly between the 1860s and 1930s. The main goal of this paper is to examine how such attempts intertwined with changing geopolitical relations, as well as with the national modernizing agenda, which included the effective occupation of its African colonies. This will highlight the ‘local’ dimensions of the global system and the

‘paradoxical effect’ of communication technologies, which will serve as an illustration of the asymmetries of technological globalization that prevailed in many ways.

2. Becoming ‘modern’ by building an electric network: Portugal and the Telegraph

The government that took power in Portugal after the military coup of 1851 signified the beginning of the ‘Regeneration’² period, the main aim of which was to promote material progress by technical innovation – the essential meaning of ‘modern’ at those times. The Ministry of Public Works envisaged satisfying the material needs of Portuguese society by endowing the country with infrastructures like improved roads and navigation facilities, railways and the electric telegraph. In order to accomplish this daunting task, a member of the Superior Council of Public Works travelled to England and France in 1854 to learn about the most modern railways and telegraphic network systems. Soon thereafter, he signed a contract with the Bréguet Company, supplier of the French telegraphic network, to build the most urgent lines “and of greatest range for Portugal”. One of the lines should “communicate with Europe, another should link the North of the kingdom to the Capital” and “the third should instantaneously connect the centres of high political powers.”³ Construction of the latter started in August 1855, and in the following month 32 kilometres of lines, linking four stations located in the main centres of political decision and equipped with Bréguet devices, were inaugurated.

The old optical Telegraphic Corps provided the operators’ devices and a Navy officer took charge of the new Electric Telegraphs as their first Director. From 1856 onwards Portuguese technicians built new lines themselves without any help of foreign experts.⁴ In the following year two new lines were built, one heading north and ending in Oporto, the other heading east which after reaching Elvas went on crossing the Spanish border and ending in Badajoz, where the Portuguese network was connected to the international one. Despite being built for official use only, the electric telegraph was also opened for civil use in 1857 as a result of the growing public demand.⁵ That, along with the internationalization of telegraphic service, caused a true expansion of the network, which in 1858 spread inland and, in the following year, a second connection with Spain was established in the North of Portugal. By 1860 the network of 1682 kilometres covered a

2 The Regeneração (the Regeneration period) is a period of Portuguese history in which the implementation of an industrial strategy was considered the way for Portugal to attain European economic standards. Although in its strict meaning the Regeneração goes from 1850 to 1877, its spirit lasts during all nineteenth century and also during the twentieth.

3 Contract between the Portuguese Government and Bréguet Company, April 1854.

4 G. de Barros, *Memória Histórica Acerca Da Telegrafia Eléctrica Em Portugal*, Lisboa, 1943, p. 15–17.

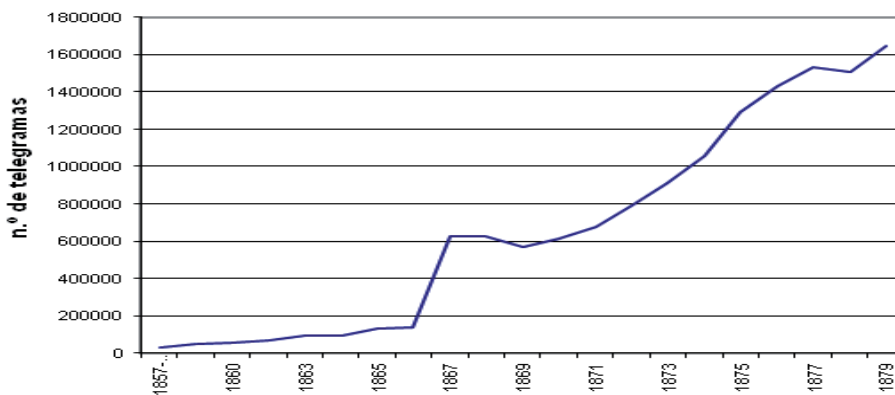
5 Even if the use of the telegraph would mostly relate to business, press and government, some individuals made significant use of it, like Ana Plácido who wrote a telegram with about thousand words addressed to her lover, Camilo Castelo Branco, a Portuguese writer, when he was in jail in Oporto.

great part of the continental national territory, significantly more than the 632 kilometres that had been contracted in 1854.

In the following decade, traffic grew constantly despite the progressive deterioration of the material infrastructure and repeated postponement of repairs. Finally in 1864, the new Director succeeded in having 1979 kilometres repaired with support of the Public Works minister's. A number of stations were equipped with Morse devices modified by Maximiliano Hermann, a Portuguese technician. Simultaneously the telegraph service was reformed and the network became the responsibility of a department of the Ministry of Public Works. It started recruiting civilians, a start of the demilitarization of the Telegraphic Corps. The new candidates had to have formal education, namely the course of telegraphy provided by the Industrial Institutes of Lisbon and Oporto. To do justice to an old demand, the telegraphers' wages were raised and the conditions for retirement and progression in career were established as by demonstration of ability and efficient performance. Because subsequent Directors of the Telegraphs followed those same management principles, telegraph traffic continued to grow.

The approval of the law establishing the conditions for granting concessions to land submarine cables in Portuguese territories in August 1869 greatly impacted network development. The connection to international submarine cable networks would allow Portugal to extend the national telegraphic network to insular territories (Madeira and Azores archipelagos in the Atlantic Ocean) and colonial spaces (in Africa, and Asia). Such extensions did indeed boost the already growing telegraphic traffic, as graph 1 shows.

Graph 1. Evolution of telegraphic traffic in Portugal 1857–1879⁶



6 A. P. Silva, *A Introdução das Telecomunicações Eléctricas em Portugal 1855–1939*, PhD thesis, Lisboa 2007. All statistical data herein presented were collected from official reports of the Portuguese Administration of Telegraphs and Post.

In spite of the evolution of telegraphic communications, a new reform put an end to the autonomy of the telegraphs in 1880 by subordinating them to the Postal Administration. The idea was to enhance both communication systems regarding facilities and work force. Post stations thus became new telegraphic stations, post clerks became telegraphers and vice-versa, and postmen delivered letters as well as telegrams. This reform considerably enlarged the scope of both networks.

A quarter century after its introduction on Portuguese soil, the electric telegraph had become an instrument of the liberal State,⁷ by working in favour of the political and administrative centralization. In 1855 a letter took 3 days to cross 200 kilometres. Four years later, Lisbon communicated by wire with all district capitals. The first telegraphic stations were put in place in local governmental facilities, which clear political and administrative goals, like tax collection, in mind. The electric telegraph also contributed to the creation of a national economic market. The increasing growth of telegraph traffic is a clear indicator that such a market was indeed taking shape.⁸ However, the circulation of information in Portugal did not follow the same tracks that goods did in other countries over the railways. One of the particularities of Portuguese telegraphs is precisely that they were not integrated in the railway system, instead they were developed along the new roads.⁹

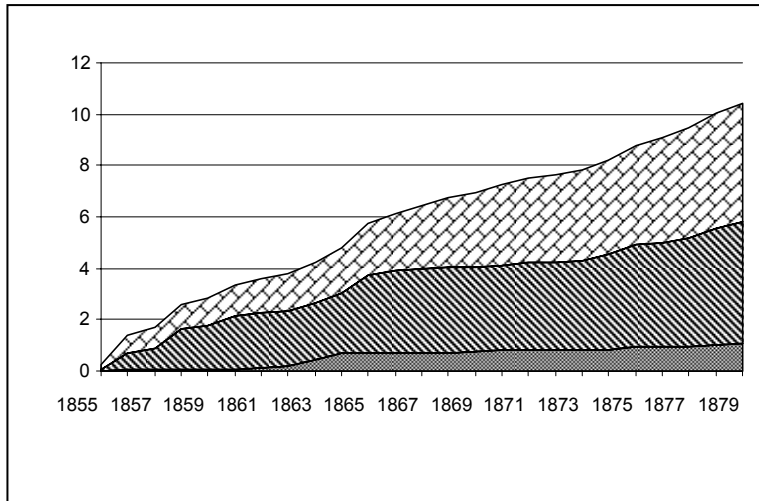
The merger of Telegraphs and Post impacted in the development of the network and its use. Between 1880 and 1893, the new telegraphic stations, named telegraphic-postal, were opened at an average rate of 15.35 stations per year, more than doubling the previous registered average. The continued growth occurred despite that the technology had entered a mature phase. The merger between postal and telegraphic services clearly increased the network's scope, by reaching the major number of people as possible. New stations opened in every district of the mainland, and on the Madeira Island, where the network started in 1874 at the time the Brazil cable landed there. The Azores network started in Ponta Delgada, Saint Miguel Island. Despite the widespread geographical dis-

7 Liberalism succeeded the end of the absolutist regime, proclaimed in Oporto on 24 August 1820 by its garrison. The wish to restructure the nation in a new socio-economic policy framework motivated the rebellion. The situation of national agriculture was, according to liberals, calamitous, synthesized by a large cereal deficit, only wine was a profitable product, and widely exported to Europe and Brazil; the charters were considered a source of problems and the suppression of religious orders a need. The trade was struggling with the lack of use of the waterways, and arrested by municipal taxes, which affect the free circulation of people and goods. The solution of this crisis was no more passing through Brazil, independent since 1820, the new hope for renewal rested on African trade and implementing a development program for internal transport and railways. Factories were other problems to solve. The Constitution of 1822 contained the most important liberal principles: the right to private property, which was based on individual liberties of the citizen. The Portuguese liberal experience resulted in the transfer of property formerly belonging to religious orders, to a new bourgeoisie linked to financial activities. In the nineteenth century, within the intellectual bourgeoisie, there was a romantic mentality of liberal values. This mentality is evident in the Cortes and the literary works of outstanding figures of the national romantic landscape, exerting a strong influence on nineteenth-century Portuguese culture.

8 D. Justino, *A formação do espaço económico nacional: Portugal 1810–1913*, Lisboa 1988–1989.

9 A. Kaijser, A research approach for understanding the development of infrastructural systems, in: *Flux – International Scientific Quarterly on Networks and Territories*, 11 (1993), pp. 53–54.

tribution of new stations in the country, the localization of those opened in Lisbon shows that the previous topology of power and communication was still relevant, as stations were concentrated in areas with high political-administrative and economic relevance.



Graph 2. Evolution of railways, telegraphic lines and roads per 1000 km, 1855–1879 (from bottom to top)

3. The telegraph and the telephone

In the meantime, the first telephonic experiments were performed in Portugal in 1877, only a year after the registration of Bell's patent. Five years later, the first telephone networks were built in Lisbon and Oporto (1882) by a British company. Although those two urban networks initially were not connected to the telegraph, they would soon be. This interconnection process begun with the connection of telegraph and post, continued with the overlapping of telephone and telegraph networks, first by introducing telephonic devices in telegraph stations (1883). These devices allowed transmitting, alongside Morse signals, spoken telegrams, which improved the telegraphic services. Later on the interurban telephone networks were developed using the telegraph lines, which were kept until 1939. Portuguese authorities took advantage of the renewal of old telegraphic circuits to develop the telephonic network throughout the territory. By upgrading the telegraphic lines with high frequency wires, the quality of the electric signal improved to the extent that it became possible to transport human voice as coded signals. The degree of overlap between the two technologies shows not only their material and technical proximities but how their complementarity contributed to the improvement of the ser-

vice. From then on messages could be converted from written into voice and vice-versa, increasing thereby the flux and fluidity of communications that was achieved also by transfusing messages from one network into another – telegraphic, telephonic and postal – which were all interconnected. The interconnection of the networks resulted in a significant improvement of the circulation of messages, making them reach the furthest, the fastest, and the greatest number of people.

Telephonic devices were introduced in the telegraphic network in the majority of the districts, although in a very variable numbers, among which springs out Ponta Delgada. The newest telegraphic network could be built with wires of higher-frequency and raising the efficiency of the telephones in transmitting the human voice.

This new development was reflected in an increasing volume of traffic, in particular from 1885 onwards, until 1891, when a significant decline started. The period of increased traffic coincided with a period of economic prosperity between 1886 and 1889. However, despite the economic, financial, social and political difficulties that followed, the telegraphic network kept developing throughout the following period.

Between 1890 and 1900, an average of 11.83 stations were opened each year, which constituted a decline in comparison with the previous period but, nevertheless, still meant a rate higher than any other registered before 1880. During this period, new stations were again distributed over the territory. This time in the Azores stations were opened on two other islands, Terceira and Faial, in the later becoming the connection point for the Lisbon-Azores cable in 1893.

Equipping the new stations with telephonic devices implied replacing old wires by new ones of higher-frequency along the already existing principal circulation routes of the country. This highlights that the network's topology was kept and reinforced.

About 50 years after the start of telegraphic network, the use of the telegraph in Portugal was very significant in comparison with Spain. In 1900, the number of telegrams per inhabitant in Portugal was double that of Spain, 0.4 and 0.2 respectively.¹⁰ In reality, however, the difference was even higher, because the international statistics in which this comparison is based only accounted half of the number of telegrams registered in the corresponding Portuguese statistics.¹¹ The reason is that the international statistics did not account for the significant international traffic passing through the cables fastened in Portugal. In the year 1900, that traffic corresponded to 61.8% of the total amount of the international traffic registered in the Portuguese statistics.

In the last ten years of the monarchy (1900–1910), and in spite of the many troubles for Portuguese society, the telegraphic network kept growing. Even if the average number of new stations opened per year had dropped, the pattern of growth was the same as before. The use of the telegraph kept growing as well, and the volume of national and international traffic became almost equivalent. The significant rise in international traffic was mainly due to the telegrams circulating in the cables, only 16% of the whole traffic

10 B. R. Mitchell, *European Historic Statistics 1750–1975*, New York 1980 (3.^a edição).

11 *Estatística Geral dos Telégrafos*, Lisboa 1900.

circulated in land lines. These data from the Portuguese case support three corresponding observations: one, the increasing globalization of the world economy as measured by an increased rate of international communication; two, the relevance of Portugal in channeling the international flows of information; and three, the economic relevance for the country of the income from the service thereby provided to the international community. The evolution of telegraphic income shows that the transit traffic income progressively constituted an ever greater part of the total amount.

From 1900 to 1910, ten governments and twelve ministers of Public Works followed one after another, but only one Director of Telegraphs and Post was in charge. Besides political and social instability, important decisions were made pertaining to the organization of telegraph and post services; the decree that gave the state a monopoly on wireless systems was published in 1901, and was followed by regulations for the operation of electrical industries; the regulation of telegraph and postal employees professional education; the regulations for the establishment and maintenance of telephone and telegraph lines and stations of the State; the regulation of concession licenses to private for the establishment and operation of telegraph and telephone lines and stations; the regulation of telegraph communication services. Under his chairmanship the International Congress of Posts and Telegraphs was held in Lisbon in 1908. It should also be mentioned that state owned urban telephone networks began developing in 1905, some of which grew in number of subscribers, calls volume and revenue, while others remained unchanged and revealing fluctuations in calls volume and revenue.

4. Portugal and the Atlantic Telegraph Networks – the local of the global

In the meantime, submarine cables became part of a truly global grid in 1902, when the Pacific line was completed. The more and obvious need for reliable communications networks with the parts of the world where a political power had vital interests led to a boom in cable release, which was, as before, led by the British committed to “turn their cable network into an invulnerable global communications system.”¹² The idea of ‘all-red’ cables, were therefore conceived, meaning that all cables in the British global network would stay within the territory of the British Empire. But it ended up not being so red at all.

A key problem was that a technical aspect of the cable system – the ‘attenuation effect of electrical current’ – impacted the transmission of messages along telegraph circuits negatively, mainly at long distances and underwater, a physical environment that really increased that effect. The reinforcement of the electrical impulse transporting the message was necessary, which was why the cables had to land every once in a while, and relay stations built, not only on British territories, which would make them ‘all-red’, but also and mainly in the Atlantic Portuguese territories.

12 Headrick (note 1), p. 93.

A few months before starting the Second Boer War, the British authorities asked the Portuguese authorities for new landing grants in Madeira and Cape Verde for a cable heading to South Africa and Australia. This ‘replaced the hypothesis of a cable exclusively landing in British territories’.¹³ The request presumed an existing relationship of interdependence started in 1869, when the India cable landed in Lisbon, and strengthened thereafter.¹⁴

A material infrastructure extending around the globe touches many different territories along he way. The global needs to be localized, a problematic aspect which often remains absent in the literature, which mainly tells the story from the perspectives of the centres. The local aspects of the global should thus be approached from a peripheral perspective as well. As Castells argues the communications networks create the ‘spaces of flows’¹⁵, which also produces, as Smith noted, “the reinvention of place at a different scale – a capital-centred jumping of scale (...) the reinvention of discrete places where power over and through the space of flows is rooted”.¹⁶ The process in its entirety resulted in the ‘paradoxical centrifugal/centripetal and decentralization/centralization effect’ that Kellerman points to.¹⁷ In sum, flows do not exist in a vacuum, but makes use of local resources, and the local places are redefined through the inclusion in the global net.

By the 1850s, when the British telegraph cable network began to grow, Portugal took advantage of its geographical and geopolitical situation for landing the cables and establishing relay stations¹⁸, both in its European territories (mainland; Madeira and Azores archipelagos) and in the African colonies (Cape Verde Islands, S. Tomé and Príncipe, Guinea, Angola, Mozambique). The nodes of the international submarine cable network, placed on Portuguese territories channeled the telegraphic traffic between several points in Europe (the intra-European regime) and between Europe and other continents (the extra-European regime). The central axis of this network was the so-called “Atlantic strategic triangle”, including Lisbon, Cape Verde and Azores.

The construction of the Atlantic triangle was, from the beginning, not only a technical enterprise but, above all, the subject of intense political, economic and financial negotiations: on the one hand Britain wanted to use the Portuguese territories as the central part of its “telegraph empire”, calling upon the old alliance between the two countries¹⁹ and

13 Denison-Pender’s letter, July 25th 1899.

14 See also A. P. Silva/M. P. Diogo, Host and Hostage: Portugal, Britain and the Atlantic Networks, in: E. van der Vleuten/A. Kaijser (eds), *Networking Europe. Infrastructure and the Shaping of Europe*, Canton, MA, 2006, pp. 51–69; A. P. Silva, *Shaping 20th Century Portuguese Empire – The Telegraph and the Radio*, in: *ICON*, 7 (2001), pp. 106–122.

15 M. Castells, *The Rise of the Network Society*, Oxford 1996, p. 453.

16 N. Smith, “Spaces of Vulnerability: The Space Flows and the Politics of Scale,” *Critique of Anthropology*, 16 (1996), 63–77, p. 72

17 A. Kellerman, *Telecommunications and Geography*, London 1993, pp. 15–17.

18 Telegraphic messages were transmitted between two points by an electrical impulse that decreased along the cable. The attenuation effect of electric current compelled to the reinforcement of the electric impulse under water. The message had therefore to be retransmitted along the way towards its destination and the cables had to land for relay purposes. See K. Beauchamp, *History of Telegraphy*, London 2001, p. 160–161.

19 George Canning stated that “Portugal was, still is and will always be the best support for Great Britain in conti-

the British strong financial power. On the other, Portugal needed to raise funds and attract foreign investors in order to implement its policy of material improvements. By the 1900s, in order to build a supposedly “invulnerable all-red cable”, the British government relied on the depth of the ocean, and once again on Portugal to guarantee its security, since the new cable Great Britain-Cape Town-Australia still landed in Portuguese territory. The proposal presented by the *Eastern Company* in July 1899 stated three important points: 1) the option of landing in Madeira and Cape Verde replaced the possibility of the cable “to touch exclusively at British possessions”; 2) the “present transit taxes for telegrams exchanged with South Africa” should be counted as revenue for Portugal; 3) an increase of the traffic through the “proposed new route” was expected, but in any case a minimum income estimated upon the traffic registered in that year was ensured. In order to reinforce the proposal it was also stressed that the new route would “be declared standard route for South Africa” and Australia.²⁰ In spite of the urgency requested by *Eastern*, the negotiations lasted more than a year. On 22 September 1900, the contract was finally signed; the cable was completed in February 1901.

The British government tried to tone down the fact that the new “all-red” cable was not truly “all-red”, as it still landed in a foreign territory. And it is therefore quite surprising that in December 1911 the Standing Subcommittee of Imperial Defense stated that the “dependence of the United Kingdom on cable stations situated upon foreign territory for the transmission of telegrams has been generally eliminated.”²¹ The British concept of “generally” was ambiguous, as the relay stations of Lisbon, Cape Verde and Azores not only were never “eliminated”, but also were in fact reinforced, as it is clear during and after World War I. Furthermore, as Charles Bright noted Britain did not effectively control a single cable in the Atlantic, as from a strategic point of view what counted was the location and not the ownership or management of cables.²²

5. World War I and the Atlantic cables

On 4 August 1914, the British government ordered the disruption of the two German cables that linked Germany (Emden) to the United States (New York) via Azores. A month later, the Portuguese authorities sealed the German station, thus interrupting the traffic between Azores and America.

Two years later, the British minister in Lisbon sent the Portuguese government a “very confidential” letter informing that his government had decided, after consulting with

mental Europe” in Report written by the Portuguese ambassador in London, 16 August 1860, in 2.º PISO, A2, M2, AHMNE, Lisbon.

20 Denison-Pender in a letter addressed to Madeira Pinto, General Director of the Post and Telegraphs of Portugal, dated from July 25, 1899. 3.7.1. Pr. 9.42/M2 Cabos Submarinos (1893–1910). Contratos de Concessão. AHFPC, Lisbon.

21 Headrick (note 1), p. 99.

22 *Ibid.*, p. 102.

France, that the German cables should be fully operational again. Both cables would link Europe to Canada via the Azores: one cable going from the British coast (Porthcurno, Cornwall) to the Canadian coast of Nova Scotia (Halifax); a second cable linking the French coast (Brest) to the Canadian coast of Newfoundland (S. Pierre). Portugal would, therefore, recover an important source of income, as the British and French authorities obviously had to pay the previously agreed transit taxes. On the next day, a new letter from the British ambassador added a second request, asking the Portuguese government to allow the *Eastern Telegraph* to use the telegraphic apparatuses and the cables in stock at the relay station of Faial (Azores). Roughly six months later, as a sign of collaboration among allies, the Portuguese government authorized the use of the cables and of the material requested by “His Majesty’s Government that was anxious that the Eastern Telegraph Company at Faial should be authorized to unseal the cable (...) and to use it for communication with the United Kingdom.”²³ On 18 July 1917, the cable linking Great Britain to Canada was already operational. Meanwhile, unlike the British government, the French authorities unilaterally diverted the second German cable to Brest and from there to Canada, using the cable without paying the due telegraph taxes to Portugal, which exceeded the amount of thousands of hundreds of francs per year.²⁴

During and after World War I the use of the German cables was a very complex affair. Great Britain and France were not alone in their interest for the Azorean cables; the United States of America soon claimed their rights to use on equal terms the Atlantic strategic triangle, and in particular the Azores relay station. For the American entrepreneurs and businessmen the Azorean link was pivotal to their expansionist agenda, since it enabled them to reach the central European markets, without being under their rivals’ surveillance. The importance of the Azorean cable became even more obvious when political conflicts in Ireland interrupted the communications between the Irish coast and the United States, preventing the Americans to reach Europe.

The landing of telegraph cables in Azores was also important for technical reasons. The old American transatlantic cables, which had been built without relay points were so slow that they became almost useless. The construction of submarine cables had proved that the cable length should not exceed 2000 miles, in order to assure the volume and the speed required by the transatlantic business traffic. The Azores were indispensable for the American telegraph network.

Therefore, the government of the United States decided to put an end to the British hegemony and actively engaged in a political and diplomatic battle to support the quest of American telegraph companies for European concessions. In 1919, when the American companies *Commercial Cable* and *Western Union Company* asked Portugal permission for using the Azores relay station for their new cables, the *New York Times* was particularly sarcastic when commenting on the delay of the Portuguese authorities to reply. They

23 3.º PISO, A1, M28, AHMNE, Lisbon.

24 According to the estimation of Portuguese Administration of Post and Telegraphs, in 3.º PISO, A10, M101, AHMNE, Lisbon.

added that it was quite a mystery why their “fellow republicans”²⁵ took so long to give the official approval, and drew attention to the links that should unite the republican brotherhood against the British monarchy.

The Portuguese answer took almost two and a half years. For the Americans it was a clear sign of the British dominant position in relation to Portugal, and of the “opposition of British companies that fear American competition (...), but American prestige makes itself felt.”²⁶ In fact, the United States were very busy using their embassy in Lisbon and addressing the Portuguese ambassador in Washington in order to lobby for a positive reply, which finally arrived in April 1922.

The contracts established with the American companies strongly displeased the British government. On behalf of *Europe & Azores*, the British diplomat requested only based on the “close and friendly relationship” with Portugal, “that in order to protect its South American traffic, the working of the proposed cables of the American Companies should be limited to their North American traffic.”²⁷ This restriction was obviously against the interests of the American companies and it broke the traditional rules of telegraph concessions, by disclosing, once again, the political character of this dispute. The long-lasting service provided by Portugal to the British telegraph empire and together with the network of economic, financial and political bonds between the two nations allowed the British government to interfere in Portuguese internal affairs and decisions.

In its first note to the Portuguese dictatorship government established by a military coup in 1926,²⁸ the United States expressed their resentment at the way American companies had been treated by Portugal between 1919 and 1924, implying that, as far as the world telegraph network was concerned, the republicans were hostage to British influence. According to this note American companies were forced to agree on the British terms due to the

*inaction of the Portuguese Government (...) in view of this situation that I asked (...) whether Your Excellency thought it likely that an untrammelled landing license in the Azores would be granted an American company if it should apply for one.*²⁹

The American concerns regarding Portuguese sovereignty were, in fact, a pretext to assert its own national interests in the new global world. The British hegemony, largely unchallenged during almost two centuries, was now facing forceful opponents, not only the traditional ones, such as France and Germany, but also the newcomer United States of America, who argued that: “Great Britain (...) must yield to the rational demands of the United States and other nations”³⁰. It was clear that those who controlled the informa-

25 “American Cables”, *New York Times*, August 17, 1922.

26 *Ibid.*

27 Note dated from June 1922, from Lancelot Carnegie, in 3.º PISO, A10, M101, AHMNE, Lisbon.

28 The military coup opens a period, which will lead to the *Estado Novo*, a dictatorship that lasted until 1974.

29 12 April 1927, 3.º PISO, A10, M101, AHMNE, Lisbon.

30 “Warns of British Control of Cables. Walters S. Rogers Urges That the Azores Be Made Free Landing Stations”, *New York Times*, August 16, 1922.

tion controlled the world. In this context the Atlantic strategic triangle, one of the crucial parts in the transnational network of telegraph, had to be considered a “free zone”, available to all countries willing to negotiate with the Portuguese government.

Besides the British, the German (*Deutsch Atlantische Telegraphengesellschaft* succeeded to get a new concession from the Portuguese Government), the French (through Commercial Cable) and the Americans, a fifth country was willing to enter the telegraphic competition: Italy. In August 1923, during the difficult process of negotiation between Portugal and the American telegraph companies (under the surveillance of Great Britain), the Italian government informed the Portuguese counterpart that the difficulties raised by Portugal to the *Western Union* project of landing a cable in Azores were intolerable. The Italians already knew that the British government opposed the American project, claiming that its interests would be damaged. Moreover, the Italians also wanted to build up their own cables lines, namely between Italy and South America. In April 1921, the Italian company *Italcable* asked permission for landing cables in Cape Verde; as usual the negotiations were not easy and in November 1923, the representative of *Italcable* came to Lisbon to try to settle an agreement. In the meantime, *Italcable* bought the rights of the cable Azores-Malaga-Italy from the *Western Union Company*. In July 1925, the Italian company tried to build the connection between Azores and Cape Verde that had already been granted in the previous year³¹. This cable would encircle with Italian cables the Atlantic strategic triangle (Lisbon-Azores-Cape Verde), until then exclusively British. However, instead of the cable Lisbon-Azores, Portugal gave its permission to a cable Italy-Azores in order to prevent the Atlantic triangle from being closed with Italian cables, and in this way promote the channeling of new traffic to Azores, thereby maximizing the income of the Portuguese Treasury.

Later on *Italcable* made a new proposal to build up a cable between Lisbon and northern Europe. This time, the British government reacted violently, complaining that it had not been informed nor heard on this matter. Following Chamberlain’s direct instructions, a note from the British embassy in Lisbon stated that “His Majesty’s Government feel bound to place on record their regret that this omission should have occurred and they confidently expect that the Portuguese Government will adhere in future strictly to their undertaking that no concessions or other facilities in Portuguese Atlantic ports will be granted to a foreign power without previous consultation with them.”³² The terms used in this diplomatic note are quite harsh, showing that the British government would not tolerate any Portuguese attempts to define its own independent strategy.

6. The paradoxical effect of telecommunication technologies

31 Diário do Governo, 10 April 1924.

32 Note dated from 1 September 1927, from Grant Watson, 3.º PISO, A10, M132, Pr. Nº 296/21, AHMNE, Lisbon.

The fact that all the participants of a transnational technological network, such as the telegraph, may profit from its presence in the network does not mean that all of them have the same negotiating status. Economic and political hierarchies extended their influence upon the technological world: a peripheral country such as Portugal could not stand against Britain's interests. But the dominance of the British cable network depended on foreign territories and Portugal was almost the ideal ally. The Portuguese mainland offered good conditions for landing the telegraph cables and Portugal had two archipelagos (Azores and Madeira) in the Atlantic Ocean, between Europe and America, with an excellent location for landing intermediate cables. Portugal also had a large African colonial empire, including islands and territories in the western and eastern coasts of Africa, also available for telegraph cables. In addition to all these resources, Portugal was also a trustful country, politically quite stable. On the other hand, Portugal needed foreign investments to develop a policy of material improvements, nor could Portugal negotiate on equal terms with Great Britain.

In addition, Portugal profited from the alliance with Great Britain, by using the technical resources provided by the British telegraph network of cables to manage and control its empire. In fact, Portugal took advantage of its host role at different levels. Firstly at the economic and financial level, because the Portuguese government engaged in a policy of material improvements and did not have to ask for more loans to build its own telegraph network. On the contrary, it received a considerable income for owning telegraph infrastructures which had been built free of charges. Secondly, at the political level, because the telegraph network allowed Portugal to establish links to all its colonies, and therefore to assert its role as a colonial nation, not only in the African arena, but also in the European scene, it was an experienced partner. Portugal also benefited from the relationship on the technical level, because there was a transfer of technology not only concerning the apparatuses, but also in terms of expertise both at an intermediate level and a higher level (engineers).

7. The “ecology” of telecommunication networks

In 1939, several agents provided telecommunication services within the country and between Portugal and the rest of the world: CTT (Post, Telegraphs and Telephones), the private company *Anglo Portuguese Telephone Co. (APT)*, the foreign cable companies and the CPRM (Portuguese Marconi Wireless Company), all of them were interconnected and exchange messages between them in the interest of the user.

CTT's Administration managed the State networks and supervised the *APT* that paid to the Portuguese government a percentage upon their income from the telephone networks of Oporto and Lisbon as rights of concession. The CPRM exploited the Portuguese wireless telecommunications, managing them along with the cables. The interconnection of those networks and their integrated management revealed a true ‘ecosystem’ as the result

of a process initiated in 1880, by the Post and Telegraphs merger. Merging was repeated as long as new telecommunication technologies were being introduced in Portugal.

Contrary to the well known development model for large technical systems proposed by Hughes³³, the technical systems regarding telecommunication networks did not replace each other, but became linked, complemented and differentiated. Effective communication at a distance was also reinforced by the integrated management of networks. The Portuguese case does not show any signs of systems replacing each other in a successive manner, nor is there any evidence that a technical system by absorbing part of the 'environment' sets the rules for the economic, social, legal and political systems.

There is rather a symbiosis between the available technological resources, the needs of individuals and an effective model of management, a conclusion which also contradicts the general thesis by Downey, who claims that technology infrastructure is embedded within society as a super-structure.³⁴ The ecological metaphor captures this interdependence nicely. The symbiotic relationship between the various systems (or 'ecosystem'), is reflected in a variety of ways. It is revealed when users in many cases contributed to the expansion of the network through their willingness to pay installation costs (as observed by de Wit and by Madureira).³⁵ It also shows up under varied political conditions: the reinforcement of the power of the state through technology during the liberalism that sponsored the expansion of the telegraph network, and the tacit acceptance of the military dictatorship and Estado Novo, which sponsored the nationwide telephone network. To some degree, these aspects in the relationship between technology and society are also captured by 'actor-network' theory.³⁶

8. Telegraph resilience and telephone development

In spite of the Renewal Plan (1937), the telegraph network continued growing and between 1926 and 1939, new stations were opened at an average of 5.76 per year, the lowest ratio ever recorded. But the telegraph network had reached its maturity long ago, and 84 years had elapsed since the beginning of its construction. The fact that it continued growing shows that it was not really an outdate technology, but still provided a useful and irreplaceable service to society. The trend of equipping most of the telegraph stations with telephones remained, as more than half of them were equipped with such devices. The growth of the telegraph network was similar in the Military Dictatorship (1926–1932) and the Estado Novo (1933–1974). The stability of the governing period

33 T. P. Hughes, *Networks of Power. Electrification in Western Society, 1880–1930*, Baltimore 1983.

34 G. Downey, *Virtual Webs, Physical Technologies, and Hidden Workers. The Spaces of Labor in Information Inter-networks*, in: *Technology and Culture*, 42 (2001), 209–235.

35 O. Wit, *Telefonie in Nederlands 1877–1940. Opkomst en ontwikkeling van een grootschalig technisch systeem*, Rotterdam 1998; N. L. Madureira, *Enterprises, Incentives and Networks: The Formative Years of the Electrical Network in Portugal, 1920–1947*, in: *Business History*, Vol. 49 (2007), 5, 595–615.

36 B. Latour, *On recalling ANT*, in: J. Law / J. Hassard (eds) *Actor Network Theory and After*, Oxford/Malden, pp. 15–25; J. Law, *After ANT: complexity, naming and topology*, *ibid.*, pp. 1–14.

of Estado Novo doesn't seem to have encouraged the opening of more stations than the dictatorship.

The development of the telegraph continued even while running the Renewal Plan, which included the elimination of stations with low traffic, improving the flow of traffic by transmitting telegrams via telephone lines, and the replacement of Hughes and Baudot equipment by teleprinters. But, in 1939 there were 751 telegraph stations, the result of an almost constant growth. In addition to the telegraph stations of the state, there were still 3562 shortened telegraph addresses. Although nearly half of the existing telegraph instruments were telephones, the total number of telegraph instruments also increased, and the vast majority were Morse apparatus, as well as some Hughes and Baudot transmitters. Contrary to envisaged in the Renewal Plan, these telegraphic instruments of an earlier generation were not being replaced by teleprinters but increasing in number. In a technological sense teleprinters were still telegraph instruments, graphic messages transmitters at distance, in real time through an electrical circuit. If in 1883 the introduction of telephones in telegraph circuits started, in the late 1930s the reverse was happening, telegraph instruments were being introduced in telephone circuits. Apparently the heyday of telegraphic technology was far from over. In fact the need for sending and receiving text messages remained. Having different technological resources, to communicate instantaneously at distance, allowed individuals using them in a discriminatory way.

The development of the telephone network of the state, between 1926 and 1939, evolved homogeneously over the territory. The actual use of the network was much more lopsided, with discrepancies showing that network coverage in itself didn't correspond to greater number of calls per inhabitant in certain areas. So reasons other than access to the network were reasons behind the number of calls, like economic activities. The relative homogeneity of the network's coverage indicates that the state intended to cover the greatest territory possible, continental and insular, reaching the largest possible number of inhabitants. Thus, in 1939, the state and APT networks together represented an average of one public telephone post by 37.3 square kilometres and 3077 inhabitants, and a subscriber post for 1.3 square kilometres and 109 inhabitants.

The period of the greatest network growth was not matched by a further increase in the number of calls. Rather, the peak usage happened precisely when the network growth petered out, confirming that use takes time to grow.

It was during the military dictatorship that the most significant developmental impulse was given to the telephone network. In 1928, Salazar was already a member of the government. Despite the politics of budget constraint imposed by Salazar to all ministries, since he took over the Finance ministry, from that period onwards, the development of telecommunications could always counted on big money. Both the military dictatorship and the Estado Novo saw them as a priority. In 1937, the Renewal Plan of Telegraph and Telephone Networks reconfirmed this priority, when establishing the amount to be spent on further improvements.

A comparison between the telephone and telegraph traffic of the multiple networks of the State shows that, after 1930, there was a decline in telegraphic traffic and a very sharp increase in the number of telephone calls. Does this mean that the telegraph was being replaced by phone? After a decline, in the 1920s, the telegraph traffic rose again, and in 1935, showed an upward trend. Obviously, more telephones installed meant more calls and more phoned telegrams, but the transmission of written messages via the telegraph system was maintained.

An analysis of calls volume shows that most calls were made to urban areas, 91.8%, while 8.1% corresponded to long-distance calls, and only 0.1% to international calls. This distribution of calls points to the use of the telephone as a medium of communication especially in urban areas. This distribution of telephone traffic in the networks of the APT was identical: 90% of urban calls and 10% of long distance calls, confirming that the telephone calls are made primarily for a short distance. Moreover, when comparing the volume of international calls to international telegrams, there is a proportion similar to calls between urban and inter-urban areas, i.e. the number of international calls is only 6% whereas the number of international telegrams is high as 94%. This indicates that the phone was not yet used for communications over long distances, which was the case for the telegraph. Although Portugal had begun international telephone communications in 1928, that had no negative impact on the telegraphic traffic. Thus, all data analyzed indicate the differentiated use of both technologies, at least with regard to the distance factor: the phone was used for communications over short distances and the telegraph for long-distance. Note that the telegraph traffic surely was much greater, since the data does not account for the traffic transmitted by CPRM that took long-distance telegraphic traffic in 1926.

Although the phone helped to optimize the circulation of telegrams, it did not eradicate this form of communication, since there still was circulating telegrams. Neither did the phone replace the telegraph, because the possibility of exchanging messages in the form of voice did not cancel out the need for further exchange in text messages. This was the case also with the introduction of teleprinters, soon in 1940s. Many organizations, particularly newspapers and news agencies, could never survive without the written communications in real time, despite the extended use of the phone. The phone allowed a fundamentally different way of communicating: conversation between individuals from their homes, resulting from the geographical and social proximity of urban population. The nature of the telegraph, as a medium to communicate over long distances, persisted over a long time, as is confirmed by data on telephone and telegraph communications in the international context. The volume of international telegraph traffic was only exceeded by the volume of calls in the late 1960's.³⁷

In 1940, the relative position of Portugal regarding the number of calls per capita was higher than Spain and Italy, only slightly away from France, which had the highest num-

37 Kellerman, p. 17.

ber. Thus, the development of electrical communication networks in Portugal, despite the shortcomings outlined to the Portuguese networks, whose resolution was provided by the Renewal Plan 1937, allowed their users to perform a very significant volume of communications, namely by telephone.

There was a close interconnection between the entire existent infrastructure, especially between the telegraph and telephone. This clearly demonstrates the perspective advocated in this paper, the synergistic complementary of telecommunication networks, which passes through the interconnection of infrastructure – land lines (aerial and underground), underwater and electromagnetic – obviously governed by specific protocols, which allowed the migration of messages between them. Sometimes they keep the original form, written or voice, sometimes they migrate between the oral form and writing, as they are circulated through the various networks. A particular case is that of so called ‘spoken telegrams’, which could be received in the form of voice, via telephone, then passed on in writing by the CTT clerk, to be transmitted, via telephone or the telegraph, again in the form of either voice or telegraphic code to the receiving station of the message recipient. There it would again be reverted to written form, before being delivered to the recipient in his/her mail address.

9. Concluding remarks

The telegraph began as a structure independent from the Post, overcoming the limitations of postal services existing at the time. However, after a period of 25 years, the telegraph was integrated in postal services. When the phone came, urban networks were installed in Lisbon and Oporto, independent of the telegraph, but those networks were later on linked to those of the telegraph. The coupling of the telephone network to the telegraph network began with the introduction of telephone sets in the telegraph network, following which the interurban telephone network was developed and attached to the telegraph network, a connection which was maintained until 1939. As the telephone network was developed throughout the country, the old telegraph circuits were upgraded with high-frequency wires, which improved the quality of the electrical signal that could carry both the human voice and encoded signals, generating the ambivalence between telegraphic and telephone channels and increasing the ambiguity of the respective networks. When, in the 1930s, the telephone network reached a considerable development, it was envisaged improving the telegraph service, by introducing telegraph instruments – the teleprinters – in the telephone network. The interconnection of networks and the renegotiation of the boundaries between their scope of action resulted in the optimization of messages circulation not only through increasing the speed, but also by making possible to change the messages form between sender and receiver (written-voice-written) and transmute them between different networks, in order to reach as far and as many people as possible.

When radiotelegraphy was introduced in Portugal, the systematic process of interconnection between networks of communication continued, especially between the state networks and the networks under concession, always following the economics of communication – establish as many links as possible, serve the largest number of possible users, enabling them to communicate as quick as possible. To that purpose, the communication networks very early functioned in an integrated and complementary way. The integrated management of networks was carried out very early, by the bodies responsible for their supervision, first the Post Office and Telegraphs, later the Post Office, Telegraphs and Telephones of Portugal and CPRM, which contributed to an ‘ecology’ of communication networks.

Another topic of this article, was the role played by Portugal in the expansion of international networks of submarine cables, which through the importance of the service it provided, became the source of rivalry between world powers. This complex set of negotiations and charges illustrates the paradoxical centrifugal/centripetal and decentralization/centralization effect of telecommunications technologies.³⁸ As the international submarine cable network expanded (centrifugal effect), the Portuguese territories were being included (centripetal effect), the ‘centre’ spread out closer to each other ‘peripheries’. Meanwhile, the network nodes installed in the Portuguese territories became major hubs for international telegraph traffic distribution ‘centres’ (decentralization). The services provided by the expansion of the ‘centre’, enabled the ‘periphery’ to develop scientifically and technologically; financially, through telegraph license fees, and politically due to leverage of housing communication ‘centres’, which allowed Portugal to maintain a centralized administration of its overseas territories. However, the ‘centre’ always proved stronger than the ‘periphery’. The inaction of Portugal in the crossfire of British, American, Italian and German pressures, as well as the inability to enforce legal and financial rights and interests in the allocation of new concessions, are proof of that. The ‘centre’ became stronger (centralization), to the extent that the periphery was subjected to power pressures. The Portuguese case therefore shows that telecommunications technologies are key channels for exercising political power, not only for transporting and providing snippets of information, but also because they result in a centralization of power. In fact, the ‘centre’ keeps the distance from the ‘peripheries’, despite the apparent rapprochement and closer relations, leading to the paradoxical effect of maintaining the structure and dynamics of power relations. Despite its geostrategic importance, Portugal never acquired bargaining power which allowed the country to truly assert itself on the international scene, but could not either be neglected, and its contribution has to be recorded in the history of telecommunications, for a more full comprehension of the networks topology, past and present, because the optical cables follow, today, precisely the same paths of his predecessors.³⁹

38 Ibid.

39 M. Faria, *Marconi da TSF às Comunicações Globais*, Lisboa, 1994, pp. 148 and 236.