

# The Western Roman Atlantic Façade

A study of the economy and trade in the  
Mar Exterior from the Republic to the Principate

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### 1.3 TRANSPORTATION COSTS IN NW HISPANIA

*P. de Soto*

#### INTRODUCTION

To understand the importance of the Atlantic façade and its close relationship with the NW Peninsula it is necessary, of course, to consider the question of transport in Roman times. Ringrose (1972) stated that peninsular stagnation between 1750 and 1850 was due mainly to a relative inability to adapt transportation to the requirements of that period. In Roman times the physical and cost conditions shaped transport systems and reflected the landscape and patterns of human settlement. The close relationship between these two historic moments is based on the continuity of road networks from the Roman period to the XVI<sup>th</sup> century AD (Uriol, 1985). Up to the XX<sup>th</sup> century the costs of land transport hindered contacts between the centre and periphery of the Iberian Peninsula, with the only exception being the areas located near rivers, which benefited from the low costs of water transport (Carreras, 1997, 164).

Communication and trade in antiquity relied on three main systems of transport. As the ancient sources relate, the most economic form of transport – the fastest and with most carrying capacity – was maritime navigation.<sup>1</sup> This means of transport was especially employed in commercial relations of the Iberian Peninsula. The second most favoured inland transport was riverine; the Iberian Peninsula rivers such as the Ebro, Tajo, Duero, Guadiana, Guadalquivir, Miño and its tributaries stood out.<sup>2</sup> Finally, the third means of communication was by land. Rome laid out a complex network of roads, approximately 90,000 km of paved roads and an overall network of 300,000 km (Chic, 1993). In the case of Hispania, the road networks were established sometimes along pre-existing pathways, for instance the Via Heraclea or the Via de la Plata (Silver way). However sometimes the roads were also built *ex novo* based on economic, military or political interests.

<sup>1</sup> On the importance, use and consequences of navigation in antiquity see Rougé (1975); Pomey (1997).

<sup>2</sup> There is recent monograph on classical resources, history and rivers of the Iberian Peninsula in Roman times (Parodi, 2001).

Modern studies on the configuration of communication and transport networks have become popular over recent years thanks to the innovation of GIS. This new approach to the study of transport networks derives in part from Hagget (1969). He and others demonstrated that network morphology provides understanding of economic and commercial structures across a wide range of territory. With regards to a British case study, Haggett (1969) concluded that the communications network gave primacy to London as a main vertex in the network. Later on, in the 1970s, scholars realized that this primacy stemmed from an earlier period – Roman times.

Dicks (1972) established that the communications network of the Roman province of *Britannia* was organised according to a form of ‘tree shape’, in which *Londinium* was located in a central position. His study analyzed the whole Romano-British road network in Roman times, with roads the simple branches of the network; like a river, the more tributaries a road had the more important it was. Following this method, he reached a conclusion that the communication network was organised according to three large axes that related the capital, *Londinium*, with three other centres: *Ebucarum* (York) through Ermine Street (Fens-Lincoln), *Isca* (Caerleon) through Silchester-Gloucester and *Deva* (Chester) through Watling Road (St. Albans-Wroxeter). According to Dicks (1972) this road pattern responded to the first military requirements of the Roman occupation, although such axes were developed later to generate the internal economic relationships of *Britannia*.

In the present work, the methodology developed by these British scholars will be applied to study how the NW of the Iberian Peninsula organized its communication network. From the particular shape of communications in this geographical region, an attempt will be made to recognize its key features and how they affect regional political and socio-economic aspects. Another important aspect in the study of the NW road network will be to focus on the centrality of the different urban centres in the territory. Such studies come from the concept of

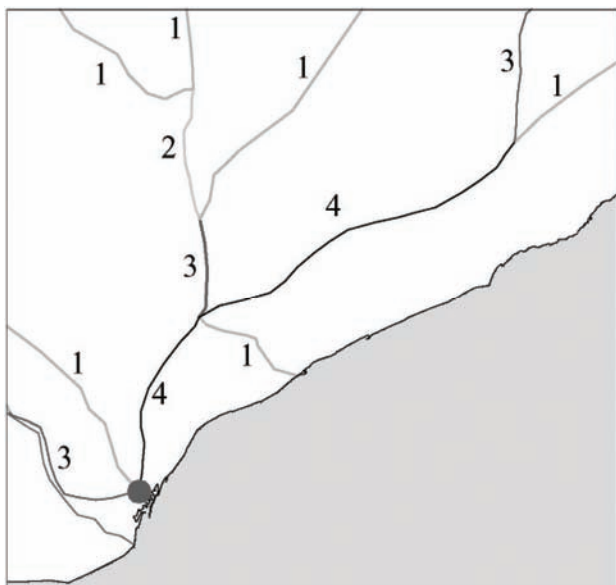


Figure 1.3.1 Example of an ordering diagram with simple branches to the network

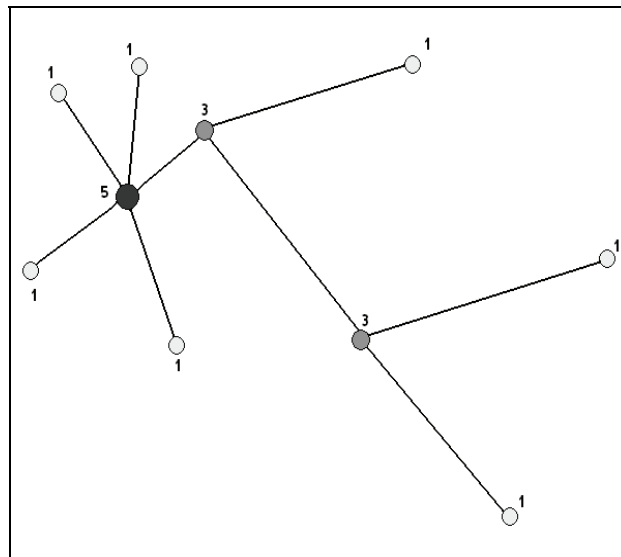


Figure 1.3.2 Example of a graph diagram (Social Network) rating nodes according to its degree of centrality (Network Degree)

*Centrality Degree*, employed in a so-called *Social Network Analysis* (Freeman, 1979). Such analyses give values to each ‘node’ (or point to which more than one roads converge) according to the number of total connections linked to it. Therefore the more connections received by a single node the more important it is. In other words it has a higher degree of accessibility or communicability.<sup>3</sup> The origin of those analyses stem from “graph theory”, applied not only in mathematics but also in computer science. Graphs are understood as a collection of points (i.e. cities, people...) identified as vertices or nodes, connected by arcs or lines, which identify relationships such a distance, cost (i.e. economic, social...).

Despite the widespread dissemination of these applications nowadays, the theory was developed by Leonhard Euler in 1736. He applied his theory to solve the communication problems of the inhabitants of Königsberg, who built 7 bridges to optimise mobility. Afterwards, in the middle of XIX<sup>th</sup> century, new intellectual challenges related to transportation (i.e. Chinese postmen, travelling businessman) were solved by graph theory. In the XX<sup>th</sup> century, sociology and social network studies have helped develop the latest applications of graph theory. Those applications have helped us to understand interpersonal relationships, and they have even been employed to analyse Internet communities.

<sup>3</sup> This system of centrality is interpreted as the most intuitive way of connectivity analysis (Freeman, 1979, 220) and was introduced by Shaw (1954). But Nieminem (1974) was the one who defined a mathematic algorithm:  $Cd(Pk) = \sum a(Pi,Pk)$ . Later, other types of analysis were established, such as *Betweenness Degree* or *Closeness Degree*. All are used in the study of social networks due to those functional components (influences and functions of individuals according to the degree of closeness). Because of the functional and economic components of our study, the analysis chosen is more related to the potential of communicability amongst cities.

In our study, a methodological parallel becomes evident: the more transport infrastructures are associated with a particular population centre, the better the accessibility will be for its people and merchandise. The complexity of the relationship increases when a correct network is defined from the archaeological and historical data, and when trying to rate the diverse types of transport employed. This will probably not affect the concept of the “degree of centrality” when arriving at either a secondary road or the existence of maritime port of interprovincial trade.<sup>4</sup> From our study, it is believed that the key urban centres in the NW transportation network in Roman times will stand out, as well as the territorial organization in terms of mobility.

As mentioned, our first step was to analyse the degree of centrality amongst different cities, as well as their layout, using the tree-branch theory proposed by Dicks (1972). It was attempted to find as many historical and archaeological details as possible in order to understand the communications layout (graphs theory) on which to base further study.<sup>5</sup>

### TRANSPORT INFRASTRUCTURES (pre-Flavian period)

Proper communications were set up in the NW peninsula in the Flavian period, however their origins stemmed from previous periods. The development of Roman roads in this region is obviously closely related to Roman state interests. However, in most cases they took advantage of

<sup>4</sup> In our case we added a different value to each point according to the mean of transport and the road category (between 1 and 4); a node with only one point (rated 4) could have more accessibility than a node with three linked points (rated 1).

<sup>5</sup> It is not intended here to look in depth at the historic and archaeological data of the NW territories.

the primitive organization of the territory coming from pre-Roman periods.

With regards to the maritime communications, Atlantic navigation is known from the Neolithic period, in which some cultural influences such as megaliths or metallurgy are well identified (Naveiro, 1991, 135; Ruiz-Galvez, 1986, 24). The discovery of a monoxile boat near Viana do Catello (Morais, 2006) appears to justify an early dating for its use (XI<sup>th</sup> century BC). The location of hill-forts on the NW Peninsula coast close to the mouths of large rivers defines the importance of such maritime contacts. In addition they provide some clues to the possible pre-Roman communication network in the territory (Morais, 2007), together with the distribution of staple products and manufactured objects (Naveiro, 1991, 135). In the Bronze Age, communities such as the Tartessian or Phoenicians (documented from the Periplus of Hannon or Himilcion) developed regular maritime contacts with the Atlantic communities to obtain gold, ivory, cooper, tin and amber. Arruda (1999-2000) demonstrates in her study of the estuaries of Sado, Tagus and Montego, as well as the Algarve coast, that eastern materials are significant, which suggests regular contacts with Phoenician from the VII<sup>th</sup> BC onwards.

By the VI<sup>th</sup> century BC, Atlantic navigation and trade in the NW Peninsula was developed further by the Gades populations, as can be inferred from Strabo (STR. 3.5.11). They kept control of the tin trade and developed trading ventures with Carthage and the Phoenicians in the Mediterranean (Morais, 2007).

Information recorded by classical geographers that has survived show that navigation across the Atlantic, between the Mediterranean and the NW coast of the Peninsula, *Gallia*, *Britannia* or *Germania* was relatively frequent. Strabo in the I<sup>st</sup> century BC, and Avienus in the IV c. AD (Morais, 2007), reveal the itineraries used to navigate these coasts. Because geographical knowledge was gathered over centuries, the conclusion has been reached that such commercial contacts were in place from the VI c. BC. Nevertheless, some differences and significant errors in the sources and locations are detected in our ancient sources.

In the Roman period, the NW Peninsula still maintain its relationship with the Roman World through Gades mediation. Thereby, the port of *Gades* and the NW reinforced relationships through stops on the route from *Britannia* to Rome.<sup>6</sup> There were already some strategic points on the peninsular coast, which, thanks to their location, became calls on the supply routes. It is also quite feasible that the relationship between the Cantabrian coast and the Aquitanian and Breton coasts was

<sup>6</sup> Rome appeared to adopt immediately the Gaditan Atlantic policy as its own. From the start, Roman sailors attempted to obtain key information to navigate across the Atlantic North (data about courses and calling ports and exchange points). Later, Romans will wage wars to pacify and assimilate hostile territories in order to reach the Northern *Gallia* and *Britannia* (Naveiro, 1991, 130-131; Parodi, 2001, 232-233).

continued along the Bay of Biscay (Atlantic route). This route is referred to mainly by Caesar (CAES. *Gal.* 3.26.6), Strabo (STR. 3.4.18) and Orosius (OROS. *Hist.* 6.21.4), who describe contacts, exchanges and transport of troops between Cantabrians and the territory of *Aquitania*.

River routes in pre-Roman periods were also often employed. The use of flat-bottomed boats, made of skins, trunks or wooden-planks or monoxile craft allowed northern peoples to navigate through most rivers in the NW (Naveiro, 1991, 138). The coastal features allowed shelter and a place for loading and offloading ships in the river mouths. This favoured the development of activities and settlements in rivers during antiquity (Morais, 2007). Due to such geographic morphology, a series of *statio*s were developed along the Atlantic and Cantabrian coasts; some sites existed in pre-Roman times and were consolidated in the Roman period.

The best description of river navigation in the NW Peninsula appears in the work of Strabo (STR. 3.3.4), in which the geographer refers to navigation along the Douro and Miño rivers (upriver navigation of 800 stadia – 150 km.).

*“After these two is the Durius, which, coming from afar, flows by Numantia and many other settlements of the Celtiberians and Vaccaenas, and is navigable for large boats for a distance of about eight hundred stadia inland. Then come other rivers. And after these the River of Lethe, which by some persons is called Limaeas, but by others Belion; and this river, too, rises in the country of the Celtiberians and the Vaccaenas, as also does the river that comes after it, namely the Baenis (others say "Minius"), which is by far the greatest of the rivers in Lusitania — itself, also, being navigable inland for eight hundred stadia. Poseidonius, however, says that the Baenis rises in Cantabria. Off its mouth lies an island, and two breakwaters which afford anchorage for vessels. The nature of these rivers deserves praise, because the banks which they have are high, and adequate to receive within their channels the sea at high tide without overflowing or spreading over the plains. Now this river was the limit of Brutus' campaign, though farther on there are several other rivers, parallel to those mentioned.”* (STR. 3.3.4)

The descriptions of the river routes of this territory and their navigability are of significant interest, so they may have shared a common means of inland transport.<sup>7</sup> There is even the possibility that rivers such as the Douro made the Atlantic coast accessible to important land routes such as the Ruta de la Plata (Silver route) (Balil, 1974, 221; Naveiro, 1991, 139). Furthermore, NW territories received more attention by ancient geographers in the description of rivers, although they did not always describe their navigability (Parodi, 2001, 227-228).

<sup>7</sup> Only a few years ago, the transport of wine inland towards the port of Gaia-Porto was done along the Douro over a long distance.

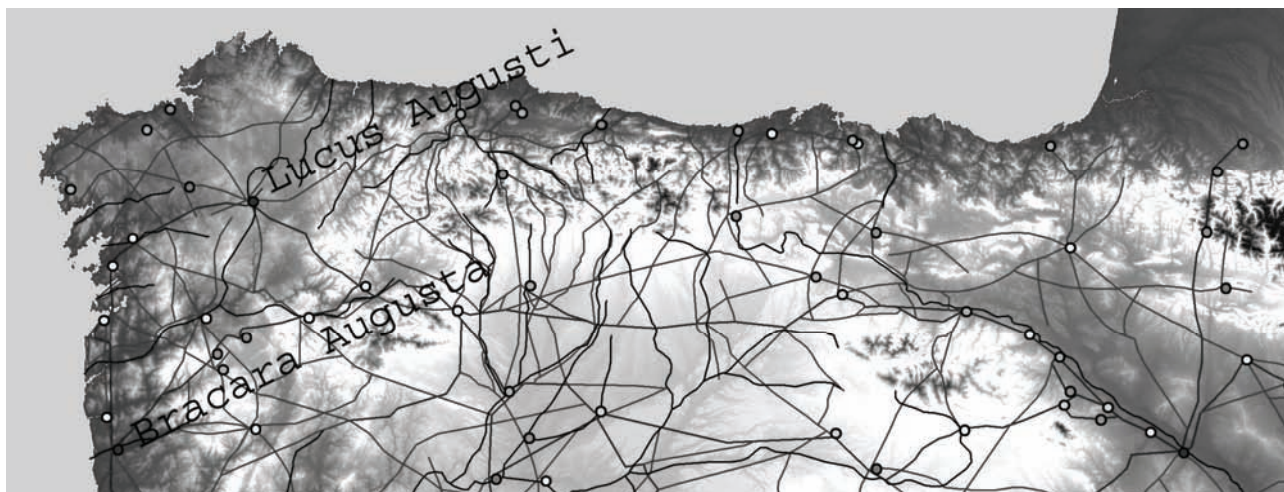


Figure 1.3.3 Main communication routes in Pre-Roman times

Finally, the land routes had also a clear pre-Roman history before the establishment of the Roman road network. It seems feasible that the natural features and routes of the territories were employed in antiquity. Most Roman sites with indigenous precedents were located in strategic places to control natural thoroughfares. The location of stone cairns (*amilladoiros*) at cross-roads discovered in the NW presupposes the existence of indigenous track infrastructures. These were identified by such stone cairns and later preserved in medieval times to identify such crossroads<sup>8</sup> (Rabanal-García, 1996, 278, Naveiro, 1991, 141-142).

Following ancient sources, such as Strabo (STR. 3.4.10), it seems likely that two important routes were employed in pre-Roman times. The first route connected the coastal areas of the Mediterranean near *Tarraco* (the Iberian *Kesse*) with the Cantabrig coast in the Bay of Biscay near *Oyarzun*, and perhaps continued further west (STR. 3.3.8; Fernández Ochoa and Morillo, 1994; Yanguas, 2001; Urteaga, 2003). This route was probably directed towards *Pompaelo*, following the way north of the Ebro River. There was also a parallel E-W axis linking the territories of the northern Douro Valley with places such as *Caesaraugusta*. The flow of Roman coinage from Spanish mints in the Julio-Claudian period probably came from this route (Naveiro, 1991, 141). The second route coincided with that known as the *Ruta de la Plata* (Silver route), which was in full use in the Augustan period. It is believed that Tiberius kept roads in good condition, and the lack of milestones from the emperors Trajan and Hadrian appears to indicate that such landmarks were still visible (Blázquez, 1997, 6-7). It was begun in the last third of the II<sup>nd</sup> c. BC, in the Viriatus revolts. Its function was to link the Baetican territories and the Cantabrig zone, where the main conflict took place at the end of the I<sup>st</sup> c. BC. Other land routes were in place in pre-Roman times, the

<sup>8</sup> It seems clear according from several scholars that *amilladoiros* had a Pre-Roman origin. They were known in Roman times as "Mercury Mounts" (Caamaño, 1979, 284-285; Acuña, 1971; Bermejo, 1978, 77-117).

via *Vía XVI* of the *Itin. Ant.* that crossed along the Atlantic foreshore was the probable result of a pre-Roman axis. Likewise, a multitude of secondary routes, tracks and natural features may have had a pre-Roman origin.

Even before, but mainly in Augustus's reign, the communication network started to grow. The creation and consolidation of a new provincial project, the establishment of new *conventus* capitals and new cities and colonies forced the administration and Roman army to set up a new communications layout. The Roman general Agrippa was responsible for such project when he arrived on the peninsula in 19 BC (Rodà, 1998; 2007). In this way the main cities of the Peninsula were defined not only as strategic military sites but also as economic and communication hubs. Cities such as *Tarraco*, *Clunia*, *Caesaraugusta*, *Lucus Augusti*, *Asturica Augusta* and *Bracara Augusta*, were favoured by this active policy in infrastructures (Blázquez, 1997). Furthermore, Agrippa was key to achieving peace in the NW, with a policy of integrating the newly conquered territories. Developing an intensive infrastructure network and the employment of indigenous personnel for local municipal posts were tasks that faced the Roman administration in terms of the process of integration (Rodà, 2007, 27).

### ROMAN ROADS (from Flavian onwards)

The physical features of the Iberian Peninsula, surrounded by the sea, favoured contacts between coastal towns with the rest of the Empire; inland movements were more difficult. In the inland regions, not all the territories suffered the same problems of accessibility and mobility. The geographical morphology favoured inland contacts along the main rivers and in this context Strabo (STR. 3.1.1) detailed a total of 2000 km of river networks in the Peninsula (Yanguas, 2001). Apart from their rivers, the important regions of the Peninsula

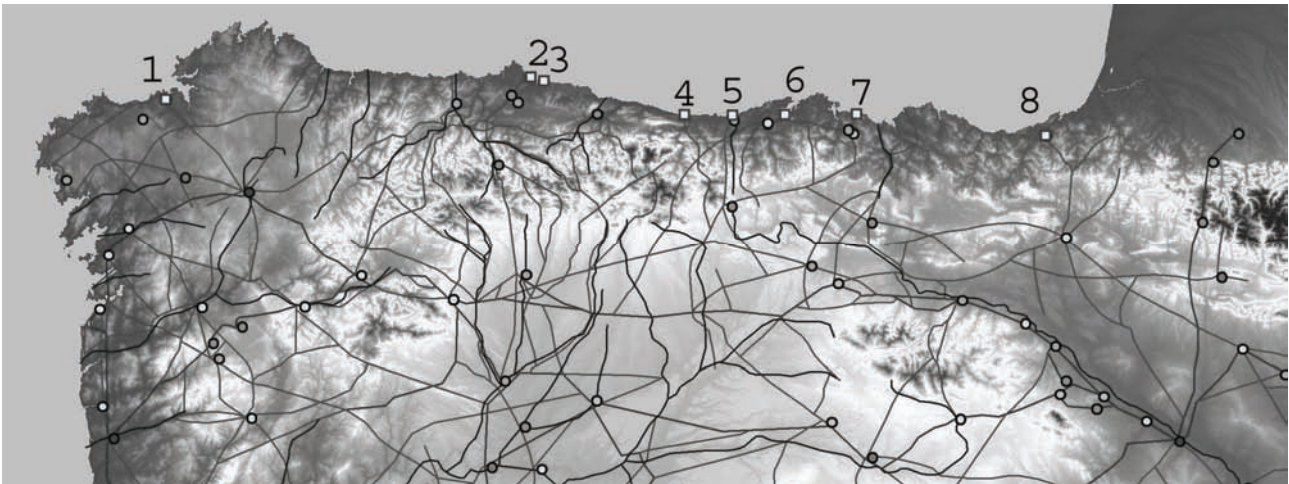


Figure 1.3.4 Main communication networks from the Flavian period onwards. Main ports along the Cantabric coast:

1. *Brigantium* 2. *Noega* 3. *Gigia* 4. *Portus Vereasuecae* 5. *Portus Blendium*
6. *Portus Victoriae Iulobrigensium* 7. *Portus Amanum* 8. *Oiasso*

lacked good land communications, mainly because of the mountain barriers (Cantabric, Galician, etc.).

Geographical hindrances to communication and economy, basically in land transport, remained unchanged until the XIX<sup>th</sup> century (Ringrose, 1972). The high cost of transport and low quality infrastructure reduced contacts between the centre and periphery, except for the Ebro and Guadalquivir valleys. Certain forms of agriculture, limited by mobility, tend to lead to self sufficiency (Carreras, 1997, 164). The close relationship between the Roman road infrastructure and the road system in place in the XVI<sup>th</sup> century meant that the problems of communication between centre and periphery still remained a main factor of the country's relative underdevelopment and the changes later introduced in the XVI<sup>th</sup> and XVIII<sup>th</sup> centuries did not significantly improve the situation (Uriol, 1985).

There was a development eventually in the land transport system when the Royal roads increased traffic. However the road layout was too biased towards Madrid and its periphery, leaving entire regions with no communication at all, such as Valladolid (Uriol, 1985).<sup>9</sup> During the XVII<sup>th</sup> and XVIII<sup>th</sup> centuries there were numerous projects set up by public companies to solve the problem of communication between the centre and periphery (new waterways, new roads...). Nevertheless, problems remained due to a lack of resources and bad planning (Ringrose, 1972).

In the Roman period, geography determined in many cases the economic exploitation of territories near the coast. Territories in the NE, Levante or Baetican coast were exploited and urbanised earlier, when those regions

were pacified. *Tarraco*, *Valentia*, *Gades*, as well as other urban centres, were developed during the II<sup>nd</sup>-I<sup>st</sup> centuries BC, in the coastal region, fostering military, political and economic control desired by Rome.

This was not the case for the central zone of the Peninsula or the NW; urbanism of those territories by the Roman government was promoted during the Principate, stimulated by Augustus's policy (Rodà, 1998). Similarly, the construction of the complex network of roads in this region can be dated to later periods for some coastal axes, as can be recognised in the classical sources (Solana, 2001) and the many milestones still seen today (Rabanal, García, 1997). (Because many dates on these milestones refer to restorations, they indicate not construction dates but repair.)

In the NW region, territories were determined by orography. The mountainous ranges of the northern coast, such as Picos de Europa or the Cantabric range, represented major obstacles for any communications between the maritime *stationes* and inland regions. In the Galician-Portuguese case these difficulties were overcome, as we can see from the location of cities with excellent communications in inland territories, i.e. *Lucus Augusti* and *Bracara Augusta*. In addition, one of the main factors that affected communication layout was the urban policy aimed at developing the old military camps from the Cantabric war into flourishing municipalities. In this sense the choice of different cities did not depend solely on economic reasons but was related to strategic decisions from previous conflicts in the area.

Geographical location and military interests came together in Cantabric territory. It seems feasible that the Roman interest in the conquest and pacification were influenced by other factors. The exploitation of metal ores, known from antiquity, was a key factor and one which fostered the need to ensure a network of stable ports around the north Atlantic, including the territories of *Gallia* and *Britannia* (Parodi, 2001, 233).

<sup>9</sup> Uriol (1977, 1985) highlighted different road itineraries and the required time to cover some distances, which did not differ much from the Roman period. The only technical evolution in land transport, basically wagons and carriages took place in the XIX<sup>th</sup> century (Lawton, 2006, 426-454).

## MAIN ROUTES OF COMMUNICATION

As explained above, the main communication network in the NW was defined according to its maritime routes. This means of transport was vital for bringing staples and was determined by the cost and speed of the ships employed. The position was enhanced by the special configuration of the Atlantic coastline and its main river estuaries that allowed upstream navigation for commercial ships (Sillières, 2003, 22). The main coastal itineraries included the established long-distance one connecting the northern territories with the port of *Gades*, as well as the regular coastal-traffic route calling in at many of the ports *en route*. According to Naveiro (1991, 125-127), the whole Cantabric and Atlantic coasts established a series of ports and harbours linking all the commercial trade. Ships were kept safe in bays and river estuaries, from which they ventured to sail on the open sea or closer coastal navigation.

*Gades* represented the first call for vessels coming from the Mediterranean and travelling to the Atlantic provinces (PLN. *Nat.* 2.57.167). It was probably the departure point for Baetican products. Seagoing routes towards the Atlantic had likely calls at *Olisippo*, *Portus Cale*, and *Brigantium* before reaching their final destinations. Navigation could continue farther on to provinces such as *Britannia*, northern *Gallia* (*Belgica*, *Aquitania*) and *Germania* (Naveiro, 1991; Morais, 2007).

These routes avoided the Bay of Biscay, as can be inferred from the archaeological material documented in the main ports of the Cantabrian region. Ceramic assemblages from the Cantabrian ports look quite different from the assemblages recorded in the Atlantic centres. Archaeological assemblages from Cantabrian sites appear closer in composition to the ones from the Garonne region, the middle Ebro valley and La Rioja (Iglesias, 2003, 108). This material implies certain commercial contacts by sea between the Cantabrian coast and territories near *Burdigala*. Cantabrian navigation was affected by the particular features of this sea, similar to those found from the Bay of Biscay to Galicia. It is a typical straight coast, of recent formations, with continuous cliffs and a few lower coastal strips and numerous estuaries and anchorages (Iglesias, 2003, 108). Despite this apparent homogeneity (Fernandez Ochoa and Murillo, 1994), only some locations went on to become important ports due to their strategic positions close to natural inland ways or mineral resources (gold mines).

Centres such as *Brigantium*, *Niega-Gigia*, *Portus Vereasuecae*, *Portus Blendium*, *Portus Victoriae Iulobrigensium*, *Portus Amanum-Flaviobriga* and *Oiasso* enjoyed special associations with the Roman maritime communication network, although with some singular differences (Fernandez Ochoa and Morillo, 1994, 165-170). Among the major centres *Flavium Brigantium* appears to have enjoyed a prominent role. The construction of a large lighthouse, known as the Tower of Hercules, as well as the possible presence of a *statio* (Fernández Ochoa, Murillo, 1994, 165), indicate its

central role among the northern ports. Its proximity to *Lucus Augusti* and its relationship with the Via XX allowed it to maintain good communications with the western territories of the Cantabrian coast. *Flaviobriga*, the ancient *Portus Amanum*, also enjoyed special status, since it was the only maritime city that received the title of *colonia* in the year AD 74 (PLN, *Nat.* 4.110). Perhaps its importance stems from the change of era, as not much attention is given to it by earlier authors such as Strabo. Its location favoured seagoing communications between the NW Peninsula and Atlantic Gaul, as well as being on one of the access routes towards the inland territory. This helps explain why it may have generated a special interest for traders. *Portus Victoriae* offered excellent communication facilities for inland transport, facilitating foreign products to reach markets such as *Iulobriga* and *Segisama*. Finally, the port of *Oiasso*, on the estuary of the Bidasoa River, also benefited from a position that enabled it to maximise the distribution of goods inland, using not only the river but also the land roads following the Pyrenees valleys (Urteaga, 2003, 106).

River communications in the NW created an unbalanced infrastructure in the communications network. Long rivers such as the Ebro, Guadalquivir, Tago, Duero and Miño made accessibility inland easier, thanks to their navigability upstream. The navigational features of the Tagus made it one of the main axes towards inland territories. Many cities grew on its banks, such as *Olisipo*, *Scallabis*, *Lebura* and *Toledo*. Further north, navigation of the Douro was described by classical geographers, who pointed out its use as a means of communication for as long as 800 *stadia* (STR. 3.3.4). Finally, in the extreme NW, there was the Miño, with its tributary the Sil, provided greater penetration inland. The location of *Lucus Augusti*, only 70 km from the navigable rivers according to Strabo (800 *stadia* – 150 km), seems to be related to it (Parodi, 2001, 228).<sup>10</sup> Similarly the location of *Bracara Augusta* on the river *Nebis* (present-day Cavado) appears to demonstrate navigation along other Atlantic rivers.

Along the Cantabrian coast the many estuaries permitted the establishment of anchorages and regular exchanges between boats and ships of different sizes. Cantabrian vessels offloaded cargoes to small boats that were hauled upstream (Iglesias, 2003, 108). It seems feasible, according to the recent archaeological finds, that the Deva and Nervión rivers were employed as water routes inland.

The use of Nervión was especially linked to the city of *Oiasso*.

Another case is the River Ebro. Its navigation is recorded by the classical sources<sup>11</sup> and allowed communication between the NW territories and the Mediterranean coast, near *Tarraco*. Together with navigability, mobility in

<sup>10</sup> Rodríguez Colmenero (1996, 419-424) refers to the importance of the River Miño for the transport of building materials to the city; good river communications was one of the main factors for the city's foundation.

<sup>11</sup> For ancient sources quoting the River Ebro, see Parodi, 2001.

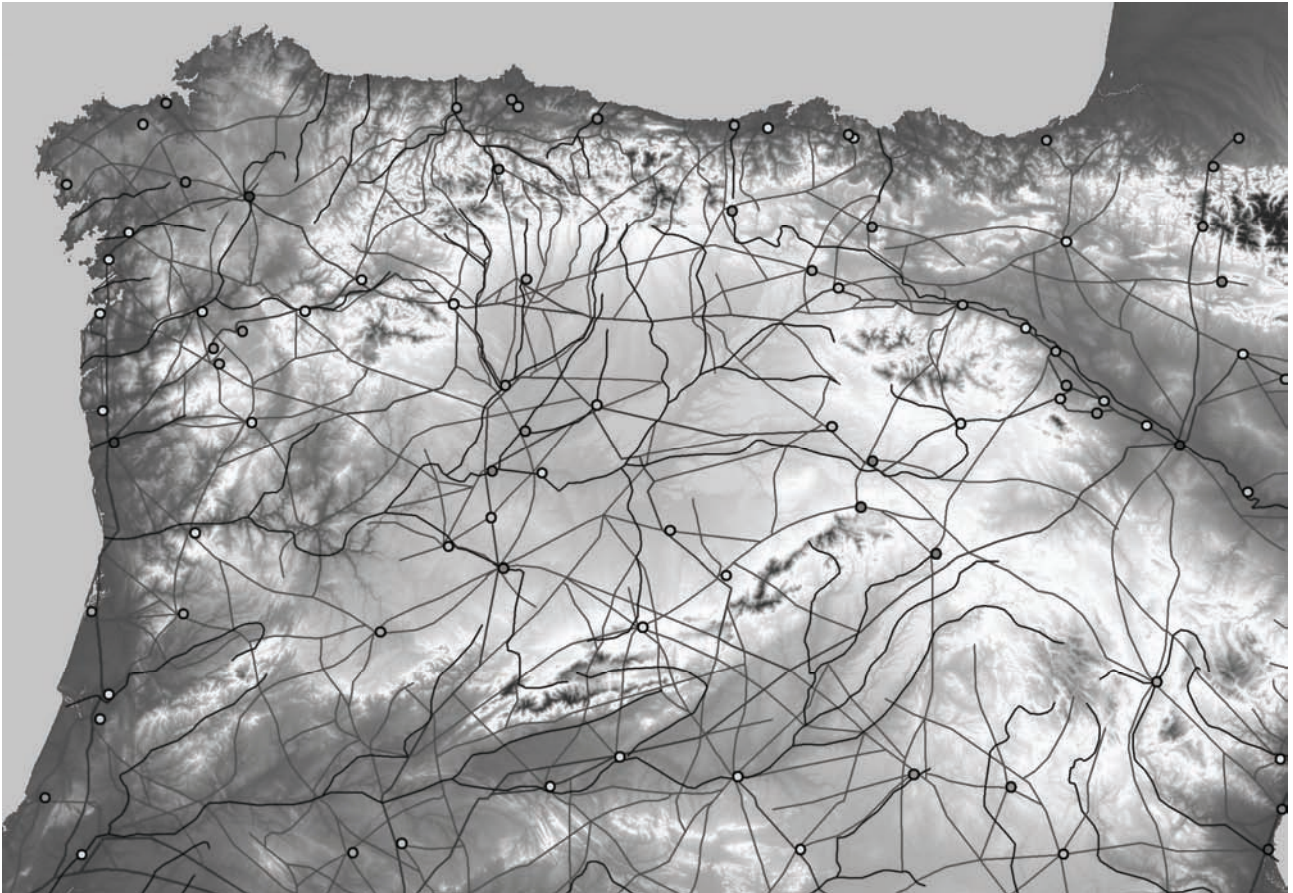


Figure 1.3.5 Map showing the main communication land and river networks in the NW

inland territories was complemented by an extensive road network following the Douro valley and the northern Meseta on the fringes of the Cantabria range.

As well as their use of rivers, the Romans consolidated their power through a sophisticated road network (Naveiro, 1996) and river valleys were also used as land tracks. The main roads were described in the well-known *Itineraria*, such as the *Antonine itinerary*, the *Peutingerian tabula* and *Rabeian anonymous*.<sup>12</sup>

These *Itineraria* included most, but not all, roads that crossed the territory. The main roads were still marked thanks to the conservation work of later emperors. These conservation works are recorded in the milestones preserved today, showing the imperial policy in the territory (Rabanal-García, 1996). In the E-W direction, the main road from the *Itineraria* corresponds to that known as Via I, and XXXII-XXXIV (*Via Tarraco ad litus Oiarsonis*) (Solana, 2001, 89-90). It covers the route from *Caesaraugusta* to *Lucus Augusti*, following the axis of *Vareia*, *Segobriga* and *Asturica*. It can be observed that this great axis, parallel to the Cantabric range, is the one that has retained most milestones (Rabanal-García, 1996, 280-281). This road (Via XXXIV) also linked this

<sup>12</sup> There are many sources on Roman roads that have survived. Vicarello vases or Valencia tegula are two good examples, as well as the ones quoted before, which help to complete the *Itineraria* from the Iberian Peninsula.

region with the other side of the Pyrenees near *Burdigala*, allowing access to *Aquitania* through northern Meseta, the plains of Alava and Pamplona. It became the basic thoroughfare for the administration of this territory and a link for the land and river routes that continued to the coastal ports (Yanguas, 2003, 50).

Another important axis for communication was Via XVII (*Item a Bracara Asturicam*), XVIII (*Item alio itinere a Bracara Asturica*) and XIX (*Item a Bracara Asturicam*), which created a triangle-shaped network that linked cities such as *Bracara Augusta*, *Lucus Augusti* and *Asturica Augusta*.

In the S-N direction, the main axis covering the region was the Via de la Plata (Silver road). The road has a military origin and was built between 139 and 78 BC.

The lack of milestones from the Flavian period suggests that the route was well maintained (Blázquez, 1997).<sup>13</sup> In the times of Trajan and Hadrian the road was enhanced to preserve it and improve this vital means of communication. The axis represents the only important route between north and south of the Peninsula, and linked the capital of the Lusitanian province, *Emerita Augusta*, with all the northern territories.

<sup>13</sup> The lack of milestones has also been interpreted in some cases as a decrease in the importance of their use (Carreras, 1997).

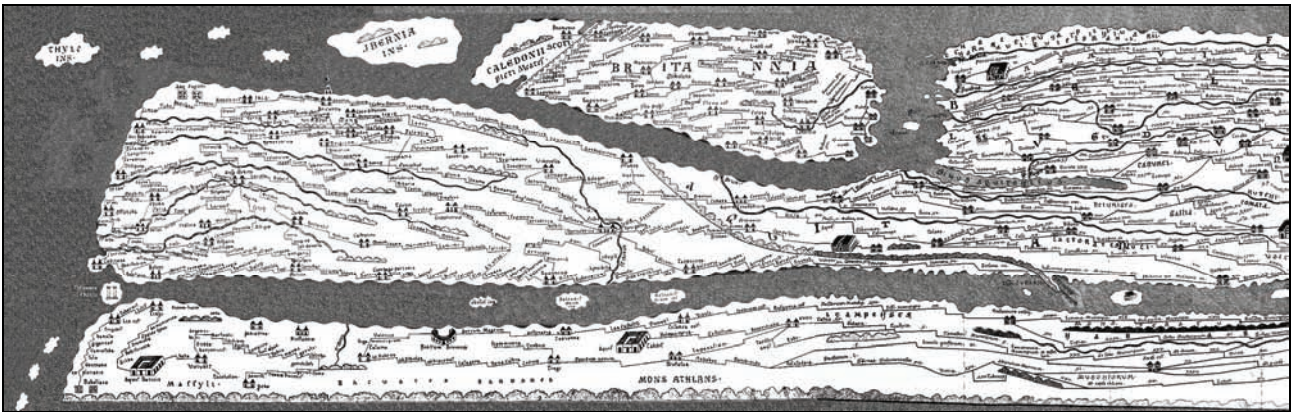


Figure 1.3.6 Reproduction of the *Peutingian tabula*

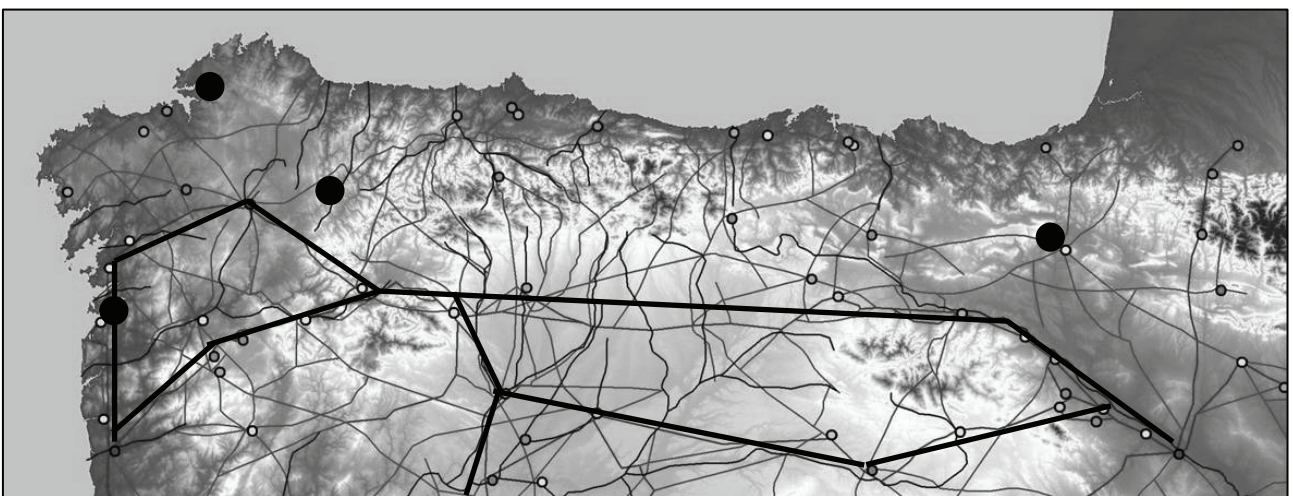


Figure 1.3.7 The main Roman communication links and *conventus* capitals

The *Itinerari Antonini* also included the road that linked *Bracara* with the territories of the Lusitanian coast, mainly *Olisipo*. This road (XVI) ran parallel to the coast, crossing towns such as *Aeminio* and *Coninbriga*.

Special mention should be made of the *Via per loca maritima*, known also as *Via XX*. The importance of this route was its role in linking the diverse maritime and riverside settlements of the extreme NW of the Peninsula. The itinerary of this road linked the *conventus* capitals (*Bracara*, *Lucus* and *Asturica*), but with the intervention of different means of transport. For instance, some secondary parts of its network were river routes (Franco, 2000).

### ANALYSIS OF THE TRANSPORT NETWORK

With the aim of analysing communications in the Iberian Peninsula, it was thought sensible to study the role and importance of different Roman cities. In order to define importance, each city (node) was rated according to its level of accessibility, analysing for each one its degree of centrality within the network. The degree of centrality obtained offers a vision of hierarchy within the

communication network, as well as showing differences in mobility in the diverse regions studied (territories in which many of the cities have a high degree of communicability are identified as either “well-” or “poorly-linked”.

Part of this study stems from studies on social networks defined above and also studies on transport and mobility carried out some years ago. Carreras (1994) defined a transportation cost map of the different means used in Roman times based on the analysis of communication network in the Roman Empire and the different transport costs (figure 1.3.8). Thanks to a thorough study of *Diocletian's Edict*, he established a series of cost ratios amongst means of transport: seagoing navigation = 1; downstream river navigation = 3.4; upstream river navigation = 6.8 and land transport = 43.3.

From the resulting map it became evident that lower transport costs were recorded in coastal areas in the Peninsula, as well as along the valleys of rivers such as the Ebro, Guadalquivir, Tajo and Duero. The map reveals higher values in inland region as a result of inaccessibility problems.

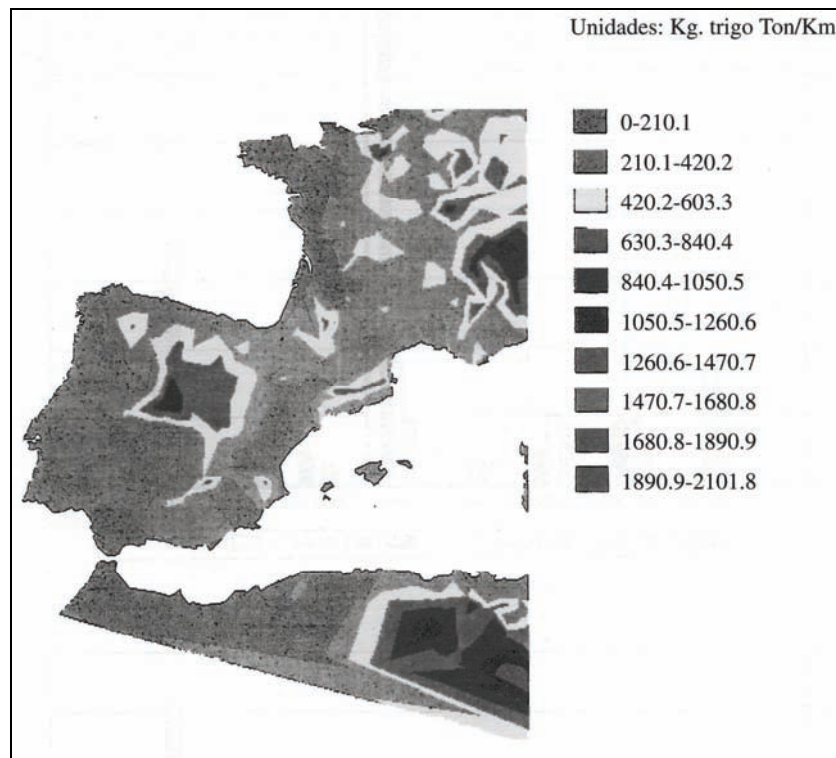


Figure 1.3.8 Transport cost map of distributing products coming from the Guadalquivir valley (Carreras, 1996)

In the present study it was decided to analyse the communication network from another viewpoint and the communication network is here analysed without taking into account transport costs. Then, using the network and the different means of transport, the nodes in the network were rated according to their accessibility. The classification of these differing nodes was undertaken following studies on the degree of centrality (Freeman, 1979), by quantifying the different axes (or edges) which link each node, and also by distinguishing edges according to the means of transport. In other words, values were given to the edges depending on whether they were linked by maritime, river or land routes.

One of the most complex issues was defining the actual values for each means of transport. Following studies on communication transport in the Roman period by Carreras (1994) and the cost studies described above, it was decided that a maritime port should be rated 4, a river port 3, each main road 2, and secondary roads as 1. Adding these edge values to each node will give “a degree of centrality” rate.

In the resulting graph diagram (figure 1.3.9) each node in the network received a size and colour grading according to its degree of centrality. The importance goes from green (lowest) to red (highest) and the larger the node on the diagram, the more accessibility it has. The resulting diagram shows interesting features in the network of the NW Peninsula, including the relative importance of the *conventus* capitals, the influence of maritime and river ports, as well as main roads affecting particular

settlements. There are also significantly lower values in specific regions, such as the Cantabric range.

From this diagram other graphical representations can be generated to help with its interpretation. By interpolating the values of each node, the map reflects the accessibility in the territory as a whole (mobility of people and merchandise). As can be observed (figure 1.3.10), there are clear differences in the degree of centrality in the diverse territories studied. In the Roman periods there were areas with little communicability, such as north of *Lucus Augusti*, between the Eo and Besaya rivers and the zone between the Nervión and the Pyrenees border. Other regions with little infrastructure was the area of southern *Salmantica*, as well as the mountainous regions of the Cantabria range and the Iberian and Moncayo ranges, amongst others.

As a contrast to these data, there are singular points with high rates in connectivity. The points with the highest connectivity correspond to the *conventus* capitals such as *Caesaraugusta*, *Clunia*, *Bracara Augusta*, *Lucus Augusti* and *Asturica Augusta*. Another feature is the location of important nodes along the main road axes inland, e.g. the axis defined by *Lucus Augusti*, *Bracara Augusta* and *Asturica Augusta*.

The triangle formed by these three *conventus* capitals records a great number of milestones, chiefly from the III<sup>rd</sup> and IV<sup>th</sup> centuries AD, following the main roads XVII, XVIII and XIX in the Antonine Itinerary. This was the main focus of gold exploitation in the NW and thanks to the triangular communication network it could

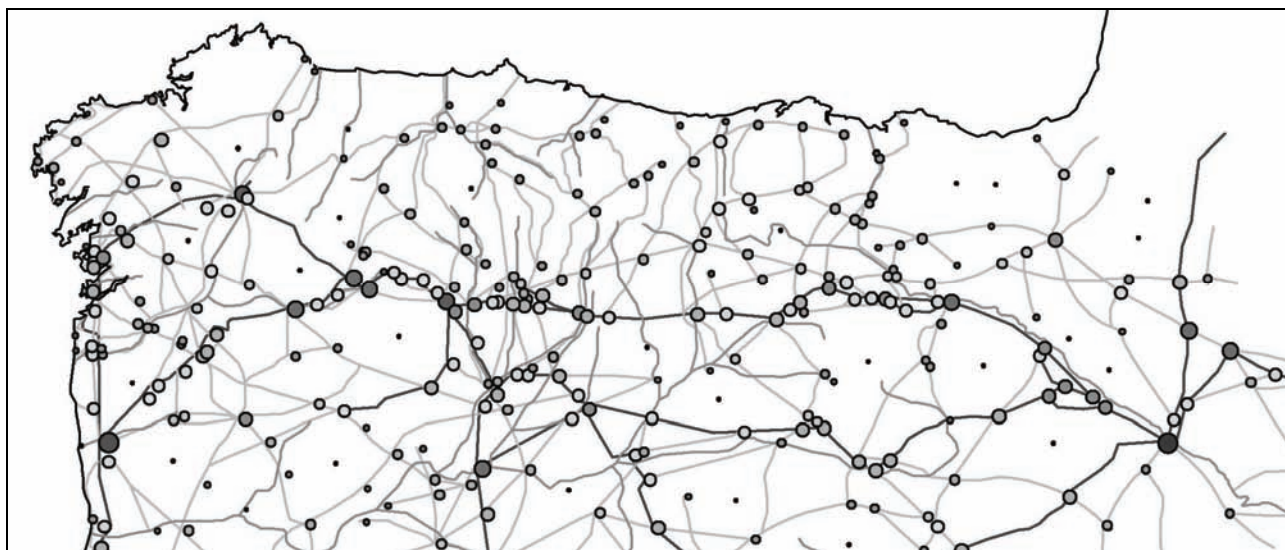


Figure 1.3.9 Map of the NW Peninsula with the main nodes and axes of the resulting graph diagram

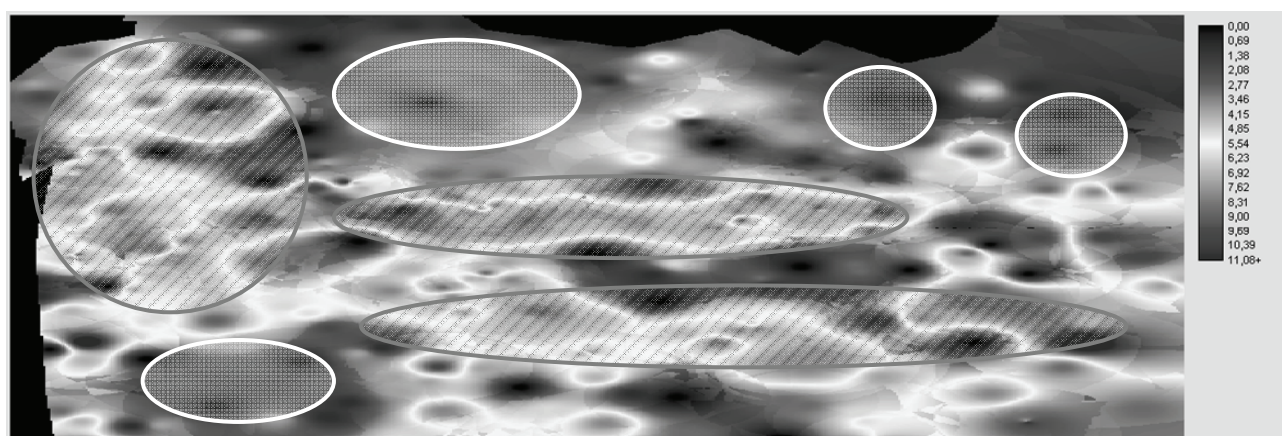


Figure 1.3.10 Interpolation map from the graph diagram, showing zones with little communication in white, and darker areas with most

communicate to the axis that ended in the Ebro valley with two parallel itineraries. According to the study results, the best route was the northern one, closer to the Bay of Biscay and crossing places such as *Grachurris*, *Calahurris*, *Virovesca* and *Regio*, to reach the nearby region of *Asturica*. This itinerary is of extra interest in that it became part of the Santiago pilgrimage route in medieval times. This itinerary also had secondary routes to the Cantabric coast through some natural features, normally following a river. This is the case with the secondary roads that communicate with the Cantabric coast, such as Iruña through Deba, Deobriga towards the Cantabric coast, and the eastern routes from the Ebro valley or La Rioja (Yanguas, 2001, 712-713; Urteaga, 2003).

The second axis running parallel to the Cantabric coast linked minor sites such as *Uxama*, *Numantia*, *Clunia*, *Tella* and *Brigeco*. This road corresponds to the Via XXVII recorded in the Antonine Itinerary. This road

followed initially the lowlands of the Douro valley before reaching *Asturica Augusta*, where it was obliged to follow a detour towards the north.

The upper axis was probably the route most employed for trade purposes linking those peninsular regions, taking advantage of particular geographical points that connected with the coast; its proximity to the military front in the campaigns against the Astures was another reason for its busy use.

Apart from those axes of communication that linked eastern regions near the Ebro valley with the extreme NW of the Peninsula, the road going from the north towards the centre and south also stands out as a prominent one. This axis, traditionally known as *Via de la Plata* (Silver Road), linked the capital of *Lusitania*, *Emerita Augusta*, with the NW territories, especially with *Austurica Augusta*, crossing towns such as *Norba Caesarina*, *Salmantica* and *Brigaecium*.

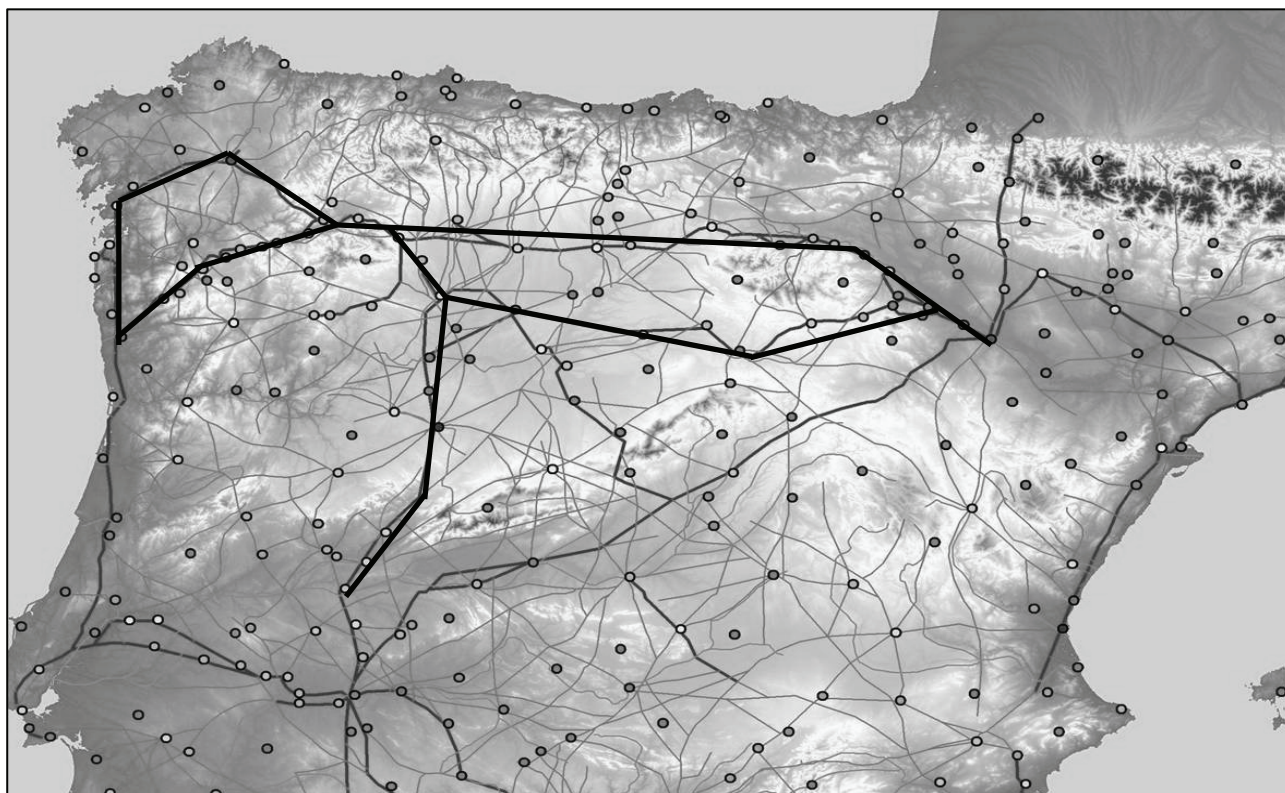


Figure 1.3.11 Map showing the main communication axes

One of the most outstanding aspects of those axes was that they linked the key political centres in *Hispania*. The two E-W axes, as already described, linked the Atlantic cities with *Caesaraugusta* and *Tarraco*, the most important cities; the N-S roads linked this NW region with *Lusitania* and *Betica*, the other key political and economic powers in *Hispania*.

With regards to the beginnings and modifications of these roads, the classical sources, archaeology and remains of milestones all indicate that they were initially built in the I<sup>st</sup> century AD. Despite having less milestones preserved, it seems feasible to think that this century was the time of the creation of infrastructures that consolidated political, administrative and economic control of the NW after Agrippa's pacification process (Rodà, 1998), to which must be added the special requirements of the mineral (gold) interests. In terms of the II<sup>nd</sup> century, the number of recovered milestones is even lower, although those erected by the Roman emperors stand out. Of most interest is the number of milestones from the III<sup>rd</sup> and IV<sup>th</sup> centuries, but they do not normally register distances in great detail. Rabanal-García has proposed (1997) that they are evidence of imperial propaganda.

To understand NW communications, they should be analysed within the framework of the infrastructures of the Iberian Peninsula as a whole. Therefore the same methodology has been employed for the whole province with some interesting results (figure 1.3.11). As mentioned above, the geography of the Peninsula favoured communications by sea routes. Some of the most important towns in *Hispania* were also maritime

ports such as *Tarraco*, *Valentia*, *Cartago Nova* and *Gades*. In addition, the potential of different river routes generated hubs of communication: *Caesaraugusta*, *Hispalis* and *Bracara Augusta* can be considered as examples of such hubs. Finally, there is a series of key interior centres such as *Emerita Augusta*, *Salmantica* and *Asturica Augusta*. These centres attracted many roads (axes in the graph diagram) as a result of their political influence, as well as their central location in the peninsular urban landscape.

The data from the main nodes, following the same process described before for the NW, produced some interesting (figure 1.3.12) findings, for example the importance of coastal areas. The eastern coast, the southern Baetican coast (*Malaka* and *Gades*), Tajo estuary (near the city of *Olisipo*) and *Porto-Bracara Augusta* all appear as areas of high communicability, indicating the excellent conditions for maritime transport. The existence of these ports was linked to the requirements of the Roman State to assure a series of safe ports on the Mediterranean coast as well as the Atlantic routes towards other destinations such as *Gallia* and *Britannia*. The anchorages that developed an important network of communications inland (either by river boat or road) were the ones that became attractive ports for seagoing traffic. Ports such as *Tarraco* (provincial capital), *Gades* and *Brigantium* consolidated themselves as 'compulsory' stops for such activities.

One of the better linked areas was the lower and middle Ebro, in which *Caesaraugusta* assumed a relevant role as hub of communications. From this city there was a major

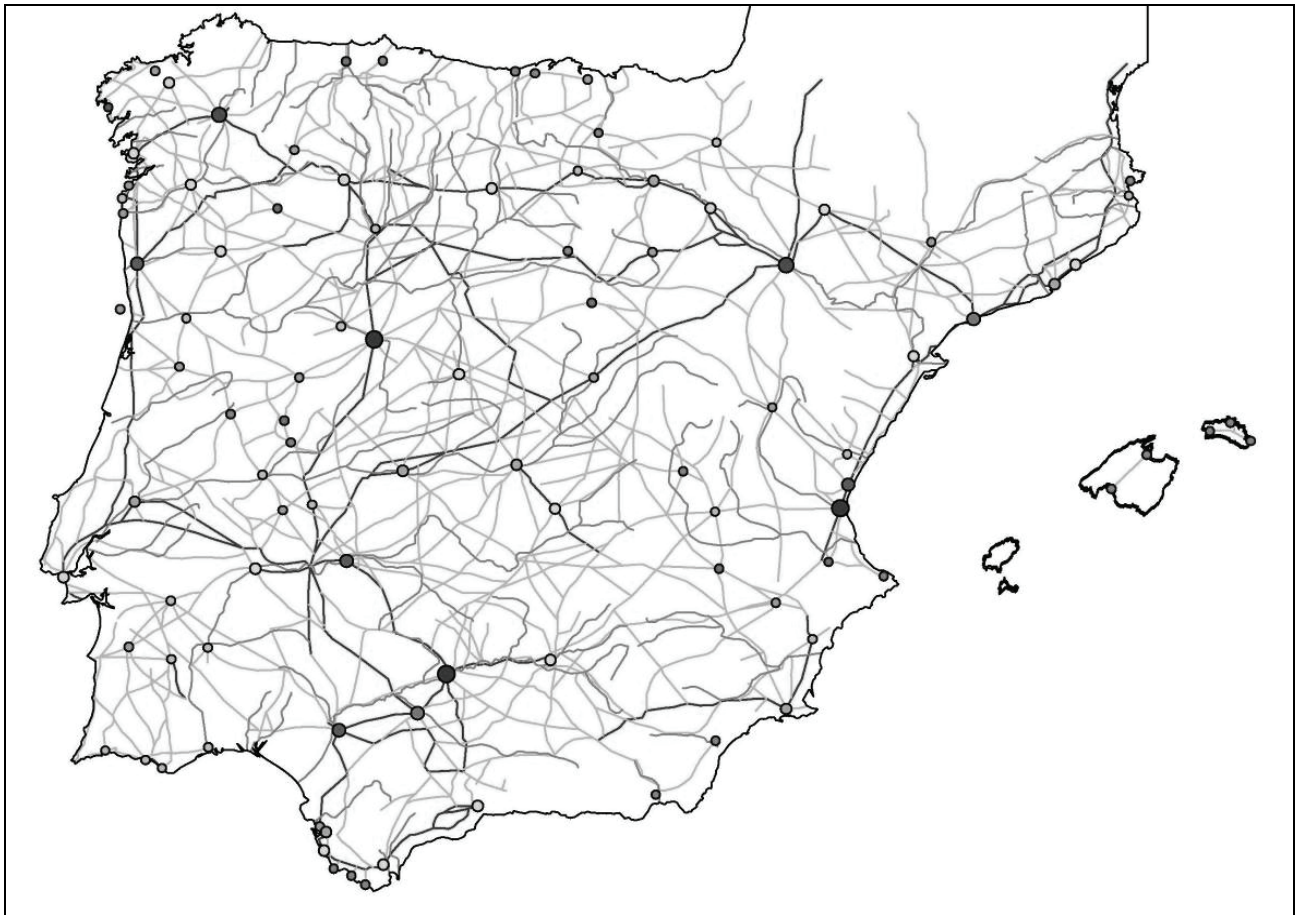


Figure 1.3.12 Diagram representing the main nodes within the Iberian Peninsula

road network that linked all the corners of the Peninsula. The city was joined by roads with the NW towns, Lusitania and its capital, *Emerita Augusta*, and with the NE coast and its most powerful city, Tarraco. Furthermore, thanks to the river Ebro's navigability, it was linked to other towns in the upper (Vareia) and lower Ebro, such as Dertosa. This latest town was also a maritime port for Rome and the rest of the Empire. Cities such as *Ilerda*, *Oscá* and *Pompaelo* were organised in the northern regions with other intermediate points between the Pyrenees (and on the other side) and the river Ebro. Similarly, *Bilbilis*, *Numantia*, *Gracchuris* and *Calagurris* represented key transit points on the southern side and also acting as intermediate points between the river valley and other inland territories. The road network and the navigability of the Ebro and its tributaries made these regions some of the best linked in the Peninsula.

Another region with enormous mobility potential was the Guadalquivir valley. From *Gades* (located further away on the coast), to *Hispalis*, *Italica*, and as far as *Corduba*, there were excellent conditions for communications,

because of the River Guadalquivir and a complementary network of roads.

Finally, the results also reveal the importance of the N-S axis – the *Via de la Plata* (Silver Road). The axis started in the Baetican territories, linking cities such as *Emerita Augusta*, *Norba* and *Salmantica* towards the NW Peninsula, and consequently features with a high level of connectivity on our map (figure 1.3.13). This may have been the result of a long tradition, having been well used since Republican times.

As a conclusion, it is important to distinguish the theoretical character of the present study with regards to relationships between the network and its use in Roman times. In other words one factor is the theoretical explanation of how this network was created, and the other is its actual use, which may differ. Mobility between the main urban sites in Roman period has been studied here, favouring contacts between the three main *conventus* capitals. However, we do not know whether its use for military, state or trade purposes was exactly the same.

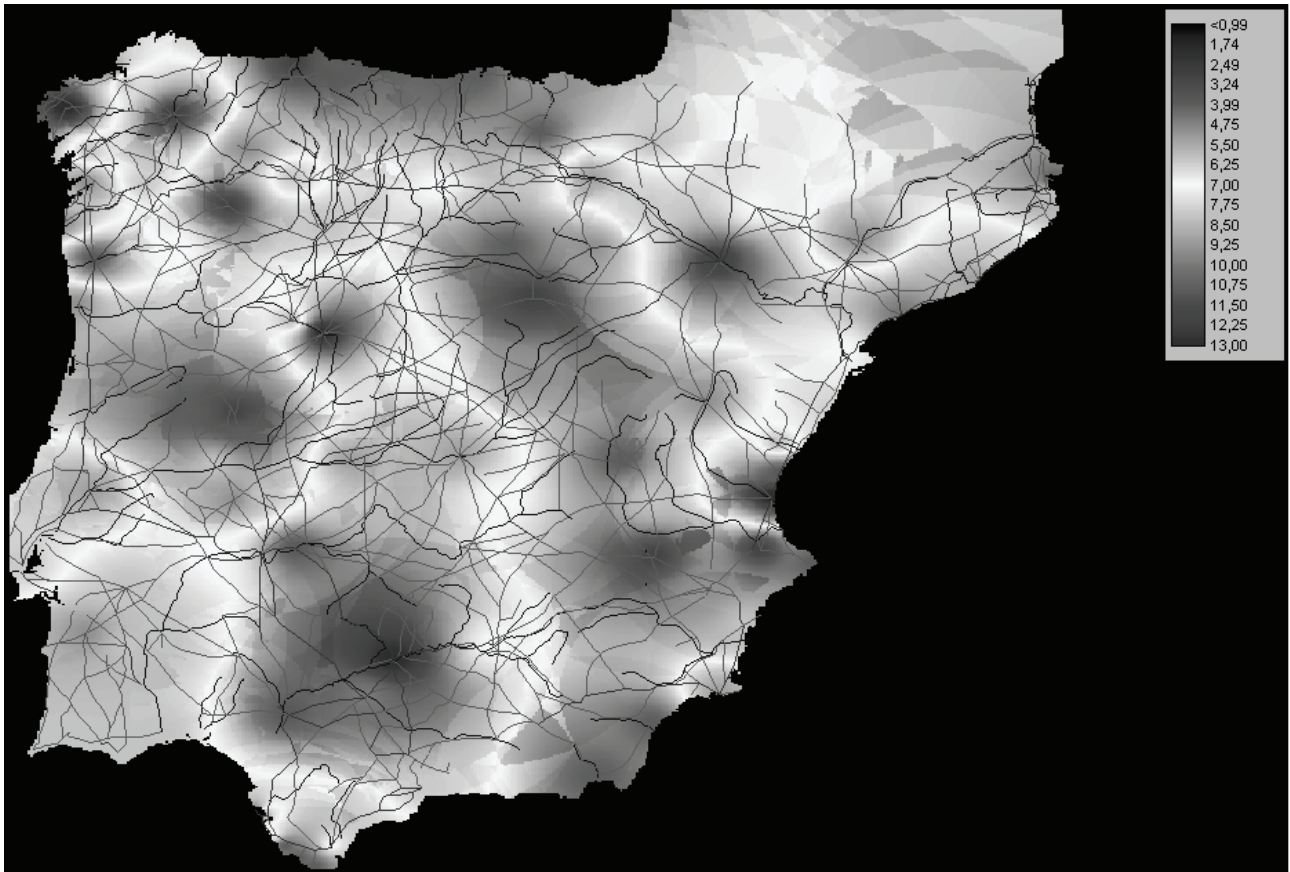


Figure 1.3.13 Interpolation map of major points in the Iberian Peninsula

