DE CIX

Madrid's Position in the Global Telecommunications Landscape

TeleGeography
Authoritative Telecom Data

White Paper

Where networks meet

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Historically bypassed by networks exchanging traffic in the traditional hubs of London or Paris, Madrid increasingly looks to be a promising market for peering. The imperative of content networks to localize caches, the sheer size of the local market, and the competitiveness of its network pricing combine to increase Madrid's potential as a viable peering hub.

DE-CIX has commissioned TeleGeography to examine Madrid's position in the global telecommunications landscape. As such, this paper examines Spain's international connectivity, its proximity to extensive subsea cable infrastructure, local demand, and pricing factors that could boost interest in using Madrid as an interconnection point.

1. International Connectivity

Spain's international Internet bandwidth reached 6.7 Tbps in 2015, having grown at a 21 percent compound annual rate between 2011 and 2015 (see Figure 1. International Internet Bandwidth Connected to Spain, 2011-2015). International capacity connected to Spain in 2015 was more than double its international capacity in 2011.

A majority of Spain's international bandwidth connects with France. The combined share of connectivity to France, the U.K., and Portugal make up fully 89 percent of Spain's international Internet capacity (see Figure 2. Share of International Internet Bandwidth Connected to Spain by Country, 2015).

While Morocco has significant capacity connected to Spain (145 Gbps), more of its Internet backbone capacity is connected to the U.K. and France, despite its relative proximity to Spain. Similarly, Algeria relies more on France and Italy for international connectivity than on Spain.

Given increasingly favorable factors that will be discussed in this paper, potentially more West African Internet backbone capacity could connect to Spain.

2. Infrastructure

The Iberian Peninsula is the landing point for numerous submarine cables. Cables stretching from Asia to Europe such as FLAG Europe-Asia, Europe-India Gateway, and SeaMeWe-3 all have landing stations here. Systems connecting Africa to Europe, such as WACS, Main One, SAT-3/WASC, and ACE, make landfall in Portugal.

Figure 1
International Internet Bandwidth Connected to Spain, 2011-2015

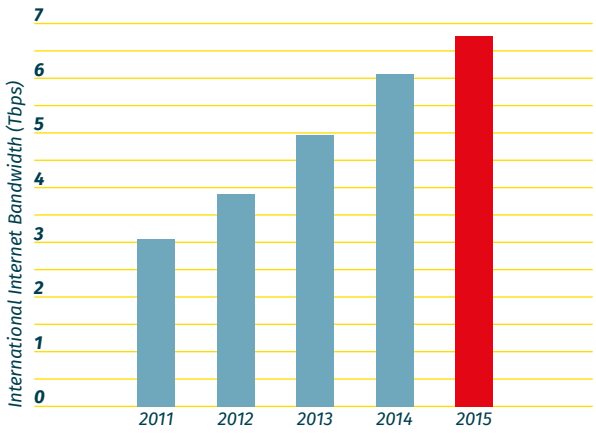


Figure 2
Share of International Internet Bandwidth Connected to Spain by Country, 2015

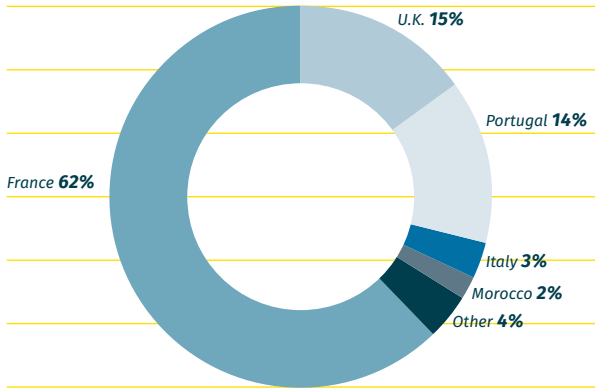


Figure 3
Map of Existing and Planned International Submarine Cables Connected to the Iberian Peninsula

Cable System	Iberian Landing	Ready-for-Service (RFS) Year
Europe-Africa		
Estepona	Spain	**1994**
SAT-3/WASC	Portugal	**2002**
ALPAL-2	Spain	**2002**
Main One	Portugal	**2010**
Canalink	Spain	**2011**
Africa Coast to Europe	Portugal	**2012**
West African Cabel System	Portugal	**2012**
Oran-Valencia	Spain	**2016**
Europe-Asia		
Flag Europe-Asia	Spain	**1997**
SeaMeWe-3	Portugal	**1999**
Europe India Gateway	Gibralta, Portugal	**2011**
Intra-Europe		
BARSA V	Spain	**1996**
TAGIDE 2	Portugal	**1996**
Tata TGN-Western Europe	Portugal/northern Spain	**2002**
Trans-Atlantic		
Columbus-III	Spain	**1999**
Atlantis-2	Portugal	**2000**
eulaLink	Portugal	**2018**

Figure 4
Existing and Planned International Submarine Cables Connected to the Iberian Peninsula

Note: Table depicts international submarine cables only.

The region also serves as a landing for trans-Atlantic cables on the southern route, namely Columbus-III and Atlantis-2. In 2018, eulaLink is slated to add diverse capacity to this route, interconnecting Brazil and Portugal (see Figure 3. Map of Existing and Planned International Submarine Cables Connected to the Iberian Peninsula).

The extensive subsea cable connectivity in the Iberian Peninsula could add weight to the region's potential as an international peering point. However, like Morocco and Algeria, other West African nations along the major subsea route connected to Portugal overwhelmingly bypass the region and connect their Internet backbones to London or Paris. Fully 77 percent of Nigeria's international Internet capacity connects to London, as does 40 percent of South Africa's. In a world where traffic exchanges are increasingly moving closer to the network edge, offsetting demand from traditional hubs, the right confluence of factors could create a peering environment in Spain to better serve both the domestic market and West Africa.

3. Demand

In order for a peering environment to thrive, it should have a strong mix of domestic and international demand. Spain's proximity to extensive subsea cables and its relative proximity to West Africa compared to the U.K. would seem to establish its potential for international peering demand. But its local market could diversify the demand and anchor a sustainable peering ecosystem as well. As international content networks look to move content nearer to end-users and reduce heavy dependence on traditional hubs such as Frankfurt and Paris, Spain's local market will inevitably see increased local demand for interconnection.

Indeed, Spain's local communications market shows signs of solid demand growth. In the past five years, broadband household penetration has increased more than 10 percent to reach nearly 75 percent penetration (see Figure 5. Broadband Household Penetration, Spain, 2011-2015).

While subscription growth has moved at a conservative 5 percent compounded annually over the past five years, growth in average subscriber throughput has been quite robust at 19 percent compound annual growth. Thus an increased appetite for end-user bandwidth has driven total broadband bandwidth growth at a healthy rate of 26 percent compounded annually between 2011 and 2015 (see Figure 6. Change in Broadband Subscribers and Average Subscriber Bandwidth in Spain, 2011-2015).

Figure 5
Broadband Household Penetration, Spain, 2011-2015

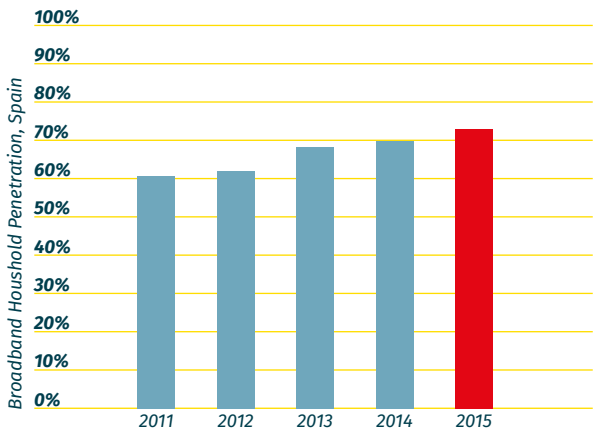
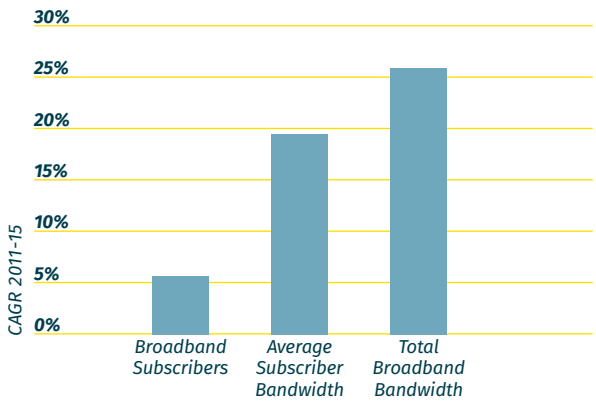


Figure 6
Change in Broadband Subscribers and Average Subscriber Bandwidth in Spain, 2011-2015



Given its status as a major subsea cable landing site, Portugal could arguably create a strong peering environment. However, local demand in Portugal is much less than in Spain. Spain has more than three times the international Internet bandwidth (6.7 Tbps vs. 1.6 Tbps) and nearly ten times the number of broadband subscriptions (22.4 million subscriptions vs. 3.1 million) (see Figure 7. Broadband Subscriptions in Spain and Portugal, 2015). Given the relative scale of domestic demand, Spain would seem to be a more plausible choice to establish a regional peering hub.

Within Spain, Madrid serves as the largest communications market. Its international Internet bandwidth of 4.1 Tbps is three times the capacity connected to Barcelona, the next largest hub. The network and colocation options available in the capital city and its proximity to most international submarine cable landings relative to Barcelona, likely make Madrid the most plausible choice for a Spanish peering location.

4. Pricing

Network pricing trends in Madrid create a compelling case for establishing a peering ecosystem in the city.

IP transit pricing in Madrid has fallen from premium levels to rates that are comparable with the most competitive markets in Europe. Just five years ago, median transit rates in Madrid were almost 25 percent higher than prices in London. Today they are 3 percent lower than rates in London, with a median of €0.67 (see Figure 8. Median 10 Gbps IP Transit Prices for Selected European Cities 2011-2015). This greatly reduces the incentive to purchase transit in a larger hub such as Paris or London and instead incentivizes the increased localization of traffic exchange.

While competitive IP transit rates can increase traffic localization, colocation prices more directly affect peering environments. Free peering is never really free. It involves investment in exchange memberships, ports, and even more significant indirect costs such as colocation and cross-connects. In regards to colocation and cross-connect pricing, Madrid is uniquely competitive among European markets in providing a relatively affordable environment in which to peer. In evaluating total colocation costs, it is useful to look at individual components along with a basic total cost model. In a comparison of median baseline colocation rates (price per kilowatt), Madrid's price of €234 is lower than the median price in each of the "big four" European markets, as well as that of the proximate secondary market of Milan (see Figure. 9. Median Price per Kilowatt at 4-Kilowatt Density, H2 2015). Its median rate is fully 70 percent lower than that of London.

Figure 7
Broadband Subscriptions in Spain and Portugal, 2015

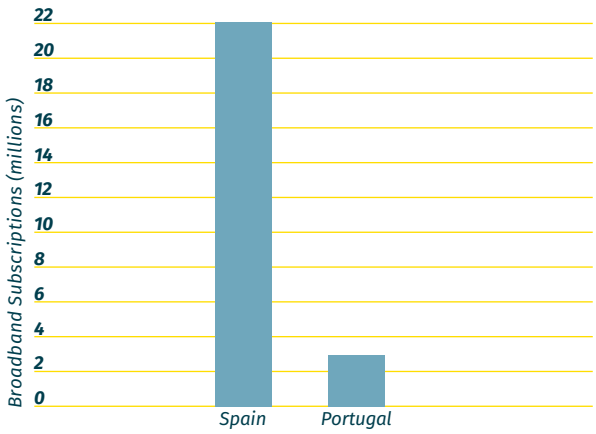
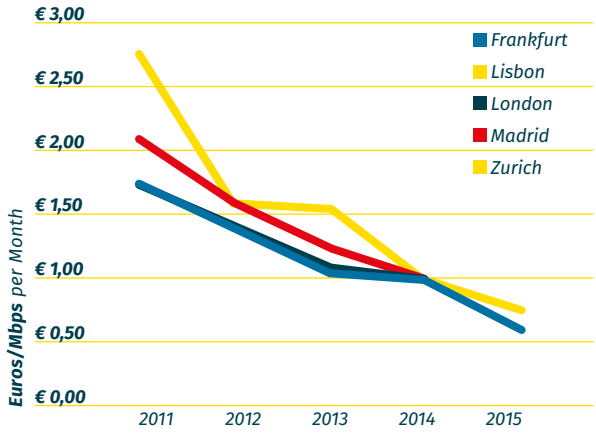


Figure 8
*Median **10 Gbps** IP Transit Prices for Selected European Cities, 2011-2015*



Even in Europe, where cross-connects tend to be much cheaper than in North America or Asia, these costs can add up to a sizeable portion of the total colocation cost. Madrid's median fiber cross-connect price is competitive with other European markets, and 7 percent lower than the median price in London (see Figure 10. Median Fiber Cross-Connect Price, H2 2015).

When we put together a basic total cost model for colocation, Madrid's relative competitiveness is more starkly apparent. If we assume a simple scenario comparing customers who take a two-year lease of a 4-kilowatt density cabinet with five fiber cross-connects, Madrid's average total cost is dramatically lower than most other cities in the sample (see Figure 11. Total Cost of Ownership per Month, Five Cross-Connects, H2 2015). With an average of €1,270 vs. €2,430, Madrid's colocation costs are fully 90 percent lower than London's.

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Figure 9
International Internet Bandwidth Connected to Spain, 2011-2015

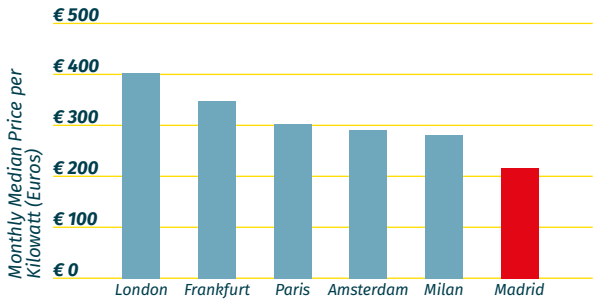


Figure 10
Median Fiber Cross-Connect Price, H2 2015

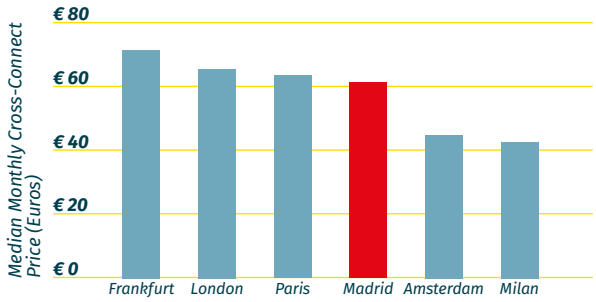
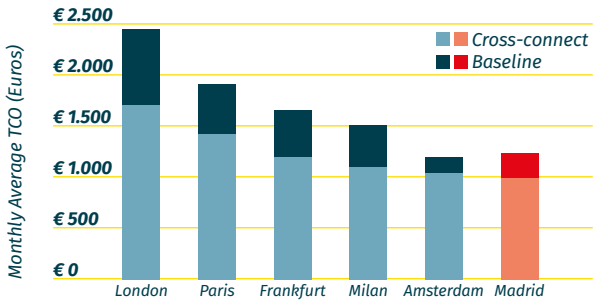


Figure 11
Total Cost of Ownership per Month, Five Cross-Connects, H2 2015



5. Outlook

The traditional hub-and-spoke model of network interconnection has dominated global traffic flows since the advent of telecommunications, but there is evidence that this model is now shifting to some extent.

As end-user bandwidth requirements insatiably increase and cloud and content platforms move toward more distributed models of network deployment, some of the natural dependence on the largest global hub markets is offset by the development of more localized ecosystems.

Madrid, traditionally bypassed by international networks interconnecting in Paris and London, could be a beneficiary of this trend toward increased network localization. Its proximity to major subsea cable systems make it a relatively close peering point for West African networks compared to London. Despite the aggregation of numerous subsea systems in Portugal, Madrid has a much larger existing network ecosystem than Lisbon, making it more suitable for peering.

With a 26 percent compound annual growth rate in broadband bandwidth, Spain exhibits strong internal bandwidth demand. Its slowing growth in international bandwidth indicates that demand is already being met more locally. As content providers and international networks continue to meet local demand directly in Madrid, the market could become more appealing to international networks that currently bypass it, provided the availability of competitive prices for backhaul from Portugal.

Madrid's increased competitiveness is clearly on display in looking at key pricing factors. IP transit is no longer at a premium relative to traditional hubs, so there is little incentive for local networks to go elsewhere to purchase global Internet access.

Colocation costs are considerably lower in Madrid than in the major European hubs. Factoring in the local demand, geographic positioning, and competitive pricing, Madrid could be poised to emerge as a compelling peering market in its own right.

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