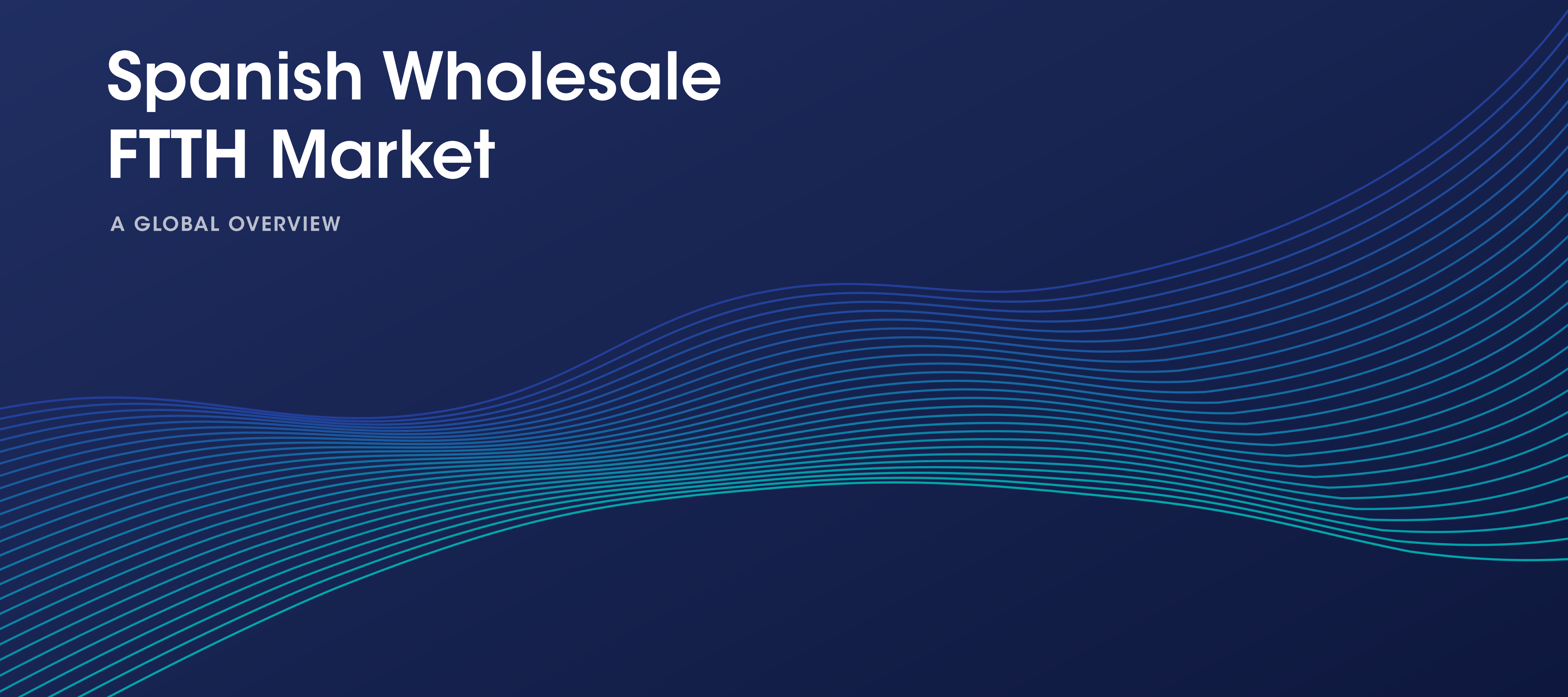




Spanish Wholesale FTTH Market

A GLOBAL OVERVIEW



Index

| | | | |
|----------------------------|----|--------------------------|----|
| 01. Introduction | 03 | 07. Regulatory framework | 20 |
| 02. Executive summary | 06 | 08. Market trends | 21 |
| 03. Coverage | 07 | 09. Main conclusions | 22 |
| 04. Penetration & Take-Up | 08 | 10. The authors | 23 |
| 05. Technology's evolution | 09 | 11. About Nae | 25 |
| 06. Spain's overview | 10 | 12. About Onivia | 26 |



Onivia is the first neutral and independent wholesale bitstream operator in Spain offering wholesale fibre-to-the-home (FTTH) access and other connectivity services

10,900km

Fiber network

+ 1300

Spanish municipalities

1Gbps

Potential speed

4.1M

Homes passed



We are pleased to present to you
the first edition of the
#WholesaleSPAINReport

Offering analyses, statistics and our thoughts about
the fiber panorama in Spain. Access to broadband
infrastructure is key to go beyond.



Jose Antonio Vázquez
CEO, Onivia

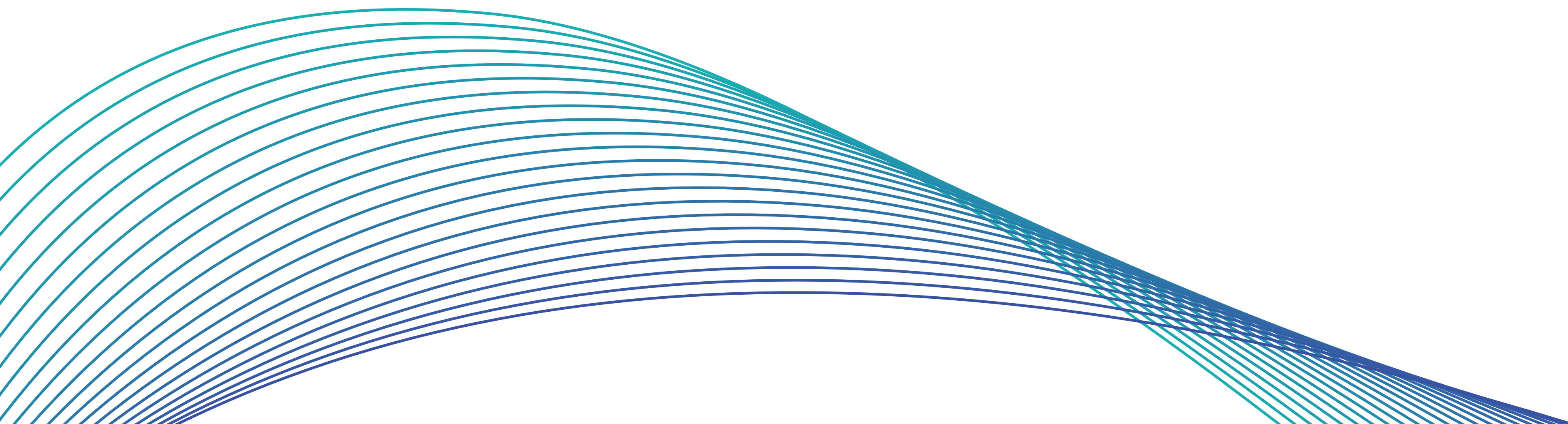
The aim of this report is to provide some visibility about Internet Service Providers in all Spanish territory

The report covers the presence and performance of the different operators, at national and regional level. The share between national and local ISPs varies hugely across the country and there is a clear geographical concentration in the south-east of the country.

The identified trends could bring significant benefits to wholesale access providers, as well as to backhaul providers in terms of increased demand and public access funding programs.

Onivia's position in the fiber optic market fosters competition by providing access to a greater number of local and regional operators.

I wish you a pleasant and fruitful reading.



Spain: European connectivity leader

Europe made a **commitment** to bring 1Gbps **connectivity** to all households and 5G coverage to all municipalities in the EU territory, in which context Spain has become an European leader in NGA technologies, especially in FFTH and rural areas with a 72% covered (+100Mbps) premises.

Geographical concentration hot points

As a competitive market the share between type of players varies hugely across the country, where the strongest concentration of them is found, besides Madrid and Barcelona, in the south-east of the country. We call this area the “ground zero of local operators”. More of 80 ISP’s are active in Murcia, Valencia or Alicante.

Competitive local offering

Such a competitive market has fostered the creation of vibrant specialised players showing a range of geographical strategies. We have identified three different strategies for Tier 2 ISP and three more for Tier 3 ISP attending the mix between presence in bigger cities and rural areas and identified the key players.

Complex and barely known ecosystem

Spanish FBB industry is a complex ecosystem with multiple players competing. A very distinctive trace of this market is having many small ISPs usually under the radar due to their small size with a key role in some local areas. We have identified 189 municipalities leaded by local ISP. We have found more of 1.416 active ISP.

Network quality leadership

With an average download speed of 178,4 Mbps Spain is 11 position in the Ookla’s Fixed Broadband Global Performance index. There are no major differences between Tier 1 and Tier 2 ISPs. Tier 3 ISPs seem to focus on a lower speed strategy. Geographically performance varies from 239Mbps in bigger cities (>1M) to 98 Mbps in small towns (<1k). The presence of different strategies confirms the highly competitive nature of the market.

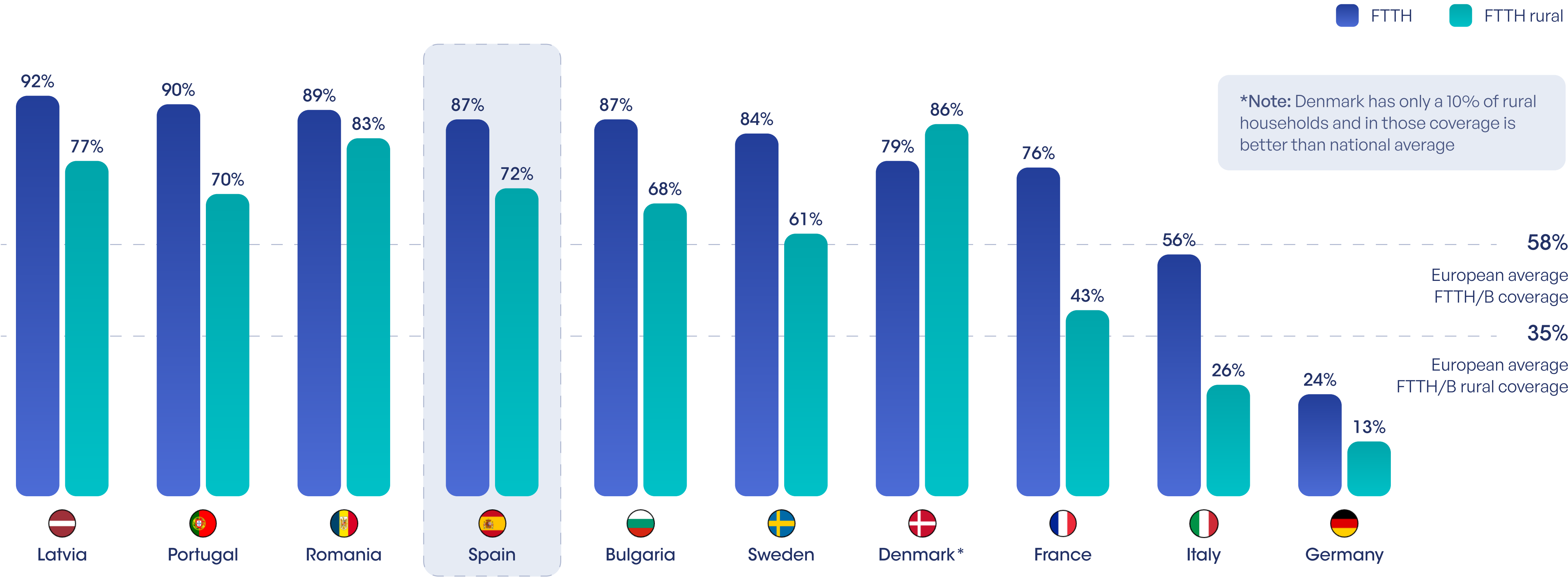
Opportunities for wholesale operators

This competitive market is being actively consolidated around some players with Tier 2 operators already connecting more of 300 rural municipalities. The role of wholesale operators is becoming more and more important bringing benefits for the different players and final customers.



Spain is one of the European leaders in FTTH coverage, in particular it outperforms fiber European averages in both rural and urban areas, especially when compare with similar countries in size and population.

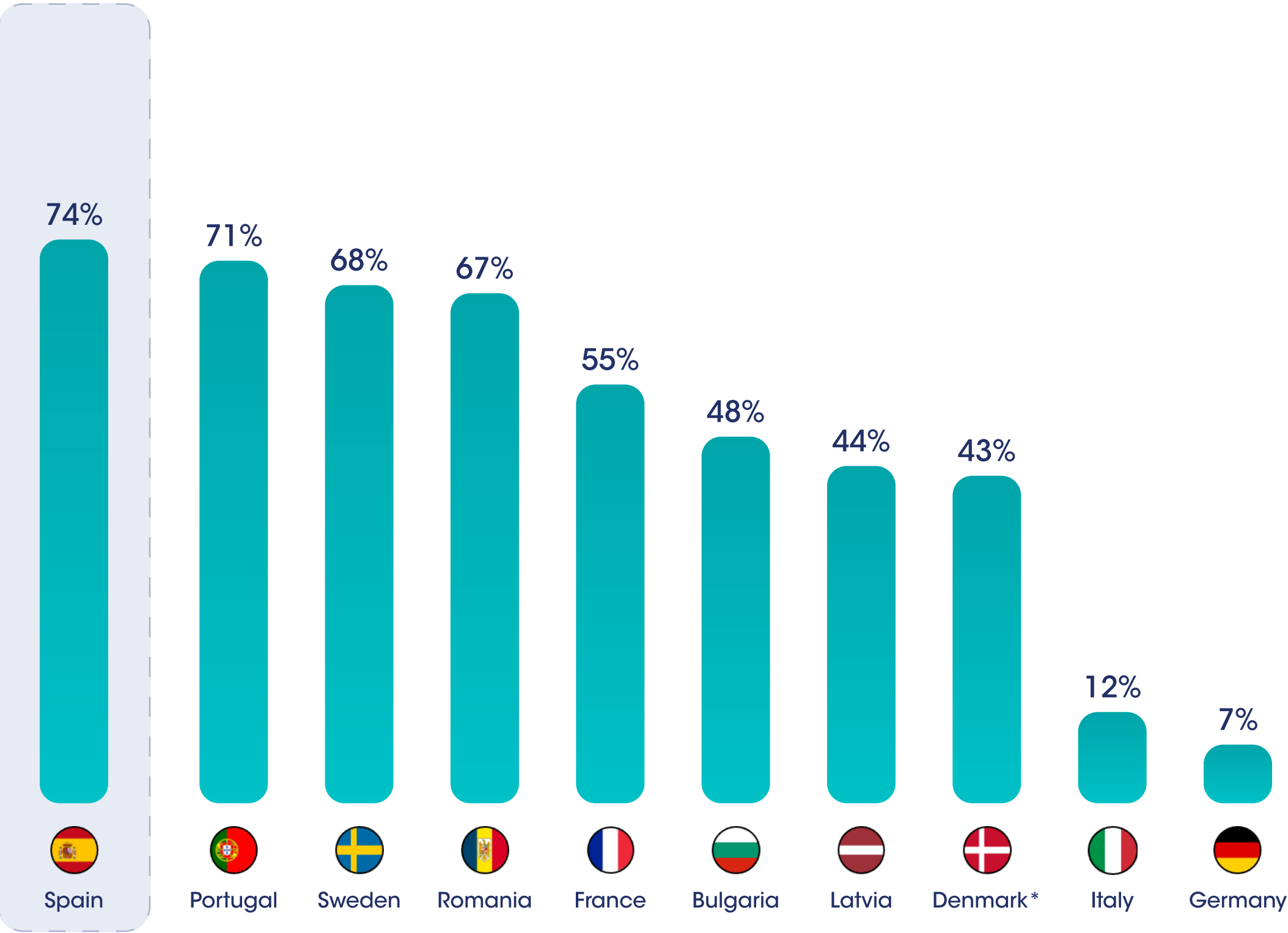
EUROPEAN BENCHMARK OF URBAN AND RURAL FTTH/B COVERAGE, 2022



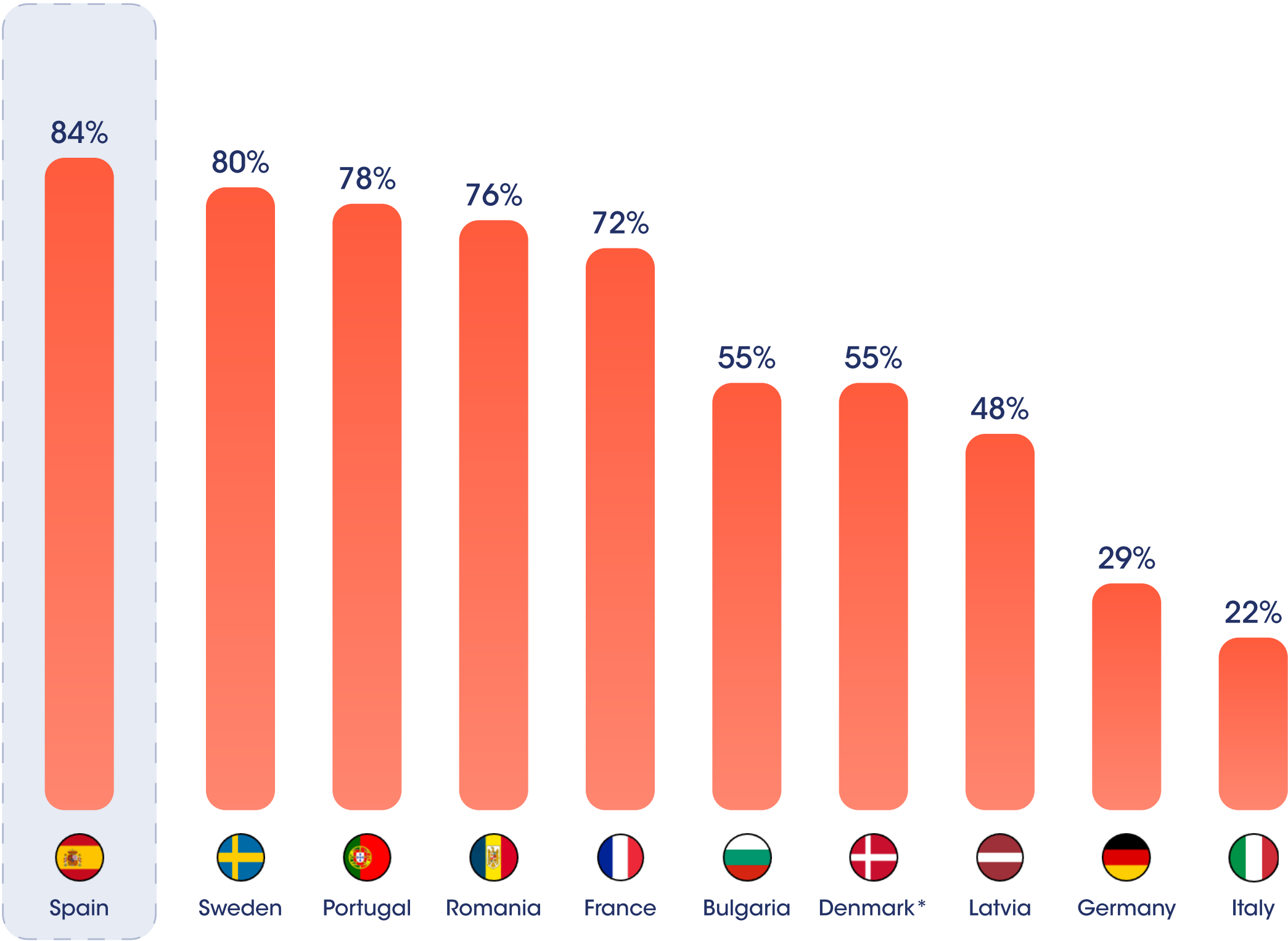
SOURCE: FTTH Council panorama April 2023

Spain is leading both penetration and FTTH/B take up rates, opening a significant gap with similar countries in terms of size and population.

PENETRATION RATES,
% FTTH/B subscriptions / households 2022



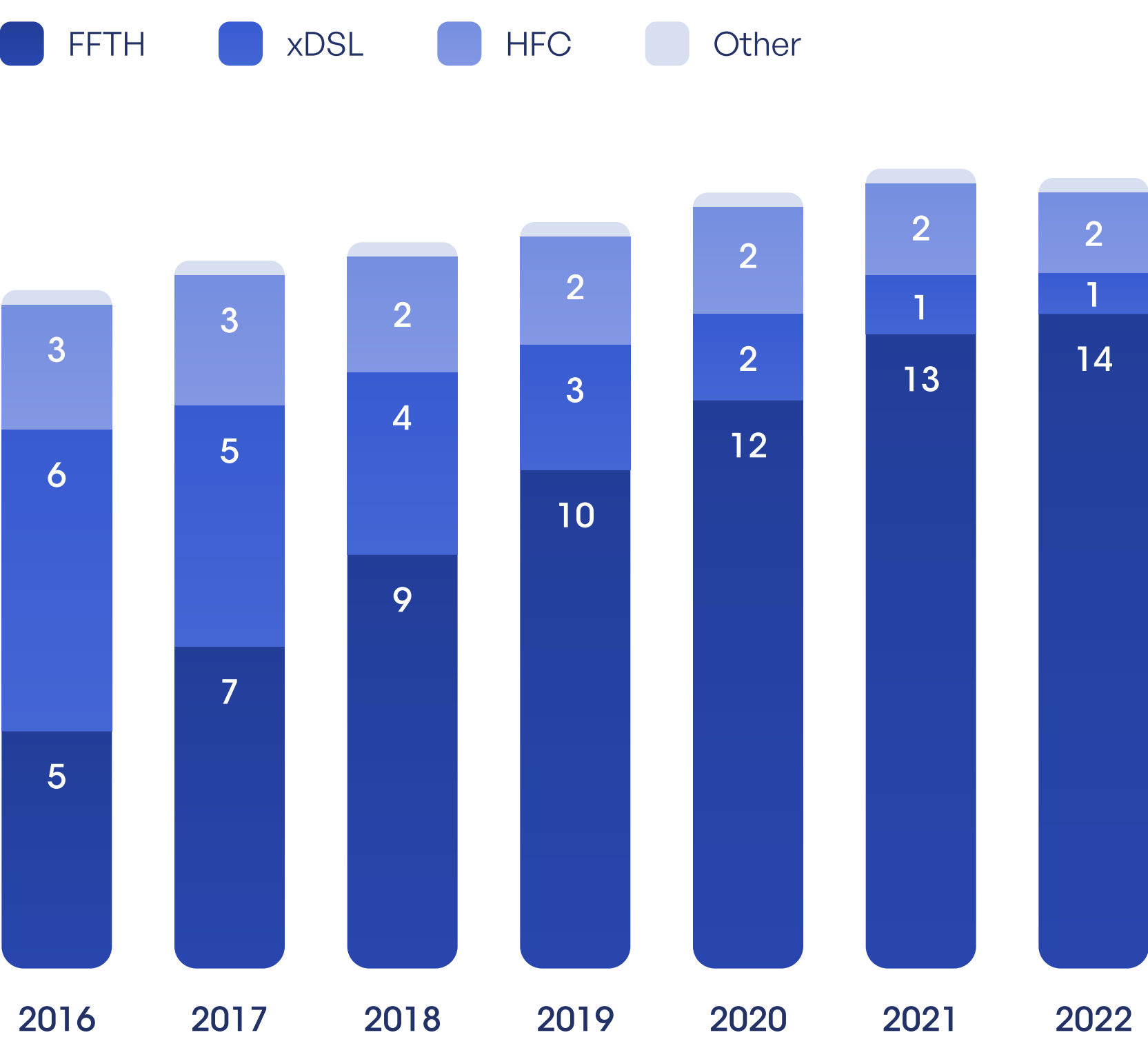
FTTH/B TAKE-UP RATES COMPARISON,
% FTTH/B subs. / homes passed 2022



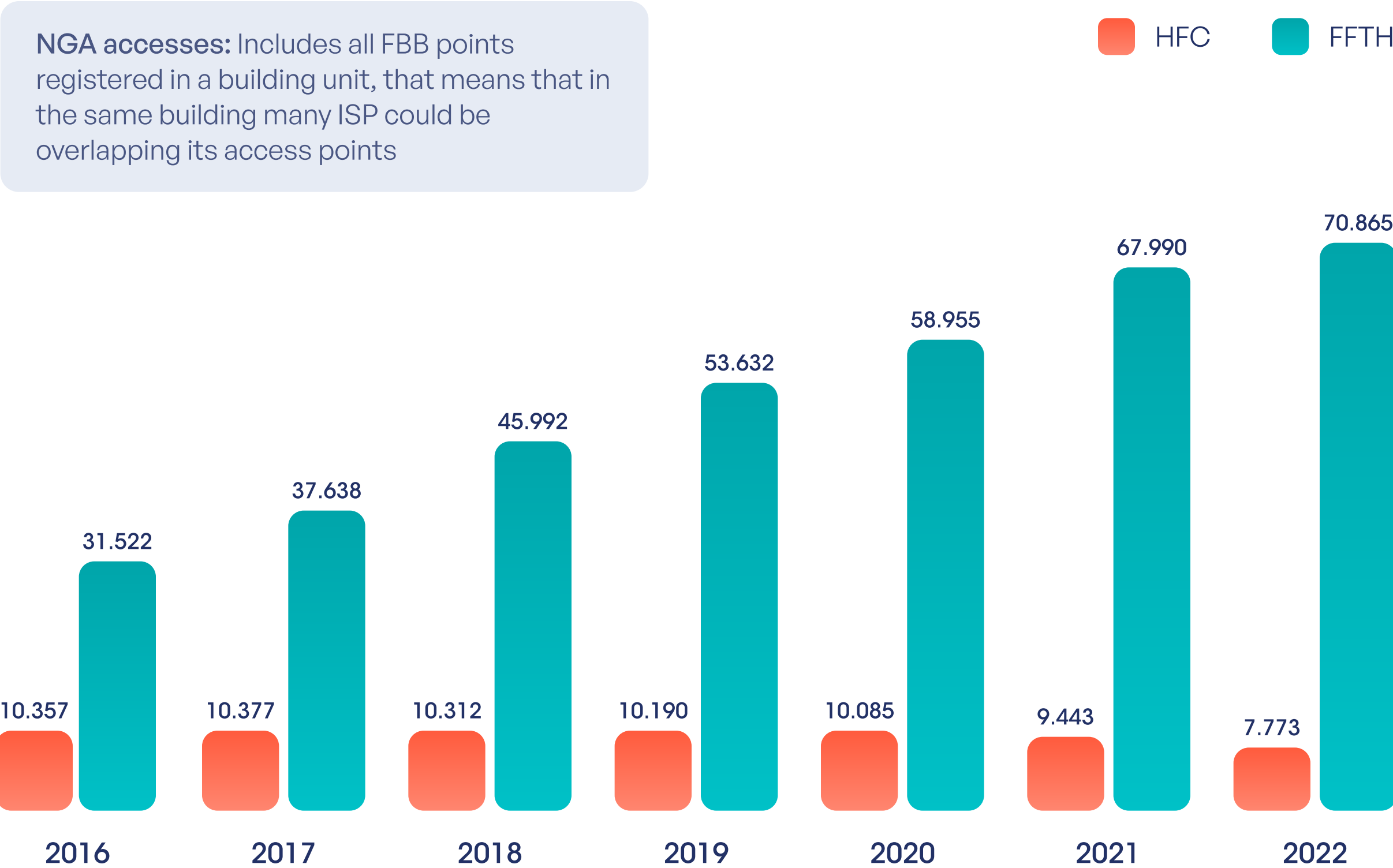
SOURCE: FTTH Council European FTTH/B Market Panorama 2022

While Spain has turned FFTH into the country's main NGA technology instead of xDSL, HFC technology has experienced a significant drop in the number of lines, and this trend is expected to continue.

FBT TECHNOLOGY EVOLUTION IN SPAIN,
million lines (subscriptions)



EVOLUTION OF INSTALLED NGA ACCESSES,
thousands of accesses (homes passed)

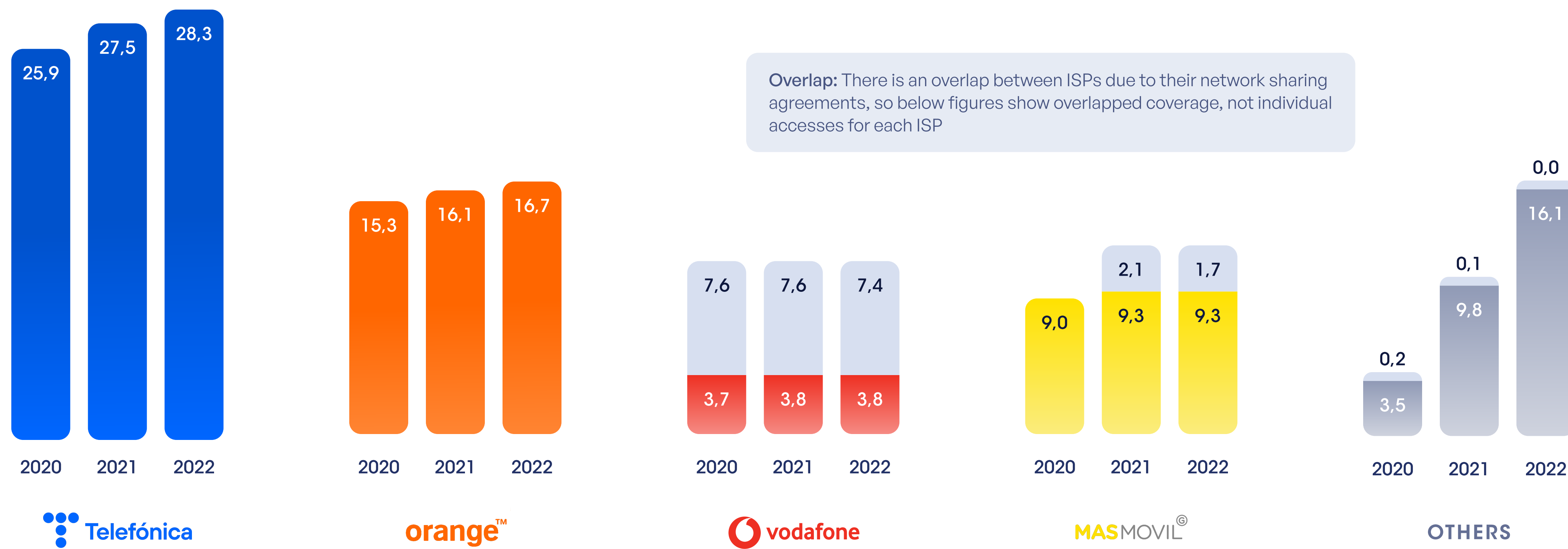


SOURCE: CNMC data

The Spanish NGA access market is dominated by Telefónica, although the highest growth rate in recent years has been experienced by small and local operators, probably due to rural expansion and EU programmes.

EVOLUTION OF INSTALLED NGA ACCESSES BY OPERATOR, millions of accesses

HFC FTTH

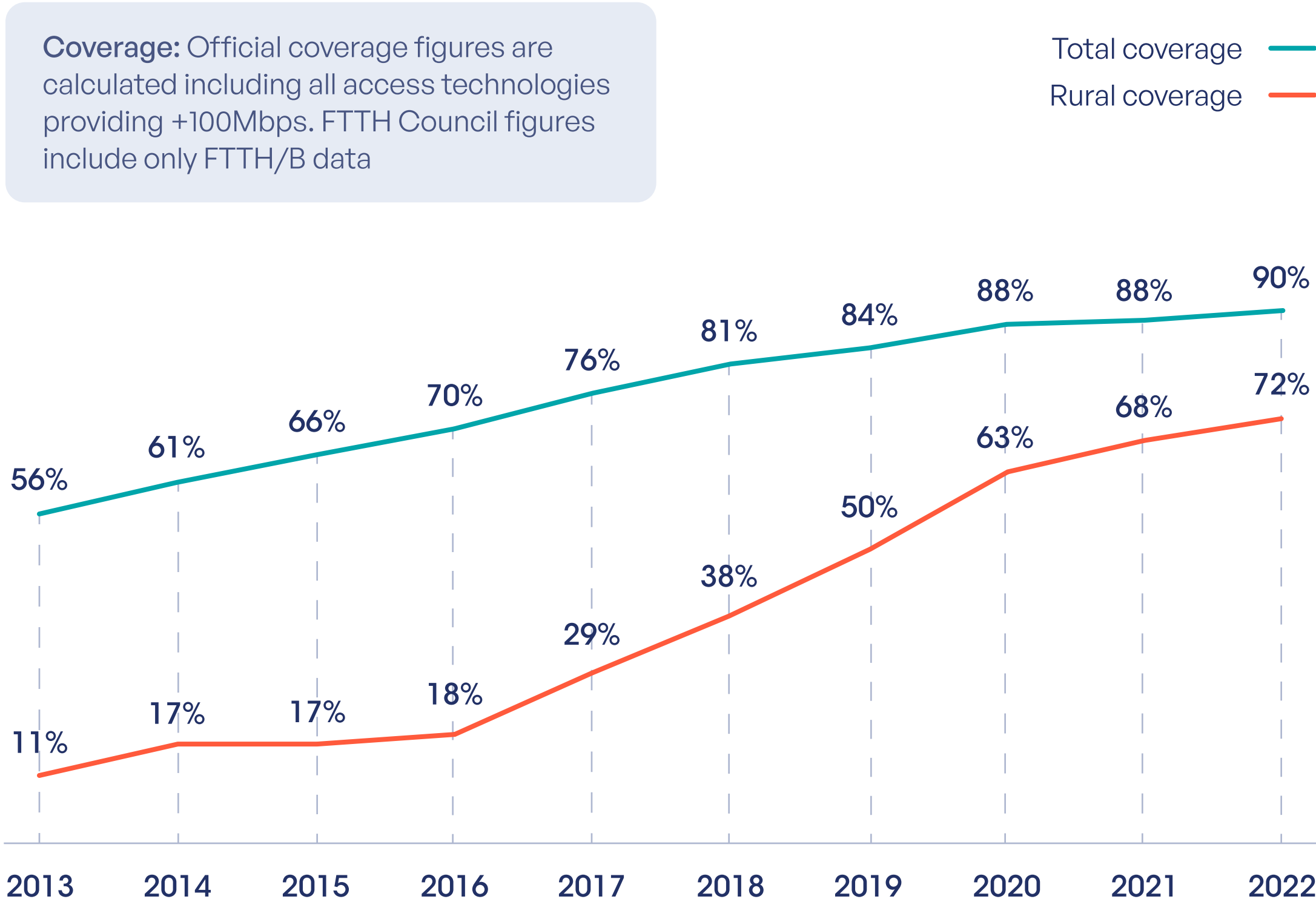


Spain shows very high rates of fibre coverage (90%), probably driven by private deployments and government support for rural areas connectivity programmes (PEBA/ÚNICO/European funds plans).

RURAL HOMES WITH BROADBAND (+100MBPS) COVERAGE,
rural homes 2022

| Coverage range | Number of rural regions | Total number of inhabitants | Total number of rural homes | FTTH covered homes |
|----------------|-------------------------|-----------------------------|-----------------------------|--------------------|
| 90≤x≤100 | 2.250 | 3.151.363 | 2.133.947 | 2.036.165 |
| 80≤x<90 | 951 | 2.118.065 | 1.434.973 | 1.227.773 |
| 70≤x<80 | 505 | 1.209.335 | 891.531 | 674.314 |
| 60≤x<70 | 316 | 675.965 | 525.633 | 347.044 |
| 50≤x<60 | 181 | 325.712 | 290.331 | 160.267 |
| 40≤x<50 | 127 | 243.847 | 213.862 | 97.682 |
| 30≤x<40 | 98 | 145.064 | 138.270 | 49.009 |
| 20≤x<30 | 68 | 101.750 | 106.691 | 26.189 |
| 10≤x<20 | 61 | 63.901 | 72.266 | 10.223 |
| 0≤x<10 | 2.128 | 453.557 | 557.595 | 3.249 |
| Totals | 6.685 | 8.488.559 | 6.365.099 | 4.631.915 |

SPANISH BROADBAND (+100MBPS) COVERAGE, % households



SOURCE: Coverage report Ministerio de Asuntos Económicos y Transformación Digital (MINECO)

The Spanish ecosystem can be allocated in three levels: national champions, big players in their segment and local providers, which have a significant relevance in their original territories.

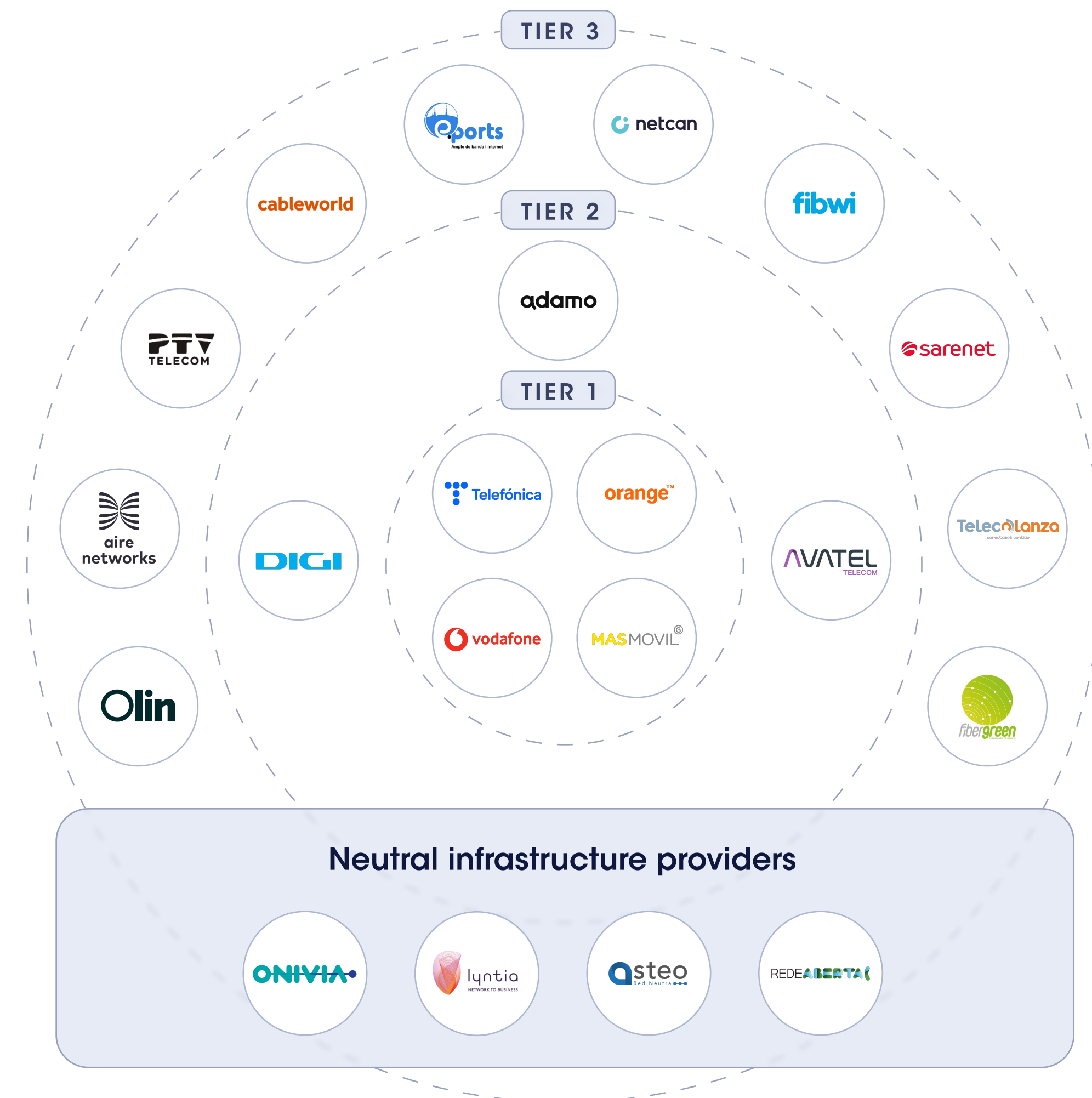
ISP FROM FBB ECOSYSTEM ALLOCATION, non exhaustive

Within the Spanish ecosystem, three different TIERS can be identified:

- + **Tier 1 ISPs:** Include national champions, the main ones: Telefónica, Orange, MásMóvil and Vodafone.
- + **Tier 2 ISPs:** Include big telecom companies with national focus, but their size in terms of presence is smaller than Tier 1: Digi, Adamo and Avatel.
- + **Tier 3 ISPs:** Other ISPs which don't fit in Tier 1 or Tier 2 requirements in Spain. We have selected the Top 10 in terms of presence according to OOKLA data.

And also, there are neutral operators offering its network for wholesale access, but those are out of the scope of this report.

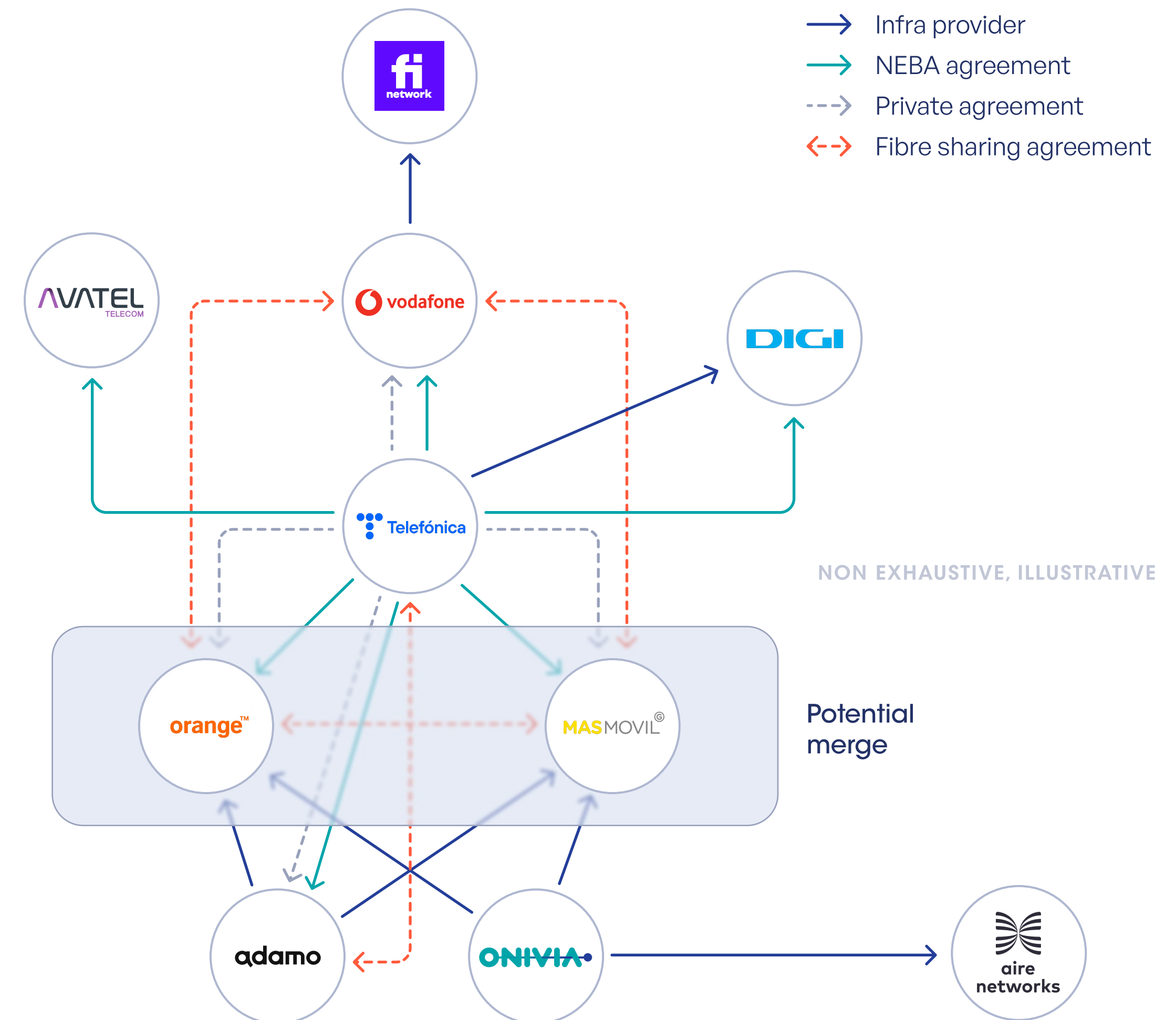
The market is complex enough to include also a number of players that are not detected by our methodology: resellers using their own brand and outsourcing all network aspect to other wholesale players.



A key point for the market competitive level is the existence of a very dense level of regulated and voluntary agreements between many players from the market different tiers. These agreements can be of different types ranging from "Fibre sharing" to "private bit stream".

NETWORK AGREEMENTS, non exhaustive, illustrative

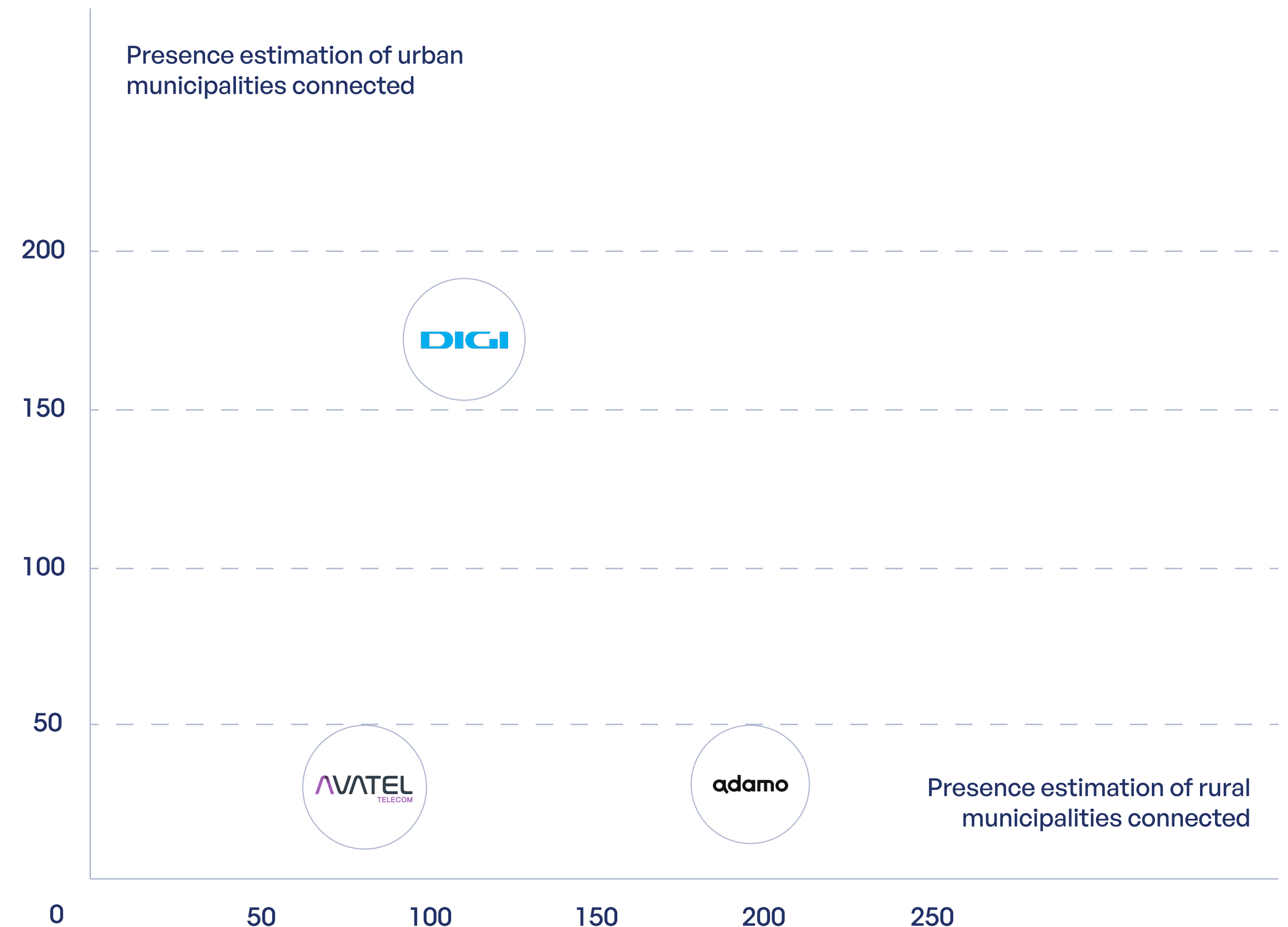
- + In the core of the very sophisticated fibre Spanish market lays the regulatory obligations imposed by regulator to historical incumbent. These regulated relationship quickly migrated to a private voluntary one creating a whole new market.
- + Also central to the ecosystem are the rest of Tier 1 ISP constructing their own infrastructure and exploring all kind of relationship models.
- + Most of the rest of ISPs operate their own infrastructure, whilst simultaneously leverage their operations on third party networks in order to provide nationwide services.
- + The richness of type of relationships and roles and the size of the infrastructure managed for every player makes the Spanish FTTH market a case of success of the deployment of NGA networks.



Tier 2 ISPs have a nationwide profile, however among them there are slight differences depending on their main focus, with Digi and Adamo having a leading presence in urban and rural areas respectively.

ESTIMATION OF TIER 2 ISP ALLOCATION ACCORDING TO PRESENCE AND RURALITY, non exhaustive

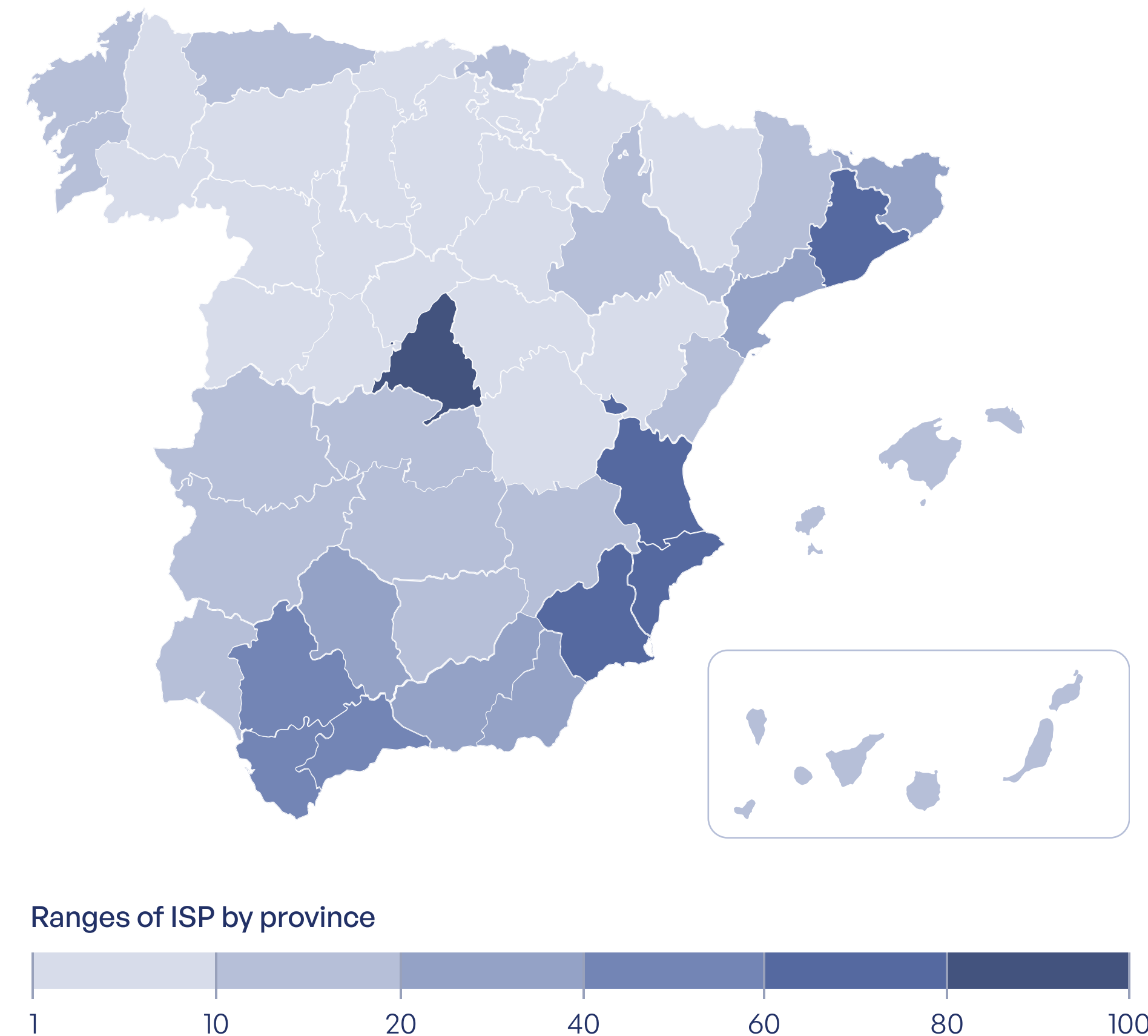
- + Digi, Avatel or Adamo, as the most relevant ISPs after TIER 1 ISPs, have managed to become one the main players in many regions of Spain, such as Castellon, Madrid or Cantabria.
- + A clear emphasis of Digi is observed within urban regions, while Avatel and Adamo concentrate on rural areas depending on the size of the region.
- + Both ISP has been very active using public grants to develop rural infrastructure. Regarding the submitted resolution for the “UNICO-Banda Ancha” Program published by the Spanish Ministry of Economic Affairs and Digital Transformation:
 - + Adamo has been granted with 98 million euros in subsidies to deploy fiber in 17 Spanish regions by 2023.
 - + Avatel has been granted with 73 million euros to deploy fiber in 14 other Spanish regions.



Southeast of Spain, Madrid and Barcelona concentrate the largest share of ISP and test by inhabitant rate, especially Valencia, Alicante and Murcia: ground zero of local ISP.

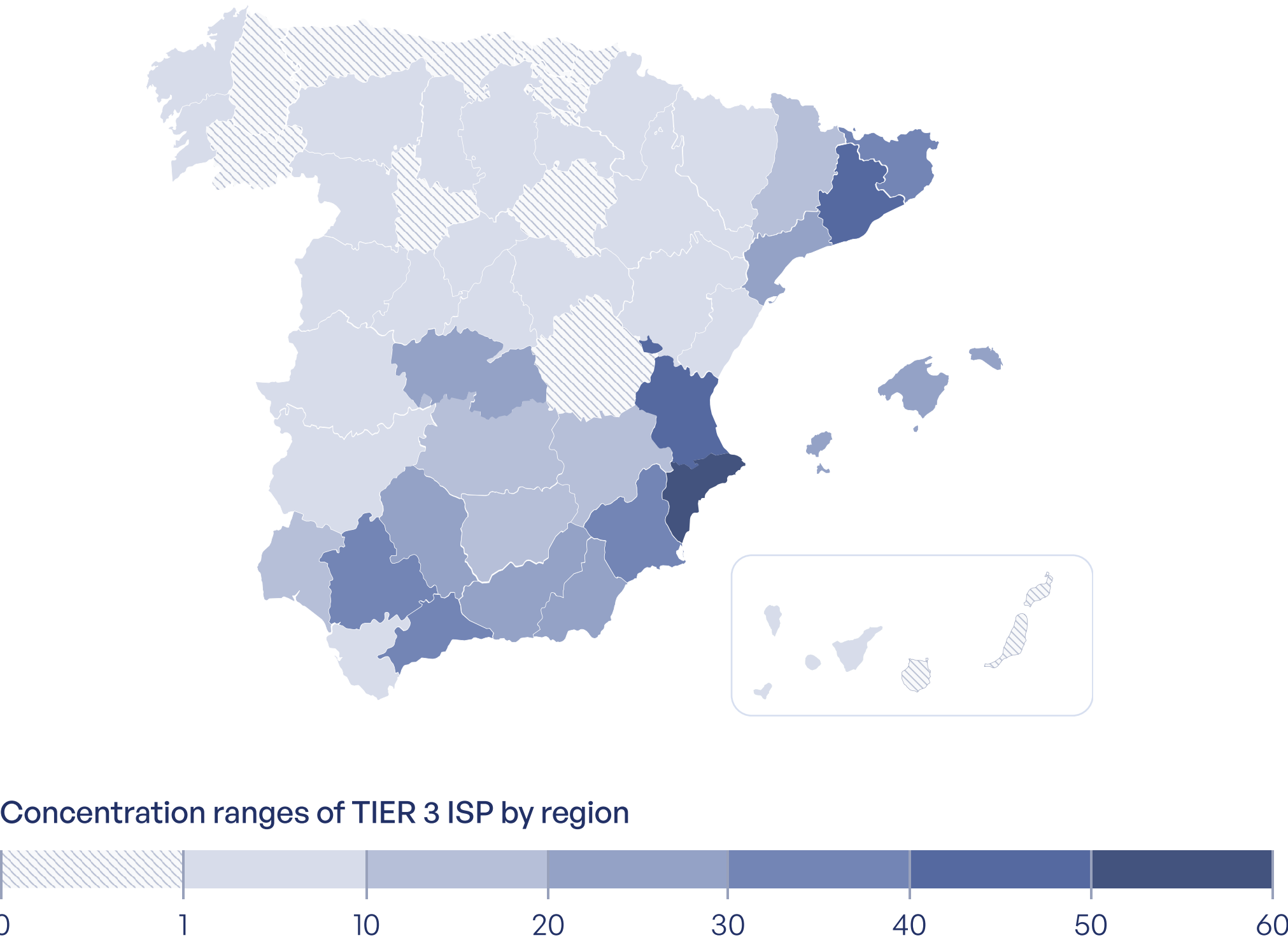
ISP PRESENCE ALLOCATION BY REGION, # of ISP, Oct 2022

- + There is a strong presence of local ISPs in south-eastern Spain, which have managed to expand and consolidate their presence.
- + Madrid, shows the highest concentration of ISPs, with a total of 93 of them coexisting, according to OOKLA's published data. The method used to provide default location to samples an the capital city effect can generate some "artifacts" so Madrid data must be took with caution regarding the number of active ISP.
- + Historically Southeast of Spain has been the home of local TV operators developing small networks. This fact shows still his impact on data.
- + The widespread liberalization of the wholesale's access market in recent years has caused a decrease in regulatory prices in order to facilitate competition between ISPs.
- + Moreover, most of those areas have been benefited from the European broadband extension programmes.










If comparison is extended to all levels, it appears that the main TIER 3 ISPs have an estimated leading presence in 189 Spanish municipalities, especially in the south-east of the country.

REGIONS WITH MUNICIPALITIES WHERE A TIER 3 ISP IS LEADER,
municipalities



TIER 3 ISP PRESENCE ACCORDING TO OOKLA DATA,
regions # municipalities

| | Regional presence | Leader in Municipalities |
|---|-------------------|--------------------------|
|  | 23 | 118 |
|  | 8 | 13 |
|  | 8 | 2 |
|  | 3 | 25 |
|  | 6 | 9 |
|  | 3 | 2 |
|  | 1 | 6 |

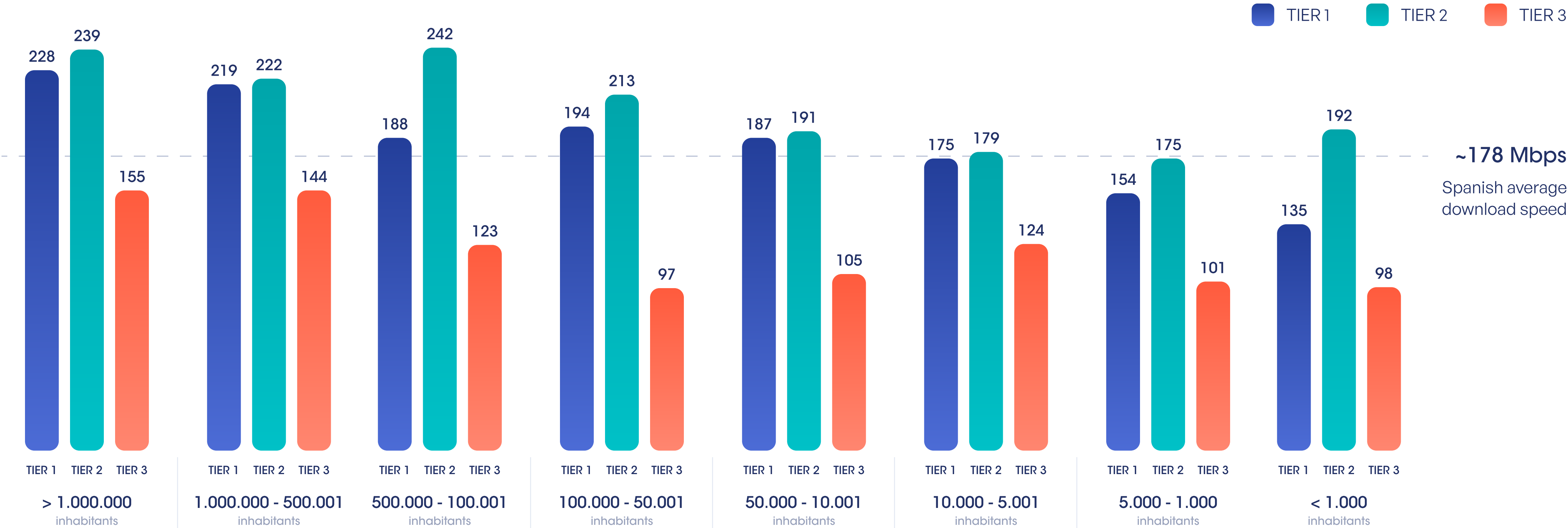
Among the main TIER 3 ISPs, there are three main groups that can be distinguished according presence estimations.

ESTIMATION OF TOP TIER 3 ISP ALLOCATION ACCORDING TO PRESENCE AND NUMBER OF REGIONS OF OPERATION, non exhaustive



Deeping down into Spanish situation bigger cities have better downland speed that smaller towns showing some geographical gap. Tier 1 and Tier 2 operators shows similar figures with variations by size of municipality.

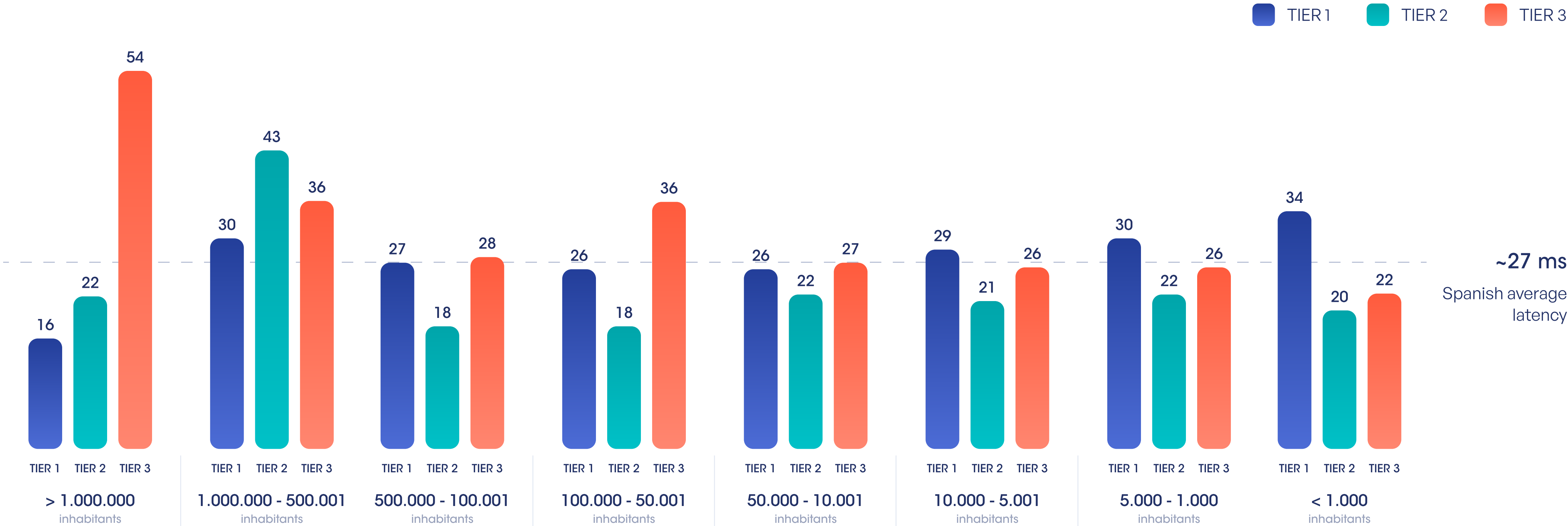
AVERAGE DOWNLOAD SPEED COMPARISON BY MUNICIPALITY SEGMENT, Mbps



SOURCE: OOKLA
Corporate commercial websites. March 2023

Similar to download speed some geographical performance gap can be identified with bigger cities having lower latencies that small towns. Never the less medium sized cities (500.000 to 10.000) served by Tier 2 operators have also very low values.





AVERAGE LATENCY COMPARISON BY MUNICIPALITY SEGMENT, ms



SOURCE: OOKLA

Under the ex-ante regulation, certain specific obligations are imposed on appointed ISPs with significant market power in relevant markets

During 2020/2021 fixed broadband markets have been reviewed impacting on current regulated prices and regulated areas

| | | |
|---|--|--|
|  | Access to physical infrastructure (PIA) | MARCo is the duct access reference offer. Duct access can be used for deployment of NGA technologies (VDSL, fibre and coaxial cable) and also for DSL copper, but this case doesn't make technological or financial case. |
|  | Dark fibre (DF) | Since there exist multiple players providing dark fibre, with market shares properly distributed, it was resolved that the market was dynamic enough for the operators to access it without the need of deploying their own infrastructure. |
|  | Leased lines (LL) | <ul style="list-style-type: none">+ ORLA is the leased lines reference offer that provides active access to wholesale terminating segments, ensuring a fixed capacity between two points.+ The Reference Offer is focused on Ethernet interfaces at 10, 100 Mbit/s and 1 Gbit/s but includes legacy LL based at 2, 34 and 155 Mbit/s for historical reasons (34 & 155 Mbps speeds cannot be contracted anymore, but existing ones can still be used by operators). Ethernet 1 Gbit/s are regulated under the "reasonable price" figure. |
|  | Wholesale broadband access | <p>NEBA and VULA are the regulated bitstream offers</p> <ul style="list-style-type: none">+ NEBA has two main price components access and traffic transport as the bitstream is transported and delivered in the province capital Pols.+ VULA only has an access component as the operators have to go to the optical header to collect the traffic and provide backhaul to their dependencies. |

We identify **6 main trends** that FTTH wholesale industry will need to pay attention to in the coming years

1

European initiatives

The Digital Decade defines two 2030 targets: gigabit coverage for all households and 5G in all populated areas.

2

Rural deployments

FBB infrastructure operators will require the need for new data transmission in small municipalities.

3

Competence and Consolidation

The highly competitive and sophisticated market is prone for consolidation, as the last two years history confirms. Infrastructure development will continue in next years and the search for increase size and footprint will reinforce consolidation trends.

4

Connectivity: XGS-PON

For some years now, there has been a consistent increase in data consumption, mainly in fixed broadband (FBB).

5

Cloudification & DCs

Spain is ranked as the European country with the highest growth in data centers, with estimated investments of close to 5,000m.

6

Edge computing

Services that require low latency are growing (business services, smart cities,...).

The Spanish FBB industry is a complex ecosystem, where local players play a key role in areas of the country describing a very competitive multilocal landscape



Competitive panorama

We have identified 17 relevant ISP and categorized it in three tiers from a total of 1416 active players. A very dense network of agreements has been created by all different players fostering a very sophisticated market.



Geographical concentration

Apart from Madrid and Barcelona, the south-east of Spain concentrates the largest number of ISPs. Murcia, Alicante and Valencia having more of 80 active ISP per province.



Municipalities segment

Looking deeper into ISP segments, and especially into TIER 2, a market positioning according to the size of the municipality can be identified, with some ISP focusing in urban areas and other in more rural and semi urban zones.



Wholesale agreements

We have identified a network of more of twenty agreements between key players. This complexity grade is prone to keep growing as the market evolves quickly.

The players that better understand the full ecosystem will be better positioned to success. The role of wholesalers will become more and more prevalent.



Expecting changes

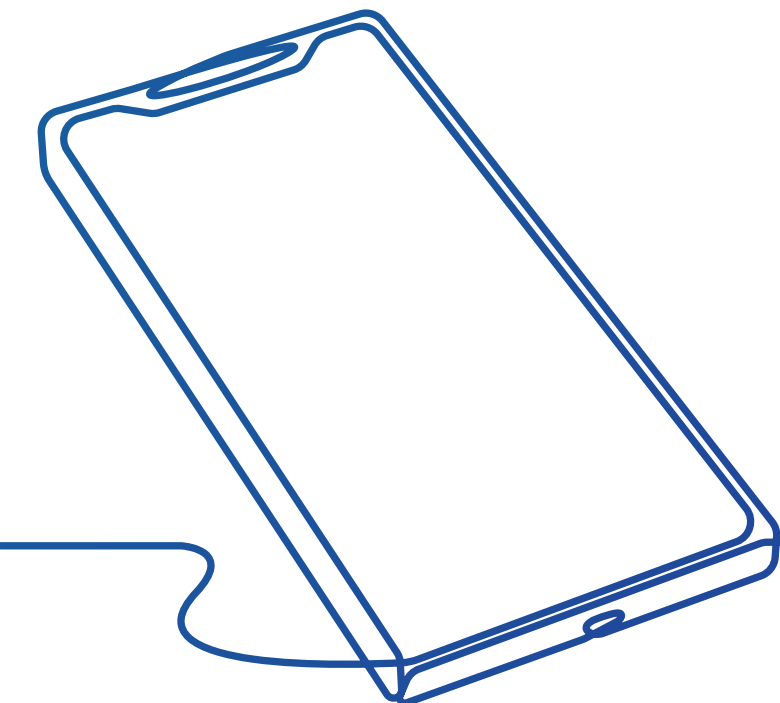
Key to market success has been the fine balance between regulated and private agreements. Both sides of the equation are changing: CNMC regulation regarding NEBA is currently under review and corporate operations have been announced and pending approval by competition authorities.



Icía Martínez Núñez
Markets & Product Director

Icía leads the Markets and Product area in Onivia, the first neutral and wholesale FTTH fiber operator in Spain, focusing on the analysis, detection and development of strategic partnership programs, and the definition and implementation of wholesale product's go-to-market.

Telecommunication engineer with 25 years of experience and strong connections in telecommunications, Icía has worked at Orange since her early days in Spanish market and, during the expansion of the French operator into new brands and services in different technical and commercial roles.





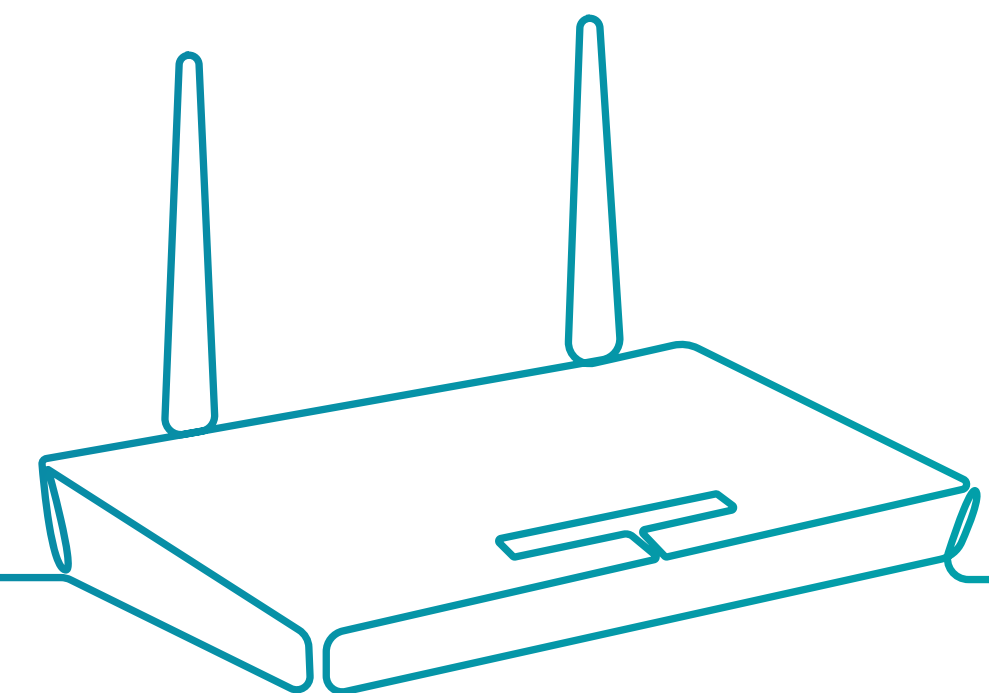
Joaquín Guerrero García
Director at Nae

Director at Nae. Nae South and Central America Founding Partner. Joaquín Guerrero has worked in the telecommunications industry for the past 30 years.

As a consultant he has developed his professional career working for the main industry groups on both sides of the Atlantic, including Telefónica, Claro, Tigo, Orange, Vodafone, Entel, MásMóvil and many other clients.

He is currently responsible in Nae for Network services globally. His goals include creating the conversations that will change the telco industry in the coming years. He also talks about Telco on the Telco Superligero podcast.

nae,



About Nae,

We have been developing telecommunications projects around the world for almost 20 years, this allows us to know the market and offer quality results. Sharing our knowledge helps us to improve day by day and to motivate ourselves to continue learning.

We work side by side to accompany to build the road and make Team with anyone related to the projects in which we participate. With this way of doing things is how we manage to promote change.

We believe that things should not always be done the same and that, with creativity and innovation, we can achieve incredible results. We seek to bring about change.

Nae, dare to go beyond

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We are growth enablers, we are Onivia

About Onivia

With nearly 4.1 million homes passed in urban & rural areas and more than 1,300 cities contributes to the development of rural areas by deploying fiber to reduce the digital divide, bringing ultra-fast and reliable broadband access to rural and urban communities in Spain and providing more choice for individual customers, as well as helping to connect communities and foster growth and innovation across all economic sectors.

Onivia is committed to investing heavily in digital infrastructure networks in Spain, having the support of the infrastructure funds that are part of its shareholding, all of them experienced investors that support this long-term industrial project capable of benefiting from the dynamic evolution of the telecommunications market in Spain with interesting growth opportunities.

