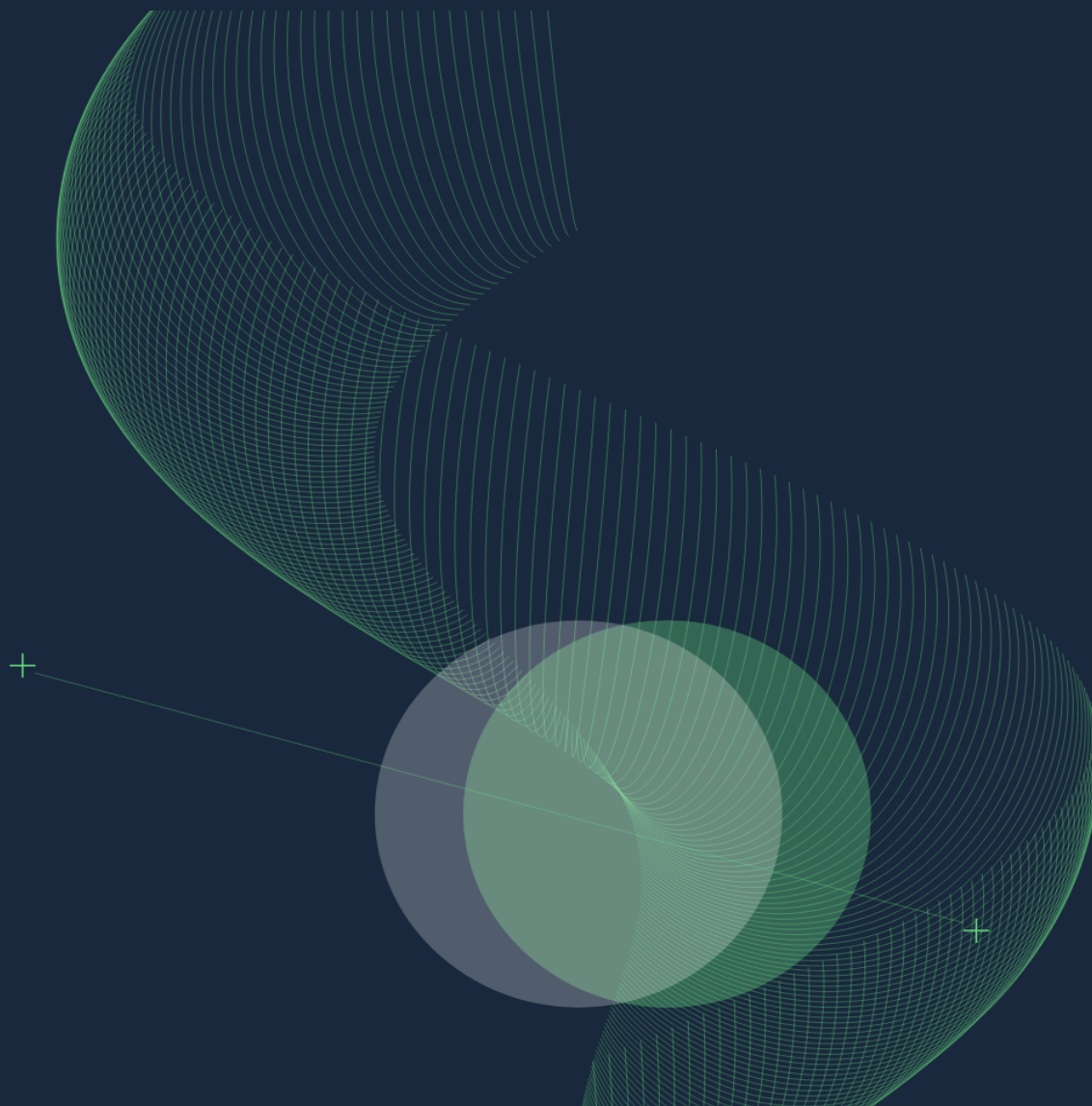




Mobile spectrum deployment and spectrum pricing in Europe

Prepared by: Laura Sear

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Executive summary

This white paper uses PolicyTracker's Mobile Deployment Database (MDD) to compare the price operators paid for spectrum in selected awards with how heavily they have deployed it. It takes as its two central examples the 700 MHz award in Belgium in 2022 and the 3.6 GHz award in Italy, assigned in 2018.

Even though Italy's 3.6 GHz auction was one of the most expensive seen in that band, it scores better on the MDD's Cost vs Deployment Index than Belgium's 700 MHz award, simply because the Italian spectrum has been so widely deployed.

The Index measures how much operators have deployed a band relative to other operators holding the same band, so the result reflects usage within a network rather than the propagation characteristics of the band itself: a cheap band that is heavily deployed can score close to 100%, while an expensive band with little deployment can score in the mid-teens — Orange Belgium's 700 MHz holding, for instance, scores just 14%. The pattern holds across bands as well as within them: of the EU's three 5G pioneer bands, 700 MHz actually posts the lowest average Cost vs Deployment Index of all, lower even than 26 GHz, where real-world deployment is close to zero because compatible devices are still scarce.

On average, Italian operators scored 50% on the Cost vs Deployment Index for their 3.6 GHz purchases, against 23% for Belgian operators on 700 MHz. In short, the Italians paid a relatively high price but deployed heavily, while the Belgians paid a little above average and deployed comparatively little.

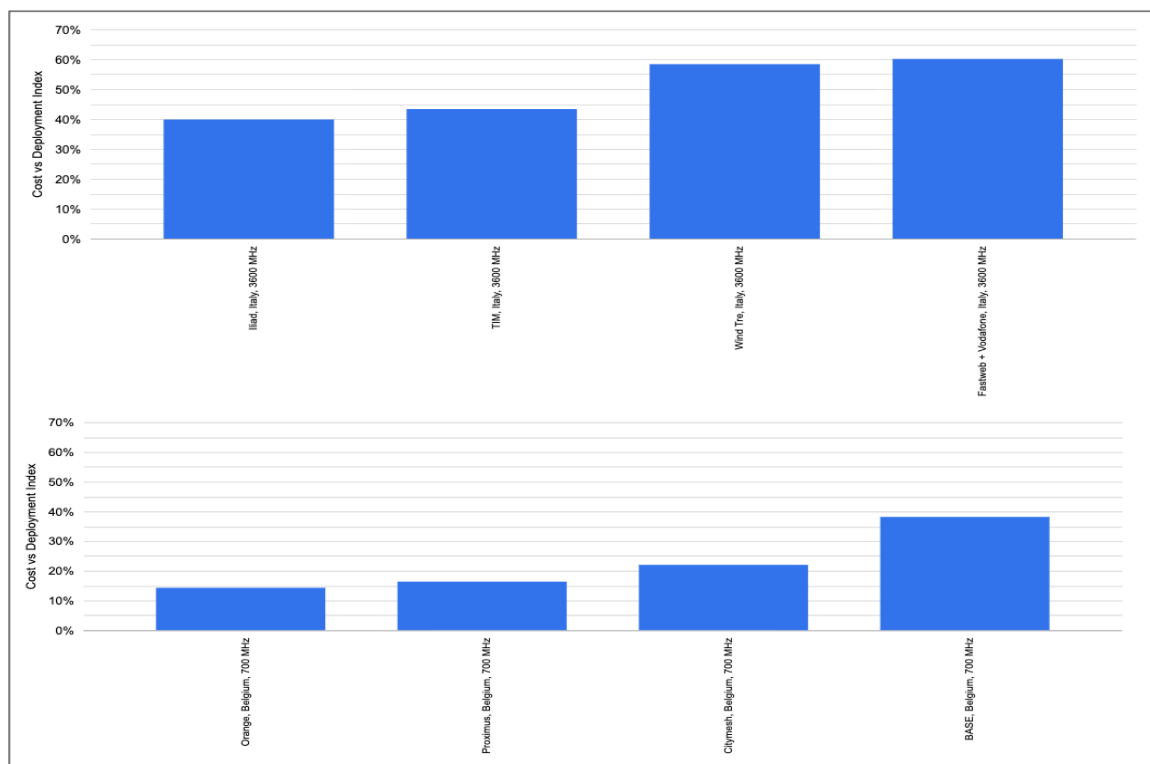
Italy's results also illustrate that heavy deployment does not necessarily mean standalone 5G: despite a 5G NSA deployment base equal to roughly 41% of the total, the country shows almost no measurable 5G SA deployment in the current dataset.

Introduction and methodology

This white paper uses a new combined spectrum pricing and deployment dataset derived from our PolicyTracker Spectrum Database (PSD) and the Mobile Deployment Database (MDD) to ask a simple question: how does what mobile operators actually paid for their spectrum compare to how heavily they're using it?

The mobile deployment database joins historic acquisition price data with radio-level deployment observations provided by our partner company, [Teragence](#). This spans 36 European countries, from the largest mobile markets (Germany, France, Italy, Spain, UK) to some of the smallest (Iceland, Luxembourg, Isle of Man, Montenegro), though coverage naturally varies by band depending on which operators hold spectrum there. Through this combination, it becomes possible to compare spectrum deployments across bands and countries in a way that neither dataset supports on its own. This white paper looks at two auctions, Belgium's 2022 award (700 MHz) and Italy's 2018 award (3.6 GHz). Both involve EU "5G pioneer bands".

Belgium shows cost and deployment moving independently: the operator paying nearly the least (BASE) deployed the most, while the two that paid the most scored the lowest. Italy shows the reverse: all four operators paid some of the highest 3.6 GHz prices in the dataset, yet also rank among its most heavily deployed licences, still producing solid scores on our Cost vs Deployment Index scores despite the amounts paid. Together, the two cases mark out what the Index can and can't tell us: whether cost and usage move together for a licence, not whether a price was fair or a network well built.



MDD: Cost vs Deployment Index for the awards of 3.6 GHz in Italy and 700 MHz in Belgium

Methodology

The analysis draws on two joined datasets: a spectrum pricing dataset (price per MHz/pop in USD, at time of acquisition) and Teragence's radio-level deployment observations, which record on which band and technology a radio transmits. Where an operator holds a band through more than one licence, the price used is a weighted average across those holdings, weighted by the size of the spectrum block and the population it covers.

The main metric used is the Cost vs. Deployment Index which tells us how cheap this band was relative to all mobile spectrum purchases, and how strongly is this operator deploying this band relative to other operators using the same band?

The Cost vs. Deployment Index is calculated as follows:

$$\text{Cost vs. Deployment index} = (\text{cheapness percentile} + \text{deployment percentile}) \div 2 \times 100$$

where:

- The price percentile ranks each record's price against every other record in the database. If a record's price percentile is 0, its price is the lowest in the whole dataset; if it's 1, its price is the highest. The cheapness percentile just flips that ranking around (1=cheapest price, 0= lowest price)
- The deployment percentile ranks each record's deployment share, meaning how many radios the operator has deployed in that band, divided by the total number of radios they have used; this is compared against every other record's deployment share in the database. (0 = lowest relative deployment, 1 = highest).

Both components are therefore relative rankings within the dataset, not absolute measures. The Index says how a given spectrum holding compares to every other holding sampled, not whether the price was objectively fair or the deployment level objectively adequate.

The Cost vs Deployment Index is not influenced by the need to deploy more radios in high-frequency bands to get the same coverage as the lower bands. The deployment percentile is a relative measure assessing whether the MNO's use of the selected band is more or less than its peers as a percentage of all the bands used in their networks. There is a more detailed explanation in the [MDD methodology section](#).

It's worth keeping in mind that the Cost vs. Deployment index reflects historic acquisition cost rather than current market value. Another element to consider is that deployment share measures radio-level activity, not network architecture; a high index score reflects heavy deployment within a band, not necessarily which specific technology (5G SA vs. NSA) is running on it.

700 MHz: Expensive band, slower deployment

700 MHz licences average \$0.332/MHz/pop across the dataset, about a quarter above PolicyTracker's spectrum database average. 700 MHz's high price is not strange considering the value operators place on the band. As low-band spectrum, 700 MHz propagates over longer distances and penetrates buildings more effectively than the mid-band and high-band spectrum typically used for capacity, making it especially well suited to nationwide and rural coverage as well as indoor reception. In most European countries, 700 MHz was originally used for digital terrestrial television (DTT); under the EU's

2017 decision on the 470–790 MHz band, member states were required to clear it for wireless broadband use, with an initial EU-wide target of making it available by the end of 2020 (the UK, for example, allocated £600 million to fund broadcaster relocation ahead of its own Q2 2020 target).

Once freed up, 700 MHz was designated one of the EU's three "5G pioneer bands," alongside 3.6 GHz and 26 GHz, and folded into the European Electronic Communications Code, which pushed member states to make these bands available wherever operators had demand for them. Given its coverage properties and its formal status as a pioneer band for 5G rollout, it is unsurprising that operators have generally been willing to pay a premium for 700 MHz relative to other bands.

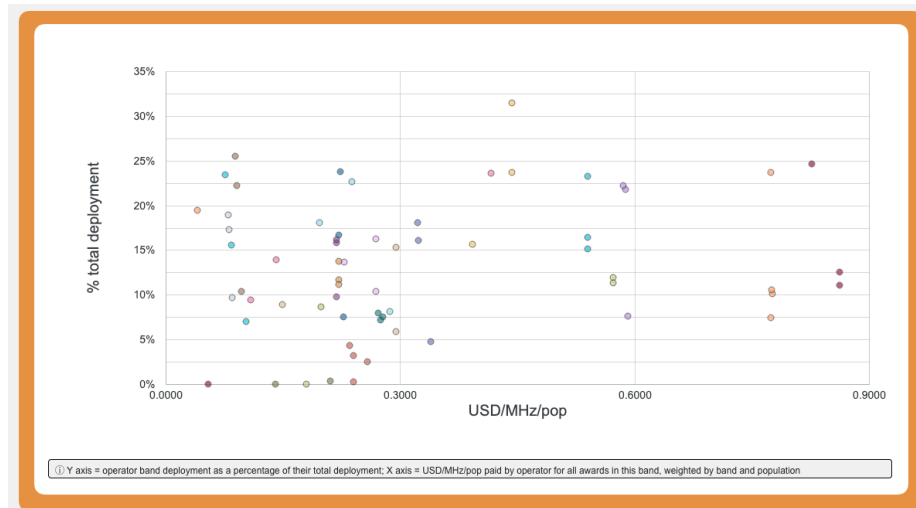
Deployment of the band tells a slightly different story: the average deployment share for the band sits at 13.0%, modestly below the 15.2% dataset average. Put together, the band's Cost vs. Deployment index comes out at 42.2%, well under the 64.1% dataset average. Set against the dataset's two other EU 5G pioneer bands, 700 MHz's Cost vs. Deployment Index is in fact the lowest of the three. 3.6 GHz, priced far lower on average (\$0.082/MHz/pop) and deployed considerably more heavily (17.7% average share), carries the highest average index of the three, at 58.5%. 26 GHz lands in the middle (47.5%) despite being priced even more cheaply than 3.6 GHz. It averages around \$0.0016/MHz/pop across the 22 licences. There are few or no 26 GHz-capable devices yet in general consumer use across Europe, which explains the 0% deployment score, even if the spectrum itself cost next to nothing.

Band	Licences	Average price (\$/MHz/pop)	Average deployment share	Cost/Deployment Index
700 MHz	64	\$0.332	13.0%	42.2%
3.6 GHz	117	\$0.082	17.7%	58.5%
26 GHz	22	\$0.0016	0%	47.5%

Cost vs. Deployment index for the 700 MHz band

There is a wide spread in what operators actually paid for spectrum per country. On PolicyTracker's per-country breakdown of 700 MHz pricing, Sweden and France sit at the top, at approximately \$0.85–0.90 and \$0.75–0.80 per MHz/pop, roughly 15 to 20 times what operators paid in Macedonia and Iceland, which sit at the bottom of the distribution at well under \$0.10 per MHz/pop.

Italy, Luxembourg, Belgium and Spain form a second tier, clustered between roughly \$0.40 and \$0.60, while most Central, Eastern and Nordic markets: Poland, Norway, Germany, the UK, Finland, Portugal, sit lower, around \$0.20–0.25.



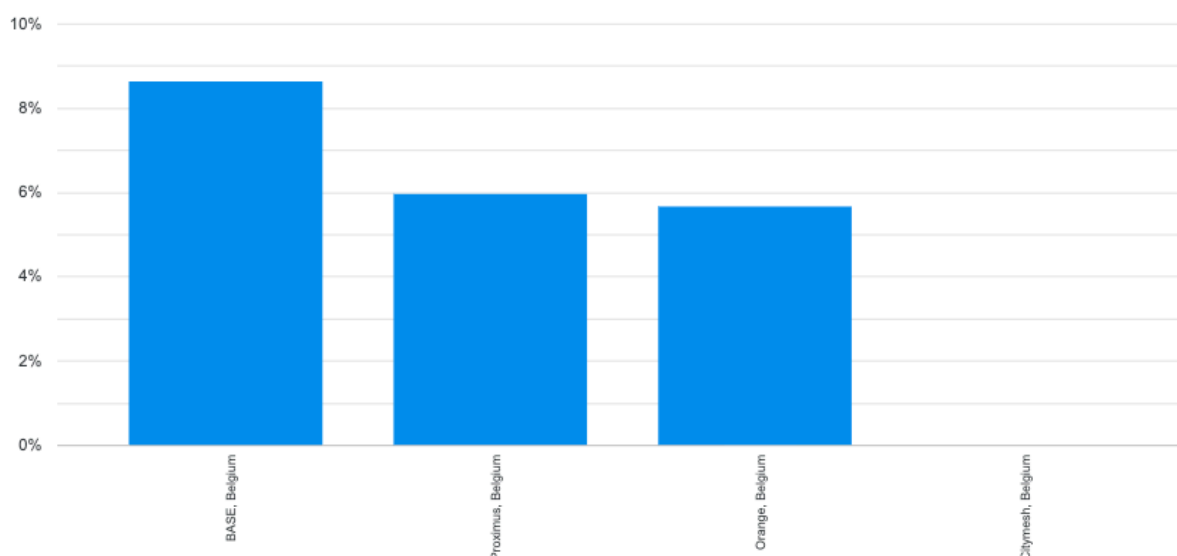
MDD: Price vs deployment in the 3.6 GHz band

This spread carries through to the Cost vs. Deployment index. Among the highest-scoring 700 MHz holdings in the dataset are A1 Hrvatska in Croatia (76%), Siminn in Iceland (75%), Bite in Latvia (75%) and Telemach Hrvatska (72%), all in markets from the cheap end of the price distribution.

It's important to note that the index only rewards cheap spectrum if it is also being deployed. A licence acquired cheaply but left largely undeployed scores no better than one bought expensively but well used, as the Belgium case illustrates clearly.

Belgian multiband auction 2022

Belgium's June 2022 multi-band auction is a useful case study because all four operators acquired 700 MHz spectrum in the same award round, under the same regulatory conditions, yet ended up with markedly different outcomes. Orange Belgium and Proximus each paid roughly €122.9 million for a 2×10 MHz block, working out to around three times the per-MHz price that Telenet (trading as BASE) and newcomer Citymesh paid for their smaller 2×5 MHz blocks (€21.3 million and €19.3 million respectively). Citymesh's lower price reflects the reserved-spectrum mechanism Belgian regulator BIPT designed to lower entry barriers for the market's fourth operator, which came bundled with reduced coverage obligations.



Operator Deployment Share of 700 MHz in Belgium

Deployment, however, tells a different story from the price gap. Of the four, BASE/Telenet has deployed the largest share of its 700 MHz holding (8.63%), ahead of Proximus (5.95%) and Orange (5.66%), while Citymesh shows no measurable deployment yet. That ranking only partly carries through to the Cost vs Deployment Index: BASE's smaller, cheaper block combined with its higher deployment gives it the best score of the four (38%), but Citymesh's discounted, reserved-spectrum block still outscores both Proximus (16%) and Orange (14%) on the index (22%), despite having no measured deployment at all.

Citymesh shows no measurable deployment in 700 MHz, or in fact in any band it holds in Belgium. As a new entrant, Citymesh, operating jointly with Romanian operator Digi, has not yet activated its own radio network; since 2023 it has launched commercial service by reselling access to Proximus's existing 4G network under a five-year national wholesale and infrastructure-sharing agreement, while building out its own sites in parallel.

Operator	Bandwidth	Total price	Price /MHz	700 MHz deployment share	Cost/Deployment Index
BASE (Telenet)	2×5 MHz	€21,340,000	€2.13m	8.63%	38%
Citymesh	2×5 MHz	€19,335,000	€1.93m	not yet measurable	22%
Proximus	2×10 MHz	€122,870,000	€6.14m	5.95 %	16%
Orange Belgium	2×10 MHz	€122,860,000	€6.14m	5.66%	14%

700 MHz results of the Belgian 2022 auction

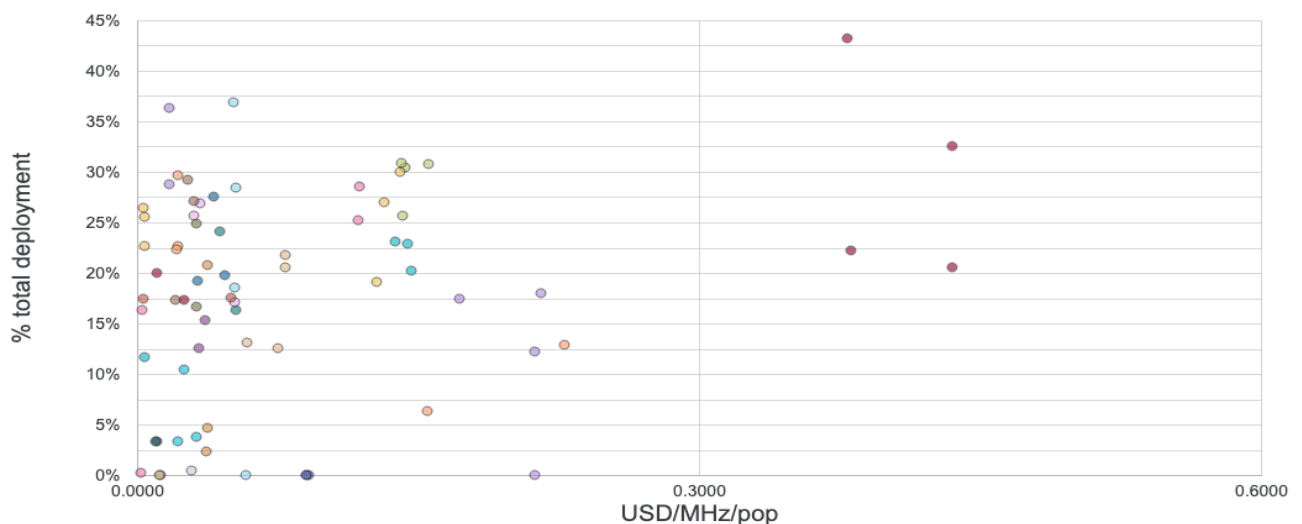
The result is that Orange and Proximus, which paid the most for the largest blocks, post the lowest Cost vs. Deployment index scores among Belgium's 700 MHz holdings (14% and 16%); Citymesh's discounted spectrum is offset by its lack of deployment so far (22%); and BASE/Telenet's smaller, cheaper block

paired with comparatively higher deployment gives it the best score of the four (38%), though still short of the band's 61.6% average.

The Belgian case indicates what lies behind the 700 MHz band's wide range of index scores: a dataset-wide average price a quarter above the norm and a deployment share modestly below it does not mean every 700 MHz licence is expensive and underused, but rather that individual awards diverge sharply depending on how competitively a block was contested and how it was acquired.

3.6 GHz band: Cheaper band, heavily deployed

3.6 GHz licences average \$0.082/MHz/pop across the dataset, the cheapest of any major band and about 69% below PolicyTracker's spectrum database average. The band's low price is not surprising given how it was assigned: as the globally-designated primary mid-band for 5G, operators are typically awarded much wider contiguous blocks here (often 80–100 MHz) than in legacy bands like 700 MHz or 2100 MHz, which mechanically pushes the price per MHz down even where total auction proceeds run into the billions.



MDD: Price vs deployment in the 3.6 GHz band

Alongside 700 MHz and 26 GHz, 3.6 GHz was designated one of the EU's three "5G pioneer bands," and it is the most widely assigned of the three: by 2026, the 3.6 GHz band had been assigned in all EU member states, while 26 GHz lagged well behind.

Deployment of this band is also high across European countries: the average deployment share for the band sits at 19.0%, about a quarter above the 15.2% dataset average and the highest of any band measured. Put together, the band's Cost vs. Deployment index comes out at 71.0%. Of the three pioneer bands, the 3.6 GHz is the best example of low price and heavy deployment moving together rather than in opposite directions.

"Heavily deployed" does not automatically mean heavily deployed as standalone 5G. Within the 3.6 GHz band itself, 92.8% of deployments recorded are 5G NSA (non-standalone, using a 4G core) and only

7.2% are genuine 5G SA. That is, in fact, a lower standalone share than the 700 MHz band (9.4% of 700 MHz deployments are 5G SA, despite the band's much lower overall deployment share of 13.4%).

In other words, 3.6 GHz's high deployment volume translates into a high Cost vs. Deployment index score, but that volume is overwhelmingly non-standalone traffic.

Cost vs. Deployment index for the 3.6 GHz band

There is a wide range in what operators paid for 3.6 GHz per licence. In the Cost vs. Deployment Index the highest-scoring 3.6 GHz holdings in the dataset are Yettel Bulgaria (92%), A1 Bulgaria (91%), Vodafone Albania (90%), and Vivacom Bulgaria (88%), Bulgaria alone holds three of the four highest scores in the entire band, combining very cheap prices with very heavy deployment. Croatia's operators also cluster near the top (Hrvatski Telekom 88%, Telemach Hrvatska 83%, A1 Hrvatska 83%).

As with 700 MHz, though, the index only rewards a cheap price if deployment has kept pace, and it will mark down an expensive price even where deployment is exceptionally strong. Italy's 2018 multi-band auction illustrates this from the opposite direction to Belgium's 700 MHz case.

Italy's 2018 multiband auction

Italy's October 2018 multiband auction produced some of the highest 5G spectrum prices seen anywhere in Europe, yet it has also deployed the 3.6 GHz band the most.

Licensee	Bandwidth	USD/MHz/pop	Deployment share	Cost/Deployment Index
Fastweb + Vodafone	80 MHz	\$0.3790	43.18%	60%
Wind Tre	20 MHz	\$0.4354	32.52%	58%
TIM	80 MHz	\$0.3810	22.23%	43%
Iliad	20 MHz	\$0.4354	20.51%	40%

MDD: 3.6 GHz prices in the Italian 2018 auction matched against subsequent deployment

TIM paid €1.694 billion for an 80 MHz block (\$0.381/MHz/pop); Fastweb and Vodafone, bidding separately at the time, paid €1.685 billion for an identical 80 MHz block (\$0.379/MHz/pop). Iliad and Wind Tre, which instead bought smaller 20 MHz blocks, each paid close to €484 million, working out to a noticeably higher unit price of about \$0.435/MHz/pop.

All four prices sit well above the 3.6 GHz European average of \$0.082/MHz/pop, and the pattern holds up against other countries too: Italy's roughly \$0.38–0.44/MHz/pop range is several times the UK's \$0.17, Spain's \$0.06, and Finland's \$0.04, and above even South Korea's \$0.19 and Australia's \$0.36, placing Italy among the most expensive 3.6 GHz markets.

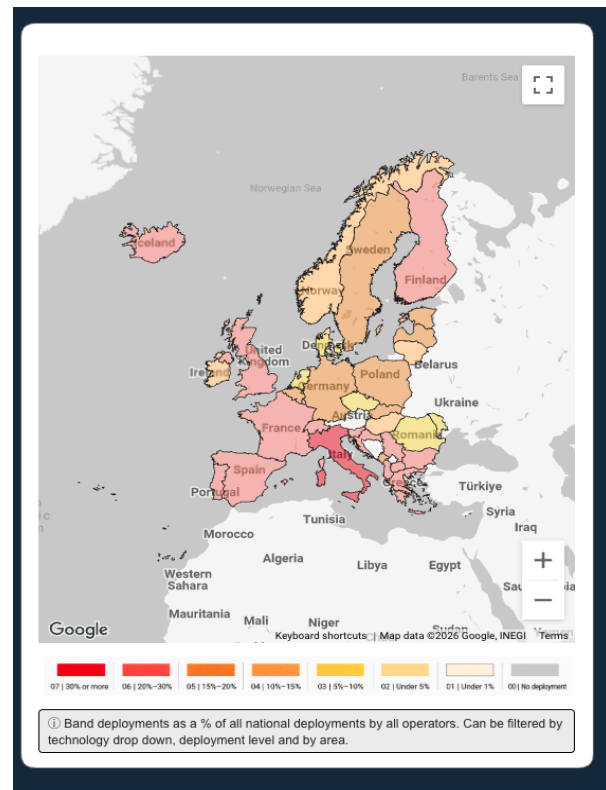
Fastweb and Vodafone Italy now appear as a single combined licensee. This is because Swisscom's (Fastweb's parent company) acquisition of Vodafone Italy, reported at roughly €8 billion and completed in 2025.

Italy's other 5G pioneer band award shows the same expensive pattern. In its 2022 700 MHz award, Iliad, TIM, and Fastweb+Vodafone each paid close to €680 million for a 20 MHz block, averaging \$0.589/MHz/pop. Which is again above the 700 MHz European average of \$0.332/MHz/pop. That expense shows up clearly in the dataset: all four Italian 3.6 GHz licensees sit at the top of the price distribution, with cheapness percentiles of just 18–20% (meaning 80% or more of all licences in the entire database cost less per MHz/pop).

Unlike Belgium's 700 MHz operators, though, none of them are under-deployed. Fastweb + Vodafone, sits at the 100th deployment percentile, meaning it is the highest deployment share of any licence in the 3.6 GHz band in this dataset, giving it an index of 60% despite its high price. Wind Tre (98th deployment percentile, index 58%), TIM (84th percentile, index 52%) and Iliad (80th percentile, index 49%) follow the same pattern: expensive spectrum, heavily used.

Italy's data also make a case for the fact that deployment doesn't equal 5G SA. Despite having some of the highest 5G spectrum costs in Europe and a 5G NSA deployment base equal to roughly 41% of its 4G footprint, Italy shows no measurable 5G SA deployment in the current dataset.

The country that paid the most for spectrum, and that has meaningfully rolled out non-standalone 5G, hasn't yet converted that into standalone 5G at scale.



MDD: Deployment of 3.6 GHz in sample countries