The economic contribution of the European tower sector

A report for the European Wireless Infrastructure Association

November 2020

EY Parthenon

Building a better working world

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Context

EY-Parthenon and the European Wireless Infrastructure Association (EWIA) published a report on the economic contribution of the European mobile tower sector in April 2019. The study examined the important role of independent wholesale wireless infrastructure provider (independent TowerCos).

Since then, the sector has continued to attract further interest from policy makers and investors, mobile network operators (MNOs) have outsourced more towers, and 5G network rollouts are now in progress.

EY-Parthenon and EWIA have refreshed the data provided in the study in September–October 2020 to reflect developments in the market from January 2019 to July 2020 (e.g., developments in market share based on acquisitions and associated capital release facilitated by Independent TowerCos). The economic contribution section continues to be based on data from the previous study in April 2019.

The overall objectives of the study remain the same: foster a better understanding of the benefits that independent TowerCos can provide in generating investment and promoting efficient use of communication infrastructure and the role they can play in delivering the EU's Gigabit Vision 2025 and other government targets, such as mobile coverage and 5G rollouts.

The report is based on a combination of publicly available data, information that has been provided by EWIA members and interviews with market participants, as well as on EY extensive experience in advising the wider TowerCo sector.

In this report, Europe is defined as EU-28 (including UK) and the European Free Trade Association (EFTA), unless stated otherwise.

About EY and EY-Parthenon

The EY member firms provide professional services to the telecom sector — EY teams serve all of the top 20 telecom operators ranked by market capitalization. EY-Parthenon's strategy and transaction services are based on deep tower infrastructure and telecommunications sector experience. The organization has a large pool of tower infrastructure knowledge derived from its presence across the globe with offices in over 90 countries and the extensive range of telecommunication audit, advisory, strategy and transaction clients in the sector.

About the EWIA

The European Wireless Infrastructure Association (EWIA) is the European trade association of independent wholesale wireless infrastructure providers. EWIA has 10 TowerCo members operating in 12 countries (Finland, France, Germany, Ireland, Italy, The Netherlands, Poland, Portugal, Spain, Sweden, Switzerland and the United Kingdom). They develop, acquire and operate communication towers together with investment in the fiber-connected small cell networks in buildings and on city streets needed for 5G.

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Executive summary

Since 2018, the share of independent TowerCos in Europe has increased from 17% to 20%, helping to release c.€3.5b of capital in the process via acquisition of tower portfolios from MNOs.

Outsourcing of wireless infrastructure to independent TowerCos is a growing trend in Europe that is in line with the model prevailing globally. It delivers a number of benefits to MNOs, the wider wireless sector and, ultimately, the consumer:

1. Independent TowerCos specialize in operating neutral host, "passive" wireless network infrastructure such as mobile towers. Sharing of towers with multiple tenants reduces overall cost for mobile operators, helps improve coverage and reduces consumer prices.
2. Long-term international investors in European infrastructure value the benefits of the TowerCo model, resulting in an active M&A market.
3. The average number of wireless network operators sharing an independent tower is 2.4, compared to 1.3 for MNO-controlled towers. Independent TowerCos make it easier and cheaper to roll out new networks.
4. A typical location of a wireless network operator (also point of presence) managed by a TowerCo is circa 40% more efficient than one managed by an MNO, resulting in economic savings of €31b across Europe between 2019 and 2029.
5. Greater outsourcing to independent TowerCos could release an estimated €28b of capital, which MNOs can reinvest in their networks, such as to improve coverage and accelerate 5G rollouts. Since 2018, Independent TowerCos have helped release c.€3.5b in capital via acquisition of various tower portfolios from MNOs.
6. There is a trend of MNO-controlled TowerCos being created throughout Europe (e.g., Vantage towers, CK Hutchison Networks, Orange TowerCo), which is seen as an interim step toward full independence of their tower portfolios.
7. Independent TowerCos are playing a key role in enabling 5G rollouts and the continued expansion of mobile network coverage.
8. While the share of independent TowerCos in Europe has increased in recent years (from 13% in 2014 to 17% in 2018 and 20% in 2020), it remains low compared to other regions (e.g., 90% in the US, 55% in Central and Latin America, and 52% in India). A further increase in Europe would help deliver the benefits of cheaper and better mobile networks.
9. The new European Electronic Communications Code (EECC) reflects the pro-competitive nature of independent TowerCos and is expected to benefit independent TowerCos through increased certainty for the wholesale infrastructure sector.

> "In summary, independent TowerCos will continue to play a significant role, underpinning modern digital economies for the long term.

The trends described in this report are expected to continue as demonstrated by market activity which was ongoing at the time of publication and is not included in this report's figures.

Source: EWIA member companies, analyst reports, Towerxchange website, EY-Parthenon analysis, July 2020

Introduction

Wireless infrastructure (towers) provides an important element for the operations of wireless network services, including mobile networks, fixed wireless access broadband, emergency services, TV and radio broadcast, internet of things (IoT), and private mobile radio (PMR) networks. The largest user segment of towers are the mobile network operators (MNOs).

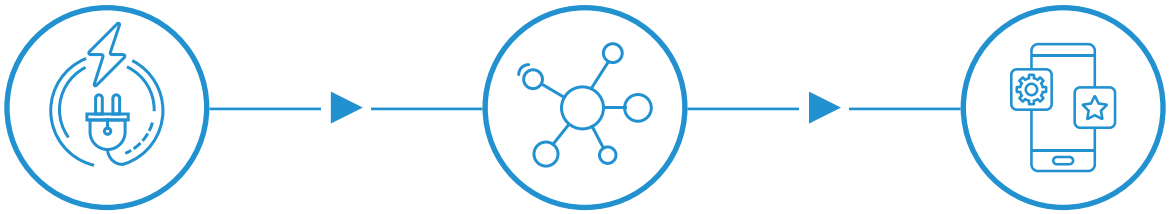
Over the last couple of decades, tower ownership has increasingly been transferred from MNOs to separate tower companies (TowerCos). These TowerCos can take the form of an internal division within an MNO, a separate entity controlled by an MNO or a wholly independent entity.

TowerCos have developed robust business models around the building and management of ground-based masts and rooftop sites, offering space on these infrastructures to multiple customers, most of which are MNOs.

To understand the economic benefits TowerCos provide, it is important to understand the provisioning of wireless networks. The value chain consists of three key segments: passive infrastructure, active networks and retail services. Towers are part of the passive infrastructure, and access to them is traded in the wholesale wireless infrastructure market.

MNOs, for instance, install Radio Access Network (RAN) equipment such as antennas, radio and baseband units on towers in order to transmit mobile signals. The active networks and passive infrastructure together enable the MNO to provide voice and data services to their retail customers. This mobile network service value chain is illustrated below.

Figure 1: Value chain for wireless network services



Passive infrastructure

MNOs and TowerCos construct and manage passive infrastructure, e.g., towers/sites for mobile and other wireless networks. These include a large variety of other existing infrastructure such as electricity pylons, water towers or motorway gantries.

Active networks

MNOs install and use active equipment to transmit data. MNOs also sell airtime to MVNOs. Other wireless networks enable fixed wireless access, emergency services, broadcast, IoT, etc.

Retail services

MNOs and Mobile Virtual Network Operators (MVNOs) provide voice and data services to retail customers, combined with handset sales. Other networks provide wireless internet, police radios, TV signals, IoT connectivity, etc.

In addition to towers, TowerCos also develop wholesale small cell platforms for high-density urban and indoor locations such as indoor distributed antenna solutions (DAS). In such cases, the wholesaler retains ownership and responsibility for the operation of the active infrastructure and can facilitate multiple operators co-locating on a single active infrastructure site. The TowerCo provides the design of the solution, develops and maintains the network, and manages the relationship with the real estate owner and with any other site users. This report primarily focuses on mobile telecoms towers.

Towers can be split into two principal types – ground-based towers and rooftop towers

There are two principal types of towers – ground-based towers and rooftop towers. Ground-based towers are typically freestanding structures and are more prevalent in less densely populated areas. Rooftop towers are (usually) set up on pre-existing buildings and are typically located on the roof, roofing pavement or high windows (e.g., in the case of a church bell tower being used as a rooftop tower). All statements, numbers and figures in this report refer to both tower types, unless stated otherwise.

Figure 2: Typical tower types

Ground-based towers

Rooftop towers

> “Our core business is to find the land, finance, build and maintain infrastructure, and offer multi-operator infrastructure to MNOs and other wireless operators.
>
> **Roland Chedlivili**
> Co Managing Director, TowerCo, TDF

TowerCos operate "passive" infrastructure enabling wireless networks to provide services ...

TowerCos develop, acquire and operate mobile network towers. They invest in mobile network towers, small cell networks and associated utility and real estate rights for the purpose of providing wholesale access to MNOs and other network operators on a shared basis. This provides an alternative to MNOs managing their own passive infrastructure.

For MNOs, outsourcing passive wireless infrastructure to TowerCos helps to free up capital. The economic benefits of outsourcing passive infrastructure to independent TowerCos are discussed in greater detail in the "economic assessment" section of this report.

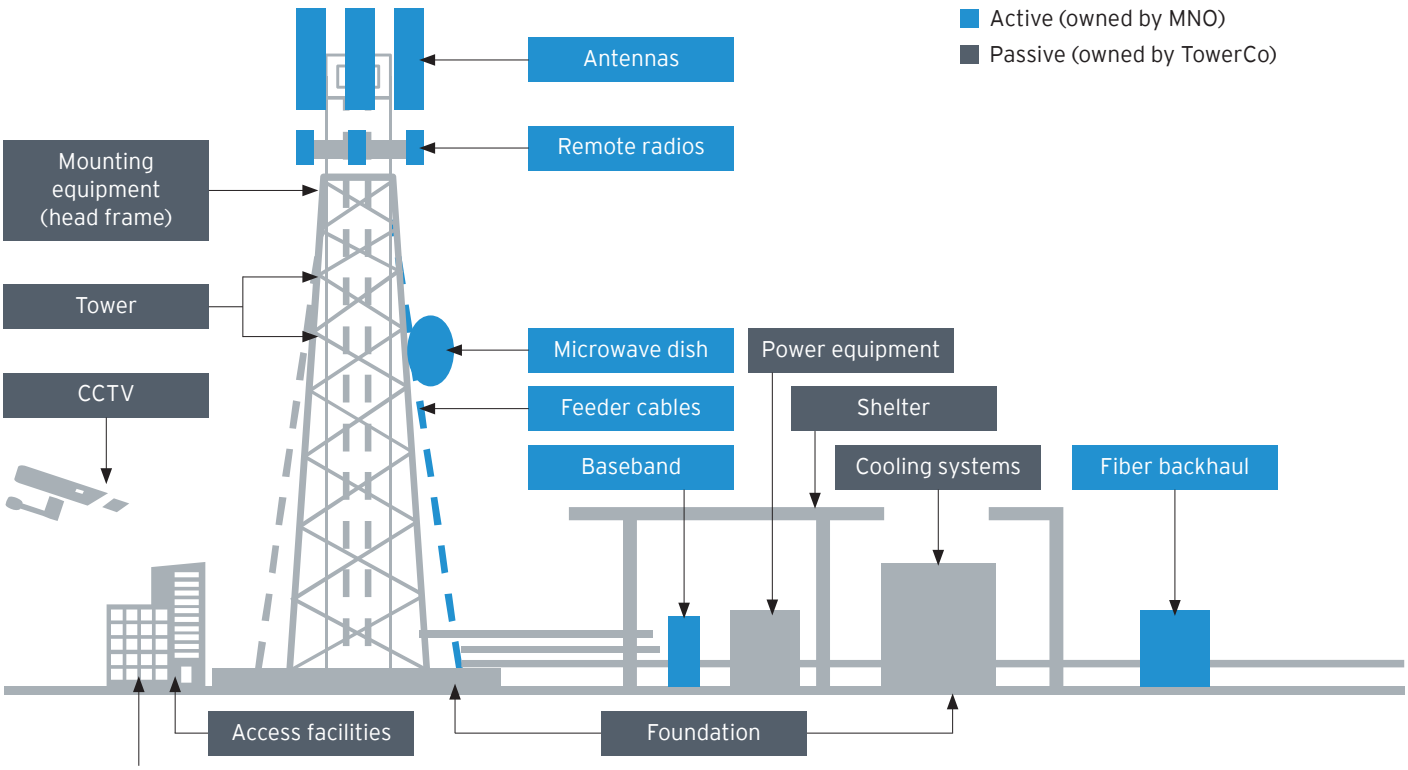
When offering passive infrastructure services to MNOs, TowerCos' responsibilities typically include:

- Provision of the physical site/rooftop and maintenance of related real estate contracts
- Installation and management of the passive infrastructure, including tower structure, civil works, fences, shelters, and possibly power supply and cooling systems
- Health and safety compliance at the site
- Access to infrastructure space and provision of services to MNOs and other network operators

Meanwhile, MNOs and other network operators' responsibilities include:

- Rental of passive infrastructure from TowerCos to install active equipment, including radio units, baseband units and other equipment
- Ownership of the feeder cables connecting antennas with radio equipment, and the fiber connection to the backhaul/ core network

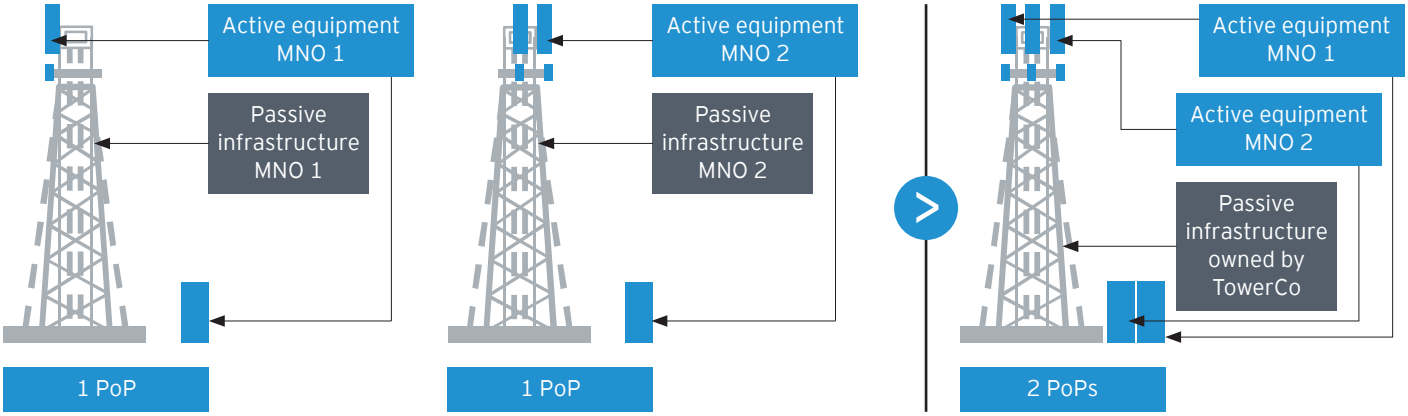
Figure 3: Illustration of active and passive equipment on a typical tower site



… and add value by reducing the duplication of infrastructure

Where MNOs can share passive infrastructure, there is less need to build multiple towers at the same geographical location. TowerCos operate the passive infrastructure and can accommodate multiple MNOs, which then focus on operating the active equipment at the site.

Figure 4: TowerCo's role in infrastructure sharing (conceptual)



A point of presence (PoP) is defined as a site where an MNO is "present" and provides a network signal. If an MNO provides multiple networks (e.g., 2G, 3G and 4G) from the same site, this presence is still counted as one PoP. The co-location (or tenancy) ratio for a single tower is defined as the number of PoPs hosted on that tower.

For instance, in the left-hand part of the above figure, each MNO operates one site that hosts its own active equipment. In this case, each tower is defined as having one PoP (and a co-location ratio of 1).

However, one tower can have multiple PoPs – e.g., in the right-hand part of the above figure, the TowerCo hosts two MNOs on its infrastructure. In this case, the tower is defined as having two PoPs (and a co-location ratio of 2). When looking at the overall portfolio of an MNO or a TowerCo, the co-location ratio is a key metric that is tracked – e.g., if a TowerCo operates 1,000 towers and hosts a total of 2,100 PoPs, it has a co-location ratio of 2.1.

Oftentimes, independent TowerCos will also have a significant presence of "other" PoPs on their towers. These other PoPs include PoPs of fixed wireless access providers, emergency services networks, IoT providers, broadcast antennas on mobile network towers, etc.

> "We're particularly well-positioned to support new technology entrants, as we are neutral hosts. MNOs may lack incentives to share their infrastructure for operational and sometimes strategic reasons. With an established independent tower industry, it is much easier for wireless innovators to gain traction, build out networks and reach the market in a timely manner.
>
> **Philipp Riederer von Paar**
> CEO, American Tower Germany

Independent TowerCos are the most mature model of wireless infrastructure sharing

The original TowerCos business model blueprint was first conceived in the US in the mid-'90s as an alternative to captive MNO tower ownership. Since then, the tower industry has become both more diverse and mature. Today, TowerCo business models differ by region but generally fall under three broad categories.

Joint venture TowerCo

- MNOs form JVs to pool their passive infrastructure, usually into a third-party company that either manages or owns the assets (e.g., CTIL between Vodafone and Telefonica UK)
- JVs offer an alternative model by which MNOs can increase the utilization of their passive infrastructure
- Challenges exist, such as disincentives to share infrastructure with rival MNOs to maintain a competitive advantage in network quality

MNO-controlled TowerCo

- TowerCos with 50%+ of equity owned by the parent MNO — usually the result of MNOs carving out and retaining ownership and control of their towers' infrastructure (e.g., Inwit/Telecom Italia or Telxius/Telefonica)
- While more sharing with rival MNOs can be observed, the parents tend to retain a veto right, in particular for strategic sites

IndependentTowerCo

- Independent TowerCos own passive infrastructure on a site and lease space on it to MNOs to host their active equipment
- They can either be "pure play" independent TowerCos with no residual equity retained by MNO(s) (e.g., Cellnex, American Tower) or have a minority stake held by an MNO
- TowerCos typically either build the infrastructure, or acquire it from an MNO in sale and lease back transactions

Source: TowerXchange website, July 2020

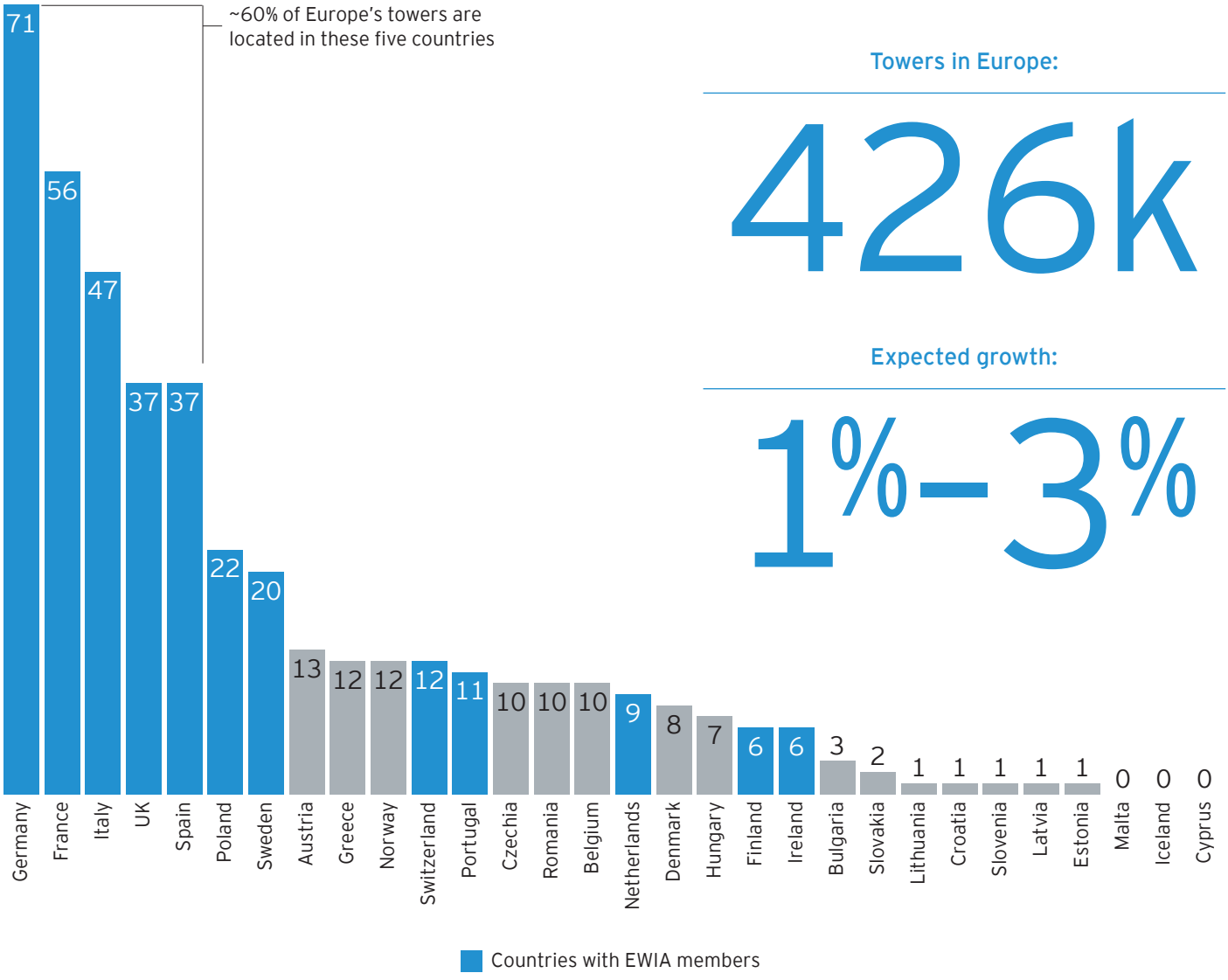
> Industry participants are recognizing the value independent TowerCos deliver. This includes the economical value, which is widely described. There are further elements, though — this relates to the ecological landscape, as people can benefit from the coverage without too much impact on the environment. We also have the financial capacity to deploy infrastructure as fast as policy makers and the population expect. Lastly, we have deep industrial knowledge and technical expertise.

Alex Mestre
Business Deputy CEO, Cellnex

Market analysis

There are 426,000 tower sites in Europe today, including rooftops and other larger structures that are used for wireless communication (but excluding small cells and DAS). This number has been broadly stable over the past years, with the number of newly built towers offset by decommissioning of duplicate and older towers. In countries such as France, the UK and Germany, MNOs are in the process of increasing coverage in rural areas, which results in new tower build programs, often linked to coverage obligations in 5G licenses. 5G in urban areas will generally require further densification, driving tower growth, estimated at approximately 1%–3% annually for the next five years.

Figure 5: European towers[1], selected countries, 2020E (000s)



1. Includes both ground-based and rooftop towers, July 2020, excluding any already agreed-to future build plans by TowerCos and MNOs
Source: EWIA member companies, analyst reports, TowerXchange, Ofcom, EY professional interviews as of July 2020, research and analysis

Table 1: Key players in the European tower sector, 2020E

Market	Tower sites[1]	# of sites controlled by independent TowerCos	% sites controlled by independent TowerCos	Key independent TowerCos	Key MNO-controlled TowerCos and JVs	MNOs
Germany	~71k	~2k	3%	ATC, Media Broadcast Group	Deutsche Funkturm, Telxius, Vantage	Deutsche Telekom, Vodafone, Telefonica
France	~56k	~19k	34%	ATC, Cellnex, Phoenix, TowerCast, TDF	Hivory	SFR, Bouygues, Iliad, Orange
Italy	~47k	~16k	33%	Cellnex, EI Towers, RaiWay	Inwit, CK Hutchinson Networks	Hutchinson,TIM, Vodafone, Iliad
UK	~37k	~11k	29%	Cellnex, Arqiva, WIG	Cornerstone, MBNL	Telefonica, Vodafone, Hutchinson, EE
Spain	~37k	~9k	24%	Axion, Cellnex	Telxius, Vantage	MasMovil, Orange, Telefonica, Vodafone
Poland	~22k	~0.4k	2%	Emitel	NetWorks!, T Infra	Orange, Play, Plus, T-Mobile
Sweden	~20k	–	–	–	Telia Towers, SUNAB, Net4Mobility	Three, 3GIS, Telenor
Switzerland	~12k	~5k	47%	Cellnex	N/A	Swisscom, Sunrise, Salt Mobile
Portugal	~11k	~5k	44%	Cellnex	Vantage	Vodafone, NOS, Altice
Netherlands	~9k	~3k	31%	Cellnex, NOVEC	Vodafone / Liberty Global	Vodafone, Deutsche Telekom, KPN
Finland	~6k	~0.6k	10%	Digita	Telia Towers	Elisa, DNA
Ireland	~6k	~2k	42%	Phoenix, Cellnex, Towercom	Vantage	Hutchinson, Eir, Vodafone
Others	~91k	~10k	11%			
Europe	~426k	~83k	~20%			

Source: TowerXchange, EY-Parthenon analysis, July 2020

The share of independent TowerCos has increased to 20%

The past few years have seen the share of towers directly owned by MNOs decline, while the share of towers controlled by independent TowerCos has grown significantly from 13% (in 2014) to 20% in 2020, with an acceleration in the last 2 years. This has been driven in part by the following:

- MNOs carving out their tower portfolios in separate MNO-controlled TowerCos (e.g., TIM carving out Inwit in Italy, Altice carving out SFR TowerCo in France). This trend has continued in the past two years (e.g., Vantage Towers, CK Hutchison Networks, Orange TowerCo) – which is seen as an interim step toward full independence of their tower portfolios – as seen in recent deals in Portugal (NOS) or Poland (Play).
- Consolidation of MNOs (e.g., the acquisition of E-Plus by Telefonica in Germany)
- MNOs setting up JVs to pool passive infrastructure resources (e.g., Bouygues/SFR JV in France)
- Tower portfolio divestments from MNOs to reduce debt and raise cash for investment in core business activities, while independent TowerCos actively pursue in-organic growth strategies (e.g., Bouygues selling towers to Cellnex in France)
- Independent TowerCos growing organically and/or building towers in build-to-suit programs for MNOs (e.g., Cellnex building towers for Bouygues in France)

CASE STUDY

Bouygues Telecom tower sales

In 2016, Cellnex acquired its first towers portfolio in France from Bouygues Telecom, a deal followed by other agreements in 2017 and 2018 involving acquisitions and deployment of more than 5,000 locations until 2022. The deal allowed Cellnex to keep the expansion of its footprint of towers in Europe. In the last four years, the company has completed 14 transactions in 6 countries with a committed investment of €4b. The transaction brought Bouygues Telecom's total of divested towers between 2012 and 2017 to 4,466, and was seen as another step toward streamlining its business and freeing up capital to support future network rollouts.

Source: TowerXchange website, July 2020

Outsourcing to independent TowerCos in Europe is still low ...

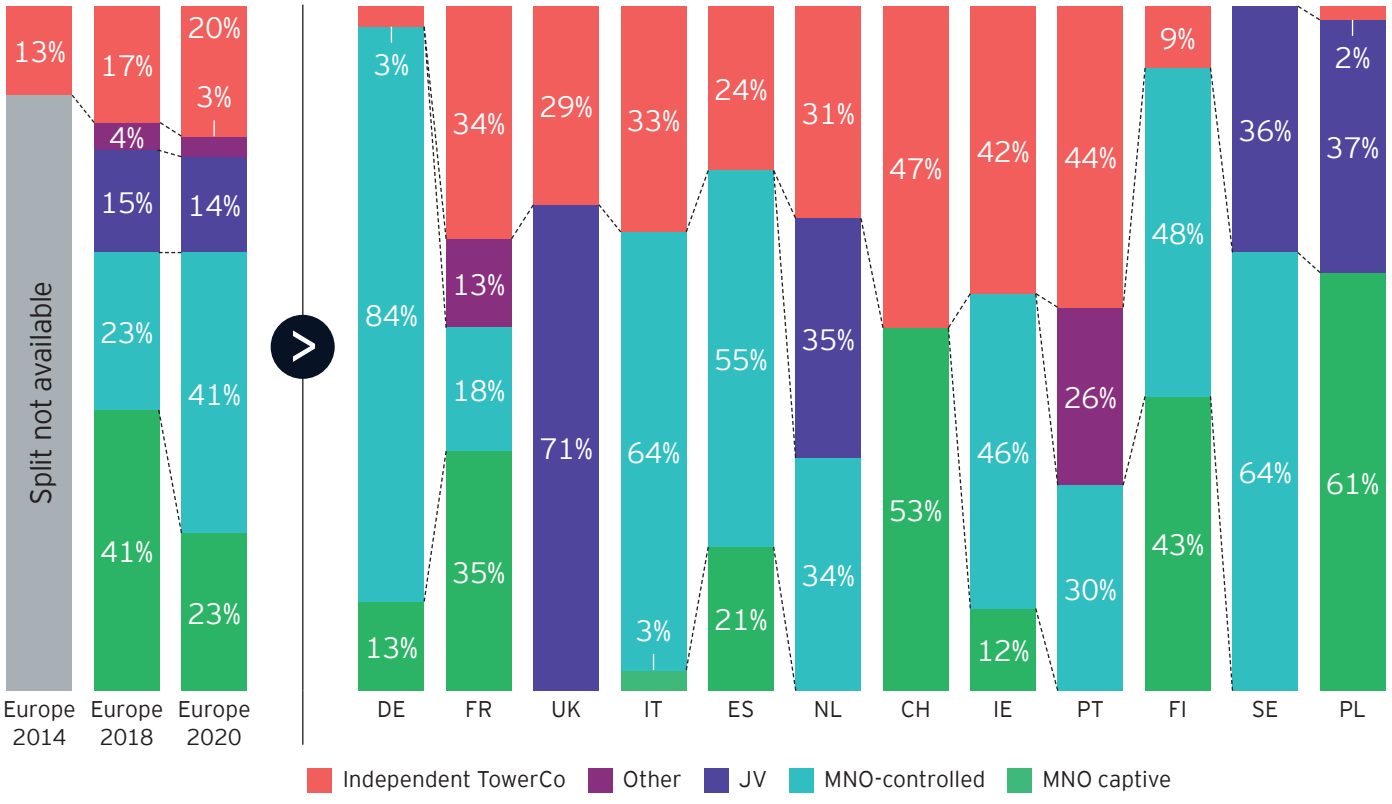
In Europe, outsourcing to TowerCos has traditionally been low. This has been due in part to:

- MNOs' strategies to differentiate in network quality
- Early formation of MNOs sharing JVs, with varying degrees of active and passive sharing
- Limited policy incentives for infrastructure sharing (as compared with the REIT model in the US)

MNOs in Europe perceive network quality, and by extension access to proprietary passive infrastructure, as a key competitive differentiator. As a result, many MNOs have been hesitant to outsource their entire passive infrastructure to independent TowerCos. As an alternative, some MNOs have set up MNO-controlled TowerCos and TowerCo JVs. This has been particularly prevalent in the UK and Scandinavia where the share of JV owned towers is greater than 50%.

Passive RAN sharing has also been a feature in many European markets. The first major wave of RAN sharing began with the introduction of 3G, with 4G resulting in a second wave. In countries such as France, regulatory intervention has compelled MNOs to share RAN and spectrum in rural areas to improve mobile coverage. This might have reduced the initial need for tower infrastructure expansion, and in turn the growth of independent TowerCos.

Figure 6: Share of towers help by TowerCos, by country/region, 2020 (%)



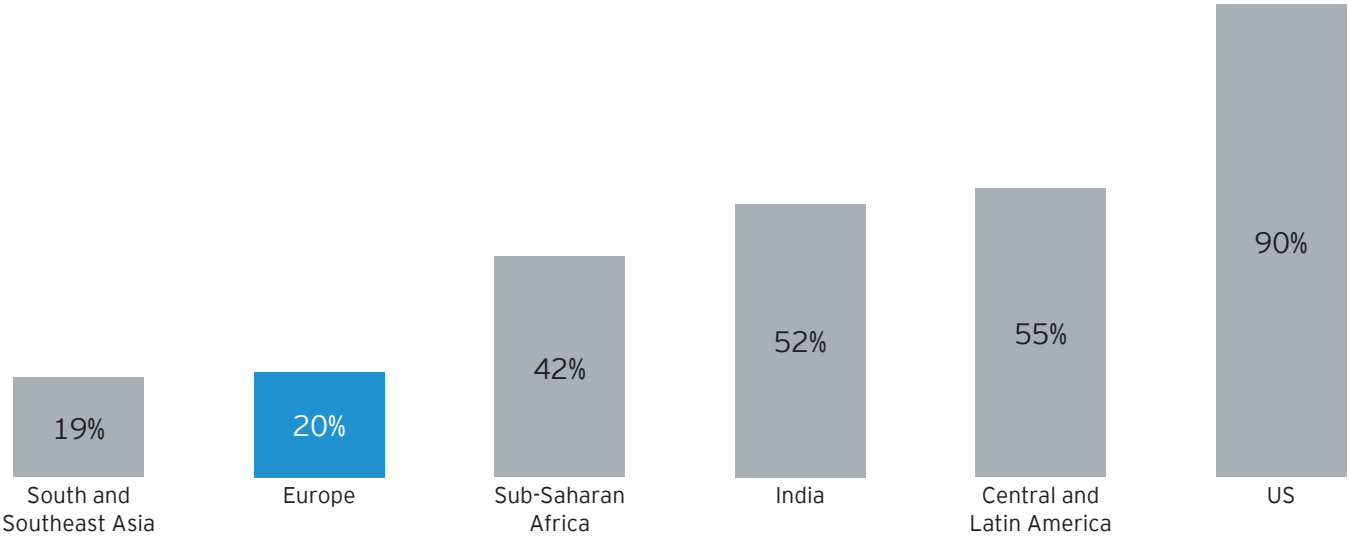
Note: "MNO captive" refers to towers owned by MNOs. "Other" refers to tower sites used for wireless networks, but not owned by MNOs, JVs or MNO-controlled or independent TowerCos (e.g., a water company with a portfolio of multiple water towers used for wireless networks); it excludes structures which are not (yet) used for wireless networks

Source: Towerxchange, EWIA members, broker reports, EY-Parthenon analysis, July 2020

… In particular when compared to other regions

Despite the share gain, there still remains a substantial gap in independent TowerCo ownership between Europe and other parts of the world. Countries such as the US have a substantially higher share of towers owned by independent TowerCos. The regulatory environments have also been broadly more favorable in the US than in Europe.

Figure 7: Share of towers held by independent TowerCos, by region, 2020 (%)



Source: EWIA member companies, analyst reports, TowerXchange, EY professional interviews, research and analysis

> Europe still trails other global telecoms markets when it comes to the penetration of independent infrastructure operators. This is changing rapidly as our more efficient business model for many types of infrastructure unlocks increased investment and better connectivity.

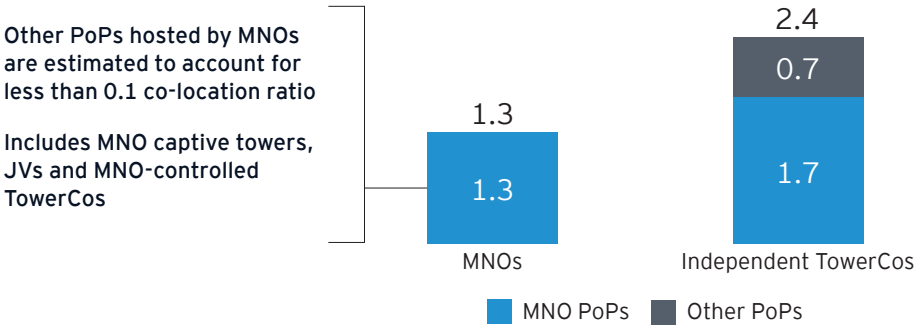
Scott Coates
CEO, Wireless Infrastructure Group

Independent TowerCos achieve higher co-location ratios than MNOs

Independent TowerCo co-location ratios, an indication for the efficiency of passive wireless infrastructure utilization, have increased at circa 5% per annum, driven by both MNO PoPs and "other" PoPs – these other PoPs include PoPs of emergency services networks (also known as public protection and disaster relief – (PPDR)), fixed wireless access providers, IoT networks, broadcasters on mobile network towers, etc.

Independent TowerCos typically achieve higher co-location ratios than MNOs. The main reason is that the TowerCo business model fully focuses on building and operating neutral infrastructure and then attracting as many tenancies as possible. MNOs, in contrast, prioritize their active network and weigh sharing of towers with their direct competitors against a potential decrease of network differentiation and increased operational complexity.

Figure 8: Average co-location ratio, Europe, 2020E



Another factor influencing the co-location ratio is the type of tower. Rooftop towers are typically less shared, while ground-based towers host more operators on average. This is driven by factors such as structure size, local legislation and the fact that ground-based towers are used more in rural areas, where infrastructure sharing is an economic imperative.

On average, TowerCos have a co-location ratio of 2.8 on ground-based towers and 1.5 on rooftop towers, with an overall co-location ratio of 2.4. In contrast, MNOs have an average co-location ratio of 1.5 on ground-based towers and 1.1 on rooftop towers, with an overall co-location ratio of 1.3.

MNO tower portfolios tend to have more rooftops, while independent TowerCos typically own more ground-based towers. The ratios vary by country. Due to their neutral host nature and focus on infrastructure sharing, independent TowerCos still achieve significantly higher co-location ratios on rooftops compared to MNO rooftops.

Source: EWIA member companies, analyst reports, TowerXchange, Ofcom, EY professional interviews, research and analysis, July 2020

Investors value the benefits of the TowerCo model ...

Recent tower deals continue to show strong M&A activity in the space, driven by both MNO tower carve-outs such as Telefonica's in Germany, and strong acquisition-led growth pursued by independent tower companies such as Cellnex. In total, the targets of M&A activity since 2018 have had a combined portfolio in excess of 25,000 towers.

Table 2: Selected European TowerCo deals, 2018–2020[1]

Date	Seller	Buyer/investor	Entity/target (% share)	Key country	Number of towers	Purchase price (€m)	Price per tower (€k)	No. of BTS towers	Value of BTS deals (€m)
Publicly listed companies									
2020	N/A	N/A	Cellnex	Multiple	38,834	N/A	N/A	N/A	N/A
2020	N/A	N/A	Inwit	Italy	22,100	N/A	N/A	N/A	N/A
Equity deals									
2020	AMP Capital	Asterion Industrial Partners	Axion	Spain	635	200	315	N/A	N/A
2019	3i	Brookfield	WIG (93%)	UK	2,046	454	222	N/A	N/A
2018	Telefonica	Pontegadea	Telxius (9.9%)	Multiple	1,690	379	224	N/A	N/A
2018	Altice	Morgan Stanley and HE	Towers of Portugal (75%)	Portugal	2,961	495	2,233	N/A	N/A
2018	Altice	KKR	Telefonica (40%)	Multiple	16,000	1,275	1993	N/A	N/A
Tower sale deals									
2020	NOS	Cellnex	N/A	Portugal	2,000	375	188	400	175
2020	OMTEL	Cellnex	N/A	Portugal	3,019	800	267	–	–
2020	Telefonica	Telxius	N/A	Germany	10,100	1,500	149	–	–
2020	Eir	Phoenix	N/A	Ireland	650	300	461	–	–
2019	Orange	Cellnex	N/A	Spain	1,500	260	173	–	–
2019	Iliad	Cellnex	N/A	France	5,700	1,400	351	2,500	1,350
2019	Iliad	Cellnex	N/A	Italy	2,200	600	273	1,000	–
2019	Salt	Cellnex	N/A	Switzerland	2,800	700	278	500	–
2019	Arqiva	Cellnex	N/A	UK	7,400	2,300	311	–	–
2019	Cignal	Cellnex	N/A	Ireland	546	210	385	–	–
Total					14,850	3,635	245	4,400	1,525

Capital released from MNO to Independent TowerCo

1. This excludes deals done prior to 2018

Source: Towerxchange, EWIA members, broker reports, EY-Parthenon analysis, July 2020

... enabling quicker rollouts of new networks, which ultimately benefits end customers

CASE STUDY

Iliad enters Italy

History

Iliad, a major French telecom company, entered the Italian market in May 2018. It had been granted a telecom license by the regulator in the wake of the merger of Wind Telecom and 3 Italia, which made it the fourth Italian MNO.

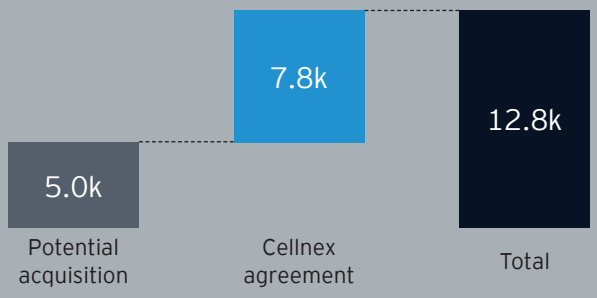
Market entry

Just four months after the launch of its Italian mobile business, Iliad had signed up 2.23m subscribers; it has set a target of 25% market share. Iliad currently relies on a network roaming agreement with Wind-Tre to provide its mobile services. However, as it aims to increase its coverage its across Italy, it has the option to acquire 5,000 towers in rural and urban areas made redundant by the Wind-Tre merger, and to access more than 10,000 towers owned by independent tower companies such as Cellnex (which Iliad already has an agreement with that covers an optional expansion) and EI Towers. Industry experts indicate that Iliad would prefer to align with third-party towers rather than build and maintain its own assets.

Consumer impact

Iliad's initial offer to consumers has been 30GB of data, unlimited voice minutes and unlimited texts for just €6 per month. This has been a significant discount compared to established players such as TIM, which had charged nearly double that price for similar packages. As indicated by Iliad's rapid customer growth, consumers in Italy have regarded Iliad's entry as a welcome change from the offerings of established network providers.

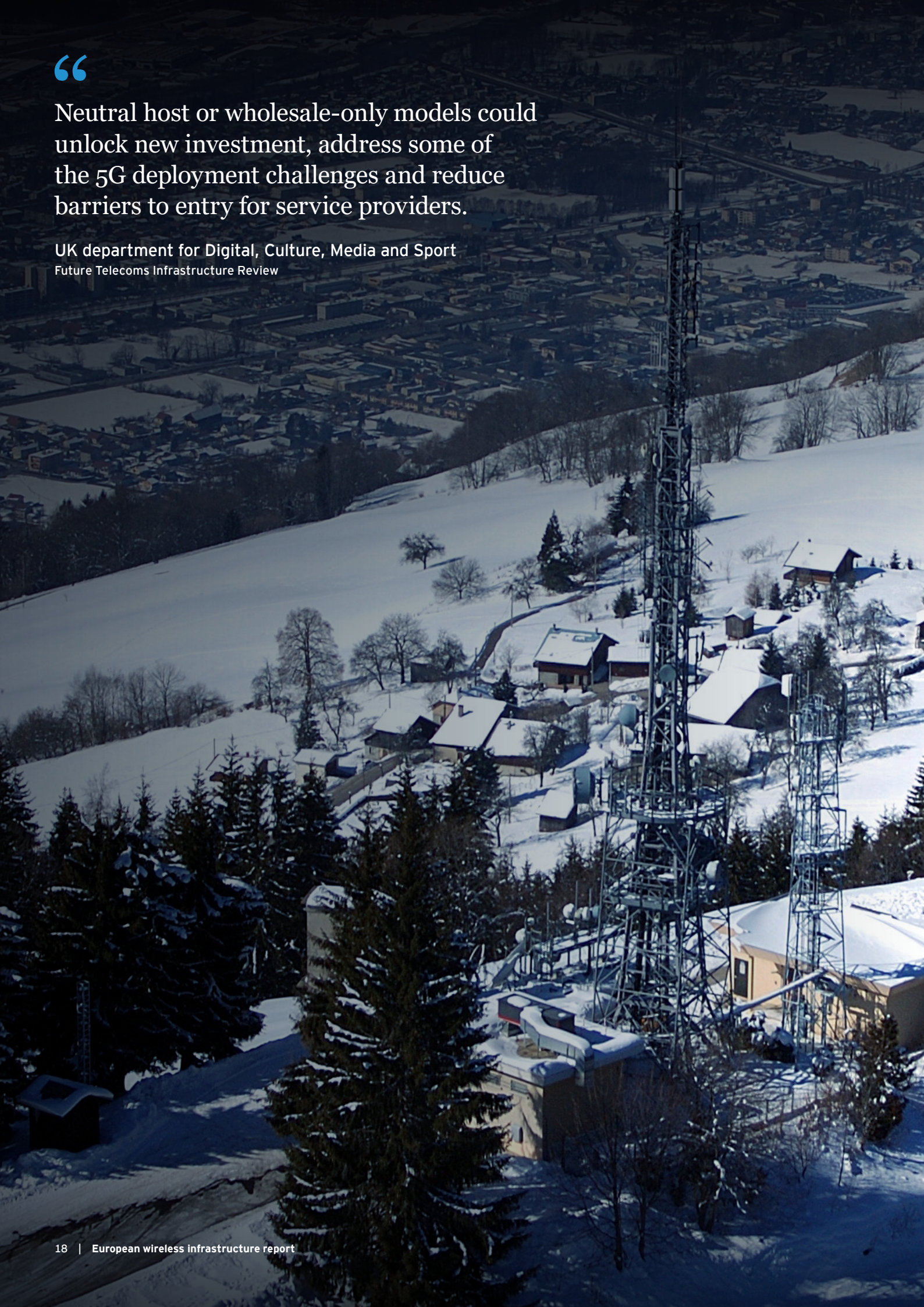
Figure 9: Iliad potential site acquisitions and sites covered by an optional expansion agreement with Cellnex



Source: MergerMarket, TowerXchange, Telecompaper, EY analysis

"When a new MNO first started and entered the market, independent TowerCos were the only ones who went to them and offered to share their infrastructure. There were no barriers, limits or difficulties preventing them from hosting their equipment on our sites. Oftentimes MNOs with existing infrastructure have no incentives to accommodate other TLC operators, especially if smaller.

Paolo Crocetti
Director of Institutional Affairs, EI Towers



> Neutral host or wholesale-only models could unlock new investment, address some of the 5G deployment challenges and reduce barriers to entry for service providers.

UK department for Digital, Culture, Media and Sport
Future Telecoms Infrastructure Review

Economic assessment

The market for towers has developed so that rural areas tend to see less investment in high-quality communications services. In this context, independent TowerCos play an important role in enabling a more efficient use of infrastructure.

There are high fixed costs associated with building towers, with the cost structure differing in rural areas compared to urban areas. The revenue opportunities are also different in rural and urban areas; the business case for a cell site can be more challenging in rural areas due to lower population density and potentially lower average incomes. Revenue projections for MNOs indicate muted growth.

Most MNOs operate a mix of profitable and unprofitable cell sites so that they can provide adequate coverage to their customers. However, there is still a link between population density, the cost of rollout and potential revenues for MNOs.

As a result, the market has developed in a way such that there are multiple overlapping communications networks, with multiple operators and networks present in economic areas, and undersupply in uneconomic (usually rural) areas.

Rural areas therefore tend to see less investment in communications infrastructure, and can lack the coverage and service quality seen in urban areas.

Independent TowerCos play an important role in enabling the telecoms industry to make most efficient use of its passive infrastructure. The higher utilization rates of independent TowerCos reduce the cost per user, lowering the threshold at which it becomes profitable to improve service coverage.

> “Operators sometimes don’t have a viable business case for implementing sites in rural areas on their own. We can provide the infrastructure, and with multiple operators, we can develop a viable business case together. From that perspective, we help to expand the network in more remote areas where coverage obligations are hard to meet. We drive digital connectivity for people in those remote areas.

Rosalie Weijers
Director Business Development, NOVEC

Independent TowerCos deliver a range of economic benefits ...

Greater outsourcing to independent TowerCos lowers the costs of infrastructure, which enables faster and cheaper rollout, delivering a range of socioeconomic benefits for consumers and the wider market. Outsourcing also benefits MNOs by freeing up more capital for investment in coverage and capacity.

More efficient market structure

Infrastructure can be delivered at a lower cost, and unnecessary duplication of infrastructure is reduced

Capital released for MNOS

Sales of towers to independent TowerCos release capital for investment in existing network and new services

Investment in capacity and coverage

Cheaper and faster rollout to rural areas helps to address the digital divide

Facilitating market entry

Non-MNO tenants have more choice, lowering barriers to entry, and may benefit from a neutral host

Environmental benefits

Due to co-location, fewer towers are needed to meet demand – reducing the visual impact of new towers

… As outsourcing is advantageous both for consumers and the wider market

Outsourcing to independent TowerCos can improve coverage in rural areas and capacity in congested areas. At the same time, the wider market benefits from diversity in tower ownership and supply.

Bridging the digital divide

The economics of network rollout mean that urban areas tend to benefit from the best coverage, while rural areas can be left behind. This is particularly relevant to the rollout of new technologies, which starts in the most densely populated areas before extending to other parts of the country. Without explicit rollout obligations imposed on MNOs, rural areas, at best, will be served later than those in urban areas, with a poorer quality service or, at worst, will not receive the service at all because it is not economic to serve the area.

Independent TowerCos can reduce the cost of delivering infrastructure, which enables faster and cheaper rollout to areas and households that otherwise could miss out.

Outsourcing can also release capital to MNOs to invest in improving coverage.

Improving service quality

Upgrading towers to provide more capacity also involves high fixed costs.

By lowering the costs of infrastructure, outsourcing to independent TowerCos can make upgrades more economic, improving service quality for consumers.

Other wireless networks

Diversity of supply of communications towers supports more use cases for other wireless network operators, such as FWA and IoT providers, facilitating market entry.

In turn, this can drive innovation in the services offered to consumers.

CASE STUDY

Filling coverage gaps

In 2018, France had over 10,000 rural villages where 4G coverage was absent, while more than 500 villages had no network coverage at all. To support mobile network operators in filling this coverage gap, TDF built more than 200 towers along transportation axes, in rural areas, and in other network white spots in 2018. This included setting up 50 new macro sites last October along the Rennes Le Mans trainline to allow the provision of 3G and 4G service to commuters. These sites also have the potential to be upgraded to provide 5G coverage at a later date. In 2019, more than 300 additional masts were erected, and this dynamic continues in 2020.

Source: EWIA members, July 2020

Independent TowerCos can realize efficiencies that result in a lower cost per point of presence

Opex efficiencies

Independent TowerCos, for whom the management of the passive elements of towers is their core business, typically have more expertise in identifying efficiencies and reducing operating expenditure – for instance, in contract negotiations for the site and in minimizing maintenance costs.

EY teams assume, based on our experience of working with MNOs and TowerCos, the opex efficiencies delivered by independent TowerCos compared to MNOs to be 10%. The impact of this efficiency on overall cost per user for independent TowerCos compared to MNOs is -3%, as illustrated in Figure 11.

Cost of capital savings

Independent TowerCos are typically able to attain finance at slightly lower cost of capital than MNOs – MNOs in the US and Europe typically have a weighted average cost of capital (WACC) that is 1.1% higher than that of equivalent European TowerCos.

The difference in WACC could reflect a range of factors. TowerCos may be seen as a lower risk, given their greater experience in operating towers. While a tower may be a depreciating asset for an MNO, it is a potential source of long-term revenue from multiple sources for a TowerCo. Additionally, TowerCos supply a higher number of MNOs, so their returns are less dependent on the success of particular MNOs at the retail level.

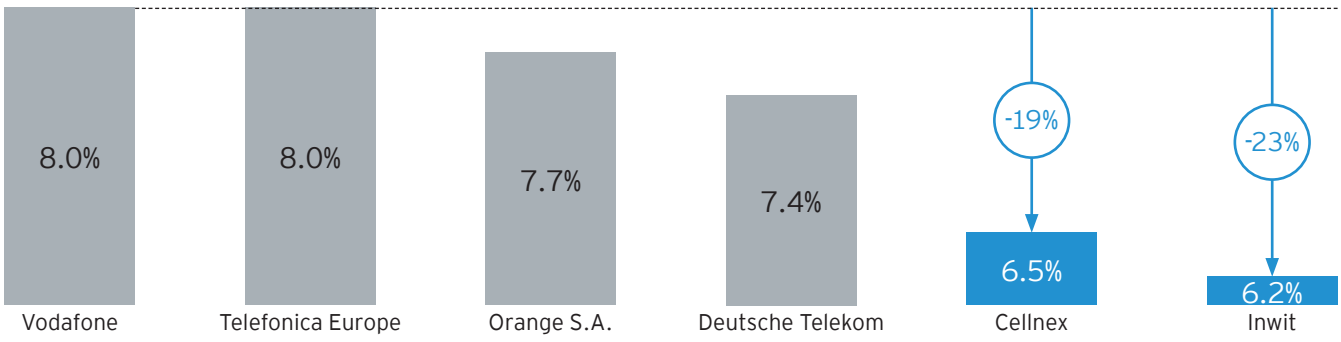
Higher rates of co-location

Independent TowerCos tend to have a higher number of users sharing towers (co-location ratios).

On average, independent TowerCos have a co-location ratio of 2.8 on ground-based towers and 1.5 on rooftop towers, with an overall co-location ratio of 2.4. In contrast, MNOs have an average co-location ratio of 1.5 on ground-based towers and 1.1 on rooftop towers, with an overall co-location ratio of 1.3.

Increased co-location has a major impact on reducing the cost per user, as it means the significant fixed costs per tower are shared among multiple network operators.

Figure 10: Illustrated weighted average cost of capital for MNOs and TowerCos



Source: EY analysis of broker reports, July 2020. WACC is nominal and post-tax, calculated using the CAPM approach

A typical point of presence managed by an independent TowerCo is 46% more efficient

The cost of tower use for a single network is referred to as the cost of providing a "point of presence."

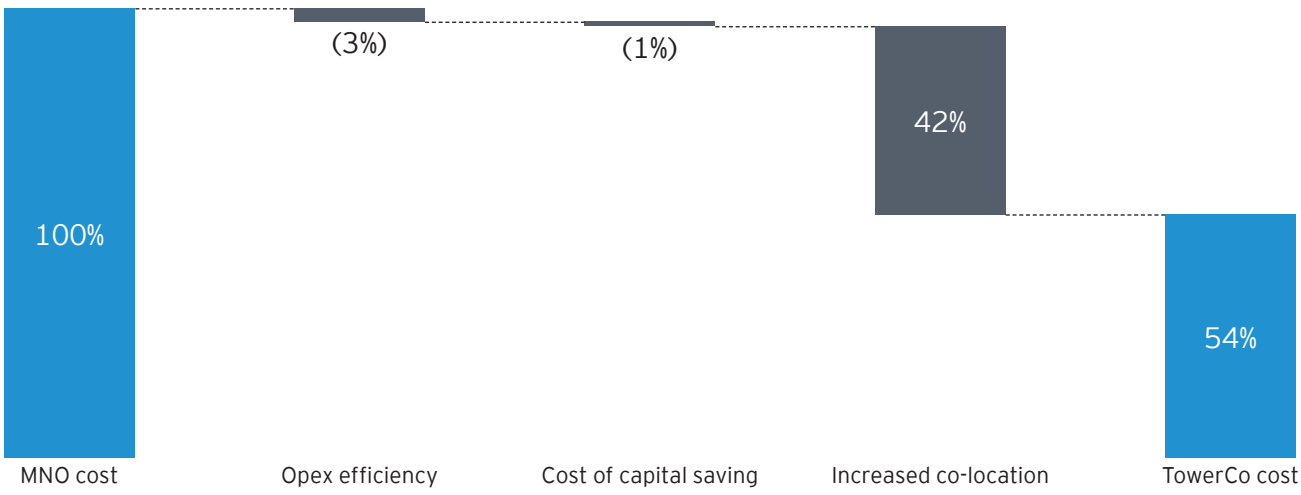
Due to a combination of opex efficiencies, cost of capital savings and higher rates of co-location, a typical point of presence managed by an independent TowerCo is 46% more efficient than one managed by an MNO. The ability of independent TowerCos to achieve higher rates of co-location is the primary driver of the differences in efficiency between independent TowerCos and MNOs, as seen in the chart below.

This analysis considers the cost of construction of a tower (including financing over a 10-year period), with the cost discounted back to a present value and shared between the users for a given tower.

The distribution of the cost savings from independent TowerCos may depend on the pricing strategies of the MNOs and the independent TowerCos. Either the MNOs or the independent TowerCos could benefit, depending on the level of markup that the independent TowerCos are able to charge on their costs.

The scope for excessive markups will be constrained by continued competition between TowerCos (MNO-controlled and independent), and the need for independent TowerCos to maintain a price advantage compared to own-built infrastructure. With continued retail competition between MNOs, economic theory suggests that the benefits from the use of TowerCos should ultimately be passed through to retail consumers, either through lower retail prices, or higher quality services.

Figure 11: TowerCo cost saving as percentage of MNO cost per PoP (%)



Note: Please note that we have included MNO captive towers, April 2019, JVs and MNO-controlled TowerCos in the category "MNOs" for this calculation
Source: EY analysis

Greater tower outsourcing could result in an economic saving of €31b between 2019 to 2029

Our analysis and assumptions

Our analysis assumes a 3% annual net growth in points of presence over the next 10 years. We have assessed the below two scenarios to understand the economic savings of greater outsourcing to TowerCos.

MNO-led scenario

Proportion of towers owned by independent TowerCos: 17% – assumes that the proportion of towers owned by independent TowerCos remains the same as today.

New towers required to meet predicted demand: circa 220,000.

Total lifetime cost per new point of presence: €106,567.

TowerCo-led scenario

Proportion of towers owned by independent TowerCos: 50% – assumes that a large proportion of towers that are controlled by MNOs[1] today are outsourced to TowerCos, but assumes that those towers that are part of a joint venture are more difficult for MNOs to outsource. Also assumes that MNOs sell more of their ground-based towers – 70% of the towers acquired from the MNOs by the independent TowerCos are assumed to be ground-based.

New towers required to meet predicted demand: circa 107,000.

Total lifetime cost per new point of presence: €70,500.

1. Please note that we have included MNO captive towers, JVs and MNO-controlled TowerCos in the category "MNOs" for this calculation.

Economic savings

Based on the above analysis and assumptions, the aggregate benefit to the economy of the increase in outsourcing to TowerCos has a present value of€31b over the next decade.

€31b

Greater outsourcing would release significant levels of capital to the MNOs for investment in new technologies like 5G

Capital release

The amount of capital that could be released if independent TowerCo ownership of towers in Europe grew from 17% to 50%

€28b

In addition to the economic savings, the outsourcing of towers to independent TowerCos can also help MNOs to release a significant amount of capital: an additional €28b of capital could be released if the rate of outsourcing in Europe grew from 17% today to 50% in the future. We consider an outsourcing rate of 50% to be an upper estimate of the level of outsourcing possible in Europe, recognizing that existing joint ventures between MNOs limit the level of outsourcing to an extent. Recent transactions provide support for this – since 2018, as their share of sites grew from 17% to 20%, Independent TowerCos have helped release circa €3.5b in capital via acquisition of various tower portfolios from MNOs. In addition, significant amounts are invested by independent TowerCos in Build to Suit programs, thereby helping MNOs avoid the corresponding capital.

MNOs could use this capital to invest in their networks to meet coverage obligations and to help address the digital divide, and to invest in high-quality networks, as required by society and industry.

The capital released by increased outsourcing of towers could also help to drive forward increased investment in the infrastructure needed to deliver new technologies. MNO capital expenditure is expected to have to increase to support the roll out of 5G networks; costs will include upgrading the capacity of existing 4G networks, investing in new small cell networks, and acquiring spectrum.

Since 2018, the share of independent TowerCos in Europe has increased from 17% to 20%, helping to release c.€3.5b of capital in the process via acquisition of tower portfolios from MNOs.

> It is positive to see regulatory developments like the new European telecoms framework that acknowledges the benefits brought by independent wholesale-only infrastructure operators and the very different incentives that apply to them. Our sector invests over 30-year horizons and a stable regulatory landscape that encourages our business model is absolutely critical.

Scott Coates
CEO, Wireless Infrastructure Group

Outlook

Successive technological developments have driven mobile usage and data consumption. The rollout of 5G (Fifth Generation Mobile Network) is expected to "supercharge" this growth by providing completely new use cases for mobile services.

The main benefits of 5G include faster speeds, lower latency and higher network capacity.

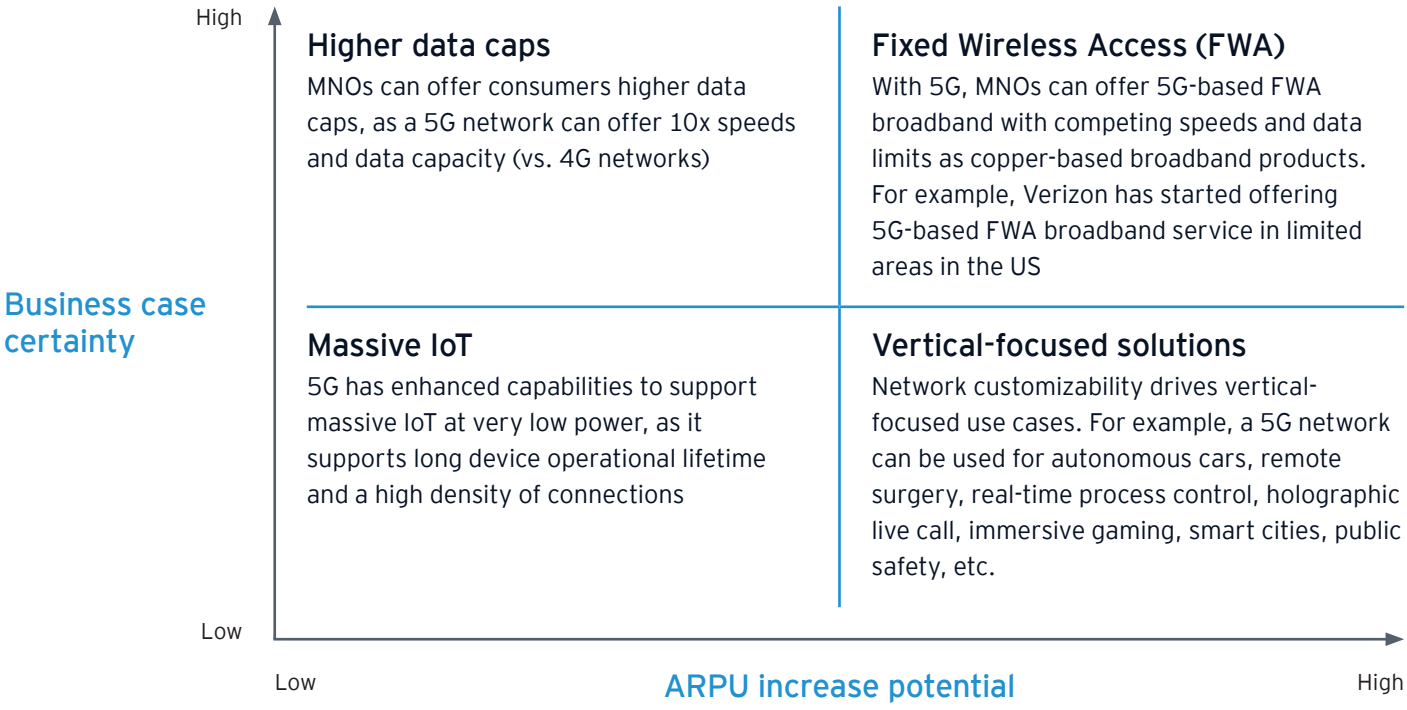
Table 3: Main differences between 4G and 5G technology

	Evolution of 4G to 5G		
Metric	**4G/LTE at launch**	**4G "LTE Advanced" today**	**5G "ambition" (longer term)**
Year	2010	2018/19	2020+
Downlink speed	100 Mbps	1,000 Mbps	>10,000 Mbps
Latency	100 ms	10 ms	<1 ms
Spectrum range	800 MHz to 2.6 GHz	800 MHz to 2.6 GHz	700 MHz to 26+ GHz
Carrier bandwidth	20 MHz	100 MHz (5x20 MHz)	400 MHz (>6 GHz, multiples)

Source: EY-Parthenon analysis, July 2020

However, the key differentiator for 5G (vs. 4G) is that it enables deployment of massively more spectrum for mobile, while making mobile networks more adaptive thanks to a high degree of software and virtualization. This allows completely new use cases:

Figure 12: Key uses cases of 5G mapped based on potential for ARPU uplift and certainty of the business case for the use case



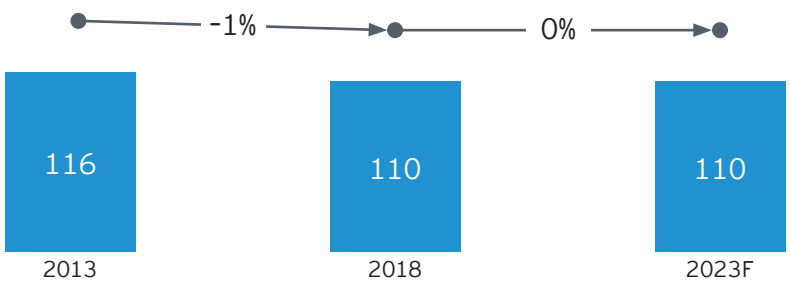
Source: Ericsson, 3GPP, GSMA, Qorvo, EY professional interviews and analysis, April 2019

5G rollout will require circa €56b of capital, while revenue is stagnant

MNOs continue to face a high degree of competition, along with price erosion and broadly flat revenue projections. This, in conjunction with other high-priority investments (e.g., spectrum, network densification), means MNOs are compelled to consider alternative approaches to 5G network investments.

Overall, MNOs revenue is forecast to remain under pressure, with analysts forecasting flat revenue growth for MNOs in EU-28* between 2018 and 2023

Figure 13: Mobile service revenue, EU-28*, 2013-23F (€b)



However, a study commissioned by the European Commission estimated that 5G deployment in the EU will require circa €56b in investments in the radio network and transmission links for MNOs.

Source: Analysys Mason, European Commission, EY analysis, April 2019

Table 4: Main 5G rollout cost drivers and incremental 5G deployment costs, EU-28*

€56b
costs

Cost drivers	Explanation
Network upgrade	MNOs need to upgrade their existing radio access networks with 5G NR (new radio) equipment (in limited cases, MNOs could software update the existing 4G LTE equipment if 5G is deployed on the existing 4G spectrum)
Network densification	Propagation characteristics of mmWave spectrum used in 5G implies MNOs would need more tower capacity on macro sites and small cells in very dense areas
Network virtualization	However, MNOs need to upgrade their RAN equipment and invest in the digital transformation of network to make appropriate use of network virtualization capabilities
Fiber backhaul	Investment in dark fiber based backhaul connectivity is considered crucial due to high data throughput from 5G base stations coupled with centralized RAN functionality

Note: *Excluding Cyprus, Malta and Luxembourg
Source: Analysys Mason, European Commission, EY analysis, April 2019

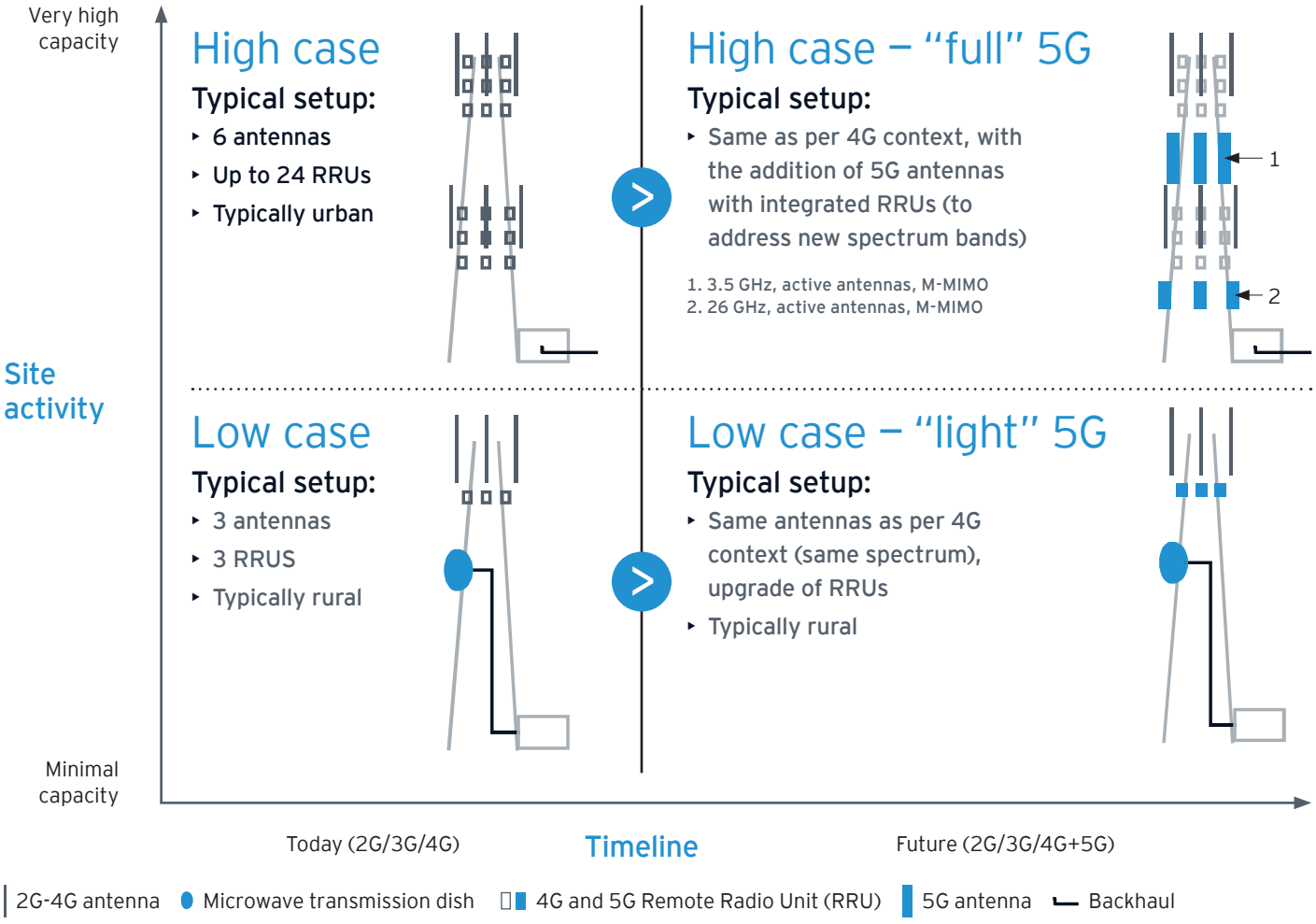
Independent TowerCos' towers are well-suited to accommodate additional 5G active equipment

The impact of the transition to 5G will depend on the activity at a given site. In most cases, MNOs will need to install new 5G equipment, except where they deploy "light" 5G – independent TowerCos' towers are better suited than MNOs' to accommodate this additional active equipment.

At low capacity sites (which are typically located in rural areas), an upgrade of RRUs to the 5G New Radio standard may suffice, leading to limited increases in equipment. However, high-capacity sites (which are typically located in urban areas) already have a significantly higher density of active equipment hosted (antennas and remote radio units); this density is expected to increase further going forward, as additional 5G antennas and RRUs will need to be installed.

Independent TowerCos' towers are typically built to accommodate multiple MNOs with multiple antennas, whereas MNOs' towers are typically not built to host a large number of antennas and RRUs. Hence independent TowerCos will be able speed up the rollout of 5G (and lower the rollout cost), particularly in dense areas, as MNOs will likely not be able to deploy the number of additional antennas and RRUs needed on their own towers without fortifying them.

Figure 14: Indicative 5G antennas upgrades, by site activity

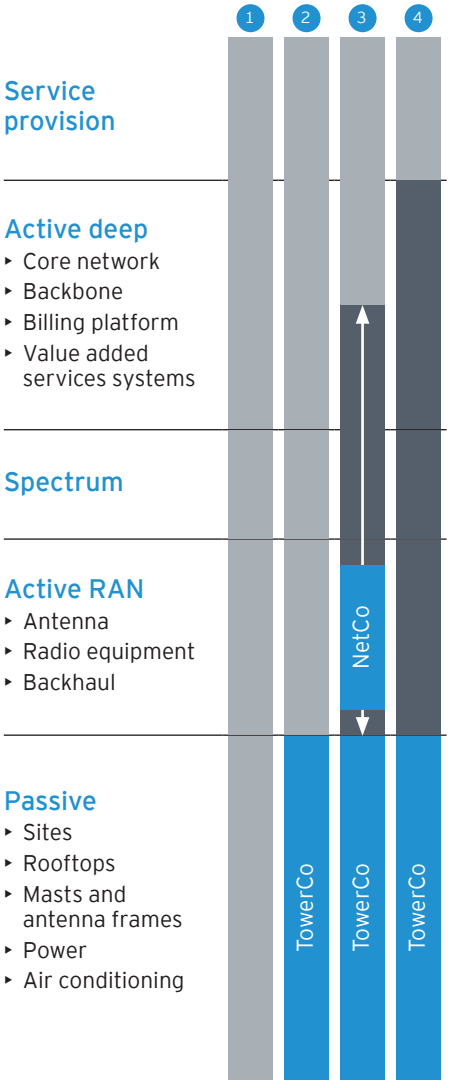


Source: EY professional interviews and analysis, April 2019

Active sharing opens new opportunities for TowerCos to operate active equipment

MNOs utilize two principal operating models for infrastructure sharing: passive and active. In passive sharing, MNOs share "passive" infrastructure elements such as tower masts, civil works, fences, shelters, power supply and cooling systems. In active sharing, MNOs share "active" elements such as RAN equipment. TowerCos play a role on all of these sharing models.

Figure 15: Types of MNO infrastructure sharing (conceptual)



1 Fully integrated MNO

- In the "traditional" fully integrated model, each MNO owns and operates all infrastructure and service layers in-house

2 Passive infrastructure sharing

- The simplest form of infrastructure sharing
- Operators agree to share available infrastructure, including sites and rooftops, masts and antenna frames, power and air conditioning

3 Active sharing

- In addition to sharing passive assets, operators typically share all radio access network (RAN) equipment, which is incorporated into a single network and then split into separate core networks (MORAN – Multi-Operator RAN)
- Further, operators can also share spectrum but not active RAN equipment (MOCN – Multi-Operator Core Network)
- An even deeper level of active sharing includes the sharing of core networks, backbone, billing platforms and value added services (VAS) systems
- Outsourcing of active sharing networks is the opportunity for TowerCos to evolve into NetCos and deliver further economic savings – DAS and Small Cells are a step toward this

4 Wholesale

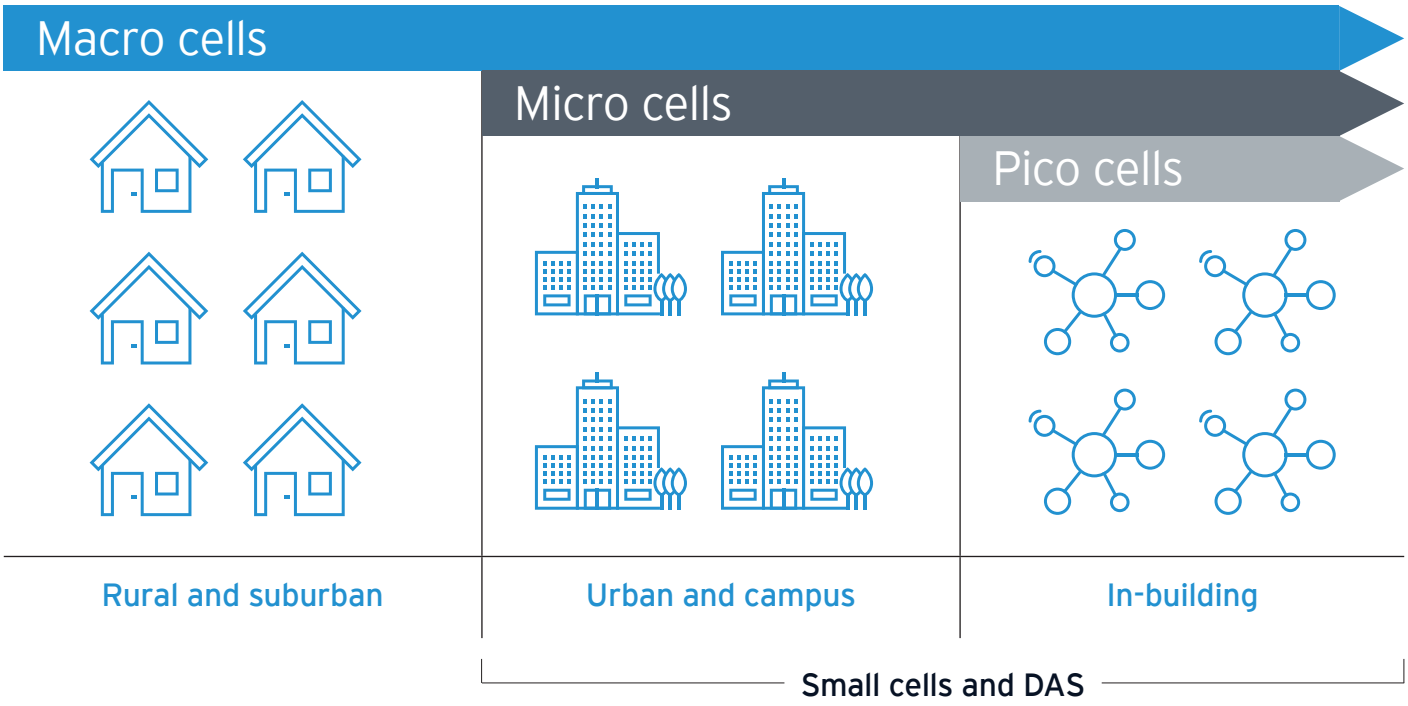
- A single wholesale network involves a single entity building and operating a network to sell wireless access to mobile service providers
- The wholesaler owns the spectrum and infrastructure, combining passive and active network sharing, and sells access capacity to all market operators. All operators in the market effectively act as mobile virtual network operators (MVNOs) under this model
- This could be the ultimate target for TowerCos evolving into full NetCos, potentially in rural areas first, where economics are most challenging

Distributed Antenna Systems (DAS) and small cells are opportunities for TowerCos to offer neutral host active networks

Small cells and DAS technologies are used by MNOs to supplement macro networks where additional macro sites would be inadequate or cost-prohibitive to maintain reliable coverage in buildings, on campus-type settings or dense urban areas.

In essence, small cells and DAS are smaller antennas used to augment and densify existing networks.

Figure 16: Typical geographies covered by small cells and DAS



Small cells differ from DAS in both the operating model and use case.

Small cells are independent, low-power radio elements and typically serve a single MNO. The indoor variant is typically used in small- and middle-sized buildings – commercial venues with limited footprint but still significant usage volume (e.g., branch offices, restaurants, retail stores).

DAS serve multiple MNOs and are typically suited to high-profile, multi-operator environments characterized by high user density subscribed to a number of different operators (e.g., airports, stadiums, convention centers, shopping malls).

DAS are provided by multiple players, including TowerCos, for which they are a logical next step toward operating entire active neutral host networks.

EY-Parthenon graphic, November 2020

The European Electronic Communications Code (EECC) reflects the pro-competitive nature of independent TowerCos

The European Electronic Communications Code (EECC) reflects the pro-competitive nature of independent TowerCos	In 2010, as part of the Digital Single Market policy, the Digital Agenda for Europe defined objectives for connectivity by 2020: basic broadband to all EU households by 2013, 30 Mbps available to all households by 2020 and subscriptions of at least 100 Mbps by at least 50% of households. In 2016, the EU revised the strategic connectivity targets as part of the Gigabit Society Vision for 2025 to include (a) Gigabit connectivity for all main socioeconomic drivers, such as schools, transport hubs and main providers of public services, and digitally intensive enterprises; and (b) all urban areas and all major terrestrial transport paths to have uninterrupted 5G coverage.
5G is a catalyst for fulfilling the Gigabit society aspiration of the European Union	As an intermediate objective for 2020, 5G connectivity is to be available as a commercial service in at least one major city in each Member State, building on commercial introduction in 2018. All European households, rural or urban, are to have access to Internet connectivity offering a downlink of at least 100 Mbps, upgradable to Gigabit speed. The required investment is estimated at circa €500b over a decade, circa €155b above the current run rate. Circa €148b are required for the necessary wireless infrastructure. A share of this additional investment will flow to independent TowerCos in the form of demand for new towers, additional PoPs, small cells and fiber-to-the-tower.
The European Union established the new EECC as a framework to expedite access to and take-up of high speed connectivity	Recognizing the magnitude of the investment required and that the prevailing regulatory framework from 2002 is no longer appropriate, the EU set out to revise the entire European telecoms regulation, encapsulated in the new EECC. It adds access to and take-up of very high-capacity connectivity as a regulatory objective (alongside existing ones such as promoting competition). The benefits to the market brought by wholesale-only operators is recognized in Article 80 EECC.
Other important objectives in the EECC relevant for TowerCos are spectrum harmonization, a consistent approach to coverage obligations and the establishment of predictable regulatory conditions	The EECC's objectives include: ▸ Establish key principles for spectrum assignment in the Union, new Union-level instruments to establish assignment deadlines and license periods (minimum 25 years), and a peer review among national regulators to establish consistent assignment practices – this would result in increased certainty regarding spectrum licenses and cost for MNOs, enabling more investment in radio access networks ▸ Promote a consistent approach to coverage obligations, to small cell deployment and to network sharing, thereby stimulating 5G deployment and rural connectivity – enabling pan-European scale effects and driving demand for PoPs, towers and small cells ▸ Establish predictable regulatory conditions to promote co-investment, JVs and wholesale-only business models, facilitating deployment of very high-capacity networks deeper into suburban and rural areas – increasing certainty for independent TowerCos (and other independent infrastructure providers such as open fiber networks) and enabling investments at more predictable returns

Source: European Commission, EY expert interviews and analysis, April 2019

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