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Vantage Towers: Infrastructure behind the digitalization
Can investors benefit from a private equity-driven market?

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Abstract

This thesis is an individual contribution to the work “Vantage Towers: Infrastructure behind the digitalization – Can investors benefit from a market driven by PEs?” by Georg Röper and Yannick Kaiser, which derives an investment recommendation for Vantage Towers (VTWR). This work contributes a detailed company and industry description, followed by a thorough market analyses to forecast the number of VT’s mobile sites. Based on this forecast, a comprehensive driver-based business plan has been derived, specifying revenue, Opex and Capex drivers. The joint work builds upon this information to derive financial statements and the valuation and concludes with a sell recommendation.

Keywords: Valuation, Infrastructure, Tower Market, Telecommunication

This report is part of the Vantage Towers AG valuation report (annexed), developed by Georg Röper (54074) and Yannick Kaiser-Sichau (53828) and should be read as an integral part of it.

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Introduction

This thesis is an individual contribution to the work “Vantage Towers: Infrastructure behind the digitalization – Can investors benefit from a market driven by PEs?” by Georg Röper and Yannick Kaiser (the joint report). The purpose of the joint report is to provide an investment recommendation (buy/ hold/ sell) for Vantage Towers (Ticker: VTWR), a European mobile telecommunications infrastructure provider.

Vantage Towers (VT) owns 46.1k physical tower sites across Germany, Spain, Greece and other European markets, which are primarily used by mobile network operators (MNOs) that deploy a network of antennas to provide wireless services. VT's business model is focused on the deployment and maintenance of physical tower sites, on which space is rented out to MNOs and broadcasters and is characterized by a high cash flow visibility through long-term contracts. VT was owned by Vodafone prior to its carve out in 2019 and was listed on the Frankfurt stock exchange in 2021. In March 2023, Vodafone and a consortium of private equity investors announced the delisting of VT. Due to its historic ownership, 78% of Vantage Towers' revenue is still generated by its anchor tenant and co-shareholder Vodafone.

The joint report concludes with a sell recommendation for investors as a price target of €29.18 is derived, below the tender offer price of €32 from March 2023 and the current share price of €36.92. The price target is based on a DCF model, which has been assessed to be the most accurate representation, as it is based on a driver-based business plan and market forecast reflecting a balance of risks and opportunities. The price target indicates that Vodafone and the consortium have paid a premium, however, is above the share price of €27.33 before the delisting was announced. It has been found that a more aggressive upside case may justify a tender offer price of €32, however, that higher trading prices cannot be justified by market developments and moderate upsides. The report concludes that recently high multiples in the tower market reflect expectations beyond market growth and may have been driven by a strong presence of PEs.

The joint report describes the tower industry and VT, its business model and key financials. Based on this and a brief competitive overview, a detailed market model is derived that forecasts the demand for sites and PoPs (one site may have multiple tenants, so called PoPs) for each geography and derives the fair share of VT. This forecast is a key business plan input, as revenues are driven by the number of PoPs and the revenue per PoP (defined in MSAs), while Opex and Capex items are closely connected to revenues and sites. The business plan serves as the basis for deriving a full set of financial statements, which are the basis of the valuation. The valuation techniques comprise discounted cashflow, dividend discount and multiple valuations as well as scenario and sensitivity analyses.

This thesis describes the industry and company as well as the competitive environment in detail to then derive a market forecast. The market forecast has been developed in great detail for each country and derives the future number of sites and PoPs of VT, which is driven by coverage obligations (the need for MNOs to provide a network without gaps) and increasing data traffic, that leads to the need for additional PoPs in urban areas. Based on the market report, this thesis derives the detailed driver-based business plan including revenue, Opex and Capex projections. Most inputs are directly linked to the market development. The thesis of Yannick Kaiser builds upon the detailed business plan and derives the free cash flow as well as the financial statements and is then focused on the valuation of VT to derive the final recommendation.

Industry and company overview

Vantage Towers (VT) is a European mobile telecommunications infrastructure provider. The company owns and operates passive infrastructure used to broadcast mobile telecommunications networks by mobile network operators (MNOs) and tenants that require tower sites. VT owns approximately 46.1k physical macro sites across Germany (~19.8k), Spain (~8.4k), Greece (4.9k) and other European markets (~13.1k in Czech Republic, Hungary, Romania and Portugal). VT further holds a 50% share in Cornerstone (~15.1k in the UK) and a 33% share in INWIT (~23.3k in Italy). Both companies follow a very similar business model, which is deploying and renting out space on physical towers¹.

Industry introduction

The mobile telecommunications market primarily consists of two types of companies: mobile network operators (MNOs) and infrastructure providers (so-called TowerCos). MNOs deploy a network of antennas to supply users with wireless internet and telephony services. These companies auction frequency spectrums from regulators and deploy the technical equipment (active equipment) to transmit mobile data via their antennas. They must oblige coverage obligations imposed by regulators, who aim to guarantee mobile network coverage without gaps in rural areas and provide sufficient capacity across their mobile networks as the data throughput per antenna is physically limited. Capacity constraints mainly occur in urban areas if the existing network can no longer support peak traffic loads and can be mitigated by setting up additional antennas. In Germany, there are four MNOs, namely Deutsche Telekom (DT), Vodafone, Telefonica (O2) and 1&1. In other markets, the prominent players include Orange and MasMovil (Spain), Cosmote and Wind (Greece). Historically, most MNOs owned the entire active equipment to host mobile networks and the passive infrastructure, which consists primarily of steel masts and concrete towers in rural areas and rooftop steel masts in urban areas. However, in the past, there has been a wave of separation of the passive infrastructure into TowerCos while the active equipment remained with the MNOs. This was done to create investment opportunities for infrastructure investors seeking a stable return at limited risk and for MNOs to raise funds required to invest in mobile (5G) and fixed infrastructures (fibre-to-the-home deployments). Most recently, Vodafone has carved out VT and raised funds in an IPO. At the same time, DT has concluded the spin-off of its infrastructure into GD Towers to sell a 51% stake to a consortium of Brookfield & DigitalBridge. Many European TowerCos originate from MNOs and have a lean business model revolving around investing in and managing physical infrastructure. These TowerCos deploy passive infrastructure onto which the active equipment is mounted by the MNOs that pay rent for every location they use. While a physical site (one distinct location) is referred to as a macro site, the presence of an MNO on this tower is referred to as a point of presence (PoP). While – due to their historic ownership – almost all TowerCos have anchor tenants (their former MNO owners), they may also rent out additional space to other MNOs. Therefore, one physical site may host multiple PoPs. For example, Vodafone and DT can colocate on a mast site owned by VT. The tenancy ratio describes the average number of PoPs per macro site and is a crucial KPI. Historically, most TowerCos exclusively hosted PoPs of their MNO owner and did not offer colocation to other MNOs. As many TowerCos are now legally independent, MNOs are increasingly colocating on sites not deployed by their "own" TowerCo. However, most revenues are usually generated by the anchor tenant, who signs long-term master services agreements (MSAs), often with contract durations of 30 years, that define usage rights, prices and services.

¹ Source: <https://www.vantagetowers.com/sites/tower-co-v2/files/2023-06/vt-fy23-annual-report.pdf> - (accessed: 19.12.2023)

VT company overview

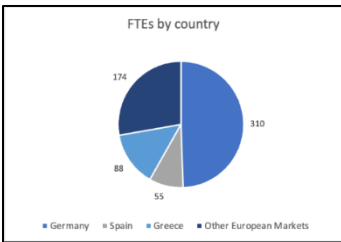


Figure 2 – FTEs by country

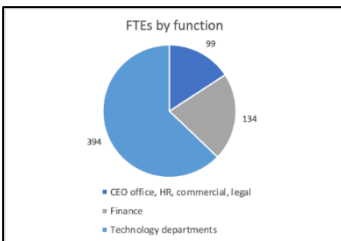


Figure 3 – FTEs by function

The creation of VT was communicated by Vodafone on July 24, 2020, following an announcement to separate the European tower infrastructure operations in July 2019. Vodafone aimed to create an infrastructure platform with over 68k towers and prepare an initial public offering (IPO) for 2021. In March 2021, VT started trading on the Frankfurt stock exchange at an offer price of €24. In March 2023, Oak Holdings, a joint venture between Vodafone, Global Infrastructure Partners and KKR (the consortium), in which Vodafone held 64.2% of the shares, completed a voluntary public takeover at a consideration of €32 per share. After completion of the transaction, Oak Holdings held approximately 89% of the shares of VT (i.e. Vodafone indirectly owned 57.3% of the shares). In July 2023, Vodafone agreed to sell additional VT shares to the consortium for €500m, increasing the consortium's stake in Oak Holdings to 40%. Also, Vodafone has the option to sell further shares to the consortium to reach a 50% ownership stake in Oak Holdings, which implies that Vodafone retains control of its infrastructure while raising capital². Until December 2023, VT's shares have been delisted from the Frankfurt stock exchange and are only trading in Hamburg to date. Oak Holdings and its controlling parties intend to squeeze out the remaining shareholders. This paper assesses the current share price and whether the offered takeover price of €32 was justified.

VT appointed Christain Hillabrant as CEO on July 28, 2023, who succeeded Thomas Reisten, the current CFO, who led the company on an interim basis. Christian Hillabrand is expected to maintain the focus on VT's core business, as he is a former COO of a similar infrastructure provider, and the PE investors are likely to expect the developments outlined in the market and business plan section, which are in line with the typical business model of TowerCos. The supervisory board consists of three Vodafone and three consortium members. VT reported 627 full-time equivalents (FTEs) in March 2023 and has a lean company structure in line with market standards (figures 2 & 3 show a split by geography and function). As VT is a pure infrastructure provider, the activities of the staff revolve around landlord contract management, including legal and financial aspects (to source and maintain contracts with house owners for rooftop antennas and landowners for masts), site planning and commissioning to achieve the desired run-rate in deployments, maintaining and upgrading sites to provide the proper configurations for MNOs and other clients, and commercializing the site portfolio.

Business model and key financials

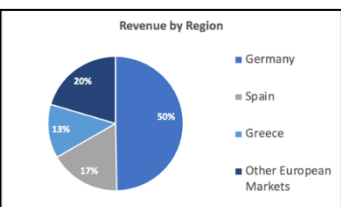


Figure 4 – Revenue by region

In fiscal year 2023, VT generated revenues of €1,095m. 50% were generated in Germany, followed by Spain (17%) and Greece (13%). As VT was carved out of its anchor tenant, Vodafone, 78% of revenues are generated by Vodafone, which rents space for mobile equipment on VT's sites. These revenues are highly secure as they are tied to inflation-linked MSAs with the members of the Vodafone group, meaning that sites are contracted ahead of their deployment and revenues per site are predetermined in framework contracts. This is crucial and logical given the shareholder structure with external infrastructure investors. The MSAs provide high visibility on future revenues and cash flows as they were signed for 8 years and are renewed automatically following expiration for three additional eight-year terms. As Vodafone cannot offer a mobile network without VT, it is not likely that VT faces a risk due to this customer concentration. VT expects slightly stronger growth across non-Vodafone revenues as it expects to become more attractive to Vodafone's MNO competitors as the business is now a standalone entity with external investors. In addition to macro site revenues generated by Vodafone and other MNO clients, there

² Source: <https://www.vantagetowers.com/sites/tower-co-v2/files/oak-joint-reasoned-statement-delisting-offer-final-version-non-binding-translation.pdf> - (accessed: 19.12.2023)

is a limited revenue contribution by non-MNO clients that rent space on the infrastructure (i.e. broadcasters) and by other rental revenues, which are revenues generated by renting space for distributed antenna systems (DAS) and small cells, both of which are used in urban areas but so far not a key revenue source. It is generally expected that strong upsides in these areas will be mainly captured by MNOs, as these deployments do not require a physical tower infrastructure. Therefore, revenue growth is primarily linked to the development of MNO tenants on VTs' sites, which are forecasted in the market section.

In line with most TowerCos, VT has an EBITDA margin of 83% (17% Opex), which is high compared to other industries and enabled by the business model of investing capital into infrastructure and lean operations. The EBITDA after leases (EBITDAaL) margin is a relevant industry KPI as ground lease costs are a major cost item (30% of revenues in 2023) but are capitalized under the new IFRS 16 standard. VT generated an EBITDAaL of €564m in 2023 (52% margin), which is in line with industry benchmarks (see competitive section). VT aims to improve its margins by increasing tenancy ratios and decreasing land lease costs and Opex.

VTs' capital expenditures (Capex) include maintenance Capex (€24m in 2023) and growth Capex (€466m in 2023), which includes new site, ground lease optimization (related to the purchase of leased land) and other growth Capex. In 2020, VT announced that it aims to invest Capex of ~€1bn for new sites between FY22-26, a further €200m for ground purchases, €100m for transformation projects and €40-60m for other growth Capex.

Generally speaking, VT's financial performance is linked to its ability to invest in the deployment of new infrastructure and its ability to increase the number of tenants across the existing infrastructure. TowerCos are often acquired and owned by private equity firms (KKR, EQT, etc.) and other institutional investors such as pension funds (Brookfield, Omers, etc.) as they have a high revenue and cash flow visibility, generate a significant amount of cash in return for strong upfront Capex investments and provide a comparably stable return at low risk.

Competitive overview

The competitive landscape across the European tower market comprises pure infrastructure players, such as VT and MNOs, that still own – either directly or through subsidiaries – their infrastructure. Most infrastructure players were created as part of carve-outs from MNOs, and there has been significant consolidation. Infrastructure providers differ in their footprint and size, anchor tenant, efficiency of the business model (cost structures) and capability to expand their portfolio. All of VTs' markets are consolidated, with a maximum of four TowerCos. As the number of PoPs is expected to grow, TowerCos mainly grow by building new infrastructure and driving up tenancy ratios without any market cannibalization; however, the attractiveness of the infrastructure is key to winning additional MNO tenancies. Financials of the key competitors in each market are summarized in figures 5 & 6.

In Germany, GD Towers is VT's largest competitor, operates more than 30k macro sites in Germany and was established as a spin-off of DT. In February 2023, DT completed the 51% stake sale in GD Towers³ to a consortium of DigitalBridge and Brookfield – the company was valued at €17.5bn. GD Towers is very comparable with VT, follows the same business model, has roughly the same scale and a similar corporate structure, and directly competes with VT for Telefonica PoPs. GD Towers is the largest TowerCo in a single European country, which implies significant scale advantages due to strong deployment capacity, efficiencies in managing the

Key competitor information - Germany			
Competitor	GD Towers	ATC	Telefonica
Total sites	>40k	225k	n/a
Sites GER	>30k	14.8k	9k
FTEs	800	6.0k	n/a
Revenue	€1.1bn	\$10.7bn	n/a
EBITDAaL	€640m	€736m	n/a
Margin	60%	62%	n/a

Figure 5 – Key competitors in Germany

³ <https://www.telekom.com/de/medien/medieninformationen/detail/deutsche-telekom-schliesst-tower-transaktion-ab-1025418> - (accessed: 19.12.2023)

infrastructure and bargaining power towards customers⁴. American Tower Corporation (ATC) is the 3rd largest TowerCo in Germany after GD and VT and operates a portfolio of ~14.8k sites within Germany, most of which were acquired from Telefonica in 2021 (the assets were separated in an entity called Telxius). The Telxius acquisition comprised sites in Germany, Spain and Latin America and the enterprise was valued at €7.7bn. ATC is one of the largest global TowerCos and operates 225k sites across 25 countries and 6 continents. Telefonica is, due to the sale of its Telxius assets, a smaller infrastructure provider and operates ~9k rooftop sites that were not transferred to Telxius prior to the sale. Telefonica is one of the three large German MNOs and uses its own rooftop sites and the ATC infrastructure. In comparison to all other TowerCos in Germany, the towers remaining under Telefonica are directly managed by the MNO.

In Spain, ATC is also a VT competitor and operates 11.7k sites, acquired along with the German sites from Telefonica and is the largest TowerCo and VT competitor in Spain. Besides ATC, Cellnex is VT's biggest competitor. Cellnex is headquartered in Spain and is the largest European TowerCo with 111k sites across 12 European countries, of which 8.8k are in Spain. Cellnex plans to expand its network to 135k sites by 2030. The company is one of the first European TowerCos and has grown mainly through M&A. TOTEM is a TowerCo owned by Orange, an MNO active in Spain and France and owns the mobile tower infrastructure that originally belonged to Orange. As per the creations of GD Towers and VT, TOTEM is fully independent and focuses solely on passive infrastructure. TOTEM owns 17k sites in France and 8k sites in Spain and has a long-term contract with Orange, like VTs' MSAs.

In Greece, OTE is the parent company of Cosmote, an MNO competitor of Vodafone. OTE owns the tower infrastructure used by Cosmote and is the only competitor of VT in Greece since the infrastructure of Wind Hellas was merged into VT. OTE operated 4.4k sites in 2020, according to VT and is one of the few competitors that has not separated its infrastructure from the MNO business (although different entities exist). The competitive situation in Greece is different from other markets as Vodafone and Wind use VTs' infrastructure, and Cosmote uses OTE's infrastructure. Active sharing and colocation agreements on competitive infrastructure are unlikely.

Mobile and tower market forecast

To derive the development of VTs' key financials, it is crucial to understand the development of mobile markets and how they translate into an opportunity for TowerCos. As described, 89% of VT's revenues were macro site revenues in 2023, and the financial development is mainly driven by the number of PoPs on VT's sites and the revenue per PoP. While the former is the uncertain variable to be estimated, the latter is, to a large degree, contractually defined through MSAs with Vodafone. Therefore, to derive a financial forecast, a market model has been built to determine the need for capacity-driven and coverage-related PoPs by MNO to estimate VTs' fair share and the demand for physical site deployments, the main driver for Capex. In each of VT's markets, the number of PoPs is expected to increase; therefore, the markets are not fully mature, and revenue growth can be achieved without a shift of market shares. The opportunity of each competitor across the markets is strongly linked to the PoP demand of its anchor tenant and the potential to colocate other MNOs on existing and new sites. To derive the infrastructure demand and the market opportunity for each TowerCo, the PoP demand has been forecasted for each MNO in each market. There are two drivers that drive the need for additional PoPs. In rural areas, MNOs are often required by law to deploy additional PoPs and to upgrade and densify the network

Competitor	ATC	Cellnex	TOTEM
Total sites	225k	111k	25k
Sites ESP	11.7k	8.8k	8k
FTEs	6.0k	3.0k	n/a
Revenue	\$10.7bn	€3.5bn	€500m
EBITDAaL	€736m	~€2bn	~€300m
Margin	62%	56%	57%

Figure 6 – Key competitors in Spain

⁴ Source: <https://www2.deloitte.com/content/dam/Deloitte/pt/Documents/technology-media-telecommunications/TEE/The-Rise-of-Netcos.pdf> - (accessed: 19.12.2023)

to close network gaps and guarantee specific levels of coverage at predetermined average down- and upload speeds. In urban areas, MNOs must improve and densify their networks to accommodate higher data traffic. The growth in data traffic is driven by consumers' mobile data consumption that increases strongly, enabled by technological trends such as high-resolution streaming and industry use cases that require mobile networks. While the growth in data traffic can partly be mitigated by upgrading existing antennas and by capturing traffic peaks through small cells and DAS systems, additional PoPs will be required to densify the existing network, meaning by decreasing the distance between macro sites. Furthermore, the deployment of urban 5G networks with download speeds of up to 1GHz requires additional PoPs as 5G is mostly transmitted on a 3.6GHz spectrum band, which has a limited reach. Both drivers for PoP demand have been estimated separately for each geography. Based on the PoP forecast, the number of required sites to be deployed by VT and the fair share of additional colocated PoPs have been computed, as well as the tenancy ratios (PoPs per macro site).

Germany

In Germany, VT's largest market, mobile coverage lacks the expectations of the government. The German regulator, the Bundesnetzagentur, has imposed a wide set of coverage requirements along with spectrum auctions in 2019 that are to be fulfilled partly in 2022 and 2024. To reach these obligations, three main measures have been publicly announced, and further obligations are expected (figure 7):

1. The "Mobilfunkinfrastruktugesellschaft" (MIG) was found by the Bundesnetzagentur, and funds of €1.1bn have been made available to subsidize deployments of macro sites in areas that are not economically viable for TowerCos and MNOs to deploy in. Based on the information that only 110 sites have been deployed to date and an average project cost of ~€600k per site (incl. tower structure and backbone network), a total of 2.0k sites are expected to be deployed, a number significantly short of the mulled 5.0k sites when the MIG was found. The number of PoPs is expected to reach 5.0k as the tenancy ratio is expected to be relatively high at 2.5x (with the maximum being 3 as only DT, Vodafone, and Telefonica must fulfil all coverage obligations) as the cost per PoP for MNOs is relatively low by law to promote deployment in non-viable areas. Deployments are expected to be completed by 2030, as the MIG program is significantly behind schedule, and a ramp-up from one tenant per site to 2.5 tenants per site is expected for each deployment cohort (sites deployed in a given year) as one anchor tenant organizes the deployment while others colocate later⁵.
2. The three large MNOs have agreed to deploy 6.0k sites in white spots (2.0k to be deployed by each MNO) that will be shared to limit deployment Capex. White spots are areas in which no MNO has deployed its network, while grey spots are areas in which one or two MNOs are absent. As a result of the agreement, 6.0k sites are expected to be deployed, hosting a total of 18.0k PoPs (3 per site). As the deployment progress has been slow, with an estimated 750 sites deployed by the end of 2023, deployments are expected to be completed by 2030. All MNOs are expected to use the infrastructure once it has been deployed to fulfil their obligations.
3. In addition to the first two requirements, the MNOs have agreed to actively share their network in grey spots. While 5.0k PoPs are expected to be actively shared, these PoPs are not considered in the further analysis as i) the active sharing agreement has largely been concluded and ii) active sharing does not imply any additional antennas but the technical sharing of the same set of equipment, i.e. is not revenue generating for TowerCos.

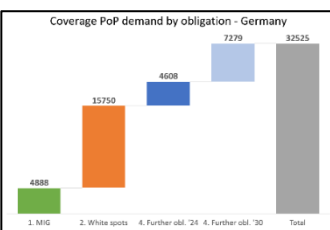


Figure 7 – Coverage PoP demand by obligation – Germany (after 2023)

⁵ Source: <https://netzda-mig.de/unternehmen#c42> – (accessed: 19.12.2023)

Coverage by infrastructure type and MNO				
Infrastructure	Length	DT	Vodafone	Telefonica
National highways	19.9k km	99.4%	99.8%	94.1%
State roads marked 1 or 0	5.9k km	96.2%	96.6%	91.7%
Main railways	21.5k km	96.5%	97.6%	92.8%
Remaining state roads	36.2k km	93.3%	95.5%	89.8%
County roads	80k km	96.9%	96.6%	97.6%
Remaining railways	20.5k km	98.7%	99.6%	99.4%
Main water ways	4.5k km	98.9%	99.6%	98.9%
Remaining water ways	4k km	95.3%	95.7%	92.6%
Remaining roads	100k km	92.5%	98.6%	89.4%
Households	n/a	98.2%	98.3%	95.1%

Figure 8 – Coverage by infrastructure type and MNO related to further obligations

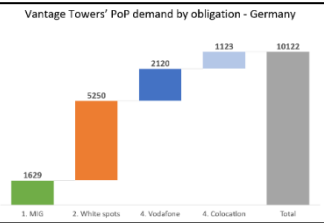


Figure 9 – Vantage Towers' PoP demand by obligation

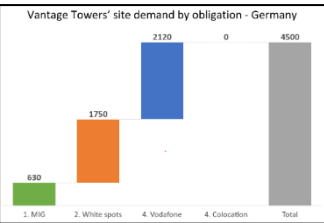


Figure 10 – Vantage Towers' site demand by obligation

4. Besides these ~20.6k additional PoPs required, additional PoPs are expected to be needed to fulfil further obligations, including the coverage of households, roads, railways and waterways. While MNOs tend to communicate that coverage goals have been fulfilled, the regulator published a report in 2022 that shows significant coverage gaps. As the visibility of the number of required PoPs is more limited, an analysis has been conducted to examine the PoP demand for each obligation (figure 7). The analysis is based on ten coverage obligations along different types of infrastructure and the coverage by MNO by the end of 2022 (figure 8). The required number of PoPs by MNO is estimated using the total length of the infrastructure and the percentage point delta between current and target coverage to derive the length of uncovered infrastructure, which is then converted into PoPs using an average cell radius of 6km⁶ (low-frequency bands used in rural areas allow for comparably high radius) and an adjustment factor to account for the fact that uncovered spots are not perfectly aligned next to each other and to account for imperfections in the terrain as the cell radius is reduced in mountainous areas. To fulfil all current obligations (required by 2024), ~4.6k PoPs are expected to be required. Additionally, 7.3k new PoPs are expected to be required until 2030 (figure 7) as MNOs are expected to be obliged to have nearly full coverage along all types of infrastructure in the long term. While DT and Vodafone require fewer PoPs and are expected to deploy them by 2024 and 2030, respectively, Telefonica is expected to deploy its PoPs required by 2024 only by the end of 2027, as the most PoPs are required (4G household coverage of 95.1% vs. 98.2% of competitors and largest gaps along roads). No further coverage PoPs are assumed to be deployed after 2030. In total, based on the agreed deployments (1.-3.) and further PoP demand of MNOs (4.), a total of ~32.5k PoPs are expected to be deployed in rural areas after 2023 (figure 7).

Figures 9 and 10 show the expected coverage PoP and site demand for VT after 2023. VT is expected to deploy ~2.4k sites hosting a total of ~6.9k additional PoPs after 2023 for obligations 1 and 2, as each TowerCo is expected to deploy one-third of all further MIG (1.) and white spot sharing (2.) sites. Additionally, VT is expected to deploy 2.1k additional sites hosting 3.2k additional PoPs for coverage obligation 4. This is driven by ~3.0k PoPs required by Vodafone to fulfil obligation 4, of which 30% are expected to be colocated on competitor's sites (therefore, 2.1k new sites are required) and the assumption that DT and Telefonica also collocate 30% of their PoPs leading to an additional 1.1k PoPs. The colocation assumption implies that in 30% of the cases, a desirable PoP location of Vodafone must be very close to a competitor's PoP and that space is available on the site (factors such as physical capacity and wind load as well as strategic considerations limit the ability to colocate on all sites). This assumption is cross-checked against future tenancy ratios and has a ceiling as MNOs are likely to have colocated on attractive sites already. VT's fair share of colocated PoPs has been derived based on the total number of sites, as larger players are more likely to have a suitable site.

In addition to rural deployments, VT is expected to face demand from the MNO new-entrant 1&1. 1&1 auctioned frequency spectrum for the first time in 2019 and faces the obligation to cover 50% of households by 2030 and expects the need to deploy 12k PoPs, mainly in urban areas. VT and 1&1 reached an agreement for VT to host 3,800 1&1 PoPs on existing rooftop sites by 2025, with limited progress so far. The market model expects that VT will indeed be able to host those PoPs on existing infrastructure with full deployment completed by 2026.

In line with the coverage analyses, the demand for capacity PoPs in urban and suburban areas has been estimated for each MNO and has been translated into a demand for infrastructure. To derive the demand for PoPs, the total data traffic has been forecasted based on historic 2018-22

⁶ Source: <https://dgtlinfra.com/cell-tower-range-how-far-reach/> - (accessed: 19.12.2023)

data from the Bundesnetzagentur (34% CAGR from 2018-23). It is expected that traffic growth will remain strong; however, growth rates will diminish over time from 30% in 2023 to below 10% in 2040 – this assumption is assessed to be conservative, taking historical growth and technological headwinds into consideration. The growth in traffic is driven by subscribers shifting from 3G to 4G and, increasingly, 5G, a significant growth in data per SIM due to the increasing quality and consumption of data-intensive media and the upgrades in technology. Additionally, mobile-to-mobile use cases and the industrial use of mobile data for IoT devices and smart features are expected to drive traffic. The traffic growth projection has been translated to a PoP forecast based on the historical development of PoPs in non-rural areas, the non-rural data traffic per MNO and the capacity supply per non-rural PoP. The supply is expected to grow at a growth rate decreasing from 23% p.a. (historical average growth) at a relative pace in line with traffic growth. This growth in capacity supplied per PoP is due to the technological advances that allow for a higher data throughput per antenna, enabled by purchasing additional spectrum (naturally limited and related to auctions), spectrum refarming (use of wider spectrum bands for technologies with higher data transmission such as 5G) and the upgrades of antennas. Based on the traffic supply per PoP and the growth in traffic, the number of required PoPs has been estimated. In Germany, ~9.1k additional capacity PoPs are expected by 2030 and ~17.3k PoPs by 2040 (figure 11). The forecast implies a total of ~2.6k demanded sites from VT as Vodafone is expected to require 5.1k new PoPs by 2040, and 50% of PoPs are assumed to be colocated. As the colocation assumption holds for all players, VT is forecast to have a colocation demand of an additional ~2.8k PoPs.

Combining the coverage and capacity analyses as well as the impact of 1&1, VT is expected to face a demand for ~5.9k new macro sites until 2030 and ~16.1k new PoPs until 2030. This implies an increase in tenancy ratios from 1.24x in 2023 to 1.59x in 2030. The forecast is slightly more conservative compared to VTs' goal to deploy 5.5k sites in Germany until 2026 as a slower phasing of deployments is expected; however further deployments are expected after 2026. The tenancy ratio growth is a result of the strong tenancy ratio on new coverage sites, which is contractually secured. Based on the competitive environment and the positioning of VT, it appears likely that each TowerCo will be able to fully deploy for its anchor tenant. Due to the slower ramp-up of deployments, the construction capacity required by VT is assessed to be sufficient and in line with historic buildouts.

Spain

The Spanish market is significantly smaller than the German market for VT (~8.4k sites vs. ~19.8k sites in 2023) and is expected to face a slightly different development. While the increase of capacity-driven PoPs is estimated in line with the German market as there is no reason to assume a deviation in consumption behaviour, the need for coverage PoPs is expected to be significantly lower due to a comparably high current coverage. VT expected that 4.0k additional PoPs will be deployed between 2021-30 (figure 11), which appears plausible given coverage of 94% with speeds above 30 Mbit/s (reference goal from the Spanish ministry), which implies that ~4.9k additional PoPs are required to reach 100% coverage based on the total PoPs in Spain (PoPs estimated based on Cellnex and market share). All active sharing agreements have been completed; therefore all PoPs require their own active equipment. As Telefonica is the market leader in Spain, it is expected that only 10% of these PoPs are attributable to Telefonica, while 30% are deployed by each Orange, Vodafone and MasMovil. Due to limited colocation potential as the market is comparably mature, all PoPs are expected to be on new sites, and VT is expected to be able to deploy 30% of all new sites, leading to the deployment of 840 new sites after 2023.

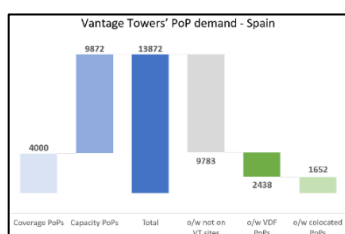


Figure 11 – VT PoP Demand Spain

The tenancy ratio is forecast to increase slightly after 2023, to 1.4x in the long run, implying ~1.2k new PoPs on these sites.

In addition to coverage-related growth, Spain is expected to face a similar capacity PoP growth as the German market due to similar consumer developments. Therefore, to account for the total population and network density, the required PoPs have been estimated based on the total existing PoPs of each MNO, the relative capacity-driven PoP growth in Germany and a network density factor reflecting the higher current number of PoPs per inhabitant in Spain. Based on the above inputs, ~9.9k additional capacity PoPs are expected to be demanded until 2040, of which ~3.2k are attributable to Vodafone. As per the German market, this translates to ~1.6k macro sites required to be deployed by VT, as all 50% of Vodafone PoPs that are not colocated are expected to be on new VT sites. Additionally, VT is expected to capture its fair share of ~1.3k colocated PoPs.

Including both coverage and capacity deployments, VT is expected to deploy ~2.4k new sites and gain ~4.1k new tenants, leading to a slight decrease in tenancy ratios from 1.84x in 2023 to 1.80x in 2040, mainly driven by a conservative estimate on coverage site tenancy ratios. As VT is well-positioned, but the market is competitive, VT is expected to deploy all Vodafone sites but no further sites.

Greece

Greece is VT's smallest separately reported market, with ~8.4k PoPs on ~4.9k sites and a revenue share of 13% in 2023. Based on the same methodology as above, a total of ~2.1k new capacity PoPs will be required after 2023. The split of deployments and the colocation shares in Greece differ from other markets as VT has acquired the infrastructure of Wind, leading to an infrastructure duopoly with Cosmote (OTE group). Therefore, no colocation on competitors' sites is expected, and VT is projected to deploy sites for all required Vodafone PoPs and colocate all Wind PoPs on the infrastructure. Based on the analysis, this implies ~1.3k new capacity PoPs until 2030 and ~700 new sites (figure 12).

The expected PoP deployments to improve network coverage have been estimated based on VTs' announcement to deploy 500 macro sites between 2021-25, subtracting the required capacity sites for 2024 and 2025. The deployments indicate that VT has a run-rate of ~120 new coverage sites per year in Greece, which is expected to be kept until 2030 due to the increasing pressure to improve coverage despite the absence of strict regulation. A tenancy ratio of 2x per site is assumed as Wind, and Vodafone will generally colocate on the new sites; however, it is assumed that 20% of sites will only be required by one MNO to account for situations in which one MNO has a PoP but there is no sufficient space to colocate. Based on this forecast, ~600 new coverage sites are expected to be deployed until 2030, with a total of ~1.0k PoPs. This is in line with a 4G coverage gap of 8%, implying ~1.0k new coverage PoPs will be required across the market as full coverage is likely to be achieved over the medium term. No further coverage deployments are expected after 2030. VT is well-positioned to deploy all sites.

Overall, a total of ~2.3k PoPs are expected to be required, translating into a demand for ~1.3k new sites, which implies a stable tenancy ratio at 1.7x.

Other European countries

The PoP and site forecast for VT's other European countries have been derived from the largest markets, as trends are expected to be similar across VT's entire footprint. Based on the average new coverage PoPs as a share of existing PoPs across Germany, Spain and Greece, VT is expected to face a demand for ~3.0k additional coverage PoPs and ~2.0k new coverage sites

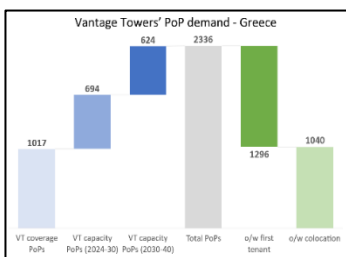


Figure 12 – Vantage Towers' PoP demand - Greece

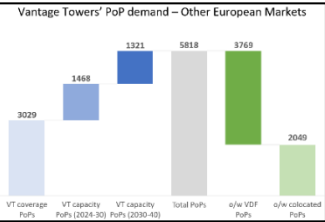


Figure 13 – Vantage Towers' PoP demand – Other European Markets

until 2040 (figure 13). This implies a tenancy ratio of 1.5x in line with the historic tenancy ratio. This estimation appears in line with VT's expectations, which estimated a total need for 13k coverage PoPs across the other European countries and Greece, which implies that VT could add ~3.5k new coverage PoPs between 2021-30 assuming they deploy their fair share of 27% of all required PoPs. Additionally, VT is expected to face a demand for ~2.8k new capacity PoPs on ~1.7k sites until 2040, derived using the same methodology as above based on PoP growth in Germany and the existing PoP density across the remaining European countries. The combined demand for coverage and capacity PoPs implies a total of ~5.8k new PoPs and ~3.8k new sites, leading to a slight increase in the tenancy ratio from 1.46x to 1.48x by 2040.

Market forecast summary

On a consolidated basis, the market forecast results in a growth of macro sites from 46.1k in 2023 to 57.6k in 2030 and 60.8k in 2040 and a PoP growth from 67.6k to 92.5k and 99.1k in the respective years. This implies a growth in the overall tenancy ratio from 1.47x to 1.61x in 2030. Germany is expected to be the strongest growth market, driven by the extensive coverage obligations. The projections are broadly in line with VT expectations from 2020 to deploy 7.1k sites from FY22-26, reach a tenancy ratio higher than 1.5x and achieve a mid-single digit revenue growth until 2026. The deployment is expected to take a longer time as VT has deployed at a slower pace than initially expected. The market model implies a 3.2% CAGR in total site growth from 2023-30. This is in line with market estimations published by E&Y and further market reports, which estimate the potential to be between 1.0-4.5%⁷.

Financials and business plan forecast

As explained, the number of PoP's and the revenue per PoP are the main drivers of VT's financial forecast. While the last chapter was essential to derive a detailed market model including the forecasted number of PoPs and sites in each country, the following chapter details all further business plan drivers. Based on the market model, few assumptions and financial data published by VT and other market participants, a driver-based business plan can be derived, as most Opex, Capex and other BP items are directly linked to the number of PoPs. The forecast has been computed separately for all regions, and the results have been aggregated to plausibly check all KPIs against VTs' own estimations and, more importantly, against competitors for benchmarking. The explicit forecast period spans from 2024 to 2040. In the following, the historical performance of VT, as well as the assumptions, are lined out shortly, following a structure along the P&L.

Revenues

VT achieved year-on-year revenue growth of 7.0% to €1,095m in 2023 (figure 14). Revenues have been forecasted separately along the different segments for each country. Total revenues are forecast to grow at a 5.2% CAGR from 2023-30 to €1,566m and at a 0.7% CAGR (excl. inflation) thereafter, which is mainly driven by the growth in capacity PoPs as coverage obligations are expected to be fulfilled. Growth is expected to be the highest in Germany (7.5% CAGR 2023-30) and lower across the other countries (2.3-3.0% CAGR), which is driven by the extensive coverage obligations and in line with the strong FY22-23 growth.

Macro site revenue is driven by the number of PoPs on VTs' infrastructure and the revenue per PoP. The number of PoPs and sites has been derived as per the market section. The average revenue per PoP differs significantly across regions based on historical financials. The 2023 average revenue per PoP per year was €19.5k for Germany, €10.8k for Spain, €15.3k for Greece

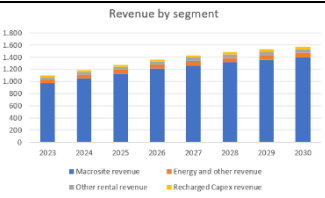


Figure 14 – Revenue by segment (2023-30)

⁷ Source: https://assets.ey.com/content/dam/ey-sites/ey-com/es_es/news/2021/02/ey-parthenon-and-ewia-report-on-european-mobile-tower-sector-v2.pdf - (accessed: 19.12.2023); <https://www.linkedin.com/pulse/telecom-tower-market-in-depth-analysis-2023-2030/> - (accessed: 19.12.2023)

and €10.5k for the other European markets, which is sensible as deployment costs are higher in Germany, and TowerCo MSAs are designed to link PoP charges to Capex to allow for a sufficient return for TowerCos. Revenues per PoP are expected to remain flat as the MSAs are inflation-linked, and the business plan forecast excludes inflation impacts. While revenue per PoP may differ slightly across different clients, it is assumed that the impact of the change of the mix of Vodafone and non-Vodafone clients is limited, and the pricing difference across clients is minor, as Vodafone is unlikely to agree to an MSA, that allows VT to rent out space to competitors at lower prices.

The revenue categories energy and other revenue (5% of total), other rental revenue (4% of revenue) and recharged Capex revenue have been forecasted for each country as a share of macro site revenues as energy and other revenue and recharged Capex revenue are closely linked to macro site revenues, and other rental revenues are very limited and expected to grow slowly (in line with FY22-23 growth). On aggregate, these revenues are expected to grow from €119m to €173m (FY23-30), including €20m and €32m of pass-through revenues in the respective years.

Opex and EBITDA

In FY23, VT faced operating expenses of €196m, leading to an EBITDA margin of 83% (figure 15), which represents a 1.6p.p. decrease vs. FY22, mainly driven by an increase in staff costs as the team was ramped up from 458 to 627 FTEs. In FY23, Opex were comprised of €81m other Opex (energy costs, transitional service, long-term services and support agreements), €69m staff costs, and €46m maintenance costs. Compared to other industries, TowerCo's margins are high, which is driven by the business model to invest in infrastructure and manage it at a low cost thereafter. The EBITDA margins are broadly in line with industry peers such as Cellnex (81% in FY22) and INWIT (91% in FY22); however, the more commonly used KPI for TowerCos is the EBITDA after leases (EBITDAaL) margin, as explained in the next section. Generally, the cost structure and margins of TowerCos are impacted by: i) the functions and number of employees that are transferred to the TowerCo at the point of its creation, which is related to MSAs (i.e. are maintenance teams internal or external), ii) the MSAs that define the responsibilities between MNO and TowerCo regarding maintenance and service activities; iii) the share of costs that are capitalized and appear as Capex rather than costs; and iv) the scale of the organization as TowerCos with many small assets across various countries generally have higher costs compared to TowerCos with large tower assets in single countries. Due to these differences, all Opex items have been forecasted separately. Overall, Opex are forecast to grow at a CAGR of 3.9% to 2030, implying an EBITDA margin improvement of 0.8%.

Other Opex is expected to grow at a CAGR of 3.4% to 2030 and is forecast as a share of revenues as these costs are closely linked to VT MSAs with its clients. Some efficiencies are expected as support, and service become more efficient with scale, leading to a decrease in other Opex as a share of revenue of 0.4p.p. by 2030.

Staff Opex is forecast to increase at a CAGR of 4.1%, driven by an increase in the number of FTEs from 627 in FY23 to 820 in FY30. The FTEs are expected to grow as VT was initially carved out with limited personnel and is expected to approach its peers in terms of FTE numbers. FTEs have been forecasted by segment, splitting the staff into top-co (158 FTEs) and operation staff (468 FTEs in technology and finance and 1 MD per market). While the number of operational FTEs is forecast to grow in line with the number of PoPs to reflect a larger number of suppliers, customers and maintenance requests, the number of top-co FTEs is forecast to grow at 50% of this rate, reflecting economies of scale.

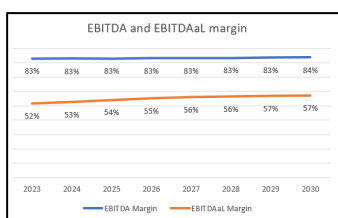


Figure 15 – EBITDA and EBITDAaL margin (2023-30)

Maintenance Opex is expected to grow at a 4.7% CAGR to 2030, driven by a slightly decreasing maintenance cost per PoP (excl. Inflation) and the number of PoPs. Maintenance cost per PoP is forecast to decrease slightly (7% until 2030) to reflect scale benefits as a denser network is cheaper to maintain on a per-site basis.

Ground lease expenses and EBITDAaL

Ground lease expenses are not an Opex item as they are capitalized under IFRS 16 because leases are long-term indefeasible-right-of-use (IRU) contracts and, therefore, are to be recognized as assets on the TowerCos balance sheets. However, they are significant cash costs of TowerCos and relevant to deriving and benchmarking EBITDAaL, a commonly used industry KPI. Ground lease expenses amounted to €324m in 2023 (4.4% y-o-y growth) and are forecast to grow by 2.4% to 2030. They have been estimated by country based on the total number of sites (expected to grow from 46.1k to 57.6k), less the share of owned sites (expected to grow from 7.0% in 2023 to 11.6% in 2030) multiplied by the cost per site, which has been derived based on the number of owned properties and total ground lease expenses per country. The increase in the share of owned sites is driven by VTs' ground lease optimization program, which aims to reduce ground lease costs by buying selected properties from its landlords for a one-off payment. VT dedicated €200m and aimed to buy back 10% of sites (4.6k sites), which implies an investment of €43k per site, corresponding to a multiple of 6.2x average annual lease costs (excl. Greece as it is not part of the program). As the ground lease optimization program has picked up very slowly (1.3k planned sites by FY23) and the lease cost multiple is unlikely attractive for landlords, a more conservative lease cost multiple of 10x has been assumed, still below comparable investments on the market (~15x annual lease cost as investment price). Based on this multiple, it is assumed that VT can acquire 2.9k sites by 2030. The share of sites acquired by country has been estimated based on the split of the first commitments made by VT.

Based on the development of ground lease expenses, VT is expected to achieve an EBITDAaL margin of 57% by 2030 (€895m), up from 53% in 2022 and 52% in 2023 (€564m). The increase is partly due to efficiencies (see Opex) but mainly due to the ground lease program, which leads to a decrease in ground lease expenses as a share of revenues from 30% in 2023 to 24% in 2030. EBITDAaL margins differ across VTs' peers, driven by Opex differences, the share of owned sites and, more generally, lease costs across countries. The expected EBITDAaL margin of 57% is in line with benchmarks (figure 16) of GD Towers (60%), TOTEM (57%), Cellnex (56%) and ATC (62%) and below the margin achieved by INWIT (69%).

Capex

In 2023, VT incurred a total Capex of €511m comprised of maintenance Capex (€24m), Capex recharges (€20m, VT realizes Capex recharge revenues to compensate for Capex that is related to specific pass-through costs defined in the MSAs), and growth Capex (€467m). From 2024-30, VT is expected to face a total Capex envelope of €2.7bn, comprised of €389m maintenance and recharge Capex and €2.3bn growth Capex (split as per figure 17). After 2030, annual Capex is estimated at an average of €181m per year. Due to their different natures, all Capex items have been forecasted separately.

The maintenance Capex forecast (3.1% CAGR to 2030) has been derived based on historic per-site Capex. Capex recharges are in line with Capex recharge revenues described in the revenue section (6.9% CAGR). Ground lease Capex has been derived as described in the leases section based on the number of properties to be acquired, the average annual lease cost and an investment multiple of 10x annual lease costs. The overall Capex envelope of €241m exceeds the €200m announced by VT as VT is expected to not only acquire currently leased properties

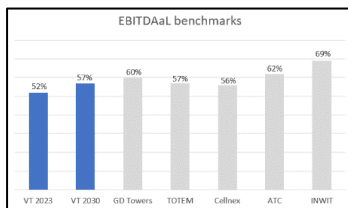


Figure 16 – EBITDA and EBITDAaL margin (2023-30)

Capex by segment and time horizon				
Capex	2023	2024-30	2030-40	2024-40
Maintenance	24	192	308	499
Recharge	20	197	337	534
Others	467	2342	1186	3510
o/w new sites	131	1609	437	2046
o/w ground lease optimization	18	241	28	269
o/w other growth Capex	317	492	703	1195
Total	511	2731	1813	4544

Figure 17 – Capex by segment and time horizon

but also a share of the properties identified to deploy new sites. Information on the historically high other growth Capex (not related to new site deployments) is limited. The forecasted Capex of €70m per year is based on the guidance of VT to invest a further €40-60m per year into other growth initiatives, adjusted upwards to conservatively account for additional Capex given the historically high figures.

The largest Capex item is new site Capex (€1.6bn from 2024-30 invested into 11.4k additional sites), which implies further Capex investments after 2026 as additional deployments are expected driven by market demand. This is in line with the initial plan of VT to invest €1bn into the deployment of 7.1k new sites from 2022-26. Capex per site has been derived from the investment guidance of VT that implies an average Capex per site of €140k and has been computed for each country separately to reflect differences in construction costs using revenue per site as a proxy. Capex per site is, therefore, directly related to historic revenue per site in each market but averages the target of VT (no inflation is reflected in the forecasts).