Growth in a converging world

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Corporate & Public Affairs Director,
Cellnex Telecom

Manish Kasliwal
VP and Chief Business Development Officer,
C&SE Asia, American Tower

About TowerXchange

Founded in 2012, TowerXchange is your independent community for operators, towercos, investors and suppliers interested in EMEA, CALA and Asian towers. We’re a community of practitioners formed to promote and accelerate infrastructure sharing. TowerXchange don’t build, operate or invest in towers; we’re a neutral community host and commentator on telecoms infrastructure.

TowerXchange produces a monthly newsletter and quarterly journal, both available to subscribers, which cover industry news and provide deep insights into telecoms infrastructure worldwide. We also host annual Meetups on each of four continents to bring together the leading tower industry stakeholders.

TowerXchange was founded by Kieron Osmotherly, a TMT community host and events organiser with 21 years’ experience, and is governed with the support and advice of the TowerXchange “Inner Circle” – an informal network of advisors. TowerXchange was acquired by Euromoney Institutional Investor PLC on December 1, 2017.
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TowerXchange Meetup calendar
- TowerXchange Meetup Europe 2019, April 9-10
- TowerXchange Meetup Americas 2019, July 9-10
- TowerXchange Meetup China 2019, August
- TowerXchange Meetup Africa 2019, October 8-9
- TowerXchange Meetup Asia 2019, December 3-4
- TowerXchange Meetup MENA 2020, January 28-29
While 2018 saw deal flow in European towers slow a little, the foundations were laid for a very busy 2019.

Although Altice was the only MNOs which sought investment for carved out towers in France (Hivory) and Portugal (OMTEL), Telia, Telenor and Vodafone all set the wheels in motion to create internal ‘towerco’ entities which will play an important role in shaping the tower landscape in 2019, both in terms of colocation and partnerships.

The news in early 2019 that UK JV towerco CTIL (an infrastructure sharing venture between Vodafone and Telefonica covering 16,500 Uk towers) may come to market has piqued the interest of towercos across Europe and further afield. French TDF, with 7,728 towers and a rapidly growing fibre unit will also doubtless attract a lot of interest. In Italy, Wind Tre is also rumoured to be looking for a buyer for ~8,000 towers.

Although the path to 5G is still littered with obstacles, there are clear signs that infrastructure owners are beginning to lay the foundations for rollout. Macro networks are under review for strength and loading, infill sites are being built and passive equipment is being upgraded ready to cope with the demands of 5G technology. In urban areas, MNOs and neutral hosts are working to build relationships with local government, fibre providers and street infrastructure owners in order to secure the real estate needed for larger scale small cell rollout. Towercos such as Cellnex, Axion, Arqiva, Wireless Infrastructure Group and many more are acquiring businesses in adjacent verticals or forming partnerships which will enable
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them to get ahead once larger scale 5G rollout takes place.

Make sure you find out all the inside news, as well as hearing from Europe's leading towerco CEOs, MNOs and developing neutral host solutions providers at Meetup Europe 2019, taking place at the Business Design Centre in London on April 9-10. Find out more here.

The current state of play in Europe
Let's review the current state of the European tower industry country by country. A couple of caveats before you start reading: firstly, TowerXchange includes Russia, Turkey, the CIS and former CIS States in our definition of Europe. Secondly, our definition of a “tower” is slightly different in Europe – when presenting tower counts, we are always interested in sites and structures that can accommodate multiple tenants, and which towercos might consider investible. While our tower statistics on emerging markets focus on ground based towers, in Europe we are equally interested in counting rooftop sites, but we exclude multi-tenant DAS, microcells and small cells from headline counts, and are working to complete national small cell counts in the near future.

TowerXchange tower counts are the result of qualitative market research and the aggregation of our own and other research firms' work – as such they should be treated as estimates. We assert copyright over data sourced to TowerXchange – you will need to request our permission to quote our data and there may be a charge to do so.
The Acsys Smart Key is now BLE-enabled.
The CIS has been relatively low on tower activity. In 2017 VEON decided to bring over 12,000 towers to market in Ukraine, Kazakhstan, Armenia and Georgia. We did believe that this deal was quietly scrapped after the sale of VEON’s Russian towers was cancelled in May 2017, but are now aware that VEON may be courting a new buyer with experience in the region.

Emerging from recession after political instability, Ukraine is a growth market with 3G yet to be extensively rolled out and 4G still on the horizon, meaning a potential 2,500 PoP could be added in the next three years.

In 2016 Turkcell carved out and transferred 811 lifecell towers to UkrTOWER, the local subsidiary of their captive towerco Global Tower. UkrTOWER’s current site count is 1,201, including a number of in building solutions, and the company boasts a healthy tenancy ratio. Outside of UkrTOWER, there are multiple structures available for co-location in the market, so there is a significant margin for error in our site counts. While all parties agree VEON has around 3,500 sites, around 60% of which are rooftops and 40% ground based towers, our best estimate is that Kcell owns around 5,500 towers and rooftops, with Altel and Tele2 combining a total of around 4,200 towers and rooftops. Third party structures make up around 30% of Kazakhstan’s mobile networks, and total at least 1,500, perhaps significantly more.

Georgia and Armenia consist of around 3,000 and 2,200 sites respectively. Around 65% of sites are rooftops, but less alternate site typologies are used than in Kazakhstan: just a handful of broadcast tower co-locations.

Belarus
Global Tower controls Turkcell’s towers in Belarus, where they have owned subsidiary BeST since 2008. Global Tower currently operates 828 towers in the country under the name BelTower.

Czech Republic
With an ongoing project to decommission 35-40% of the country’s parallel infrastructure, TowerXchange estimate there are around 10,200 active cell sites in the Czech Republic’s telecom network, of which only around a quarter are ground based towers, with the balance being rooftops and IBS.

CETIN (Česká Telekomunikační Infrastruktura), an infraco carved out of O2, has 4,800 towers and 750 micro sites. CETIN’s business model includes all the physical assets which used to belong to O2, including active equipment and 38,000km of fibre, the MNO having been acquired by PPF and the infrastructure business spun off. CETIN absorbs O2’s RANsharing venture with T-Mobile, which operates under the MORAN model.

There were rumours that Macquarie-owned České Radiokomunikace (CRA) would come to market in 2018, but nothing has been officially announced.
as yet. With an EBITDA of €63mn, the asset could fetch as much as €800mn for 800 towers in the Czech Republic. Macquarie bought the towerco for €574mn in 2010 and has attempted to sell it unsuccessfully at least twice since then.

**Denmark**
Infrastructure sharing is second nature in Denmark, where Telia and Telenor formed active infrastructure sharing joint venture TT-Network. There are around 4,500 towers in Denmark, with co-location management agreements managed through KPR Consult. Falck operates a small towerco in the country with around 75 towers, while Teracom operates the country’s broadcast towers.

There is little possibility of sale and leasebacks in Denmark in the short term, but don’t discount the possibility in the medium to long term, with TT Networks working to streamline operations quite possibly in advance of a divestiture.

**Finland**
There are around 9,576 towers in Finland, around half of which are owned by incumbent operator Elisa, with the balance distributed across the other MNOs Telia and DNA. An active infrastructure sharing joint venture between Telia and DNA increases the efficiency of providing coverage to the sparsely populated Northeastern region.

Digita operates Finland’s broadcast network, with 27 high masts and 530 smaller masts and was acquired in April 2018 by Digital Colony.

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**France**
There are just over 52,298 sites (ground based towers and rooftops) in France, of which just 32% remain operator-captive. The remainder are divided among three independent towercos and one new MNO carve out towerco.

Broadcast-telecom hybrid TDF has 7,728 telecom towers as well as an established broadcast business and growing fibre interest. TDF’s owners Brookfield, APG, Arcus and Credit Agricole Assurances are believed to have instructed banks to look for a buyer for France’s incumbent towerco, which will doubtless be of interest to the main independent players in France as well as infrastructure funds keen to deploy capital in towers.

In December 2016 American Tower announced the acquisition of FPS Towers for €697mn, a deal which closed in February 2017, gaining them a significant foothold in the market with 2,472 towers.

Cellnex have bought into the French market having acquired 500 towers from Bouygues Telecom in two transactions in 2016, the first of which was for 230 towers at a valuation of €80mn and the subsequent tranche for 270 towers for €697mn, and in January 2017 they signed a deal with the aforementioned governing the transfer of 1,800 existing sites and 1,200 new build towers for a total of €354mn, giving Cellnex a good presence in France and a solid anchor tenant.

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**Current site numbers in France**

<table>
<thead>
<tr>
<th>Type of Structure</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>14,600</td>
</tr>
<tr>
<td>Free</td>
<td>7,500</td>
</tr>
<tr>
<td>SFR TowerCo</td>
<td>2,900</td>
</tr>
<tr>
<td>TDF</td>
<td>2,472</td>
</tr>
<tr>
<td>Bouygues captive towers</td>
<td>2,300</td>
</tr>
<tr>
<td>Cellnex</td>
<td>3,250</td>
</tr>
<tr>
<td>American Tower</td>
<td>7,728</td>
</tr>
<tr>
<td>Towercast</td>
<td>10,198</td>
</tr>
<tr>
<td>Other structures not belong to towercos or MNOs</td>
<td>500</td>
</tr>
<tr>
<td>Other ground based structures</td>
<td>850</td>
</tr>
</tbody>
</table>

Source: TowerXchange
Now Altice's new SFR TowerCo becomes France's first carve-out towerco, with 10,198 more towers becoming available for co-location. Entering the market with 10,198 sites allows SFR TowerCo to leapfrog the current largest towerco in France, TDF, which has 7,728 towers, as well as Cellnex (with 2,000 towers and another 2,100 in the pipeline) and American Tower with 2,472 towers.

In terms of MNO activity in the market, there are reports in the French press that Orange and Iliad’s Free are teaming up to extend and deepen their infrastructure sharing agreement past the 2020 deadline may have an impact on France’s towercos, but the sheer volume of new sites needed in France, as well as the quality of tenants, keeps the market buoyant. According to French site BFM Business “By 2020, Orange, SFR and Bouygues must install another 50,000 antennas [in France]. Free, who entered the market six years ago, will have to catch up and install around 10,000.”

There has also been recent activity in the broadcast vertical of the French market. With TDF acquiring ITAS for a reported €100mn (420 towers) and NRJ seeking a buyer willing to part with ~€300mn for their 500-tower asset Towercast.

German broadcast towerco Media Broadcast Group owns a further 450 towers in Germany, and was acquired by Freenet in 2016 for €295mn (around 12x EV/EBITDA).
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Of the remaining MNOs in the market, we believe Telefónica owns a further ~2,000 towers plus ~12,000 rooftops, and Vodafone owns around 4,000 masts and ~18,000 rooftops in Germany.

There are a total of around 23,000 co-locations in Germany, most being on Deutsche Funkturm and American Tower’s ground based towers, with tenancy ratios estimated at 2.5 and 1.8 respectively. Deutsche Funkturm is believed to be embarking on a policy of rapid growth in Germany, planning to double the number of GBTs by 2022.

**Greece**

While there are no independent towercos in the 12,000 site Greek market at present, tough economic conditions and the dominance of market leading Cosmote may prompt a sale and leaseback in the medium term.

Cosmote’s competitors Wind may have an appetite to monetise their towers, while the other MNO in Greece, Vodafone has less financial incentive. Joint venture infraco VICTUS Networks currently manages Vodafone Greece and Wind Hellas’ sites. There are around 10,500 tenants on VICTUS Networks’ 7,000 sites. Decommissioning could see VICTUS Networks’ site count fall to 6,000 and the tenancy ratio rise accordingly.

Broadcast towerco Digea owns 156 towers in Greece.

**Ireland**

60% of Ireland’s 4,000 cell sites sit in the hands of the country’s three MNOs: Vodafone, Eir and 3.
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RISK MANAGEMENT
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REPORTING
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COST CONTROL
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A network sharing partnership between Meteor and O2 (Mosaic) is in place with 3 joining the alliance, putting downward pressure on current and prospective future tenancy ratios.

With little prospect of sale and leasebacks in Ireland, the most likely source of tower transactions remains consolidation among the many independent tower companies, broadcast operators and public sector players. Irish towerco Cignal seems keen to consolidate further after their acquisition of Cellcom in early 2017, and larger European players seem to be turning their attention to this small but interesting market as well. We anticipate seeing some smaller scale consolidation between existing Irish towercos in the short term, followed by the entry of a larger towerco in the medium term.

**Italy**

With the merger of 3 and WIND now complete, and Iliad having launched into the Italian market, Wind Tre are now rumoured to be selling their remaining towers, which we estimate at around 8,000 sites.

Currently, INWIT, Cellnex and EI Towers’ TowerTel lead the telecom tower market in Italy, where towercos own just under half the total sites, and where decommissioning may outstrip organic growth in the coming years. Wind Tre will no doubt have their eye on any of these towercos as a potential buyer, however with Vodafone’s towers also in the mix, it’s not clear that any buyer will jump at the Wind Tre portfolio.

TIM retains a 60% equity stake in INWIT, with the balance having been floated on the Milan Stock Exchange in June 2015, and had initiated a process to sell some or all of their retained equity in 2016 which was then halted ostensibly because the TIM management team believed that several value adds had yet to reach fruition and were not yet reflected in INWIT’s valuation. Although recent rumours were that TIM would sell its 60% stake in INWIT in 2018, a complete overhaul of the INWIT board in April 2018 and ongoing turbulence in the TIM board and management team may mean the operator has other plans for the asset.

By the end of 2018, INWIT had driven tenancy ratios to around 1.9x, decommissioned 800-1,000 more sites, and built as many as 500 new sites, primarily for TIM’s 4G rollout.

The continent’s largest pan-European towerco, Cellnex, has rolled up several small towercos in Italy, but the lion’s share of their portfolio comes from the acquisition of Wind’s towercos Galata, and their 7,377 towers, for €693mn in 2015.

Both INWIT and Cellnex remain bullish about the potential of small cells in Italy, highlighted by Cellnex’s acquisition of CommsCon for €18.65mn in June 2016.

The other key player in the Italian market is EI Towers, whose telecom-focused subsidiary TowerTel has built and acquired a portfolio of 700 telecom towers with an aggregate EV of up to €55mn, ~300 of which have been added through several small acquisitions. In October 2018, EI Towers delisted from the Milan stock exchange through
In 1995, Polar was the first company in the Telecom industry to introduce DC Generators as a prime power replacement to AC generators. Polar was also the first to incorporate DC Generators into Solar Hybrid systems. For over 22 years, our focus has been to improve reliability and maintenance by making every component within the system better through engineering innovation, new production tooling, and raw material sourcing.

Polar manufactures in volume its own alternators, controls, engine accessories, and enclosures. Because Polar is the direct manufacturer we can provide you the best value and performance for your money.
Mobile tower ownership in Portugal

![Mobile tower ownership in Portugal diagram](image)

- **OMTEL**: 4,700 towers
- **Vodafone**: 1,300 towers
- **NOS**: 2,961 towers
- **Radiotelevisão Portuguesa**: 2,500 towers
- **Alternate site typologies**: 350 towers

The Netherlands, where 1,781 (59%) of the country’s 3,031 ground based towers are already owned by towercos. Cellnex’s acquisition of Dutch broadcast towerco Alticom in 2017 gave them a further 30 towers in the country, as well as securing them high-quality infrastructure to support 5G rollout in the Netherlands.

Open Tower Company has around 850 towers, plus access to over 1,000 electricity pylons. Dutch pension fund ABP acquired a 75% stake in the company in late 2017. UK headquartered Wireless Infrastructure Group is also present in The Netherlands.

KPN sold their towers in four tranches between 2008-12, while Vodafone and T-Mobile retain around 1,250 towers between them. New entrant fourth MNO Tele2 has few if any towers, preferring to rely on co-location and a RANsharing deal with T-Mobile.

T-Mobile and Tele2 Netherlands agreed to deepen their existing co-locations and RANsharing deals at the end of 2017, announcing a merger of the two entities. Deutsche Telekom has ringfenced their tower assets in the market and is in the process of bringing them under the control of infrastructure arm Deutsche Funkturm, which has been operating almost exclusively in Germany to date.

Poland

There are around 22,000 telecom structures in the Polish network, a little under half of which are towers, with the rest being rooftops.

Poland has more subscribers per tower than the majority of other countries in Europe, indicating both potential demand for more towers, and indicating the extent of decommissioning that has already taken place in the country. A balanced, competitive MNO market amplifies the attractiveness of the Polish market to towercos.

T-Mobile and Orange share passive and active infrastructure in Poland through 50-50 joint venture NetWorkS! Initiated in 2011, the partnership was intended to last 15 years, but there has been speculation that one or both party might wish to exit the venture and sell towers to a third party.

While NetWorkS! operates around 13,000 towers, the assets remain on T-Mobile and Orange’s own
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- Intelligent power harvesting from any combination of solar, grid and genset
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Ground based towers:
1. First Tower Company (MegaFon) 15,500
2. VEON 13,000
3. MTS 16,500
4. Tele2 Russia 9,000
5. Russian Towers 3,700
6. Vertical 2,300
7. Service-telecom 1,000
8. Sotka Vysotok 200
9. Other towercos 250
10. Rooftops 65,400

Source: TowerXchange

In 2018, Altice sold a 75% stake in its newly formed Portuguese towers business ‘Towers of Portugal’ (now trading as OMTEL) to a consortium including Morgan Stanley and Horizon Equity Partners. Comprising 2,961 towers, Towers of Portugal is valued at €660mn, or as much as 18.9x pro forma EBITDA for 2017. As with the French towerco, the deal also includes a build to suit agreement for a further 400 new sites for Altice’s Portuguese opco MEO (part of Portugal Telecom) over the next four years. Towers of Portugal is the country’s first towerco in any form, making them well placed to capitalise on the densification needed to complete 4G coverage and begin 5G rollout.

Romania
Romania hosts a competitive four MNO market, with no independent towerco activity to date. Orange and Vodafone Romania operate a joint venture infrastructure sharing company called Netgrid Telecom (formerly Ovidiu Telecommunications).

Despite being one of the poorest countries in Europe, ARPU is relatively high in Romania at around €20, which means there is little financial imperative for the country’s MNOs to monetise their towers.

Russia
TowerXchange estimate there are around 61,260 ground based towers and 65,400 rooftop structures across the vast Russian landscape. Each of Russia’s four MNOs has looked at utilising tower company business models, but in contrasting ways.

Portugal
TowerXchange understands there to be ~7,100 ground based towers in Portugal, with a further ~4,700 sites in use across different topographies (rooftops, street poles, utilities etc). With no known bilateral sharing agreements in place between MNOs, co-location has been organised on an ad-hoc basis and the tenancy ratio across the country is close to one (the only exception to this being indoor DAS projects, where one operator provides the infrastructure and shares with the other two).

Altice’s MEO had the largest tower portfolio with 2,961 traditional structures, which have now been rolled up into towerco OMTEL, Vodafone owns approximately 2,500 and NOS about 1,300. In addition, there are around 350 broadcast towers run by state-owned Radiotelevisão Portuguesa, although TowerXchange are not aware of any current co-location agreements with Portugal’s three MNOs.

Outside of the NetWorkSI venture, as little as 2% of Poland’s towers are shared between multiple MNOs.

Alinda Capital Partners owned Emitel is the Polish broadcast towerco, operating 377 sites and diversifying into telecom. It was rumoured that Emitel would be coming to market in 2018, although nothing has been officially reported as yet.

Balance sheets. Outside of the NetWorkSI venture, as little as 2% of Poland’s towers are shared between multiple MNOs.
**Spanish ownership of Spain’s 49,461 telecom and broadcast sites**

<table>
<thead>
<tr>
<th>Tower Operator</th>
<th>Number of Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellnex</td>
<td>12,500</td>
</tr>
<tr>
<td>Axion</td>
<td>10,741</td>
</tr>
<tr>
<td>Orange</td>
<td>8,136</td>
</tr>
<tr>
<td>Telxius</td>
<td>17,500</td>
</tr>
<tr>
<td>Vodafone</td>
<td>584</td>
</tr>
</tbody>
</table>

**Source:** TowerXchange

VEON’s creation of ‘National Tower Company’, into which they injected their ~13,000 Russian towers, was hailed as a precursor to the sale of the assets to an independent towerco. However, the company decided to pull the plug on the sale process in May 2017, and it is believed that the towers are being reabsorbed into the opco.

MegaFon has carved out First Tower Company, which has ~13,000 Russian towers, and is expected to be prominent bidders as Russia’s towers come to market, with Tele2’s towers the most likely up for grabs. Russian Towers is also undergoing a period of sustained organic growth, growing from ~2,300 to ~3,700 since the beginning of 2017. Newcomer Service-Telecom is also keen to expand organically and recently acquired Link Development, a Russian towerco with around 200 towers in the St Petersburg region. A new Russian towerco has also recently come onto the TowerXchange radar: Stoka Vysotok. Based in Tatarstan, Stoka Vysotok is believed to have around 200 towers centred mainly around the regional capital, Kazan.

**Serbia**

Managed service provider Konsing Group, which also owns a portfolio of 47 sites, counts all three MNOs among their client base (Telekom Serbia, Telenor and Telekom Austria).

**Slovakia**

Broadcast towerco Towercom, which has acquired around 700 sites, was acquired by Macquarie Infrastructure Fund in 2013. Towercom turns over in excess of €50mn annually and includes O2, T-Mobile and Orange among their customer base. Towercom completed the roll up of TBDS, RK Tower and Rádiokomunikácie in 2008. Macquarie is believed to be considering exiting Towercom.

**Spain**

40% of the 49,461 broadcast and telecom towers and rooftops in Spain are owned by towercos, led by Telefónica’s Telxius and European market-maker Cellnex.

Cellnex has seen fast growth in its telecoms arm, deriving €471mn of its €789mn 2017 revenue from telecoms, an increase of 23% yoy. In 2017 they entered the Swiss market, as well as acquiring Alticom in the Netherlands.

In 2016, Telefónica transferred 11,000 Spanish towers and rooftops to their towerco Telxius for an undisclosed sum ahead of their planned IPO, however, the IPO was scrapped in October 2016 due to lack of interest in the market. Telefónica has since completed the sale of a 40% stake in Telxius to investment firm KKR for €1.3bn.

AMP Capital acquired Axion from Antin
Infrastructure in 2018. Axion operates 584 broadcast towers, with some telecom co-location, 70% of which are in Andalucía.

**Switzerland**
Cellnex acquired 2,339 towers from Sunrise in May 2017, creating Switzerland’s first fully fledged towerco Swiss Towers AG. Working with partners Swiss Life and Deutsche Telekom Capital Partners, the Cellnex-led consortium paid €430mn for roughly 20% of Switzerland’s 11,300 towers, mostly in rooftop locations. With future build to suit as well as 200 DAS nodes agreed in the deal, Cellnex sees a chance for significant growth through data usage and 5G rollout in this central European country.

**Turkey**
Established in 2006, Global Tower has 8,067 ground based towers among a portfolio of over 23,000 sites in Turkey. Of these macro towers, TowerXchange believes that Global Tower owns around 3,400 and leases around 2,390 from Turkcell, for which they

Source: TowerXchange
Who owns/operates the UK’s 42,500 active cell sites?

In addition, the Turkish government has just launched a new towerco called PTT Kule Inc, which is currently focussed on very large scale tower structures for telecoms and broadcast as well as hosting datacentres and other facilities.

United Kingdom
The UK has a tower market structure unlike any other in the world. Independent towercos, headed by Arqiva, Wireless Infrastructure Group and Shere Group (acquired by Cellnex in 2016), own 38% of the 42,500 active towers in the UK. The balance are contained within two joint venture infracos: CTIL, which operates Vodafone and O2’s network (Telefónica), and MBNL, which performs a similar function for EE (now BT) and 3 (Hutchison).

CTIL and MBNL are both the primary clients of the UK’s independent towercos, and site sharing businesses in their own right. Their business models differ in that the tower assets are actually on CTIL’s balance sheet, while MBNL is a management company with the assets retained by the MNOs. CTIL is a passive infrastructure sharing play, while MBNL’s model extends to active infrastructure and transmission sharing.

Recent comments from Vodafone’s senior management suggest that Vodafone and O2 UK are considering their options in terms of monetising CTIL. This could relate to offering colocations on CTIL infrastructure outside of Vodafone or O2, or it could relate to the sale of CTIL’s 16,000 UK towers, a prospect which has raised the interest of towercos and investors across Europe.

The UK’s broadcast tower operator Arqiva has been through many changes of identity and ownership (BBC, Crown Castle, National Grid to name a few), and was initially believed to be close to closing a sale to a consortium of buyers led by Brookfield, before a short-lived attempt at an IPO in Q417. It remains to be seen whether Arqiva will revisit the option of a strategic sale, or give themselves some breathing room to try and show that their improving EBITDA is sustainable in order to close the gap between their expectations and market valuation.
## Major European towerco equity deals and listings since 2016

*estimated Source: TowerXchange

<table>
<thead>
<tr>
<th>Year</th>
<th>Seller</th>
<th>Entity and # towers</th>
<th>Buyer/Stock Exchange</th>
<th>Equity%</th>
<th>Deal value in €</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>Telefonica</td>
<td>Telxius 16,000</td>
<td>Pontegadea</td>
<td>10%</td>
<td>379,000,000</td>
</tr>
<tr>
<td>2018</td>
<td>Altice</td>
<td>SFR TowerCo 10,198</td>
<td>KKR</td>
<td>49.99%</td>
<td>1,799,000,000*</td>
</tr>
<tr>
<td>2018</td>
<td>Altice</td>
<td>Towers of Portugal 2,961</td>
<td>Morgan Stanley and Horizon Equity Partners</td>
<td>75%</td>
<td>495,000,000*</td>
</tr>
<tr>
<td>2017</td>
<td>Telefonica</td>
<td>Telxius 16,000</td>
<td>KKR</td>
<td>40%</td>
<td>1,300,000,000</td>
</tr>
<tr>
<td>2016</td>
<td>American Tower</td>
<td>American Tower Germany 2,197</td>
<td>PGGM</td>
<td>49%</td>
<td>Undisclosed</td>
</tr>
<tr>
<td>2016</td>
<td>Antin Infrastructure Partners</td>
<td>Axion 584</td>
<td>AMP Capital 100%</td>
<td>Undisclosed</td>
<td>Undisclosed</td>
</tr>
<tr>
<td>2016</td>
<td>New equity investment</td>
<td>Wireless Infrastructure Group 2,000</td>
<td>3i Investments</td>
<td>Undisclosed</td>
<td>300,000,000</td>
</tr>
<tr>
<td>2015</td>
<td>Telecom Italia</td>
<td>INWIT 11,200</td>
<td>MIB</td>
<td>40%</td>
<td>875,300,000</td>
</tr>
<tr>
<td>2015</td>
<td>Abertis</td>
<td>Cellnex 15,091</td>
<td>MCE</td>
<td>66%</td>
<td>2,138,000,000</td>
</tr>
<tr>
<td>2015</td>
<td>Coillte</td>
<td>Telecoms assets 300</td>
<td>InfraVia Capital Partners</td>
<td>100%</td>
<td>70,000,000</td>
</tr>
</tbody>
</table>
## European sale and leaseback deals since 2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Seller</th>
<th>Buyer</th>
<th>Tower count</th>
<th>Deal value €</th>
<th>Cost per tower €</th>
<th>Deal structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>Italy</td>
<td>Wind (Veon)</td>
<td>Cellnex</td>
<td>*</td>
<td>77,000,000</td>
<td>104,054</td>
<td>SLB 10% stake out</td>
</tr>
<tr>
<td>2017</td>
<td>Spain</td>
<td>MasMovil</td>
<td>Cellnex</td>
<td>551</td>
<td>40,000,000</td>
<td>72,595</td>
<td>SLB</td>
</tr>
<tr>
<td>2017</td>
<td>Switzerland</td>
<td>Sunrise</td>
<td>Cellnex, Swiss Life and DTCP</td>
<td>2,339</td>
<td>430,000,000</td>
<td>183,839</td>
<td>SLB</td>
</tr>
<tr>
<td>2017</td>
<td>France</td>
<td>Bouygues</td>
<td>Cellnex</td>
<td>3,000</td>
<td>854,000,000</td>
<td>284,666</td>
<td>SLB</td>
</tr>
<tr>
<td>2017</td>
<td>France</td>
<td>Bouygues</td>
<td>Cellnex</td>
<td>600</td>
<td>170,000,000</td>
<td>283,333</td>
<td>SLB</td>
</tr>
<tr>
<td>2016</td>
<td>France</td>
<td>Bouygues Telecom</td>
<td>Cellnex</td>
<td>230</td>
<td>80,000,000</td>
<td>347,826</td>
<td>SLB</td>
</tr>
<tr>
<td>2016</td>
<td>France</td>
<td>Bouygues Telecom</td>
<td>Cellnex</td>
<td>270</td>
<td>67,000,000</td>
<td>248,148</td>
<td>SLB</td>
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<tr>
<td>2016</td>
<td>Ukraine</td>
<td>Lifecell</td>
<td>UkrTower</td>
<td>811</td>
<td>47,820,000</td>
<td>58,964</td>
<td>SLB</td>
</tr>
<tr>
<td>2015</td>
<td>Italy</td>
<td>Wind (Veon)</td>
<td>Cellnex</td>
<td>7,377</td>
<td>693,000,000</td>
<td>94,892</td>
<td>SLB with 10% equity</td>
</tr>
<tr>
<td>2014</td>
<td>Spain</td>
<td>Telefonica/Yoigo</td>
<td>Cellnex</td>
<td>4,277</td>
<td>385,000,000</td>
<td>90,016</td>
<td>SLB</td>
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<tr>
<td>2012</td>
<td>France</td>
<td>Bouygues Telecom</td>
<td>FPS Towers</td>
<td>2,166</td>
<td>185,000,000</td>
<td>100,400</td>
<td>SLB with 15% equity</td>
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<tr>
<td>2012</td>
<td>Germany</td>
<td>KPN</td>
<td>American Tower</td>
<td>2,031</td>
<td>393,000,000</td>
<td>193,501</td>
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<tr>
<td>2012</td>
<td>Netherlands</td>
<td>KPN</td>
<td>Protelindo</td>
<td>261</td>
<td>75,000,000</td>
<td>287,356</td>
<td>SLB</td>
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<tr>
<td>2012</td>
<td>Netherlands</td>
<td>KPN</td>
<td>Shere Group</td>
<td>460</td>
<td>115,000,000</td>
<td>250,000</td>
<td>SLB</td>
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<tr>
<td>2012</td>
<td>Spain</td>
<td>Telefonica</td>
<td>Cellnex</td>
<td>500</td>
<td>45,000,000</td>
<td>90,000</td>
<td>SLB</td>
</tr>
<tr>
<td>2010</td>
<td>Netherlands</td>
<td>KPN</td>
<td>Open Tower Company</td>
<td>500</td>
<td></td>
<td></td>
<td>SLB</td>
</tr>
<tr>
<td>2008</td>
<td>Netherlands</td>
<td>KPN</td>
<td>Open Tower Company</td>
<td>101</td>
<td></td>
<td></td>
<td>SLB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Totals / average</strong></td>
<td><strong>25,474</strong></td>
<td><strong>3,656,820,000</strong></td>
<td><strong>147,019</strong></td>
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</tr>
</tbody>
</table>

Source: TowerXchange
## European towerco consolidation since 2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Seller</th>
<th>Buyer</th>
<th>Tower count</th>
<th>Deal value €</th>
<th>Cost per tower €</th>
<th>Deal structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>Finland</td>
<td>Digita</td>
<td>Digital Colony</td>
<td>556</td>
<td></td>
<td></td>
<td>Company acquisition</td>
</tr>
<tr>
<td>2017</td>
<td>Netherlands</td>
<td>Mom and Pop</td>
<td>Cellnex</td>
<td>32</td>
<td>12,000,000</td>
<td>375,000</td>
<td>Company acquisition</td>
</tr>
<tr>
<td>2017</td>
<td>Russia</td>
<td>Link Development</td>
<td>Service Telecom</td>
<td>400</td>
<td></td>
<td></td>
<td>Company acquisition</td>
</tr>
<tr>
<td>2017</td>
<td>Netherlands</td>
<td>Alticom</td>
<td>Cellnex</td>
<td>30</td>
<td>133,000,000</td>
<td>443,333</td>
<td>Company acquisition</td>
</tr>
<tr>
<td>2016</td>
<td>France</td>
<td>ITAS TIM</td>
<td>TDF</td>
<td>420</td>
<td></td>
<td></td>
<td>Company acquisition</td>
</tr>
<tr>
<td>2016</td>
<td>Germany</td>
<td>WDR</td>
<td>American Tower</td>
<td></td>
<td></td>
<td></td>
<td>Portfolio acquisition</td>
</tr>
<tr>
<td>2016</td>
<td>France</td>
<td>Antin/FPS</td>
<td>American Tower</td>
<td>2,482</td>
<td>697,000,000</td>
<td>280,821</td>
<td>Company acquisition</td>
</tr>
<tr>
<td>2016</td>
<td>UK &amp; Netherlands</td>
<td>Shere Group</td>
<td>Cellnex</td>
<td>1,004</td>
<td>393,000,000</td>
<td>391,434</td>
<td>Company acquisition</td>
</tr>
<tr>
<td>2016</td>
<td>Netherlands</td>
<td>Protelindo</td>
<td>Cellnex</td>
<td>261</td>
<td>109,000,000</td>
<td>417,624</td>
<td>Company acquisition</td>
</tr>
<tr>
<td>2015</td>
<td>Ireland</td>
<td>Coillte</td>
<td>Cignal</td>
<td>113</td>
<td></td>
<td></td>
<td>Portfolio acquisition</td>
</tr>
<tr>
<td>2015</td>
<td>Italy</td>
<td>Tecnorad</td>
<td>EI Towers</td>
<td>134</td>
<td>17,000,000</td>
<td>126,866</td>
<td>Portfolio acquisition</td>
</tr>
<tr>
<td>2015</td>
<td>Italy</td>
<td>TowerCo</td>
<td>Cellnex</td>
<td>212</td>
<td>94,600,000</td>
<td>446,226</td>
<td>Company acquisition</td>
</tr>
</tbody>
</table>

|       | **Totals / average** |               |           | **5,604** | **1,455,600,000** | **322,392** |               |

Source: TowerXchange
European heatmap

Legend

- TowerXchange research has not revealed any infracos or towercos to date
- Towercos or infracos active in the market. No recent transactions have taken place and none rumoured to take place soon
- Towercos or infracos active in the market. No current transactions taking place but an attempted tower sale has taken place in the last 3 years or there are unconfirmed rumours of a deal in this market.
- Towercos or infracos active in the market. Rumours of deals confirmed in the market.
- Towercos or infracos active in the market. Deals of significant size have taken place in the last 5 years.
- Towercos or infracos active in the market. Deals have taken place in the last year and more imminent deals rumoured

Note: For the purposes of our European coverage, ‘Towerco’ describes an independent company which owns and operates passive infrastructure for commercial profit. ‘Infraco’ incorporates MNO joint venture organisations and carve outs which serve more than one entity or market their towers commercially.

Source: TowerXchange
# TowerXchange Meetup Europe Agenda

**London | Day one - April 9, 2019**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Break outs</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00 - 09:00</td>
<td>Registration and welcome coffee</td>
<td></td>
</tr>
</tbody>
</table>
| 09:00 - 09:45 | **TowerXchange analysis of the European tower market**  
Kieron Osmotherly, CEO, TowerXchange  
Frances Rose, Head of Europe, TowerXchange |                                                                                               |
| 09:45 - 10:30 | **TowerXchange European CEO panel: our vision for the future of infrastructure in Europe**  
Giovanni Ferigo, INWIT  
Alexander Chub, Russian Towers  
Rhys Phillip, CEO, CTIL  
Bruno Jacobfeuerborn, CEO, Deutsche Funkturm |                                                                                               |
| 10:30 - 10:45 | Update from the EWIA  
Olivier Huart, Chair, EWIA                                                                                                                    |                                                                                               |
| 10:45 - 11:05 | **Indoor and outdoor small cells in the UK market**  
Graham Payne, CEO, Digital Colony UK                                                                                                             |                                                                                               |
| 11:05 - 11:25 | Fireside chat with Cellnex CEO, Tobias Martinez                                                                                                  |                                                                                               |
| 11:25 - 11:55 | Coffee and networking                                                                                                                           |                                                                                               |
| 11:55 - 12:55 | **Roundtable Session I**  
Buyer briefing with Wireless Infrastructure Group                                                                                           |                                                                                               |
| 12:55 - 14:00 | Networking lunch                                                                                                                                |                                                                                               |
| 14:00 - 15:00 | **Roundtable Session II**  
Working Group: Enabling collaboration between neutral host infrastructure providers and local government in the context of 5G |                                                                                               |
| 15:00 - 15:30 | Networking break sponsored by [tarantula](https://www.tarantula.com)                                                                            |                                                                                               |
| 15:30 - 16:15 | **Panel discussion: Sale and leaseback vs carveout: evaluating the pros and cons for MNOs**  
Moderator: Nick Elverston, Partner, Ashurst  
Jörg Weber, SVP Investment Management, Deutsche Telekom  
Alex Mestre, General Manager, Global Business, Cellnex  
Nihat Narin, CEO, Global Tower  
Pat Coxen, CEO, MBNL |                                                                                               |
| 16:15 - 17:00 | **Panel discussion: who is investing in European infrastructure today? How and why is this changing?**  
Moderator: David Martin, Partner, Linklaters  
Christopher Ehrke, Partner, Arcus Infrastructure Partners  
Bruno Cades, Partner, InfraVia Capital Partners  
Mauricio Bolana, Partner, Antin Infrastructure Partners  
Tomas Budnik, CTO, PPF |                                                                                               |
| 17:00         | TowerXchange Europe drinks reception                                                                                                              |                                                                                               |
| 19:30         | TowerXchange networking dinner                                                                                                                  |                                                                                               |
# TowerXchange Meetup Europe Agenda

**London | Day two - April 10, 2019**

<table>
<thead>
<tr>
<th>Day and time</th>
<th>Session</th>
<th>Break outs</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30 - 09:00</td>
<td>Welcome coffee</td>
<td></td>
</tr>
</tbody>
</table>
| 09:00 - 09:45 | Panel: **5G economics – what is needed to kick start the massive investment needed for 5G infrastructure rollout?** | Moderator: Pankaj Agrawal, Partner, Capitel  
David Crawford, MD, Telecoms & M2M, Arqiva  
Oscar Pallarols, Innovation & Product Strategy Director, Cellnex  
Alastair Davidson, Director, Wireless Infrastructure Group  
Pat Coxen, CEO, MBNL |
| 09:45 - 10:30 | Panel: **European infrastructure convergence: collaborate or compete?** | Moderator: Doug Dimitroff, Partner, Phillips Lytle  
David Porte, SVP International, SBA Communications  
Jose A. Aranda, Product Strategy & Innovation Director, Cellnex  
Cara Mascini, CEO & Founder, EdgeInfra  
Graham Payne, CEO, Digital Colony UK |
| 10:30 - 11:15 | Panel: **M&A in European communications infrastructure: multiples, opportunities and longevity** | Nikolay Berdin, CEO, Service Telecom  
Paolo Crochetti, Head of Institutional Affairs, EI Towers  
Jonathan Dann, Managing Director, Greenhill & Co |
| 11:15 - 11:45 | Networking break sponsored by [accruent](#) |  |
| 11:45 - 12:45 | Roundtable session 3 | Working group: **Changing operational needs in Europe: resilience, technology and the shifting scope of infrastructure offerings**  
11:45-15:00 TowerXchange Investment Hub |
| 12:45 - 14:00 | Networking lunch |  |
| 14:00 - 15:00 | Roundtable Session 4 | Working Group: **Data utilisation and visualisation** |
| 15:00 - 15:30 | Networking Break |  |
| 15:30 - 16:15 | Panel: **exploring partnerships to unlock the value of existing infrastructure (street poles, ducting, billboards etc)** | Marc Merlini, JCDecaux  
Jorge Jimenez, CEO, Axion  
Graham Thrower, Urban Foresight |
| 16:15 - 17:00 | Panel: **European new build: the changing shape of infrastructure and what a more diverse portfolio means for passive infrastructure owners** | Jonathan Freeman, Customer Infrastructure Programmes Director, Arqiva  
Timur Shikov, Head of Strategy, Russian Towers  
Tony Killarney, CEO, Towercom |
| 17:00 | End of Meetup |  |
New for 2019: Working Group: Enabling collaboration between neutral host infrastructure providers and local government in the context of 5G

Tuesday 9th April 14:00-15:00

This unique, invitation-only working group will bring together representatives from local government and municipal organisations, mobile network operators, towercos, fibrecos and other neutral host infrastructure providers to allow a one-of-a-kind workshopping session addressing some of the nascent opportunities presented by 5G rollout. Key topics to be addressed include:

- The concession terms needed for neutral host operators to invest in 5G infrastructure at the levels required
- Logistical issues re site assembly for neutral host operators and mobile network operators, including permitting and access to power
- A mobile network operator’s view of compelling business use cases
- The local government view of 5G as an enabling technology
- Local government views on priority outcomes from 5G roll-out
- Local government perspectives on financing and risk
- Local government capacity
- Timeframes for transition to true 5G, and for whom
- Future scoping applications that will further 5G business models
  - Connected Automated Vehicles
  - Smart City applications – sensors, smart parking, intelligent transport systems
  - Connected buildings and communities
  - Industry 4.0 and 5.0

To be considered for the invitation list or for more information, please email Frances Rose frose@towerxchange.com
Introducing the TowerXchange Investment Hub

Bringing together investors looking to deploy funds in infrastructure with neutral host operators and cleantech solutions providers seeking to raise capital

TowerXchange will leverage our unique contacts in the communications infrastructure community, and those of our parent company Euromoney Institutional Investor, one of the world’s leading publishers of investment journals and data, to create a pool of qualified investors.

The Investment Hub will expose those investors to four groups of potential investments:

1. Large listed / near IPO tower companies
2. Startup to medium sized tower companies
3. Other communications infrastructure innovations such as edge data centres, neutral host network operators (small cell and IBS), and smart poles
4. Cleantech for communications infrastructure power

Under the guidance of an expert moderator, the Investment Hub will showcase to potential investors 4-6 innovative businesses in each of the above categories through succinct pitches and Q&As, to be followed by private conversations in 1:1 meeting rooms and at presenting companies’ booths (subject to the presenters availing themselves of such facilities).

Participation in Investment Hub is strictly invitation only.
To participate either as an investor or a presenter, please contact Annabelle Mayhew amayhew@towerxchange.com

TowerXchange is delighted to have welcomed some of the biggest and most influential infrastructure investors in the world to our Meetups across the globe. Attendees of TowerXchange Meetup Europe include:

<table>
<thead>
<tr>
<th>Large listed / near IPO tower companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1848 Capital Partners LLC</td>
</tr>
<tr>
<td>3i Investment Plc</td>
</tr>
<tr>
<td>4M Investments</td>
</tr>
<tr>
<td>Albright Capital Management</td>
</tr>
<tr>
<td>Alcazar Capital</td>
</tr>
<tr>
<td>Alinda Capital Partners</td>
</tr>
<tr>
<td>Allianz Capital Partners GmbH</td>
</tr>
<tr>
<td>AMP Capital</td>
</tr>
<tr>
<td>Amzak Capital Management</td>
</tr>
<tr>
<td>Antin Infrastructure Partners</td>
</tr>
<tr>
<td>SAS</td>
</tr>
<tr>
<td>APG Asset Management NV</td>
</tr>
<tr>
<td>Arcus Infrastructure Partners</td>
</tr>
<tr>
<td>Bank of Tokyo Mitsubishi</td>
</tr>
<tr>
<td>Barclays Capital</td>
</tr>
<tr>
<td>Baring Vostok Capital Partners</td>
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<tr>
<td>Barings</td>
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<tr>
<td>Berkshire Partners</td>
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<tr>
<td>BNP Paribas</td>
</tr>
<tr>
<td>Brookfield Asset Management</td>
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<tr>
<td>Capital International Private</td>
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<tr>
<td>Equity Funds</td>
</tr>
<tr>
<td>Consulta Limited</td>
</tr>
<tr>
<td>Credit Suisse</td>
</tr>
<tr>
<td>Crescent Park</td>
</tr>
<tr>
<td>DekaBank</td>
</tr>
<tr>
<td>Development Bank of Japan</td>
</tr>
</tbody>
</table>

| Digital Colony |
| Digital World Capital LLP |
| Edizione |
| Equity International |
| Fidelity International |
| Fox Haven |
| General Communications inc |
| Genesis |
| Goldman Sachs |
| Grain Management LLC |
| Highline Capital Management LP |
| Indigo Capital |
| ING Bank |
| Inter-American Investment Corporation (IIC) |
| International Finance Corporation (IFC) |
| Invus |
| IP Capital Partners |
| Kempen & Co |
| Kingsley Capital Partners |
| KKR |
| Kohlberg Kravis Roberts & Co LP |
| Lansdowne Partners |
| Lone Pine Capital |
| Longview Asset Management |
| Macquarie Group |

| Madison Dearborn Partners |
| Miton Group |
| Morgan Stanley UK Limited |
| Nomura |
| Och-Ziff Real Estate |
| Peppertree Capital Management |
| Petrus Advisers |
| PSP Investments |
| RBC Capital Markets |
| RENLAN, S.A |
| Rothschild |
| Scotiabank |
| Silver Swan Capital |
| Sojitz Corporation |
| Soroban Capital Partners LP |
| Southern Cross Group |
| SPO Partners |
| Sycale Advisors |
| T.Rowe Price |
| The Hongkong and Shanghai Banking Corporation Limited |
| Tiger Global |
| Tillman Global Holdings |
| TPG Capital |
| UFG Asset Management |
| Wells Fargo Bank |
| Wood Creek Capital Management |
TowerXchange Investment Hub: engagement options

Moderation of a session during the Investment Hub Theatre Europe 2019
Position as thought leaders in the TowerXchange Investment Hub Theatre - moderate a plenary investment panel session to present your knowledge and expertise of investible platforms in the communication and infrastructure market. We will also raise your brand around a coffee break during the morning or afternoon of either day 1 or day 2. Open to all 200 attendees your brand will be further reinforced through signage and branded napkins, whilst delegates network and relax over their coffee.

Host of the Investment Hub Theatre Europe 2019
Be seen as the host of the TowerXchange Investment Hub Theatre - We will raise your brand in the Investment Hub Theatre to position you as Hosts of the theatre and thought leaders in advising on investible platforms in the communications and infrastructure market.

Breakfast Briefing Europe 2019
Sponsor a breakfast on Day 1 or Day 2 of the meetup giving you an opportunity to address the audience on your take on the state of the telecom infrastructure investment market whilst your company brand is emblazoned on signage supporting your message of being thought leaders and the advisor of choice in the market.

Investor pre-event briefing call Europe 2019
Join the pre-event briefing call where TowerXchange researchers will talk you through the attending delegates outlining innovative, disruptive new market entrants as well as proven established players in the European Communications Infrastructure market.

Advisory firm pre-event briefing call Europe 2019
Join the pre-event briefing call where TowerXchange researchers will talk you through the attending investors delegates and investment opportunities in innovative, disruptive new market entrants as well as proven established players in the European Communications Infrastructure market.
Speakers and roundtable hosts already confirmed to join us at Meetup Europe 2019

- Tobias Martinez, CEO, Cellnex
- Giovanni Ferigo, CEO, INWIT
- Jorge Alberto Jimenez, President, Axion
- Alex Mestre, Global Business Managing Director, Cellnex
- Nigel Moss, COO, Wireless Infrastructure Group
- Enda Hardiman, Managing Partner, Hardiman Telecommunications
- Rustem Umerov, MD, ASTEM
- Michele Vitale, Head of IR, INWIT
- David Crawford, MD Telecoms, Arqiva
- Joerg Weber, SVP Investment Management, Deutsche Telekom
- Paolo Crochetti, Director of Institutional Affairs, EI Towers
- Olivier Huart, CEO, TDF
- Christopher Ehrke, Partner, Arcus Infrastructure Partners
- Bruno Candes, Partner, InfraVia Capital Partners
- Graham Thrower, Head of Infrastructure & Investment, Urban Foresight
- Marc Merlini, Business Development Director, JCDecaux
- Alexander Chub, President, Russian Towers
- Nikolay Berdin, CEO, Service-Telecom
- Rhys Phillip, CEO, CTIL
- Pat Coxen, CEO, MBNL
- Nihat Narin, CEO, Global Tower

- Mauricio Bolana, Partner, Antin Infrastructure Partners
- Eric Crabtree, CIO, IFC
- David Porte, SVP International Strategy and Business Development, SBA Communications
- Jonathan Dann, Managing Director, Greenhill & Co
- Jonathan Freeman, Customer Infrastructure Programmes Director, Arqiva
- Cara Mascini, CEO & Founder, EdgeInfra
- Tony Killarney, CEO, Towercom
- Timur Shikov, Head of Strategy, Russian Towers
- Graham Payne, CEO, Digital Colony UK
- Bruno Jacobfeuerborn, CEO, Deutsche Funkturm
- Tomas Budnik, CTO, PPF
- Antony Tomlinson, CEO, Ontix
- Colin Cunningham, CEO, Cignal
- Arthur Akopyan, Managing Partner, UFG
- Jason Day, VP Telecom, Accruent
- Nick Elverston, Partner, Ashurst
- David Martin, Partner, Linklaters
- Pankaj Agrawal, Partner, Capitel
- Doug Dimitroff, Partner, Phillips Lytle
- Spencer Crawford-White, CTO, Delmec
How can I join?

250 passes available for 2019
All previous Meetups have **SOLD OUT**: Register early to avoid disappointment

**Conditions of entry**

1. Attendance is restricted to Director level or higher
2. Vendors (with the exception of MSPs) are restricted to a maximum of two delegates per company in order to balance the ratio of buyers to sellers (to enquire about increasing your presence through sponsorship or exhibition contact Annabelle Mayhew)

**Register today to guarantee your involvement**

- amayhew@towerxchange.com
- +44 (0) 7423 512588

**Pricing**

<table>
<thead>
<tr>
<th>Category</th>
<th>Price</th>
</tr>
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<tbody>
<tr>
<td>Standard pass</td>
<td>£2,500</td>
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<tr>
<td>Towercos</td>
<td>£1800*</td>
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<tr>
<td>Mobile network operators</td>
<td>Free*</td>
</tr>
<tr>
<td>Sponsorship and exhibition</td>
<td>On request</td>
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</tbody>
</table>

*Discount codes to be supplied on application to Annabelle Mayhew at amayhew@towerxchange.com. Please note these will only be supplied to qualified MNOs and independent towercos.
Europe’s largest gathering of tower owners in one room: How can you make the most of the opportunity?

The TowerXchange Meetup Europe enables you to condense months of travelling, client visits and business development calls into just two action packed days. Yet with such a large number of clients in one place, planning your time efficiently and finding a way to stand out from the crowd is a must.

As a sponsor or exhibitor at the event you open up a world of premium opportunities unavailable to delegates. Such opportunities have proven so valuable that over 60% of 2018’s sponsors and exhibitors rebooked their packages during the course of last year’s event! Can you afford not to join them?

TowerXchange’s top five tips to meet your goals on site

1. Position yourself as a thought leader and let clients approach you
   - Share expertise in the TowerXchange Europe special edition journal
   - Lead the discussion by hosting a roundtable or discussion forum

2. Secure access to invitation-only working groups with MNO and towerco procurement teams
   - Closed door task forces eliciting intimate feedback from buyers responsible for trialing, procuring and using key energy equipment and monitoring and management systems

3. Create a meeting point and bring in reinforcements to cover a large client base
   - Vendors are limited to two Meetup passes to preserve the ratio of buyers to sellers; exhibitors can leverage two additional expo hall passes to cover more meetings with the large customer base
   - Welcome prospects to your exhibition stand or take a closed meeting room for ad hoc conversations when needed
   - Benefit from TowerXchange’s concierge service; facilitating one-to-one introductions

4. Strengthen brand awareness, reputation and likeability
   - Sponsor the networking breaks, drinks reception or networking dinner: this year’s most prominent branding opportunities

5. Arrive prepared: Benefit from a briefing on what your target clients are looking to buy
   - Get ahead of the crowd, don’t just find out which companies are attending but learn more about their portfolio, strategy and who will be representing them in our exclusive pre-event briefing

To discuss the opportunities available contact Annabelle Mayhew, Chief Commercial Officer email: amayhew@towerxchange.com phone: +44 (0) 7423 512588
## TowerXchange Meetup Europe prices 2019

### Benefits

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Delegate pass</th>
<th>Exhibitor</th>
<th>Bronze Sponsor</th>
<th>Silver Sponsor</th>
<th>Gold Sponsor</th>
<th>Platinum Sponsor</th>
<th>Diamond Sponsor</th>
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<tbody>
<tr>
<td>Access to TowerXchange Meetup</td>
<td>1 pass</td>
<td>1 pass</td>
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<td>2 passes</td>
<td>3 passes</td>
<td>4 passes</td>
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<td>Video on TowerXchange TV</td>
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<td>10ft x 10ft Turnkey booth</td>
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<tr>
<td>Logo on backdrop, signage, fliers &amp; invites for TowerXchange Meetup</td>
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<td>Your choice of bronze sponsorship benefit</td>
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<td>Your choice of silver sponsorship quality benefit</td>
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<td>Your choice of gold sponsorship premium benefit</td>
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<td>Your choice of platinum business-class benefit</td>
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<tr>
<td>Your choice of diamond first-class benefit</td>
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### TowerXchange Meetup Prices 2019 (All prices in GBP £)

- Bronze Sponsor: £2,500 * 1 pass
- Silver Sponsor: £8,500 2 passes
- Gold Sponsor: £12,500 3 passes
- Platinum Sponsor: £17,500 4 passes
- Diamond Sponsor: £21,500 5 passes
- Roundtable hosting: £8,500
- Panel moderator: £3,000
- Technology Evaluation working groups: £2,000
- Buyer briefing call and supporting documentation: £1,500

* *Discounted rate available to Towercos, Government and Regulator representatives, 100% discount for qualifying Director - C-level execs from Operators

### Industry breakdown of a comparable tower industry Meetup

- Independent towerco: 44%
- MNOs: 9%
- Investor: 15%
- Managed services, tower & accessory supply: 8%
- RMS and ILM: 5%
- Small cells and DAS: 3%
- Advisory firm: investment strategy legal: 5%
- Energy equipment and services: 5%
- Other: 5%
Our sponsors & exhibitors

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Accruent

Siterra, an Accruent Product, addresses the software needs of tower companies to sell co-locations, upgrade capacity, build-to-suit, maintain accurate asset registers, manage maintenance, and collaborate with vendors operationally as well as consolidate and integrate tower-related software technically. Sixteen of the towercos and infracos that TowerXchange tracks are current Siterra customers, spanning 18 countries and five continents. The first version of the Siterra site management platform was released in 2001. 100,000 users later, Siterra has become the industry standard, must-have operating software for tower companies today. Accruent works with its leading towercos customers to jointly develop new features that are deployed regularly through the SaaS platform to constantly improve customer value. Accruent has developed global process standards with local flexibility to pair with best-in-class software functionality.

Accruent’s telecommunications division serves some of the world’s largest mobile network operators and service providers in addition to tower companies, helping link employees from different organizations in the industry to collaborate to projects. Accruent is the largest independent provider of commercial property management software, serving the telecom, retail, education, healthcare, and corporate markets with over 7,000 customers in 149 countries.

www.accruent.com

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Acsys International Ltd

Acsys International is a global technology company specialized in security and access management of critical infrastructure through the emerging field of remote access management solution. Instigated in 1999 from the technologies of two French defense contractors, Acsys International provides remote access control using both smart-key and keyless solutions. The signature Intelligent Access Management System (iAMS) is a platform that brings together smart-padlocks, smart-keys and management software to provide a powerful means to control who goes where and when, indoors and outdoors.

Our highly specialized and international team of engineers develops world-unique and patented solutions—from the Code Generation System (CGS) and Keypad Key to remote staff management via the mobile App. This modular, and solution-oriented approach sets Acsys International apart from other security solution provider in the market. With presence in 64 countries, our clients are global leaders from different industries, including telecommunications, power, mining, logistics and more.

www.acsys.com

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Cellnex Telecom

Cellnex is the main services and infrastructure operator for wireless telecoms in Europe. It operates in Spain, Italy, the Netherlands, France, Switzerland and the United Kingdom.

Its activities are structured around four main areas: telecoms infrastructure services, audiovisual content distribution networks, security and emergency services networks, and smart infrastructure and urban services management solutions (smart cities and the internet of things). The company is listed on the continuous market of the Spanish stock exchange. It is part of the selective IBEX 35 and EuroStoxx 600 indices and part of the FTSE4GOOD, Carbon Disclosure Project and Standard Ethics sustainability indices.

www.cellnextelecom.com/en/

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Delmec

Delmec has been a primary component in the telecommunication industry, not only within the infrastructure area but also providing state of the art telecom solutions for Ireland, UK, Africa, Europe, America and the Middle East for over 30 years. With the company’s headquarters based in Ireland, Delmec
Our sponsors and exhibitors

Since 1947, the STULZ company has evolved into one of the world’s leading suppliers of air conditioning technology. With focus on precision air conditioning units, chillers, humidifying systems, service and facility management, this division of the STULZ Group achieved sales of around 450 million € in 2016. Since 1974 the Group has seen continual international expansion of its business, specializing in air conditioning for data centers and telecommunications installations. STULZ employs 2,400 workers at ten production sites and 21 sales companies worldwide and cooperates with sales and service partners in over 140 other countries. Current annual sales are around 1,300 million euros.

www.stulz.com

Vinson & Elkins is one of the oldest and largest international law firms, with approximately 700 lawyers located in 15 offices around the world.

Our global telecommunications team has extensive experience advising on international telecoms and telecoms infrastructure M&A transactions, including in respect of towers, data centres, fibre, wireless and wireline technology. We have significant

www.tarantula.net

Tarantula is a proven market leader of telecom site management solutions and a trusted advisor and long-term partner for tower site owners worldwide. With extensive industry knowledge and customer understanding, Tarantula supports and empowers its customers to build profitable and sustainable businesses. Through an end-to-end, purpose-built telecom site portfolio management solution and knowledge-driven services, Tarantula helps telecom site owners to monetize their towers. Tarantula is a vital part of the daily management of more than 300,000 towers and US$25 billion worth of assets across the world.

Tarantula is owned by Volaris Group, an operating arm of Toronto-based software and services provider, Constellation Software Inc. Tarantula’s offices are situated in Singapore, Stockholm, London, and Hyderabad. For further information, please visit: www.tarantula.net.

www.tarantula.net

Signify, formerly known as Philips Lighting, is the world leader in lighting for professionals, consumers and lighting for the Internet of Things.

BrightSites by Signify delivers an innovative smart pole solution that promotes city livability, connectivity, and enables mobile network operators around the world to deliver Wi-Fi, 4G and 5G LTE as well as IoT applications to the citizens while maintaining the city’s aesthetics. This smart infrastructure supports multiple wireless platforms and provides a standardized, aesthetically pleasing, solution with all components enclosed and obscured from public view.

www.signify.com/brightsites

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Our global telecommunications team has extensive experience advising on international telecoms and telecoms infrastructure M&A transactions, including in respect of towers, data centres, fibre, wireless and wireline technology. We have significant
Our exhibitors

industry experience, advising on telecoms transactions in numerous countries, including across Europe, Africa, Asia, the Americas and the Middle East and our team is well recognised for such transactions worldwide. Our telecommunications advice includes acquisitions and disposals, debt and equity financing, infrastructure development, operational arrangements, regulatory matters and dispute resolution. We also have significant experience in the negotiation and drafting of sale and purchase, debt and equity financing, master lease, build-to-suit, site management, site marketing and service level arrangements, fibre IRUs and other complex commercial contracts.

www.velaw.com

Abloy Oy

Abloy Oy is one of the leading manufacturers of high quality locks, locking systems and architectural hardware and the world’s leading developer of high security electromechanical locking technology.

For decades Abloy has delivered security solutions to protect telecommunications sites and assets. At its simplest level, the CLIQ® system eliminates the risks and expense caused by lost or stolen keys. The web managed system also facilitates financial savings, reduces CO2 emissions and provides significant time saving with ‘smart’ infrastructure integration, generating a fast pay-back and high ROI.

Abloy operates in all continents and several major companies have chosen ABLOY as their trusted advisor and the solution provider in the rapidly developing and changing telecom industry.

www.abloy.co.uk/en/abloy-abloy-co-uk-solutions1/telecommunications/

Exhibitor:

Atrebo

Atrebo is a telco asset and infrastructure management solution provider. Atrebo’s asset and infrastructure management suite of solutions TREE, helps Towercos and MNOs manage the life cycle of their fixed and mobile network assets in a simple, effective and collaborative way.

TREE provides a new perspective on how to manage infrastructure of mobile and fixed networks, focusing on collaboration instead of self-centered management of own infrastructure, focusing on performance instead of execution of tasks, maximizing the overall efficiency of your assets.

Atrebo’s solution TREE has been conceived as a hub for convergence, where infrastructure providers and clients exchange resources. With the irruption of new technologies, such as IoT or 5G, the collaborative nature of TREE will become more crucial, helping Towercos and MNOs transform their networks.

www.atrebo.com

Exhibitor:

Crowd SiteIntel by M2Catalyst, LLC

M2Catalyst is a big data/business analytics licensor that crowdsources trillions of cell tower, mobile network, device, and application data points from millions of mobile devices. Our data scientists then utilize proprietary algorithms to generate invaluable actionable intelligence for members of the wireless ecosystem, i.e., infrastructure providers, tower owners, wireless carriers, mobile device manufacturers, and app developers.

http://www.m2mobileinsights.com/blog/a-r-evolution-in-how-towers-are-valued-and-how-co-locations-are-sold/

Exhibitor:

Polar Power Inc

Polar Power, Inc. (POLA), designs, manufactures and sells direct current, or DC, power systems, lithium battery powered hybrid solar systems for applications primarily in the telecommunications market. Polar’s systems provide reliable and low-cost energy for applications for off-grid and bad-grid applications with critical power needs that cannot be without power in the event of utility grid failure. Our systems integrate DC Generators, Solar PV, DC Air-conditioning, and batteries. Our Hybrid Solar Systems provide reliable power with very low maintenance and operational costs. Our Prime Power DC Generators provide very low fuel consumption, low maintenance with 3,000-hour oil change interval and long generator life. Our Backup DC Generators provide compact, lightweight, minimum fuel storage providing long reserve.

www.polarpower.com

Exhibitor:

Ashurst

Nick Elverston leads Ashurst’s global Digital Economy Transactions team. Based in London, Nick has over 25 years’ experience providing cross-border legal advice to clients in the TMT sector.
Nick has worked extensively on digital infrastructure and telecoms deals across the UK, Europe, Asia, Africa and the Middle East. His deals include the roll-out of new services, network shares, acquisitions and disposals, joint ventures and partnerships. Nick is recognised as a leader in his field for his legal and industry knowledge. Clients have said he is “a brilliant legal and practical mind who can quickly cut through complex issues to deliver excellent outcomes.” (Source: Chambers and Partners, 2019)

Nick is bi-lingual in English and French and fluent in Japanese. His clients include telecoms and content companies, vendors, funds and banks operating in the TMT sector. Nick has recently advised Amazon, Digital Colony, Facebook, Three and Virgin Media on digital infrastructure deals.

www.ashurst.com/en/people/nick-elverston/

Capitel

Capitel is a specialist transaction advisory firm with a focus on addressing the most complex techno-commercial issues for our clients, especially for major transactions and investments.

Our primary focus area is techno-commercial due diligence and planning to support transactions and investment decisions for TMT infrastructure such as wireless towers, fiber, data centers as well as TMT networks such as fixed broadband, wireless broadband and media distribution networks. Capitel is headquartered in Singapore with offices in New Delhi and New York, and the recently opened branch office in London for EMEA markets. Capitel advises global infrastructure funds, private equity funds, public market investors as well as towercos, fibercos and telecom operators, and has advised on 25+ transactions and investment decisions with a cumulative investment value of $40bn+ in the last six years.

http://capitelpartners.com

Digital Colony

Digital Colony is focused on investing in the next generation of digital infrastructure. The firm invests in the mobile and internet infrastructure landscape worldwide, including macro cell towers, data centers, small cell networks, and fiber networks.

Digital Colony’s strategic investments help meet the demand for digital infrastructure capacity which is driven by growth in mobile data and video consumption, and the mega-trends of cloud computing, big data analysis, IT outsourcing and e-commerce.

Digital Colony brings together the industry and investment expertise of Digital Bridge Holdings, LLC, and Colony Capital, Inc. (NYSE: CLNY). The Digital Colony executive leadership team has a history of successful operations in digital infrastructure across multiple platforms and continents.

www.digitalcolony.com

Hangar

Hangar is reinventing how tower owners and operators see and manage their assets. We’ve created an enterprise-grade platform that automates drone data workflows specific to your tower assets, helping you tap into previously unseen insights that enable your teams to work more safely, efficiently and intelligently - across your entire portfolio.

The best way to capture, process and interpret drone data depends on the needs of each individual telecom company, department and user. Using off-the-shelf drones and best-in-class partners, Hangar automatically collects, processes and performs machine learning analysis on tens of thousands of towers - solving operational inefficiencies at scale and eliminating bad data problems that have troubled the industry for decades.

www.hangar.com

Hardiman Telecommunications

Hardiman Telecommunications Ltd. was established in 1994. We are a boutique consultancy specialised in strategy development, due diligence assessment and valuation support.

Our clients include major TowerCos, private equity funds, corporate finance / advisory and investment functions
of leading banks, and telecommunications carriers. We are particularly active in end-to-end support of mergers, acquisitions and divestitures.

All of our staff have held profit-accountable positions with global telecommunications carriers, manufacturers and systems integration houses prior to joining us. This allows full support of clients across the continuum from technology through to market effectiveness, spanning engineering, commercial strategy, financial structuring and proven operating methodologies.

www.telecoms.net

Investment Hub
Theatre supporter:

Peppertree Capital Management, Inc.

Peppertree Capital Management, Inc. is a private equity firm focused on making investments in growing communication infrastructure companies.

Peppertree was formed in 2004 and is currently investing out of its seventh private equity fund. Peppertree has more than $1B under management and has made more than 75 investments in communication infrastructure companies in 10 countries. In addition to sponsoring tower, DAS, data center and communication rooftop developers, fiber network operators and spectrum auction participants, Peppertree seeks investments in real estate related to its areas of focus, non-telecom infrastructure projects and other businesses and assets with contractually recurring revenue.

See you at our future events!

 Meetup Europe 2019
9-10 April, London

 Meetup Americas 2019
9-10 July, Boca Raton

 Meetup China 2019
August, Beijing

 Meetup Africa 2019
8-9 October, Johannesburg

 Meetup Asia 2019
3-4 December, Singapore

 Meetup MENA 2020
28-29 January, Dubai

www.towerxchange.com
Demand forecasts for telecom infrastructure equipment and services in Europe

Your comprehensive guide to expected procurement activities in 20 markets

Keywords: 5G, Austria, Baltics, Batteries, Belgium, Build-to-Suit, CIS, Country Risk, DAS, Decommissioning, Energy Storage, Europe, Europe Research, Fencing, France, Germany, Greece, Hybrid Power, Ireland, Italy, Masts & Towers, Netherlands, Nordics, Off-Grid, On-Grid, Pass-Through, Procurement, RF Design, Renewables, Russia, Russia & CIS, Shelters, Small Cells, Solar, Switzerland, TowerXchange Research, UK, Unreliable Grid, Wind

From macro tower decommissioning to urban densification, significant investment is going into European communications infrastructure. Ahead of the 3rd annual TowerXchange Meetup Europe coming up on 17-18 April 2018 in London, TowerXchange takes a deep dive into the European region, exploring the current appetite for passive infrastructure equipment and services in 20 countries and regions.

Our detailed guide condenses months of interviews and market studies to provide you with the most comprehensive overview of where the key opportunities lie for the supplier ecosystem.

To connect with MNOs, towercos and I&C rms leading procurement activities, join us next April at the 3rd Annual TowerXchange Meetup Europe; Europe’s most concentrated audience of buyers of passive infrastructure and equipment.

- 49% attending companies procure infrastructure equipment and services
- Invite-only, buyer-led technology working groups to inform product development and sales forecasts
- Europe’s only dedicated telecom passive infrastructure exhibition
- Exposure to a database of 35,000 tower industry professionals

Contact Annabelle Mayhew, Chief Commercial Officer to learn more about how to get involved

Read this article to learn:
- Where the volume of new build will be highest across Europe
- Countries, MNOs and towercos requiring significant investment in cell site rollout and upgrades
- Country-by-country requirements for small cells and DAS
- Where the most imminent opportunities exist for consultancy and legal advice
- Who are the leading MNOs and towercos in each country
## Vendor opportunity matrix

<table>
<thead>
<tr>
<th>Vendor opportunity matrix</th>
<th>Energy</th>
<th>RMS, ILM and access control</th>
<th>Tower manufacture</th>
<th>Turnkey infrastructure</th>
<th>Small cells, microcells, DAS and IBS*</th>
<th>Advisors</th>
<th>Towercos</th>
<th>Joint ventures</th>
<th>MNOs</th>
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<tbody>
<tr>
<td>Austria</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>Österreichischer Rundfunk</td>
<td>A1, 3, T-Mobile</td>
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</tr>
<tr>
<td>Belgium</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>Norkring Belgie</td>
<td>Proximus, Orange, BASE</td>
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<tr>
<td>Baltics (Estonia, Latvia, Lithuania)</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Telecentras, Teletower, Levira</td>
<td>Orange, Onatel, Telecel</td>
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</tr>
</tbody>
</table>

### Austria

The Austrian market has seen very little tower activity. The only towerco in the country is ORS (Österreichischer Rundfunk), the incumbent broadcast towerco with around 450 towers available for colocations. While new build in the market is believed to be fairly low, operational management tends to be outsourced and towers are well maintained. With 4G close to 100% and 5G rollout on the near horizon, the need for small cell and DAS solutions is growing.

### Belgium

As with Austria, there is very little towerco activity in Belgium, and what there is is driven by broadcast infrastructure. As an established mobile market, very little new build is required but the country is a leader in the European drive towards 5G meaning small cells, DAS and other future network solutions are increasingly important.

### Baltics (Estonia, Latvia, Lithuania)

The Baltics is one of the most active regions in terms of tower sharing, with two small towercos Telecentras and Levira (with 30 and 22 towers respectively) offering mobile services from a background in broadcasting and Latvia’s Teletower managing 180 towers spun out of MNO Bite in 2009, after the same towers were unsuccessfully brought to market. The Baltic economies are fairly buoyant, and although 4G rollout is not complete, they’re starting to look at 5G rollout and offerings in the small cell and IoT space. With some newbuild and consolidation in the market, there is a need for tower manufacture, but nowhere near as much as the need for MSPs and turnkey management of the infrastructure. Energy is mainly on grid, but networks are being hardened and some backup power provision is increasingly necessary.
### Demand forecasts: telecom infrastructure in Europe

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<tr>
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<th>Joint ventures</th>
<th>MNOs</th>
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<tr>
<td><strong>CIS</strong></td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Logicom, UKRTower, Eurasia Telecom, BelTower</td>
<td>Kyivstar, Vodafone, lifecell (Ukraine) KCell</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td><strong>France</strong></td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Cellnex, FPS (American Tower), TDF, SFR TowerCo</td>
<td>Orange, SFR, Bouygues, Free Mobile</td>
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<td></td>
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</tbody>
</table>

It’s hard to typify a ‘CIS’ market, as the CIS is made up from a diverse collection of countries. Certainly, there is need for further new build to cover countries with vast territories, and maintenance and upgrades of the existing towers is still a tough task in many areas. The Veon towers in four key CIS markets (Ukraine, Kazakhstan, Armenia and Georgia) came to market in 2017 and it’s unknown whether they still intend to find a buyer. But with these towers still potentially in play, and Telia assessing their options ahead of a planned focus on their core markets, there may well be transactions of scale happening in the market in the next 12-24 months. Power is an important part of the tower offering in these markets, with a higher percentage of off-grid sites than in Western Europe. Small cell and future network infrastructure is not something on the short term horizon in most CIS markets, therefore need for solutions in this areas has been classified as ‘low’.

Generally seen as a ‘testbed’ for the European market, France has many of the key factors which drive an active tower market: a relatively new MNO (Iliad’s Free Mobile) with a need to grow their network (particularly in light of their entry agreement with Orange to share towers coming to an end); two highly ambitious and international towercos in Cellnex and ATC Europe; a successful and well established broadcast towerco which has a significant offering in the telecoms market (TDF); a carve out towerco in the form of Altice’s newly formed SFR TowerCo; an MNO (Bouygues) which has bought into the idea of the sale and leaseback of their existing infrastructure; and finally a good economy and data-hungry population driving the need for accelerated urban infill ahead of 5G rollout.
## Demand forecasts: telecom infrastructure in Europe

<table>
<thead>
<tr>
<th>Vendor opportunity matrix</th>
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<th>RMS, ILM and access control</th>
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<th>Joint ventures</th>
<th>MNOs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Germany</strong></td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Deutsche Funkturm, American Tower, Telxius</td>
<td>O2, Telekom, Vodafone</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cosmote, Vodafone, WIND</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Greece</strong></td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Digea</td>
<td>Vicus Networks</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cosmote, Vodafone, WIND</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ireland</strong></td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Cignal, ESB Telecoms, Hibernian/ Britannia Towers, CIE, Towercom, Shared Access, 2RN, HighPoint, Wireless Infrastructure Group</td>
<td>Vodafone, 3/02, Meteor</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ZO2, Meteor</td>
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</tr>
</tbody>
</table>

With three towercos and three operators in Germany, the market is well established in terms of rooftops but significant macro build is needed, with Deutsche Funkturm planning to build 9,000 new towers over the next three years. There is also still scope for towers to change hands and with rumours persisting that the Deutsche Funkturm towers could still come to market, plus the 7,000 rooftops which O2 transferred to Deutsche Funkturm in 2016, there is plenty of demand for advisory and consultancy services, with likely reviews of suppliers in terms of MSPs and site management over the subsequent months. As Europe’s leading economy, Germany is committed to pursuing a 5G vision, and small cells are already rolling out across the country. Need for further densification will no doubt be critical as data demand accelerates, and we therefore predict that demand for small cell and DAS solutions, as well as associated infrastructure such as fibre, will remain high for the foreseeable future.

The Greek market has seen a small amount of infraco activity, including the JV between WIND Hellas and Vodafone (Vicus Networks) and small towercos Digea. With some very remote sites, power and maintenance can be tricky, and strong partners are needed in these areas. Small cells and DAS are rolling out in urban areas and there is opportunity for growth here, as in the rest of the continent. The market has not yet seen any tower deals take place, but as towercos search for the next opportunity, there is a growing possibility of a tower acquisition in Greece.

There are a large number of towercos in the Irish market, as well as infrastructure sharing ventures. As with most Western European towercos, most of the players in the market prefer a ‘hands off’ approach to operations, and most O&M functions are outsourced to partners. There is little new build of macro towers, apart from some rural initiatives, but small cells and urban densification solutions are growing rapidly. Cignal have acquired two portfolios of towers to date, but there have been no large scale acquisitions in the market as yet. However, TowerXchange sees the Irish market as a strong contender for acquisitions and there may well be a rolling up of Irish towercos in the next 12-24 months.
## Demand forecasts: telecom infrastructure in Europe

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<th>Joint ventures</th>
<th>MNOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>Low</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>INWIT, Cellnex, EI Towers, RaiWay, HighTel Towers</td>
<td>Telecom Italia, Vodafone, Wind Tre, Free Mobile (Iliad)</td>
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<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Cellnex, NOVEC/Open Tower Company, Wireless Infrastructure Group</td>
<td>KPN, Vodafone, T-Mobile</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Emitel, ECS</td>
<td>NetworkS!</td>
<td>Orange, Play, Plus, T-Mobile</td>
</tr>
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</tbody>
</table>

Italy is one of the most active tower markets in Europe, and towercos Cellnex and INWIT are highly proactive in pursuing new technologies to support impending 5G rollout. There is some new build in the market, with Iliad’s entry into Italy driving some build to suit activity in the low thousands over the next two/three years, but decommissioning is also gathering pace as the market consolidates. Italy’s high proportion of mature towercos also drives a higher incidence of backup power provision than other parts of the continent. In terms of deals, there may be some remaining deals to be done, but these will be largely in the small cell and DAS space.

Cellnex has recently acquired the majority of the independent towers in the Netherlands, through the acquisitions of Protelindo’s opco, Shere Group and Alticom. With little new build underway and excellent grid access, operationally the needs of the Dutch market are very stable. There remains persistent rumours in the market about the potential for further tower acquisitions, however, and the MNOs in the market are planning their 5G strategies. Cellnex’s commitment to future networks in all the countries in which it operates means there is ongoing opportunity in the small cell and DAS arena.

There have been ongoing rumours of tower sales in Poland for years, but as yet no deals have taken place. Emitel is the national broadcaster and ECS are looking to move up the value chain from managed service provider to towerco over the coming months. Some ongoing new site build is taking place, but the majority of infrastructure growth is focussed on the need for urban infill.
## Demand forecasts: telecom infrastructure in Europe

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<th>Joint ventures</th>
<th>MNOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portugal</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td></td>
<td>Towers of Portugal</td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td></td>
<td>RTRS (State owned), First Tower, National Tower, MTS Towers, Russian Towers, Vertical, Link Development, Service Telecom</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td></td>
<td>Cellnex, Telxius, Axion</td>
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</tbody>
</table>

Portugal’s first towerco, Towers of Portugal, was formed in June 2018, and the other tower owners in the country will no doubt be interested to assess their options in terms of how they manage their assets. Vodafone’s presence in the market, and their forward-looking attitude to their networks drives innovation around power, both in terms of hybrids and backup, and in terms of smart metering. For a Western European country, 4G rollout and imminent 5G rollout is not accelerating particularly quickly, so although there is growth in this area demand for small cells etc is not the same as in neighbouring Spain. The need for turnkey tower management is slightly higher as in all markets where towercos are not present, but a lack of new build and projects keeps this country from promising major growth in the area.

The Russian market has blown hot and cold for years, with Veon (formerly VimpelCom) most recently deciding against a deal to sell their towers at the 11th hour in May 2017. With ambitious new towercos emerging, led by young entrepreneurs, and almost all of the MNOs spinning out their towers into stand alone entities, it seems like a deal must still take place in this market, but the key players and timescales in any future deal are hard to define. With excellent grid access throughout the country, power is low on the agenda, but management of towers over a huge area is vital and there is some new build in rural areas. Although the Russian market may be behind Western Europe in terms of 4G rollout and 5G preparations, it is most certainly on the agenda and is growing in importance.

With the towerco market dominated by Cellnex, Spain currently seems quite settled in terms of tower activity. Cellnex’s provision of power as a service in Spain means backup needs are slightly higher here than in other markets, and their needs for site monitoring and security remain at a decent level. New build is low, with decommissioning taking place across the country, but Spain has high investment in small cells and urban solutions and this is a potential area of growth in the country.
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<th>MNOs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scandinavia</strong>&lt;br&gt;(Sweden, Norway, Finland and Denmark)</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Falck, Teracom, Digita</td>
<td>SUNAB (Sweden), Net4Mobility (Sweden) 3GIS (Sweden), TT Networks (Denmark)</td>
<td>Telia (Sweden, Finland, Norway and Denmark), Tele2 (Sweden), Telenor (Sweden, Norway and Denmark), 3 (Sweden and Denmark), TDC (Denmark), Elisa (Finland), DNA (Finland)</td>
</tr>
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<td></td>
</tr>
<tr>
<td><strong>Switzerland</strong></td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>Medium</td>
<td>Swiss Towers (Cellnex)</td>
<td>Swisscom, Sunrise, Salt</td>
<td></td>
</tr>
</tbody>
</table>

The four markets we count as ‘scandinavia’ have some critical similarities but also their own idiosyncracies. There are several joint ventures across the region, all of which manage operational challenges in their own way, and many of which are reviewing the efficiency of their operational systems and processes. Site monitoring is critical and experiences of sabotage in the region make security an important factor. With a higher percentage of off-grid sites than further south in Europe, power is also an important area of interest. New build is not particularly active, but city infrastructure and 5G networks are being rolled out, providing more opportunity here.

The Swiss tower market has been brought to Europe’s attention with Cellnex’s acquisition of the Sunrise towers in 2017. However, the market remains fairly stable. Unsurprisingly, TowerXchange predicts the biggest opportunities here are in turnkey solutions as the networks are refined and in small cell technology and laying the foundations for 5G rollout.
## Demand forecasts: telecom infrastructure in Europe

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<th>MNOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>Global Tower</td>
<td>Vodafone + Turk Telecom rural tower project</td>
<td>Turkcell, Vodafone, Turk Telecom</td>
</tr>
<tr>
<td>United Kingdom (UK)</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Arqiva, Wireless Infrastructure Group, Cellnex, Hibernian/Britannia Towers, Spyder, Shared Access</td>
<td>CTIL, MBNL</td>
<td>Vodafone, O2, EE, 3</td>
</tr>
</tbody>
</table>

The MNO and tower markets are largely dominated by Turkcell and their towerco arm, Global Tower, with over 8,000 towers in the country. However, recent government legislation will see a joint venture between Vodafone and Turk Telecom build in excess of 2,000 towers in rural areas, considerably boosting need in the country for tower manufacture, SMS and turnkey services. In addition, new government towerco PTT Kule is planning to build up to 40 high towers across Turkey with backup power for both broadcast and telecoms purposes. Although Turkey is not as close to 5G rollout as western Europe, small cells are being rolled out and DAS solutions are needed in urban areas, making Turkey an attractive market for tower growth over the next few years.

The UK ecosystem of towercos and JVs has functioned adequately to date, but with Wireless Infrastructure Group acquiring new assets, Cellnex becoming more established and Vodafone and Three both assessing their options for European towers, there could be a lot of change in the UK market over the course of 2019. As with all of the more affluent western European countries, power and new build demands are reasonably low, but there is ground to be gained in future networks, as well as advisory and managed services.
Europe 2019: TowerXchange forecasts a dynamic year

Sale and leaseback, consolidation and operational complexity anticipated for 2019

Despite 5G use cases being thin on the ground, both towercos and MNOs are beginning to make significant changes to their organisations in order to position themselves to capture the nascent value in the impending ‘fourth industrial revolution’ and to minimise the cost of infrastructure rollout. TowerXchange predicts a busy 2019 for European towers, from carve outs and tower sales to a much sharper focus on managing opex through data generation and analysis. Business models will continue to multiply, with state players entering the market, MNOs creating more towercos and investors keen to deploy capital into this growing asset class. In this article we highlight some of the major changes we predict for 2019, and assess some of the drivers behind them.

Keywords: 5G, Acquisition, Active Infrasharing, Arqiva, Business Model, CTIL, Carve Out, Co-locations, Densification, Europe, Europe Insights, Fibre, Infraco, Infrastructure Sharing, Investment, IoT, Market Overview, Masts & Towers, Operator-Led JV, Sale & Leaseback, Small Cells, Smart Cities, TDF, Telenor, Telia, Valuation, Vodafone

Read this article to learn:
- Which MNOs are carving out towers and what they might do with them
- Where market consolidation is likely, and where new players are entering the market
- Likely exits for European towercos in 2019
- Operational pressures and how tower owners are driving efficiencies in Europe
- New structures and models for towercos in the face of 5G rollout

Next steps for Europe’s indebted MNOs

With European MNO still struggling under the pressure of debt, and investor confidence remaining shaky, operators are evaluating their options and exploring how they can monetise their passive assets. Recent 5G auctions in Italy saw MNOs bidding as much as €6.5bn for spectrum, and the burden of rolling out 5G infrastructure is making operators question the economics of the 5G model.

With this in mind, towercos can offer MNOs solutions on two fronts: firstly, through the acquisition of their existing macro infrastructure, offering both the chance to release capital and the conversion of capex expenditure into more predictable opex commitments. Secondly, towercos can position themselves as neutral hosts for the rollout of 5G infrastructure, accessing their own capital to build new infrastructure and allowing MNOs access to a more efficient, shared network rather than creating four parallel sets of infrastructure, as was often the case in the creation of macro networks in the 1990s.

However, European MNOs are keen to retain control of their assets and we’re seeing a proliferation of MNO-captive towercos being created, with more expected in 2019. In addition to the long established Deutsche Funkturm (Deutsche Telekom’s captive towerco in Germany and, more recently, the Netherlands) and Global Tower (Turkcell’s captive towerco in Turkey),
we saw Telecom Italia create and IPO towerco INWIT in 2015 as well as Telefonica carving out their German and Spanish towers (plus towers in LATAM COUNTRIES and subsea cable), 49% of which was sold to KKR in 2017 for €1.3bn.

Most recently, Altice created two SPVs in 2018: Hivory (the new name for SFR Towerco) in France; and Towers of Portugal in Portugal, of which Altice sold 49% to KKR and 75% to Morgan Stanley and Horizon Equity Partners respectively.

The trend could well continue into 2019. New Vodafone CEO Nick Read has stated that the British giant is in the process of creating a ‘virtual tower company’ with a dedicated management team as

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**Figure One: European MNO debt (Net debt/EBITDA)**

![European MNO debt graph]

Source: Bloomberg Intelligence

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### Major European towerco equity deals and listings since 2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Seller</th>
<th>Entity and # towers</th>
<th>Buyer/Stock Exchange</th>
<th>Equity%</th>
<th>Deal value in €</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>Telefonica</td>
<td>Telxius 16,000</td>
<td>Pontegadea</td>
<td>10%</td>
<td>379,000,000</td>
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<tr>
<td>2018</td>
<td>Altice</td>
<td>SFR TowerCo 10,198</td>
<td>KKR</td>
<td>49.99%</td>
<td>1,799,000,000*</td>
</tr>
<tr>
<td>2018</td>
<td>Altice</td>
<td>Towers of Portugal 2,961</td>
<td>Morgan Stanley and Horizon Equity Partners</td>
<td>75%</td>
<td>495,000,000*</td>
</tr>
<tr>
<td>2017</td>
<td>Telefonica</td>
<td>Telxius 16,000</td>
<td>KKR</td>
<td>40%</td>
<td>1,300,000,000</td>
</tr>
<tr>
<td>2016</td>
<td>American Tower</td>
<td>American Tower Germany 2,197</td>
<td>PGGM</td>
<td>49%</td>
<td>Undisclosed</td>
</tr>
<tr>
<td>2016</td>
<td>Antin Infrastructure Partners</td>
<td>Axion 584</td>
<td>AMP Capital</td>
<td>100%</td>
<td>Undisclosed</td>
</tr>
<tr>
<td>2016</td>
<td>New equity investment</td>
<td>Wireless Infrastructure Group 2,000</td>
<td>3i Investments</td>
<td>Undisclosed</td>
<td>300,000,000</td>
</tr>
<tr>
<td>2015</td>
<td>Telecom Italia</td>
<td>INWIT 11,200</td>
<td>MIB</td>
<td>40%</td>
<td>875,300,000</td>
</tr>
<tr>
<td>2015</td>
<td>Abertis</td>
<td>Cellnex 15,091</td>
<td>MCE</td>
<td>66%</td>
<td>2,138,000,000</td>
</tr>
<tr>
<td>2015</td>
<td>CoiIte</td>
<td>Telecoms assets 300</td>
<td>InfraVia Capital Partners</td>
<td>100%</td>
<td>70,000,000</td>
</tr>
</tbody>
</table>

*estimated Source: TowerXchange
he attempts to reduce operating costs by €1.2bn by 2021. Read’s suggestion of partnering with a towerco may be well received, but suggestions Vodafone might sell a minority stake in the towers will most likely leave the towercos with the digestive capacity to get on board cold, particularly in light of IFRS 16 regulation and the needs of towercos such as Cellnex or American Tower to control their own portfolios. We’re therefore more likely to see Vodafone entering into a deeper agreement with one or more towercos across Europe, or looking for a financial investor who will be happy to settle for a 49% stake in the new towerco. With KKR already holding minority stakes in 16,198 European towers across two portfolios, there’s no doubt there could be appetite for more.

While MNOs such as Duetsche Telekom and INWIT have already spun off their towers into new entities, we may begin to see captive towercos coming to market. Telecom Italia already kicked the tires of a sale of their 60% stake in INWIT in 2016, but postponed (at the time saying 2019 seemed like the optimal time to sell). With internal politics between Vivendi and Elliott possibly driving a very infrastructure-light model, we may see this parcel of towers coming to market in 2019 as well, an rumours of Deutsche Funkturm coming to market have sprung up several times over the last few years.

In Italy, Three is looking to sell ~7,000 towers and rumours abound that they may divest towers in others European countries as well. Telia has also carved out its own towerco, and we believe Telenor may be doing the same – all vehicles which can help MNOs to manage their portfolios more effectively, but in light of IFRS 16 they may become more effective in terms of managing cost of sold to a majority partner.

There will be no shortage of MNO towers moving balance sheets in 2019 – but exactly whose balance sheets they move onto remains to be seen.

More activity from international towercos in Europe and increased market consolidation

In 2018, Digital Colony entered the European market. Hoping to replicate their investment platform model which has worked so successfully in the USA and Latin America, they acquired Finnish Digita and UK indoor service providers OpenCell and Stratto over the course of just five months. Highly acquisitive and dynamic, we anticipate Digital Colony will make further acquisitions in towers, fibre and communications infrastructure throughout 2019.

American Tower, whose operations have remained fairly low key in Europe since the acquisition of French MPS Towers in 2017, have recently undergone a management reshuffle, placing Julian Plumstead, former Managing Director at Rothschild, as the new CEO of Europe. With so many potential opportunities to both consolidate towerco portfolios and acquire towers from MNOs in 2019, we expect American Tower to play a more active role in 2019 processes and to expand their European portfolio through strong deals with high profile counterparties.

In a recent interview with Tobias Martinez, CEO of Cellnex, he stated that Cellnex are looking to consolidate their portfolios in the Netherlands and the UK, so we can expect Cellnex to be actively looking for acquisitions in these markets, as well as their other primary target markets including Portugal, Ireland, Belgium, Germany and Austria (Target Markets: Cellnex Annual report 2017)

We expect to see an increasing amount of towerco consolidation in 2019, with markets such as Ireland, where there are eight towercos or JVs active in the market, ripe for acquisitions.

New towercos enter the market

Despite the high number of towercos in Europe, we are seeing new ventures launching as well, headed by experienced tower professionals who believe they can fulfill needs that have not been met by the current players.

One such towerco is Atlas Tower Group, launched in the UK by a team with a background on the MNO side of the fence: CEO Russell Jeffries has held various roles at MBNL, Vodafone and Three, and has a vision for a flexible, dynamic towerco which offers a build to suit solution for UK MNOs. From the Altice deals, Portuguese OMTEL also launched
in 2018, with 2,900 towers across the country and plans for more and Altice/KKR towerco Hivory is bringing a further 10,198 towers for colocation in France.

Return of the IPO?

With IPOs shelved by Arqiva and Global Tower in the last three years in Europe, 2018 saw three African towercos (IHS, Eaton and Helios) prepare and fail to float their businesses. The only listed company fluctuation in Europe in 2018 was EI Towers’ de-listing, undertaken as part of a plan to try and acquire broadcasting competitor Rai Way.

We expect to see more IPO attempts, and successful ones, in 2019. Global Tower’s expanded and ambitious plans to consolidate towers in Turkey will possibly see them engage with a minority investor prior to another IPO attempt, but their need for a more diverse ownership in order to build value as an independent player is clear. Arqiva has spent the last 18 months putting together new partnerships, refining their value proposition and posting consistently positive results, which will stand them in good stead for another run at a floatation. With the TDF process also ongoing, we may well see Arqiva’s French counterpart considering an IPO if the sale process fails to meet valuation expectations.

Increases in operational challenges and complexities

As the European tower market matures and towercos look to manage costs, the effective deployment of capex and tighter control of opex will become more and more critical. From delivering consolidated backup power solutions for tenants whose networks form a part of critical national infrastructure, to managing a tenfold increase in points of presence as small cells roll out, towercos will need to manage their assets more closely in order to improve EBITDA as their model moves away from ‘real estate’ and towards ‘service’.

In addition to managing existing portfolios, regulations and operational challenges around urban infrastructure will change the cost structure of small cell rollout, bringing new service providers into the ecosystem and driving a leaner model which will be driven by new partnerships.

Permitting, power, accessibility and access to fibre will all become critical components of small cell rollout, while the technical and engineering services needed for macro networks will become less relevant to newer, denser urban networks.

Expert opinion. We asked Nick Elverston of Ashurst what his headline predictions for 2019 are:

Convergence. We’ll see the growth in diversification accelerate, with towerco’s looking to get into fibre, data centres and small cells. That said, increasingly diversified business models could cause problems for some of the new classes of investor getting into digital infrastructure.

Services. The ecosystem around core infrastructure assets is likely to grow. There is a lot of pressure to roll-out more efficiently and faster. I wouldn’t be surprised to see growth and consolidation in the service sector.

5G is going to be a game changer. The big issue is that nobody quite knows how! This is already leading to a scramble for positions on the starting grid.

Carve-outs. There are still a lot of towers to be carved out of MNOs and captive tower JV’s which are ripe for outside investors. The economic pressure on MNOs to get these deals done will increase with the need to roll-out 5G.

Oversupply? There are a lot of deals which could come to market in a relatively short space of time. Whether this will lead to reduced multiples or even oversupply and deal fatigue remains to be seen.

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Since the capex-heavy days of the 90s and early 00s, when MNOs rolled out their networks, European infrastructure has tended to need little investment beyond some infill and expansion. However, this will need to change dramatically over 2019 and 2020 as infrastructure owners prepare for 5G rollout. Many industry commentators have stated that the infrastructure needs of moving from 4G to 5G won’t be simply a case of adding a few towers; the investment and reach needed will more closely mirror the initial network rollout of 20 years ago. TowerXchange’s own research discovered that 51,500 new towers are planned for construction in Europe over the next five years, and a further 180,000 towers will need to be reviewed for their suitability for 5G equipment, with significant upgrade work required.

Finally, towercos will need to be able to generate, manage and interpret huge amounts of data from across a burgeoning number of sites in order to maximise the value of their portfolios and provide the depth of service their customers will demand. Effective platforms which will help to manage and analyse data will become more and more critical as we move through 2019.

Continued convergence

Cellnex have been at the forefront of communications infrastructure convergence, with acquisitions in fibre, datacentres, small cells and DAS over the last few years, as well as a new contract with Bouygues to deliver 88 new data processing centres. Digital Colony’s entry into the European market will bring their expertise in datacentres, fibre and towers to the continent and we’re seeing new partnerships and investments from dynamic smaller players such as Wireless Infrastructure Group and Axion.

For towercos to maintain the infrastructure multiples they have been achieving in recent years, and to retain their access to low cost capital, they will need to ensure their offering in urban infrastructure becomes more than a simple aggregator of municipal leases, and the pressure to secure partnerships, infrastructure and expertise in growing areas such as fibre, data centres or strategic telecom centres will be increasingly important.

New stakeholders entering the infrastructure landscape

Could 2019 see greater state involvement in European towercos? As 31.9% owner of Deutsche Telekom, the German state is a de facto minority owner of Europe’s biggest towercos, Deutsche Funkturm, and Norwegian Telenor, who have been rumoured to be carving out towers in Europe and Asia, is 54% owned by the Swedish government. However, we may be about to see a more conscious move by governments to enter telecoms infrastructure, perhaps to harness a highly successful growth industry, or perhaps to allow them to push

Most notably in Europe, Rostelecom, Russia’s state telecoms provider has recently expanded ambitiously into digital services. Owners of Russia’s fixed line network, they are already the biggest fibre owner in Russia, also offering datacentres and digital solutions. Their recently announced ‘Strategy 2022’ sets out Rostelecom’s digital transformation from a telecoms operator into an IT-company, servicing retail, business clients and the Russian Government. Already over 50% of the Rostelecom’s revenue comes from digital and content services, internet access, pay TV, cloud-based solutions, data centres, cybersecurity and other services, and now they are undergoing significant organisational changes internally to reflect their new focus. Rostelecom is establishing new teams and centres of excellence created to boost key focus areas, such as biometrics, cybersecurity, IoT and smart homes.

Owned by the state-owned Bank for Development and Foreign Economic Affairs and the Federal Agency for State Property Management, this state-owned organisation owns 45% of Tele2, giving it substantial interests in wireless telecommunications infrastructure as well as access to Russia’s broadcast towers.

To date, only Rostelecom and Russian MNO MegaFon have access to Russia’s 5G spectrum, with MegaFon trialling 5G in Moscow and St Petersburg.
in 2018, and Rostelecom doing the same with partners Nokia and Ericsson in different locations.

Rostelecom owns much of the infrastructure needed to support 5G rollout but only owns a handful of high towers, lacking the wireless infrastructure needed for 5G. Their stake in Tele2, which owns ~9,000 towers in Russia, could be augmented to a controlling stake of around 55% through the transfer of assets from Russian banks and insurance companies, which would effectively make Tele2 the mobile wing of Rostelecom, and give them access to towers in Moscow and St Petersburg.

The option which would give Rostelecom national reach, however, would be to acquire the ~15,000 towers which MegaFon claims to be bringing to market, or to do a deal to work collaboratively with MegaFon in order to use their infrastructure. Combining the towers of Tele2 and MegaFon could result in a network of ~24,000 towers across Russia, which, combined with Rostelecom’s existing fixed line network, data centres and infrastructure, would put them significantly ahead of any one of the European tower cos focussed on preparing for 5G rollout.

In Turkey, where the only towerco to gain scale in recent years has been TurkCell’s carve out, Global Tower, PTT, the Turkish Ministry of Transport and Infrastructure group company, has established a new tower arm, PTT Kule, which will allow the Turkish government to capitalise on the ownership of tower infrastructure in Turkey, as well as creating some of the most impressive pieces of infrastructure in the world. With a 369m tower under construction in Istanbul, which will provide space for 80 broadcasters and all three Turkish MNOs as well as ISPs, IoT providers and other wireless service providers, PTT is already throwing a lot of capex at Turkish infrastructure. However, with several thousand towers currently managed by Turkish MNOs due to revert to government ownership in 2022, and over 3,500 towers rolled out in rural areas as part of the state-mandated Universal Services Project, there are plenty more opportunities for PTT Kule to reach significant scale very rapidly.

**Looking ahead**

While 2019 will be a busy year, we expect the pace of evolution in the European market to accelerate into 2020 and beyond. As 5G economics are proven through demonstrated use cases, technology is refined and business models for tower cos become more evident, we will see more tower owners following the first movers in diversifying their portfolios and delivering a full range of communications infrastructure services, not just to MNO partners, but to a greater number of relevant parties. €100s of millions will exchange hands in 2019 as investors, tower cos and MNOs strive to find the optimal landscape from which to grow European 5G infrastructure efficiently, quickly and collaboratively.
The three pillars of Cellnex’s growth

Europe’s leading towerco and connectivity infrastructure increases focus and lays out roadmap for 5G service offering

TowerXchange was yet again granted the privilege of speaking with Cellnex Telecom CEO, Tobias Martinez, as he reflects on the activities of 2018 and plans for growth in 2019 and 2020. As ever, Europe’s biggest and most acquisitive towerco has a clear vision for both its current and future service offering to customers, which is reflected in its entry into new contracts with clients to deliver services in edge computing, as well as consolidating core competencies in towers, small cells and fibre. We asked Tobias what he thought about how the market was developing, and where opportunities may lie in 2019, as well as finding out more about the ‘three pillars’ on which Cellnex is building out its service offering to customers.

Keywords: 5G, C-Level Perspective, Carve Out, Cellnex, Co-locations, Consolidation, DAS, Data Centre, Deal Structure, Edge, Europe, Fibre, France, Infrastructure Sharing, Italy, MLA, Netherlands, Network, Rollout, Sale & Leaseback, Small Cells, Smart Cities, Spain, Switzerland, Towercos, UK

Read this article to learn:
- Cellnex’s take on the European tower landscape in 2018
- Growth plans and objectives for the short and long term
- Cellnex’s forecast for tower opportunities in 2019/2020
- How Cellnex plans to evolve to meet the needs of its clients as 5G rolls out

TowerXchange: Thanks for making time to speak to TowerXchange again Tobias. Can you update us on Cellnex’s 2018? What were the activities which you considered the most important to the company?

Tobias Martinez, CEO, Cellnex Telecom: Our focus over the past year has been on two areas: market consolidation and increased contracts for 5G. On existing market consolidation, 2018 has been an important year for us to enhance our footprint by strengthening relationships in existing markets. Our most notable achievement has been to enter into new contracts with tower customers looking for 5G solutions. In terms of our 5G activity, we have seen a number of acquisitions and agreements. These include our recent fibre acquisition in Catalonia and more recently our agreement with Bouygues to build to their requirements for strategic telecom centres known as Metropolitan and Central Offices. Although 2018 was not remarkable in terms of M&A activity, nonetheless Cellnex grew its portfolio through organic market development and greater 5G service contracts.

Our latest deal with Bouygues, which is a five-year BTS construction project for 88 Metropolitan and Central Offices, is followed by a 15-year service agreement. This serves as a good case study for other telecom operators who are considering entering into deals beyond towers with infrastructure providers. Cellnex is one of the major players moving from being a tower operator to also becoming a network operator.
These transactions with Bouygues demonstrate to other market players that they have opportunities to share their existing networks beyond the current remit of just towers or rooftops. Fibre will be part of this value proposition as will edge computing and Metropolitan and Central Offices where we’ll see the consolidation of data and voice services. This allows us to deliver the core of the 5G network, going beyond pure towers and ensures MNOs slim their infrastructure by outsourcing and investing in future infrastructure.

Generally, when building a new platform like Cellnex is, people expect greater M&A activity. However, the opportunities aren’t always readily available to consolidate your strategy. This is why we did a lot of work on organic growth in 2018 and we’re optimistic that in 2019/20 we will be able to capture outsourcing opportunities with more MNOs. Nonetheless, we believe 2019 will be more active in terms of M&A.

**TowerXchange: There has been a lot of change in the European market too, with new market entrants and MNOs exploring new options. What is Cellnex’s view on how the market is developing?**

**Tobias Martinez, CEO, Cellnex Telecom:** 2018 has not been as attractive in terms of M&A, as we only saw the Altice transaction come to market for a minimum stake. However we see the big players are reviewing their strategy to outsource passive infrastructure, as such we think 2019 will be very active.

This is because 5G network design, planning and execution is and will be highly demanding, requiring two to three years of work ahead of a massive rollout. This is why MNOs are starting to review their outsourcing strategy accordingly. For a company like Cellnex, with a clear value proposition and neutrality at its core, we expect this will be an opportunity. The growth in the market is very appealing for investors such as private equity funds, infrastructure funds, as we saw in 2018 with the SFR transaction with KKR, but those transactions were minority stakes, and we will see how they are affected by IFRS 16.

**TowerXchange: Talk us through Cellnex’s current growth plan and market objectives.**

**Tobias Martinez, CEO, Cellnex Telecom:** As I said, for us it’s very important to gain scale on our existing markets, we want to find the right target in the UK and the Netherlands because scale matters when talking about telecoms infrastructure. We will also test the water around our domestic markets, potentially acquiring more assets from the big European MNO players and smaller towerco acquisitions. In terms of market consolidation, many of these smaller towercos are owned by infrastructure funds and financial institutions and sooner or later we expect this basket of towercos in Europe will be accessible for consolidation.

TDF, for example, is not a small towerco as they also deliver broadcasting and FTTH and are really a wholesale telecom infrastructure player, but TDF coming to market would be a sign of the current markets dynamism.
TowerXchange: We believe several towerco assets may be coming to market in the CEE region soon. Will this be of interest to Cellnex?

Tobias Martinez, CEO, Cellnex Telecom: Central and Eastern Europe is our second priority. Our first priority is to explore and consolidate in Western Europe: we don't have enough scale in the UK yet, the second largest market in Europe; we'd like to do more in the Netherlands; we will have to track how potential prospects in our core markets evolve, like TDF. There are many moving parts but when it comes to looking at Eastern Europe, why not? We would consider some countries, in Eastern Europe there are several markets with different appeal for us so we are keeping one eye on CEE as well.

TowerXchange: At the last count we estimated there were around 65 towercos of various shapes and sizes in Europe. Do you think we will see an acceleration in towerco consolidation in the coming year? Is this a priority for Cellnex?

Tobias Martinez, CEO, Cellnex Telecom: This is one of the 'baskets' of towers we are looking for. One is the MNO towers, the second one is the small telecom operators, the third is the existing towercos in Europe. There is an opportunity for consolidation in every country, we just need to understand shareholders' ambitions and their willingness to sell down and consolidate the capital gain. At a certain point in time these financial investors should sell and these exits are an opportunity for us to assess and consider the integration of those type of companies.

TowerXchange: We've been talking for some time about convergence between communications infrastructure verticals. Cellnex is clearly leading the way in this in the European market with acquisitions and expertise in small cells, DAS, datacentres and fibre. What will 'towercos' look like in 5 years' time?

Tobias Martinez, CEO, Cellnex Telecom: The first thing we see is that the towerco model is evolving thanks to the advancement of technology and changes to our customers business models, which is in turn is driving 'pure' towercos to become network infrastructure providers. It's a question of time, but we feel that this is the evolution of the structure and value creation that telecom infrastructure companies like us will take.

We are building our own value creation proposition on three pillars: the first is the extension of existing wireless infrastructure, by which I mean adding small cells, DAS, and datacentres, so it's no longer a question of towers but of urban infrastructure as well. Second is fibre, at least to the antenna. If you have more than that you can provide backhaul services to the interconnection point, which will be a value add for our customers. The third pillar of our development is based on edge computing. This is maybe the newest part of our role in the value chain: we don't have previous experience in managing edge computing, which is why we are very happy to help our customers, like Bouygues, to develop this new business model. This was the reason why we acquired Alticom in 2017, as they already delivered a part of these types of services. All in all, we're focussing on improving our capacities, our experience and our knowledge to deliver these new types of services for 5G. This is the path where we are developing our future strategy and structure and crystallising the whole telecom infrastructure system related to 5G. There are a lot of new roles in the value chain, it's not just a real estate proposition.

TowerXchange: Do you see your customer base changing shape as 5G use cases and proven and it rolls out further?

Tobias Martinez, CEO, Cellnex Telecom: Yes, very much so. There will be new roles for the MNOs or for new providers in the market. 5G will require more vertical solutions aside from connectivity or capacity. Telecoms operators should deliver more solutions and integrate more niche companies to provide more services for all kinds of verticals such as insurance, manufacturing or healthcare. Partnerships will allow a small but highly knowledgeable skill set to be integrated into a solution around 5G technology. I don't expect to see Orange or Deutsche Telekom, for example, delivering industrial solutions without partnering with specialist niche companies. Then what will be our role? Delivering edge computing and telecom services on our passive infrastructure. We are exploring the new part of this role with our core customers now.

TowerXchange: We are seeing European MNOs looking to spin out their towers into a captive towercos rather than looking for a trade sale (such as Altice and Vodafone). Does this mean...
the days of sale and leaseback are numbered? Will towercos have to look elsewhere for growth?

Tobias Martinez, CEO, Cellnex Telecom: I can see the appeal of this structure, when extracting the monetisation without any accounting adjustment as it was prior to IFRS 16, but after this you should move from MLAs to MSAs. If you keep MLAs you will receive 49.9% of the value of monetisation but the ratings agencies will account for this through debt or EBITDA adjustments, meaning you gain nothing. This won’t be the best way to reduce debt, and minority transactions won’t be the most attractive, while we expect majority stake transactions and opportunities to deliver a lift to capitalisation of contract through IFRS 16.

This is the reason why we believe 2019/2020 will be critical for big players to consider best strategy for them considering the impact of IFRS 16. A lot depends on objectives of telecom operators, looking at big players we don’t believe that a minority stake transaction could be the best for them. It may well be a first step, but it may not be the most efficient solution to capture all the value of their asset and reduce net debt.

We don’t think the days of sale and leaseback are numbered, there will be opportunities out there, but operators will need to think carefully in terms of how the deal is structured, an MSA in our opinion is the best solution as it’s a service and means you don’t have to make adjustments in terms of liabilities, so you’re maximising the value of the transaction by monetising a bigger portion of your infrastructure and avoiding capitalisation of the service contract.

TowerXchange: The European market is probably one of the most diverse in terms of towercos profile – independent towercos, broadcast towercos, MNO captive towercos and joint ventures all serve the MNO community in Europe, backed by a variety of financial structures. How do you think this will evolve further as the industry develops? What new business structures or partnerships could we see evolving?

Tobias Martinez, CEO, Cellnex Telecom: From our point of view we are open to any type of collaboration in terms of infrastructure but having said that we have one line in the sand which we will not cross – that of neutrality. It’s not just a marketing play, we believe in the value of being neutral to all the players in the market and we must be able to allocate services to everyone under the same conditions, as we do on our existing infrastructure. As a long-term partner of mobile network operators, we consider this to be critical, it’s around this pillar that we develop the best solutions in each country.

We have formed partnerships before, for example in Switzerland with Swiss Life and Deutsche Telekom Capital Partners, so why not consider other strategies and arrangements with partners to help us execute our business plan, incorporate assets or consolidate our position in certain countries. We’re certainly not against partnering with others but we should have majority control in order to deliver our independent role. This is our commitment to our investors: we can’t be a passive, minority investor, nor just a financial investor, we need to capture synergies amongst our assets and deliver the same service to our customers across Europe – there are a lot of restrictions and requirements which invite us to remain as an industry player with a controlling stake in all our operations. However, under the right circumstances we are open to partner with the right and suitable players in every country. This is not about money is about sharing a common vision on the drivers of this industry and how a network infrastructure operator is able to meet its customer’s demands and expectations.
Wireless Infrastructure Group - hungry for growth
The UK’s largest pure play independent towerco continues its long run of entrepreneurial growth

Over the last ten years Wireless Infrastructure Group has strived to maintain excellent service to its customers whilst expanding its range of infrastructure solutions. With a leading position now established in the UK indoor neutral host sector and a growing portfolio of fibre-connected small cells under its belt, WIG now turns its attention to opportunities for both organic and inorganic growth in 2019. TowerXchange spoke with CEO Scott Coates to find out more about what the company has planned.

Keywords: 4G, 5G, Acquisition, Arqiva, C-Level Perspective, DAS, Densification, Europe, Fibre, IoT, Ireland, Netherlands, Project Finance, Sale & Leaseback, Small Cells, Smart Cities, Towercos, UK, Wireless Infrastructure Group

Read this article to learn:
- How WIG’s activities in 2018 have positioned them for growth
- The advantages of medium scale in delivering DAS projects
- WIG’s methodology and plans for future growth
- Potential changes and shifts in the European tower market

TowerXchange: Can you update us on where Wireless Infrastructure Group is right now?

Scott Coates, CEO, Wireless Infrastructure Group: We are now organised clearly into three distinct units: Towers, Indoor Networks (which incorporates our established DAS business but operates with a far broader scope) and Strategic Projects, which includes longer range opportunities such as fibre, smart cities and transport-based developments such as the Transport for London (TfL) project.

Through these business units, our core strategy remains the same as it has been for many years - to keep improving the quality of service for our customers and to add to our base of high-quality infrastructure through new construction and selective M&A.

Our business operations platform is very well established with many of our team having been together for a decade or more running independent wireless infrastructure in the UK. This is a key asset for our business, and we continue to develop it alongside our processes to lead the sector on infrastructure and service quality. A good example of this is the early investment we made in implementing Siterra in our back office to become the first European towerco with this capability.

WIG is primed and more capable than ever to manage a significant step up in tower ownership and operation.

TowerXchange: Tell us about your expansion plans for 2019.
Scott Coates, CEO, Wireless Infrastructure Group: We are looking to grow through new infrastructure construction and through M&A.

We secured significant new long-term debt facilities in the second half of 2018 which gives us plenty of firepower for the right M&A targets and our organic growth plans.

We have a very full pipeline of Indoor Networks projects. We now work with 20 of the UK’s largest 30 shopping centres, a growing number of iconic stadium venues such as Anfield, Lord’s and BT Murrayfield, and large campuses such as King’s Cross, MediaCityUK and Canary Wharf. Across our Tower portfolio, we’ve recently completed a build-to-suit (BTS) programme which is a relatively new model in the UK – we have the capacity and desire to do more of these kinds of programme.

On the M&A front we have maintained our disciplined approach to transactions and during 2018 we completed a number of transactions including the acquisition of a new tower portfolio in Ireland and a portfolio of DAS assets from Arqiva. We will continue to look at most deals in the market but believe there is a creeping tendency for over-heating in some assets that may not be strategic enough to merit it.

Our key priority on M&A is to position ourselves for any opportunities from a major divestment of tower assets by UK MNOs. The UK needs a proper scale rival to Arqiva in the independent infrastructure space and with over 10 years’ experience in the UK market and a well-invested platform we know WIG would be a great partner for a strategic deal that could be transformative in the UK market.

TowerXchange: What about your indoor connectivity business? Tell us about your recent acquisition from Arqiva.

Scott Coates, CEO, Wireless Infrastructure Group: Our Indoor Networks business is mainly an organic story but the Arqiva acquisition represented a strategic opportunity for our growth ambitions in this space.

One thing we find with Indoor Networks is that they often demand a bespoke solution with a hands-on approach to getting deployment delivered. For bigger wireless infracos, even a large stadium network doesn’t shift the needle enough to really command the attention required to make the project work well. WIG has around £500mn of wireless infrastructure assets and we can still get excited about the intricacies of indoor projects and the entrepreneurial approach required to make them succeed. The deal with Arqiva involved 42 systems and the attraction for us was more around the opportunity to really invest behind the portfolio to upgrade and extend these systems. We were also pleased to secure the transaction in an off-market process that benefitted both sides.

We have been developing Indoor Networks for nearly seven years now and have made some real changes to the way the market works here in the UK. The old model involved real estate owners demanding significant payments to allow infrastructure to be deployed in their venues. A lot of our up-front work with venue partners is to illustrate the benefits of great connectivity in terms of customer experience and engagement.

Today the model in the UK has completely shifted and we see more of our venue partners actively
participating in infrastructure costs to secure the best possible network. We are pleased to have played a leading part in that. Moving forward the opportunity is to deploy high quality 4G infrastructure into medium sized buildings like offices and hotels under a model that sees the venues and real estate owners pay for the infrastructure as a service rather than the MNOs.

**TowerXchange: What’s happening with your developmental projects?**

Scott Coates, CEO, Wireless Infrastructure Group: On the back of our first fibre and CRAN deployment last year, our next project of scale is in Birmingham and Coventry, where we are the wireless infrastructure partner to a programme testing connected and autonomous vehicles. We are planning a major investment into fibre deployment to support small cells on lampposts and to create a backbone infrastructure for future expansion. We still view fibre as exploratory – the volumes for small cell rollout in the UK are still thin, with only a handful of trials and a few pockets of deployment. We are a long way from the US market take up of small cells.

We have a handful of other strategic projects in the transport sector, and are also a shortlisted bidder (the only British provider, in fact) for the TfL project to deploy DAS on the London Underground and deploy fibre across TfL’s London asset base. Whilst this is an important opportunity to extend our DAS activities it will only work, in our view, if TfL follows the approach taken elsewhere in the market to help manage the affordability of the infrastructure to the MNOs. If the commercial model is wrong then we risk a similar outcome to the Toronto metro which has suffered from minimal MNO take up and sub-optimal wireless experience for end users. Great connectivity on the Underground can help stem a decline in passenger numbers and improve productivity and so there is a lot at stake.
Putting down roots: Europe’s new multi-national digital infrastructure platform

Digital Colony plans for further growth across the European market

In 2018, Digital Colony invested in three European digital infrastructure businesses: Digita in Finland, and Stratto and Opencell in the UK. Graham Payne, formerly the CEO of Opencell and now the CEO of Digital Colony’s broader UK digital infrastructure platform spoke to TowerXchange about Digital Colony’s rationale for entering the European market now, their investment philosophy and their plans for growth in Europe in the coming months.

Keywords: 4G, 5G, Acquisition, C-Level Perspective, Consolidation, DAS, Data Centre, Deal Structure, Digita, Digital Colony, Europe, Fibre, Finland, IBS, Investment, LTE, Market Entry, Market Overview, Opencell, Small Cells, Stratto, Towercos, Transfer Assets, UK

Read this article to learn:

- Who Digital Colony are and how they were formed
- What Digital Colony owns in Europe and how this fits with their investment philosophy
- Where Digital Colony sees differences in the European market versus the rest of the world
- How the unique shape of European infrastructure ownership might affect 5G rollout

Graham Payne, CEO, Digital Colony UK

TowerXchange: For those who don’t know you, please introduce Digital Colony, how you were formed and your global portfolio.

Graham Payne, CEO, Digital Colony UK: Digital Colony is a partnership between Digital Bridge and Colony Capital, who have combined to form a partnership called Digital Colony. Digital Bridge is the technology lead in this, they are currently invested in nine platforms, with over $10bn in committed capital, 150+ acquisitions and $450mn of site cashflow.

Digital Colony's investment target is in digital infrastructure; that is datacentres, wireless towers, small cells (indoor and outdoor) and fibre. Digital Bridge is very much a digital infrastructure company, using their experience and knowledge in the partnership with Colony Capital, which is a NYSE listed company with $44bn assets under management and 400+ employees across 10 countries.

TowerXchange: Digital Colony made three acquisitions in Europe last year, can you talk to us about those three acquisitions and how they interact with each other?

Graham Payne, CEO, Digital Colony UK: Digital Colony's European investment started with acquisition of Digita, one of the biggest independent towercos in Finland, which is a broadcast towercos with lots of mobile tenants. We then followed with the acquisition of Stratto
and Opencell in the UK. Stratto was just starting off in in-building solutions on big sites and Opencell had launched a new small cell model where the enterprise pays for the infrastructure, rather than the MNO – a model which had gained 130+ sites in the UK. By combining best of both worlds from these two companies we can cover anything from smallest in-building solutions to the largest. With Digital Colony commitments to additional investment there is a wonderful in-building opportunity in the UK.

**TowerXchange: Why did Digital Colony choose to enter the European market now, tell us about the market conditions or other factors which influenced the decision?**

**Graham Payne, CEO, Digital Colony UK:** Looking at where growth is in telecoms, we believe there is no sign of a slowdown. When you look at the key metrics for Western Europe, we’re seeing subscription connection growth at 3%, which is fairly small, but the regional share of smart devices and connections are seeing massive growth with mobile data traffic up 6x and video share up 31%.
If we look at the US, Digital Colony knew the US market and compared the US to Europe: although Europe is clearly behind North America in terms of infrastructure deployment, it’s catching up. There are two clear examples of this. Firstly in fibre, where we see significantly more deployed in the US, and therefore in small cells, where the US has deployed 100,000 small cells and in Europe there are hardly any. Secondly the US has embraced hyperscale datacentres and these have yet to really roll out in Europe. A combination of both of these, coupled with good regulation and a stable investment landscape, means we still see Europe as being a very healthy investment opportunity.

**TowerXchange:** You’re well known for an innovative approach to converging infrastructure, what’s the Digital Colony stance on 5G rollout in Europe, will/how will it differ from elsewhere in the world? What do you think the biggest obstacles to 5G are in Europe?

Graham Payne, CEO, Digital Colony UK: We call it 5, 5, 5 - Digital Colony has an ambition to invest $5bn in 5G infrastructure over the next five years globally. Obviously a significant portion of that investment is targeted for the European market. We will be investing in the infrastructure which is required to support the deployment of antennae, fibre to carry signal, datacentres to house the host of server equipment which will be needed, and also small cells, not just in-building but outdoors as well, an area which hasn’t grown much in the UK.

If you look at 5G and how it will differ in Europe and the US, the biggest challenge for the mobile network operators is the investment case for 5G, and the concern that rolling out 5G infrastructure will cost a lot of money and they won’t see huge returns. They are currently scratching their heads and wondering how to fund it all.

It’s a good opportunity for us because through Digital Colony’s expertise and investment, we can take a lot of that pain away for the operators and help them to roll out 5G. Growth in data traffic won’t go away and eventually 4G will run out as 3G did. The 5G standard and frequencies are so much more efficient, it’s inevitable that it will happen. In my opinion the view for the UK is that there will be pilots in 2019 and some operators with launch areas but our expectation is that rapid rollout will not follow everywhere like it did with 4G. Initially, 5G will be targeted at urban areas where populations are denser.

**TowerXchange:** Do you see 5G as ‘evolution’ or ‘revolution’?

Graham Payne, CEO, Digital Colony UK: A clear advantage of 5G will be reduced latency, and this will enable a step change in the way technology is used. Another advantage is the number of devices it can connect: 4G is limited in terms of the number of devices it can connect, but 5G is phenomenally more effective, you get more throughput for your buck. But to have these advantages fully working you will have to have the network fully rolled out, which takes money and time. It will be a revolution, in five years everything will be connected, we’ll see connected vehicles, better robotics, there will be a transformation. But I think at the start it will be more evolutionary, even in terms of the 5G standards themselves, the first 5G standard uses 4G signalling and only 5G for the data – so it’s a combination of both.

There will be a gradual evolution from 4G to 5G traffic initially, then as the network rolls out more and more applications can use the faster latency and more devices will see the revolution kick off. Full deployment should happen by 2021. This is a massive investment opportunity which will need lots of network deployed in terms of fibre, and space for antennas and datacentres.

**TowerXchange:** The European market is quite unique in that much of the ‘towerco’ infrastructure is owned (carved out) by MNOs, who often sell a minority stake to an investor. Do you think this will have a long term influence in shaping the way neutral host operators and MNOs work together or do you see this as a stage of evolution towards a different end point?

Graham Payne, CEO, Digital Colony UK: I don’t know how that will pan out. I founded MBNL and did the negotiation between T-Mobile and Three, following that I then became Managing Director of MBNL, then I ended up supporting
Vodafone on their Beacon contract to form CTIL with Telefonica.

In terms of Vodafone’s purported plans to monetise CTIL, I think that’s absolutely the right thing for these guys to do because of the return they should get from that and the funding to help them support 5G rollouts will be significant. The downside for the mobile network operators is that they risk losing some control and ability to do things quickly on their network. It doesn’t have to be the case, naturally they will want to leverage as much money out of the transaction as they can, but they will need a partner who understands digital infrastructure, has proven to be a trustworthy operator of networks and can deliver SLAs which can be flexible enough to deliver when they want to do something. In the current climate they can’t just be doing it for money and selling for 19x multiples, they need to choose a business which can deliver fantastic SLAs, then can migrate to a neutral host model.

TowerXchange: What’s next for Digital Colony? Will you be making more European acquisitions in 2019? What can you share of your plans for the future?

Graham Payne, CEO, Digital Colony UK: Digital Colony is absolutely looking at making more acquisitions in Europe, and we will be looking at towers, datacentres, fibre, and small cells indoors and outdoors. We are actively looking and engaged in a number of conversations already.
Facilitating better relationships between local government and infrastructure providers

Unique insights into the obstacles which need to be overcome to enable closer partnerships with local government

Urban Foresight is a smart city and innovation consultancy with a strong practice in working with in public sector bodies (at all scales), industry and investors; notably in areas such as smart cities, digital transformation and smart mobility. Through their extensive experience in helping to get Smart City projects off the ground, they have seen the difficulties faced by local government in attempting to create and enact digital policies despite funding and staff cuts, and have witnessed how infrastructure providers struggle to navigate complex public sector chains of command and decision making structures. Graham Thrower, Head of Infrastructure and Investment at Urban Foresight, talks to TowerXchange about where he sees the challenges for infrastructure providers, and how both industry and local government can collaborate more effectively to deliver the next generation of infrastructure and services that our cities need.

Keywords: 5G, Business Case, Business Model, Europe, Fibre, Infrastructure Sharing, Lawyers & Advisors, Leasing & Permitting, Regulation, Small Cells, Smart Cities, TowerXchange Research, UK, Urban Foresight

Read this article to learn:
- How the economics of 5G impact at a municipal and regional level
- The varying approaches of local government to Smart City readiness
- How local authorities are preparing for 5G rollout
- How infrastructure providers can better collaborate with local government

TowerXchange: Please introduce Urban Foresight and the scope of what you do.

Graham Thrower, Head of Infrastructure and Investment, Urban Foresight: We’re a smart city and innovation consultancy, originally born out of an expertise in low carbon mobility and electric vehicles. We have now expanded to encompass an array of technologies considered by urban governments in context of their digital transformation and smart city plans.

To understand how we work, think of a triangle: on one side are entities that have challenges which need solving, they could be in the public or private sector. On the second side we have solutions providers, from the diversified global technology firms to small companies providing data sensors to monitor air pollution. On the third side we have funders: from research organisations financing test beds, pilots, demonstrators and accelerator facilities, through to central Treasury funding, banks, pension funds, Sovereign Wealth Funds, through to infrastructure funds and PE.

Each of these three sides of the triangle speaks a different language and they need someone in the middle translating. We bring problems which need solving together with people who can help them be solved. It could be a large scale, city-wide IoT solution or connectivity technologies such as 5G. Also the work we do around mobility, is not just taking carbon out of the transport network, whether that’s cars, taxis or buses, but also improving the efficiency of mobility; and that is increasingly a data intensive subject.
In terms of mobility as a service, we think of ways to make it more efficient: combining journeys, public transport handing off to other forms of transport, EV charging points and the energy infrastructure needed to make that happen. We’ve run a project around assistive technology for vulnerable communities where the technology used could be an off-the-shelf solution like Alexa or customised platforms from large players to much more niche suppliers. We sit down with clients to understand the issue they have, define the problem, develop the solution to that problem, and then deliver that solution. We don’t just produce research (although we do produce market-leading research) but we work always with the aim of delivering improved outcomes for stakeholder groups in whatever area we’re working in.

TowerXchange: 5G is being discussed in depth at the moment but the use cases which will make the business model work are yet to be made clear. Can you talk us through how you see technology working in the cities of the future? How will the economics of 5G work?

Graham Thrower, Head of Infrastructure and Investment, Urban Foresight: It is challenging in a way that the previous iterations from 2G to 3G to 4G haven’t been. In the past we have seen business cases predicated on selling more services to an existing client base, effectively keeping up with demand. With 5G there’s an element of that. EE have been making announcements about where they’ll put 5G in major UK cities for example and if you unpick that it’s not that different from what a number of MNOs are saying: they’re targeting exiting dense patches of business clients and increasing demands for capacity from personal customers in urban hotspots. Part of what MNOs will do is put in fibre to help meet that demand, which gives you some 5G type connectivity but only in defined hotspots to a defined customer base.

MNOs and infrastructure owners are looking at other easy wins – those cities which have extensive train and subway networks are a logical place to put fibre. In Tyne and Wear, operators can put fibre on the metro and that will get them close enough for quasi 5G connectivity to 40% of the population. But outside of major cities there is a lot of geography and communities without an easy or clear case for 5G. In those cases at the moment we’re seeing various business constituencies which are putting forward their case for needing this connectivity: increasing requirements around supply chain management and business processes using things like immersive technology which needs substantial data-carrying capabilities over a number of parties. But you still have the remaining issue that if you want a fully 5G enabled local authority area then you will have to deal with a lot of marginal areas. Local authorities are speaking to are trying to work out how to make it as easy as possible for industry players to deploy 5G. They’re trying to put together packages of owned infrastructure assets, the primary purpose of which at present isn’t telecoms, but so they can be used as part of a 5G network. By packaging and granting access to those, perhaps through a neutral host operator, you can make life easier for other industry players to roll out. We need a combination of working with industry to create use cases to justify spend, coupled with trying to facilitate rollout and make your area easier to work with than others. Even though those use cases aren’t known now people can see what’s coming particularly in areas such as urban focused IoT and preparatory work for autonomous vehicles. The fear cities have is that even if they can’t see the justification now, in five to ten years they may be left behind which will be a constraint on their economic growth.

TowerXchange: You work with local government bodies to help them steer towards the most effective uses of technology – can you talk us through the spectrum of their readiness for 5G and smart city infrastructure? Where do you find most local authorities sit on that spectrum? What are the galvanising factors which help a local authority to prepare more effectively?

Graham Thrower, Head of Infrastructure and Investment, Urban Foresight: We work with cities across continental Europe and through projects with multi-national organisations we work even further afield than that, but our biggest field of expertise is in the UK. Firstly for any of the Tower community dealing with Local Authorities, they’ll realise the incredible complexity of local government in the UK. There are national strategies, not just 5G but industry strategies driving the digitalisation of industry. Then you have Local Authorities, Local Enterprise Partnerships (LEPs), Combined Authorities (such as in Greater Manchester or the North East), elected mayors in some places with varying responsibilities, differing amounts of devolved responsibility and, as a results of the City Deals process, highly variegated levels of control over funding.
All that feeds into two really important things: Local Authorities can have widely differing financial capabilities to deliver Smart City strategies and to be a financial partner with industry. When trying to deal with local government you’ll be looking at different scale as well, so in some places at a combined authority level, at a LEP (Local Enterprise Partnership) level you could have five or six different stakeholders around a table, in other areas you’ll be dealing with just one Local Authority. Each region a potential technology supplier or partner approaches will have a different financial capacity, different responsibilities and different institutional capacity. Austerity has been hitting local government for a while, and in some places considerable amounts of capacity and knowledge have been lost as part of the need to cut headcount, which of course is problematic in terms of 5G rollout which is an enabling tech for cities of the future. You can’t have a smart, sustainable, prosperous city in the future without 5G because the services won’t be able to run. This means 5G strategies tend to need to involve more than just normal technology or IT type people: they will touch on transport, premises and real estate, key industrial sectors, housing etc., and knitting all these together in the past would have been senior people in planning who in the main aren’t there anymore. So, Local Authorities are finding 5G a real challenge and are struggling to decide where it sits.

Your clients will already have seen this, they try to initiate discussions and it quickly becomes clear that the Local Authority hasn’t been able to take a singular view on what their strategy is. In places like London or Greater Manchester they have much more institutional capacity, devolved funding, and the scale to engage with industry in a much more meaningful way, as well as the density of business demand, density of individual demand and scale. The question is: what happens to secondary and tertiary cities and the periphery beyond that?

**TowerXchange: What are the key things you advise local authorities to do in order to prepare for 5G rollout?**

**Graham Thrower, Head of Infrastructure and Investment, Urban Foresight:** I think the firstly to work closely and openly with business. To pull together the principal business sectors you already have in your area, for example in the North East of England we have a lot of advanced manufacturing business with complex supply chains, as well strong capabilities in data intensive immersive tech businesses. Then you need to make the business/eco-system use cases for the sector and for the supply chains within the sector as well. Additionally, some local governments are bundling together Local Authority-owned street assets in a way where they can go to industry players with simplified planning approvals, meaning any assets in this vehicle will have an enhanced planning process and a level of co-operation to make these available.

I also think using the Local Authority as a lead business case in itself is important as well. We are aware that most Local Authorities are looking at a huge digital transformation in their own services, partly driven by the government agenda of doing more with less. It is also driven by realising that social housing, education, assisted technology for the elderly and vulnerable, transport and efficiencies in the way people and goods flow through the city are all drivers of 5G; meaning the most compelling use case is the Local Authority itself.

The enabling power of 5G becomes a recurring theme. Local Authorities can take a strong lead and can work with business, showing they’re really ‘open for business’. Metros or transport systems can be a real enabler for getting coverage quickly, and this, along with creating vehicles for street assets, can make one area more attractive to be part of the early roll out plans versus an area which doesn’t have these things. Most Local Authorities are speaking to large telcos and technology providers more generally, and have also been busy bidding into various government pots of money for testbed status to show they’re open for business. It’s a competitive environment but putting together the regional public sector side is one thing, being a strategic partner for test beds and working closely with business to articulate what the business use case is now and in coming years is critical.

**TowerXchange: Our readers are mainly third party infrastructure providers, what would you advise them are the most important steps they can take to work effectively with local government?**

**Graham Thrower, Head of Infrastructure and Investment, Urban Foresight:** I think first of all that the industry players need to recognise this will be a hugely expensive network to deploy. I’m sure they do realise but, if I remember back to the early days of mobile, there wasn’t a great deal of
co-operation unless enforced by regulation. The shared infrastructure model becomes so compelling when you look at the number of sites required for 5G. Part of what confuses Local Authorities is when they’re visited by many individual companies who all seem to be saying quite contradictory things. Of course, it’s a competitive industry and people want to demonstrate why Local Authorities should choose them, but in terms of fundamental infrastructure layout, making the 5G estate most efficient needs to be laid out clearly and consistently by industry. At the moment the local government is struggling to get its head around the business use cases, it shouldn’t need to struggle to know what an optimal 5G network will look like as well. You need to map out roads, rail and existing communications infrastructure. A lot of cities are already digitally rendered by various entities, so you can map all this stuff onto a city, overlay a bundle of assets the Local Authority might make available to a neutral host operator and agree on what that structure should look like. Industry has a huge role to play in getting Local Authorities up that learning curve.

When individual companies are speaking to local government it’s important to try and be open around the business models that industry see and communicate them clearly. Lots of Local Authorities are trying to work out what those business models might be but they’re one step removed and don’t have access to all the current data so, although they’re trying to sit down with business, the real experts are the industry players. I’m not saying businesses need to open up all of their data but perhaps they can give examples of experience in cities where this is starting to happen, what have been the most compelling uses, test beds or deployments in the most busy parts of the city. It’s useful to dig into conversations that MNOs are having with potential future transport providers, communicating what the business cases will be with local government who will be having discussions around smart parking, low carbon mobility, autonomous vehicles and managing traffic flow. The more they can see what is starting to work elsewhere, then Local Authorities can make the case themselves. We do see Local Authorities at some industry events and see some telcos at Local Authority events but I’m not sure the flow of information is all it could be.

**TowerXchange: Some of the main challenges faced in planning and rolling out urban infrastructure in Europe are planning and permitting – with this driven to a degree by local populations and a reluctance to see RF devices placed near to homes or schools. Do you envisage this process becoming easier in the future?**

**Graham Thrower, Head of Infrastructure and Investment, Urban Foresight:** I think it’s undeniably a challenge and always has been. The vast majority of research shows there isn’t an issue here, but that doesn’t help in the court of public opinion. Regardless of how easily Local Authorities make bundles of infrastructure available, national planning regulations do allow concerned people or communities to raise objections, and a lot of those aren’t going to be addressed or shifted by published research. People can tell school trustees it’s safe to have a mast on the school roof, it doesn’t mean they’re going to agree it.

These are real world problems. When I was financing large scale mobile rollouts (primarily in the UK and Continental Europe) this was a real factor. It caused delays in civil works, which affected network capacity and had a knock on effect on revenues. Industry needs to continue to reach out to the public and local government to try and provide reassurance. The danger is that if we don’t, then areas where learning is critical won’t be covered as effectively as they should. It would be a shame if schools and colleges are left among the weaker areas of coverage. I’ve not seen any concerted and successful attempts by the industry to address this in countries like the UK which have a culture of people protesting planning approvals. I think businesses engaging with schools and colleges and perhaps having someone come along and contribute to something like a science challenge in a school can help. People are used to 4G and know the value of being in coverage. 5G will enable them to do so much more but will mean being always in reach of the infrastructure needed to provide the connectivity. People are now more comfortable with living in a networked society than they were 10-15 years ago and, if it makes people’s lives easier, then it will break barriers down.

As always, both for those who govern our cities and the Tower community and other technology providers, it comes down to open communication and early and meaningful engagement with all stakeholder constituencies. We look forward to working with all sides of this challenge to help facilitate this next generation of critical enabling connectivity.
Regional insights

Change in European digital infrastructure is accelerating at a rapid pace, driven both directly and indirectly by the advent of 5G rollout. An increasing number of Europe’s mobile network operators are assessing how their macro infrastructure will be managed as 5G rolls out: assessing the need for new towers, upgrades, power needs and more effective sharing. As a result, we’re seeing more and more MNO tower portfolios being carved out into ‘towerco-style’ entities, and will most likely see stakes in these come to market in 2019.

In terms of new infrastructure, MNOs, towercos and other neutral host operators are trying to put in place the processes which will allow them to navigate complex and multifaceted relationships in order to roll out small cells and urban infrastructure. Although small trials have been successful in Europe, there’s no ‘secret formula’ in place which will allow digital infrastructure owners to scale to the estimated 6,000,000 small cells which 5G will require in Europe alone. In addition, once agreements are in place with local government, fibrecos, utilities and other stakeholders, issues around powering and maintaining street infrastructure will require a whole new approach.

Don’t miss:
72 TowerXchange Forecasts 51,500 new towers to be built in 16 European countries by 2023
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TowerXchange forecasts 51,500 new towers to be built in 16 European countries by 2023

Insights into tower upgrades and new tower and small cell deployment

TowerXchange forecasts 51,500 new towers to be built in 16 European countries by 2023.

Keywords: 5G, Arqiva, Axion, Belgium, Best of TowerXchange, Build-to-Suit, CTIL, Cellnex, Consolidation, DAS, Data Centre, Denmark, Europe, Fibre, Finland, France, Germany, Global Tower, INWIT, Ireland, Italy, MBNL, MNOs, MTS, Market Forecasts, Market Overview, Masts & Towers, MegaFon, Netherlands, Norway, Orange, Rooftop, Russia, Russia & CIS, Russian Towers, Service Telecom, Small Cells, Spain, Sweden, Switzerland, Telxius, TowerXchange Research, Towercos, Turkey, UK, Vertical, Vodafone, Wireless Infrastructure Group

Read this article to learn:
- Which towercos and MNOs have announced extensive new tower build in Europe
- Forecast tower build in the biggest European markets
- Details on demand for tower strengthening and upgrades across the continent
- How European countries are preparing for 5G rollout and volumes of small cells on order

It is often assumed that European tower portfolios are ‘complete’ and, if anything, decommissioning is needed to consolidate high levels of parallel infrastructure put up in the 1990s and 2000s when coverage was a critical market differentiator. However there are several reasons for new build in Europe, and these will drive a growth of around 51,500 towers across the 16 markets covered in this report over the next five years, not including small cells and DAS. Nonetheless, there will still be considerable decommissioning ongoing in markets such as Spain, Italy and the UK, as parallel infrastructure is reduced.

Less disruptive, but equally critical to the future of telecoms infrastructure will be the need for existing sites to be upgraded and strengthened. The need for this will be driven by two main factors: an increase in co-location as towercos seek to lease up their infrastructure and MNOs increase sharing to infill their networks; and the imminent rollout of 5G equipment, which will test the wind load capacities for most of Europe’s towers, having been built for single 2G tenants over ten years ago.

The imminent arrival of 5G is triggering a thorough assessment of existing infrastructure, and in some countries, such as France and Germany, driving significant build of macro towers as MNOs and governments seek to reach as close to 100% 4G coverage as possible within the next two to three years. This infrastructure will then form the backbone of 5G infrastructure, as focus is switched to densification through small cells and DAS solutions.
This report is based on hundreds of conversations with Europe’s towercos, MNOs, tower builders and advisors who are involved in rolling out key infrastructure, rooftops and streetpoles across some of Europe’s key markets over the next five years, as well as taking the temperature of how prepared each market is for 5G, sharing headlines on fibre rollout, expected small cell deployment and DAS forecasts.

### Benelux

**New towers 2018-2023: 2,000**

**The current landscape**
The Belgian tower landscape has not seen particularly dramatic change to date, with no significant towerco activity or tower sales. However, Belgian MNOs seem to be jostling to gain the upper hand in terms of 5G rollout, so we may well see closer partnerships with third party infrastructure providers as they roll out more dense networks.

In the Netherlands, Cellnex has consolidated two of the Dutch towercos (Protelindo and Shere Group) as well as acquiring Alticom, which brought them not only 30 high towers, but also expertise in datacentres as well. Cellnex’s sole remaining competition in the Dutch towerco market, 860-tower NOVEC, is about to be joined by Deutsche Telekom’s towerco arm Deutsche Funkturm, after DT carved out their ~650 towers ahead of their merger with Tele2.

**New build forecast**
Belgian Proximus and Orange Belgium are both

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**Current and forecast Europe inventory**

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<tr>
<th>Country</th>
<th>Current inventory</th>
<th>Forecast new build through 2023</th>
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**Estimated tower ownership and rooftop usage in The Netherlands**

- Open Tower Company
- Cellnex
- Other towercos (inc WIG)
- Vodafone/Liberty Global
- T-Mobile
- Rooftops
investing heavily in 5G infrastructure, initially in concentrated urban test beds, but with a vision for this to roll out further as soon as their commercial offering is off the ground. We anticipate that this will necessitate further macro infill of several hundred towers across Belgium over the next five years. In the Netherlands, we expect to see Deutsche Funkturm consolidate their role in the market, as well as Cellnex adding in build to suit for their customers where needed.

5G infrastructure
Both Belgium and the Netherlands are ahead of much of Europe in terms of 5G infrastructure, with Orange Belgium recently claiming the first 5G use cases in Europe. We expect to see further extensive fibre rollout in both countries, as well as small cell and data centre infrastructure added at an accelerated rate.

France
New towers 2018-2023: 15,000

The current French landscape
The French tower landscape has undergone some significant changes in the last three years, with international towercos Cellnex and American Tower entering the market, and most recently Altice creating SFR TowerCo, which has become France’s biggest towerco through the incorporation of over 10,000 SFR towers into its portfolio. TDF, the broadcast incumbent, has been working hard on building its telecoms portfolio and diversifying into adjacent verticals such as fibre. French MNOs, Orange, SFR, Bouygues and recent entrant Free Mobile (owned by Xavier Niel’s Iliad) are all under pressure to roll out new towers both rurally and in urban areas, as well as to use existing networks more efficiently to maximise coverage.

Rumours about potential consolidation in the French market are still going strong, with Orange CEO Stephane Richard saying it’s ‘unavoidable’ if MNOs want to secure enough capital and market share to invest in their networks for 5G rollout and compete in a market currently undergoing a price war.

New build forecast
There is new build planned in the French market by both MNOs and towercos, with some reports claiming that as many as 50,000 new points of presence will be needed in France (although much of this will be fulfilled by more effective co-location rather than new build). Publically available plans for new build include Cellnex’s commitment to build 2,200 towers for anchor tenant Bouygues in the next three years and new towerco SFR TowerCo’s announcement that they will build a further 1,200 towers for owner/tenant Altice.

Although the French regulator has stipulated that the three most established French MNOs (Orange, SFR and Bouygues) must build a further 15,000 points of presence between them, this has not always translated into build-to-suit business for the towercos, as the MNOs are being heavily incentivised by the French government to build their own towers, particularly in rural areas.
This is leading to French towercos embarking on a new policy of ‘build to fill’ in order to reduce complexity in the tower building process for the MNOs and gain more business in a competitive market. In the meantime, older towers are also in need of strengthening in order to support a bump in co-locations as MNOs try to maximise the points of presence they can achieve from existing infrastructure. Free (Iliad) needs to gain a further 10,000 points of presence in order to compete in the French market – much (but not all) of this will be achieved through co-location.

5G infrastructure
With Cellnex and American Tower present in the French market, there is plenty of appetite for driving 5G infrastructure across the country, and we anticipate small cell rollout will gather pace in the next 18 months. In addition, TDF has identified fibre as one of their three ‘pillars’, along with telecoms and broadcast, and is currently rolling out networks in five départements, with aims to provide fibre across France in the near future. We anticipate small cell orders in the thousands into 2019, building further momentum as we reach 2023.

As well as offloading their rooftops, Telefónica transferred 2,350 German towers into their towerco Telxius in 2016 in a deal valued at €587mn.

American Tower have been active in Germany since acquiring KPN’s ~2,000 E-Plus towers for €393mn in 2012. Their portfolio has grown slightly over the last six years to a total of 2,206, mainly through the acquisition of 186 transmission towers from German broadcaster WDR. Although the cost of these towers was not publicised, we estimate that American Tower probably paid €35-50mn for the assets.

German broadcast towerco Media Broadcast Group owns a further 450 towers in Germany, and was acquired by Freenet in 2016 for €295mn (around 12x EV/EBITDA).

New build forecast
Extensive new build in Germany is already underway and due to increase in momentum over the next few years. Just 20,006 of Germany’s 75,474 cell sites are ground based towers – the rest are rooftops, which can be problematic for tower owners.

### Ground based towers:
1. Deutsche Funkturm 9,000
2. Vodafone 4,000
3. Telxius 2,350
4. American Tower 2,206
5. Telefónica 2,000
6. Media Broadcast Group 450

### Rooftops:
7. Deutsche Funkturm 19,000
8. Omega Towers 6,500
9. Vodafone 18,000
10. Telefónica 11,968
owners seeking to lease up their assets. Deutsche Funkturm’s rooftop portfolio has a tenancy ratio which is currently 0.8x lower than their GBTs, and this gap could grow as they actively pursue further co-locations, and as access and landlord contracts make leasing up rooftops a significantly trickier proposition than towers. With this in mind, Deutsche Funkturm plan to build a further 9,000 GBTs in the next three years in Germany.

The network merger of Telefónica and E-Plus in Germany is galvanising further work. Telefónica Deutschland are restructuring and optimising the mobile network with tens of thousands of mobile phone locations are being worked on and investing heavily in LTE expansion in order to build additional LTE base stations in urban as well as rural areas. Telefónica Deutschland is currently activating more than 100 new LTE stations per week. Of course, most of these upgrades are on existing structures, but some new build is inevitable, and existing sites will need to be upgraded and strengthened to support Telefónica’s plans.

5G infrastructure
The German government is keen to support the rollout of 5G infrastructure and this, combined with the enthusiasm of well-funded towercos such as Deutsche Funkturm, American Tower and Telxius, will see Germany rolling out small cells and fibre networks at a faster pace than much of Europe. We anticipate orders in the thousands from 2019 onwards and increasingly sharply into 2023.

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**Ireland**

**New towers 2018-2023: 1,500**

60% of Ireland’s 4,000 tower sites sit in the hands of the country’s three MNOs: Vodafone, Eir and 3, with Eir being taken over by Xavier Niel in April 2018. A network sharing partnership between Meteor and O2 (Mosaic) is in place with 3 joining the alliance, putting downward pressure on current and prospective future tenancy ratios, and there are several independent towercos in the market, including Cignal, Towercom and Shared Access, making tower ownership in Ireland very fragmented.

**New build forecast**

InfraVia-backed Cignal seem to be the most committed to new build in Ireland, having recently embarked on a programme of build to suit which has added 100 sites to their portfolio in the last 18 months. We would expect to see them add around 75-100 new towers a year to their portfolio over the next five years, with Ireland’s other towercos and joint ventures adding a similar number between them, and Irish MNOs doing similar. Irish tower owners will need to undergo a rigorous evaluation of their infrastructure in light of pending 5G rollout, however, and significant strengthening and upgrades will be needed to ensure the existing towers are able to support new equipment, in some cases necessitating tearing down a tower and building it again in the same spot.

5G infrastructure

As yet, small cells have not gained much momentum in Ireland, where LTE rollout still remains a key focus. There is nascent expertise in the country, and available capital to at least get testing underway, but Irish MNOs are still developing their 5G strategies and more will be known in the next 18 months.

**Italy**

**New towers 2018-2023: 3,000**

**The current landscape**

Italy boasts four towercos: Cellnex, Telecom Italy-owned INWIT, EI Towers and broadcaster Rai Way. Between them they own 25,478 of Italy’s 54,378 telecom and broadcast towers. In terms of MNOs, Telecom Italia leads the market, with Vodafone and a newly merged Wind and Hutch close behind. New entrant Free, owned by Xavier Niel’s Iliad has recently entered the market and is gaining market share, but needs to find the best route to scaling up coverage over the coming months.

**New build forecast**

We expect to see the bulk of Italy’s new build driven by Telecom Italy-owned INWIT, who have already announced a plan to build a further 700 macro sites by the end of 2020, and who we anticipate will continue to add another 200-250 new sites (or replacement towers) per year to their portfolio until 2025. We would expect Cellnex to add a few hundred to their Italian portfolio over the next few years, and for towerco EI Towers to add some new build to their portfolio as well. In addition, the merger of Wind Italy and Hutchison has put a pause on building out their networks, but there will be considerable need to overhaul and optimise their shared network, which will result in new
build, whether self-deployed or built to suit by a towerco, in this case most likely Cellnex, who own the Wind towers already after their acquisition in 2015. The wild card in Italy remains Iliad’s Free, who are currently mainly reliant on co-location, giving them a similar lean business model to their French business. Although traditionally light on infrastructure investments, Free may well need to add a significant amount of new build to their portfolio, as well as relying heavily on Italy’s towercos for network coverage. The level of their commitment to their own infrastructure could see our forecast for the Italian market double dependant on the outcome of their decisions.

5G infrastructure
The Italian market is one of the most advanced in Europe in terms of rolling out small cells, not least because of the presence of Cellnex and INWIT, both powerhouses of European small cell rollout. INWIT is aiming to roll out a further 8,300 small cells by 2020, with this number accelerating between 2020-2023 as 5G use cases hit the ground.

Russia
New towers 2018-2023: 10,000

The current landscape
Despite numerous false starts, there has been no significant sale and leaseback activity in Russia to date. MTS, Russia’s biggest MNO, made noises about carving out 5,500 towers into a towerco in 2016, although this does not appear to have come to fruition. VEON-owned Beeline created carve out towerco National Towers in 2016 and progressed towards a sale in 2017 before pulling the plug in the late stages. MegaFon, which has recently delisted from the London Stock Exchange, created First Tower Company, a carve out of its ~14,000 towers, around the same time as National Tower Company and has recently announced they are looking for buyers for the asset. Tele2’s ~8,000 towers have been rumoured to be on and off the market for several years, with no concrete announcements to date. There are plenty of potential buyers for Russian tower portfolios, including Russian Towers, Russia’s most established towerco; Vertical, who have been growing aggressively, and number three in the market Service Telecom, who recently acquired the number four towerco, Link Development, giving them a total of 1,000 points of presence in Moscow and St Petersburg.

New build forecast
Having been locked out of the opportunity to purchase a portfolio of towers to date, Russian towercos have focussed heavily on strategic relationships and new build to create impressive growth for their businesses. Russian Towers have partnered with national institutions like the Russian railway provider to set up towers along transport links, as well as creating urban infrastructure in Russia’s main cities, expanding their geographical reach to the far corners of the country, including Ekaterinburg, Vladivostock and Krasnodar. Vertical and Service Telecom’s new growth has also focussed on urban areas, with street poles going up in Moscow and St Petersburg, and towercos now looking towards growth in Russia as well as diversification, with Russian Towers already adding in-building solutions to their diverse portfolio. We would predict that each towerco will increase the number of points of presence in their portfolio.

Who owns Italy’s 47,468 telecom and broadcast sites?

<table>
<thead>
<tr>
<th>Telecom</th>
<th>Broadcast</th>
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<tbody>
<tr>
<td>INWIT</td>
<td>2,000</td>
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<tr>
<td>Vodafone</td>
<td>10,945</td>
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<tr>
<td>Cellnex</td>
<td>5,000</td>
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<tr>
<td>Hutchison</td>
<td>8,933</td>
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<tr>
<td>Iliad</td>
<td>~7,000</td>
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<tr>
<td>TowerTel</td>
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<tr>
<td>Others</td>
<td>7,990</td>
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<tr>
<td>EI Towers</td>
<td>2,300</td>
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<tr>
<td>Rai Way</td>
<td>2,300</td>
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Source: TowerXchange
by around 3,000 over the next five years, with Russia's MNOs easing back on new build but still increasing their overall number of PoPs somewhat. Most of Russia's growth will be focussed on urban densification, and therefore we expect new structures to be street poles rather than macro towers as a general trend.

**5G infrastructure**

Small cells are gaining momentum in Russia, but as yet there's no clear vision about how this will roll out. 5G is becoming a priority in Russia at a governmental level, so we may well see new momentum behind the rollout and control of 5G infrastructure over the new two to three years, as regulations and governmental incentives come into play as well as market forces.

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**Scandinavia**

**New towers 2018-2023: 3,000**

**The current landscape**

The Scandinavian tower market is uniquely structured in Europe with several joint ventures and co-operations between competing MNOs, in particular in Sweden. One of the reasons for this could be that Scandinavian regulators subscribe to the view that as long as there is full competition between the operators on the retail side of the business, there is no need to restrict the sharing of network infrastructure and spectrum.

The first joint venture was 3G Infrastructure Services (3GIS) in Sweden, which was set up in 2001 to build up a complete organisation responsible for rolling out and operating the shared 3G RAN between Telenor and Three. The following year TeliaSonera and Tele2 set up SUNAB for managing their shared 3G network, although they chose a different operational model for the partnership. SUNAB was given the responsibility for procurement and coordination of the project but the two operator organisations retained responsibility for executing all tasks related to rollout and operations. Sweden was split up into four regions and each operator took responsibility for two regions. The SUNAB model was later replicated for Net4Mobility, the joint venture between Telenor and Tele2 for their shared 2G and 4G network.

In Finland, Yhteis Verkko, The Finnish Shared Network is a joint operation between DNA and Telia Finland which is responsible for developing and maintaining an entirely new, shared mobile network for Northern and Eastern Finland. The new 2G, 3G and 4G networks cover half of Finland's total geographical area and serve approximately 15% of the population.

In Denmark, TT Networks is a joint venture between Telia and Telenor, with TT Networks taking full operational responsibility for their towers through a managed services agreement with Nokia. TT Networks has more than 4,000 points of presence, of which ~1,100 are owned by TT Networks, with a further ~600 rented from other operators (mainly TDC). TDC have announced that they will densify their network, increasing the number of points of presence from ~3,300 to 4,000. It's as yet unclear whether this increase will reply mainly on new build or colocations, but will most likely be a result of both.

Norway does not currently have any joint venture activity, with Telenor/Norkring owning over 60% of the country's towers.

**New build forecast**

The Norwegian market currently has the most potential for new build activity in the Scandinavian region. Third MNO Ice has significantly fewer towers than competitors Telenor and Telia with under 100 proprietary towers, managing to cover ~70% of the country through co-locations, particularly with Telia. Ice plan to increase coverage dramatically by building out their network, whether that is through their own build activity or working with a third party towerco is yet to be made clear.

In Denmark it’s rumoured that TT Networks, the joint venture between Telia and Telenor, may come to market in the coming years – which will galvanise the need for significant infill and strengthening across their network of 1,800 towers.

Sweden’s market is fairly well served currently, but as 4G coverage becomes more extensive, Swedish players are considering their options for 3GIS and SUNAB, Sweden’s 3G network sharing ventures, and we may well see these networks undergo a round of rationalisation, infill and strengthening over the next few years.

**5G infrastructure**

Small cell rollout in Scandinavia is gathering momentum, with orders expected to accelerate rapidly over the next five years. In addition, many
of the MNOs are investing heavily in fibre, either through laying their own networks or acquiring fibre where possible.

Spain
New towers 2018-2023: 3,000

The current landscape
39% of the 48,997 broadcast and telecom towers and rooftops in Spain are owned by towercos, led by Telefónica’s Telxius and European market-maker Cellnex, who secured the bulk of their portfolio in Spain through acquisitions from Telefónica and Yoigo in 2012-2014. Broadcast towerco Axion, which operates in the Andalucian region of Spain, have around 600 towers in their portfolio.

New build forecast
With three successful towercos, there is new build underway across Spain, both in terms of build to suit and network infill. We would expect to see around 500 new towers a year built by Spanish towercos, plus a few more by MNOs in the country. In addition, we would expect a significant degree of decommissioning as MNOs seek to rationalise their networks and move their equipment to third party towers.

5G infrastructure
The Spanish market is moving ahead with 5G infrastructure, with Cellnex announcing some high profile small cell and DAS partnerships with venues such as the new Wanda Metropolitano and partnering with JCDecaux in Spain and Italy. Axion, the broadcasting towerco in Andalucia, has recently partnered with Enagas to launch a new fibre operator Axent, with a national network of 5,000km across Spain. Axion has also partnered with UK towerco Wireless Infrastructure Group to form a new venture called Iberia Small Cells Network, which will provide neutral host services to venues and municipalities in the region. The Spanish government is keen to promote 5G evolution, with a €20mn grant available to good use cases in Spain.

Switzerland
New towers 2018-2023: 700

The current landscape
Cellnex acquired 2,339 towers from Sunrise in May 2017, creating Switzerland’s first fully fledged towerco Swiss Towers AG. Working with partners Swiss Life and Deutsche Telekom Capital Partners, the Cellnex-led consortium paid €430mn for roughly 20% of Switzerland’s 11,300 towers, mostly in rooftop locations. Market leader Swisscom owns around 5,800 towers in Switzerland as well as diversifying into broadcasting, internet and fixed line consumer offerings.

New build forecast
Cellnex has around 400 new towers planned in Switzerland, agreed as part of their deal with Sunrise in 2017. Swisscom is also continually expanding its network and increasing the number of antenna sites, and we anticipate their new build to exceed that of Cellnex over the next five years – over the last few years they claim to have upgraded or built around 2-300 towers per annum. Third operator Salt, which has the fewest towers in the Swiss market at around 1,500, may do a small amount of new build but we anticipate they will reply mainly on co-location opportunities to grow their network coverage in the short term.

With future build to suit as well as 200 DAS nodes
agreed in the deal, Cellnex sees a chance for significant growth through data usage and 5G rollout in this central European country.

5G infrastructure
Swisscom is highly committed to rolling out what will become the backbone of 5G infrastructure, including fibre, small cells and data centres, having rolled out thousands of small cells to date. Cellnex has an agreement in place as part of their deal with Sunrise to provide another 200 DAS nodes. We expect Swiss small cell orders to snowball, putting the country towards the front of the European market in terms of 5G infrastructure rollout.

Turkey
New towers 2018-2023: 4,000

The current landscape
The Turkish tower market is dominated by Global Tower, a captive towerco owned by Turkey’s leading operator, Turkcell. TowerXchange believes that Global Tower owns around 3,400 and leases around 2,390 from Turkcell, for which they only receive revenue from co-locations. In addition they manage a portfolio of around 2,215 towers on behalf of Turkcell, for which they just receive maintenance fees. In addition the Universal Service Project has seen all three Turkish MNOs collaborate on achieving the Turkish government’s requirement to achieve 99.99% coverage through building in rural areas, with Turkcell building 1,100 towers as part of phase one and Turk Telecom and Vodafone constructing around 2,300 lattice towers and container poles to date as part of phase two. Most recently, the Turkish government has entered the tower market, through PTT Kule Inc. PTT is a government-owned service which offers postal services, logistics and banking and has established PTT Kule mainly to provide terrestrial FM broadcasting and digital TV services to broadcasters, but who will also offer space to Turkey’s MNOs as well.

A quirk of the Turkish market is that the infrastructure rolled out for 2G in the early 2000s, a total of around 16,000 towers, will revert to the Ministry of Transport and Communications in 2023. As yet it is not clear what the government will do with these assets: it has been widely believed that the government would not have the appetite or resources to manage such a large portfolio of towers and would hand them back to the MNOs, but the current investability of telecoms infrastructure means no option is currently off the table.

New build forecast
Turk Telecom and Vodafone are currently rolling out phase two of the Turkish Universal Service Project, which has a further 900 lattice towers and 300 container poles yet to be built before the phase is completed in the next two years. Phase three has not yet been announced, but we envisage we may see a further 2-3,000 sites rolled out across Turkey before this is complete. Global Tower are actively engaging in build to suit activities for Turkish MNOs and infill activities in Turkey, and we expect to see them both building and strengthening towers over the next five years.

PTT Kule, Turkey’s newest towerco, currently has two towers under construction, a 387.5m tower in Istanbul which will provide office space, datacentres, cafes and more, as well as having three fibre feeds – the site will also have full generator backup and be capable of power autonomy; and a 150m lattice tower. PTT Kule are planning as many as 40 high towers across Turkey in the next few years.

5G infrastructure
5G rollout is not going as quickly as hoped, primarily due to rows about the ownership and use of Turkey’s fibre network.

Partially state-owned Turk Telekom has thus far invested most heavily in fibre, spending US$7bn over the last ten years and laying 213,000km of fibre across the country. Currently Turk Telekom is able to set its own commercial prices for use of this network, meaning Turkcell and Vodafone feel they are losing out and paying over the odds in a market where increasingly mobile is bundled together with broadband and fixed line offerings.

With another 250,000km of fibre still needed to cover the Turkish market, Turkcell Chief Executive Kaan Terzioglu has suggested that by working together, rather than investing separately, the Turkish operators could save US$12.5bn. However Turk Telekom CEO Rami Aslan has thus far been disinterested in the idea of collaboration, particularly in urban areas, claiming Turk Telekom plans to invest another US$2.8bn in the next three years.
This stalemate between the key players is hampering the rollout of 4G and could have a serious impact on getting 5G networks off the ground when the time comes. We anticipate small cell orders in Turkey will grow over the next five years, but will remain lower than average for Europe until the politics of the market can be resolved.

**UK**

**New towers 2018-2023: 5,000**

**The current UK landscape**

The UK tower market is dominated by dedicated infrastructure players. Towercos Arqiva, Cellnex and Wireless Infrastructure Group own around 12,000 in-use towers between them, and the UK’s MNOs have split into two joint venture towercos, with Three and EE forming MBNL, and Vodafone and Telefónica creating CTIL soon after. Although CTIL and MBNL don’t lease up their towers on a commercial basis (yet), there is a certain amount of pragmatic bi-lateral swaps between the two entities, as well as both parties using towers provided by the independent towercos in the market.

With four established players in the UK market and with a tenancy ratio greater than two on most UK towers, the market doesn’t need to undergo dramatic growth in order to fulfil 4G needs, however there are still ‘not spots’ which need to be addressed. The UK market is currently pursuing a ‘macro first’ approach, with infrastructure owners maximising their macro portfolios rather than rushing to deploy small cell or DAS technology in most cases. However, the rate of macro new build is currently in something of a lull as the outcome of the tribunal around the Electronic Communications Code is determined, as the Code will have a significant impact on the availability and cost of leases. We would therefore expect nascent new build need to be on hold until a resolution, hopefully in Q119.

**New build forecast**

It’s believed the UK may need as many as 3-5,000 new macro towers in the next five years, with the bulk of this needed in rural areas in order for MNOs to satisfy coverage obligations, and the rest needed to add capacity to networks. However, this number may be affected by more effective sharing of UK infrastructure, both by using independent towercos and bi-lateral swaps between MBNL and CTIL. Much of the forecast in new build is dependent on how quickly 5G rolls out in the UK. A slower rollout may result in the number of new macro towers sitting around the 3,000 mark, while a faster rollout could push the numbers well beyond the 5,000 estimate in order to densify the network across the country.

The main focus on UK macro tower and rooftop owners over the next five years will not be build to suit, however: it will be upgrades and tower strengthening. While the UK’s profile as a mature tower market with extensive coverage means the need for build to suit is less than markets such as France or Germany, British tower owners are aware that much of their infrastructure won’t be able to support two or more tenants using heavier 5G equipment, and are about to undergo an extensive programme of upgrades across their portfolios.

**5G infrastructure**

The UK has had some small cell rollout but the country is generally perceived as being behind much of Europe in terms of rollout, with operators preferring to get as much out of their existing macro networks as possible in the short term. The ‘chicken and egg’ situation, where operators need viable use cases to invest in 5G infrastructure, but without 5G infrastructure the use cases are hard to identify, will persist in stunting the UK rollout in the short term. The ‘macro first’ approach adhered to by UK MNOs may see small cell orders moving from the hundreds in 2018 to the low thousands in 2019, but nothing like the proliferation of points of presence predicted for 5G rollout in the short term.
European new build heat map

Legend

- Data unavailable for this market
- Up to 999 new build towers planned in this market
- 1,000-2,999 new build towers planned in this market
- 3,000-4,999 new build towers planned in this market
- 5,000-9,999 new build towers planned in this market
- 10,000+ new build towers planned in this market

Source: TowerXchange
How ready are your towers for 5G technology rollout?

With as many as 30% of towers in Europe not fit to support 5G equipment, reviewing your assets is critical.

Recent TowerXchange research revealed that in excess of 50,000 new towers will be built in Europe over the next five years. During the course of that research it was also discovered that many tower owners are also considering embarking on a programme of tower upgrades and strengthening projects in order to prepare their infrastructure for the demands of 5G rollout. TowerXchange spoke to Spencer Crawford-White, CTO at Delmec, who estimates that as many as 180,000 existing European structures will need to be reviewed for upgrade as 5G rolls out.

Keywords: 3G, 4G, 5G, Build-to-Suit, Capacity Enhancements, Editorials, Europe, Densification, Fibre, Health & Safety, Infill, LTE, Loading, Masts & Towers, Network Rollout, RF Design, Site Surveys, Steelwork

Spencer Crawford-White, Chief Technical Officer, Delmec

Spencer Crawford-White, Chief Technical Officer, Delmec: There are two key areas to consider in this. The first is that 5G equipment will have to be much bigger than current antennas. Just like with phone handsets themselves, the first evolution of any technology tends to be quite large as manufacturers are working out the optimisation of the electronics, cabling etcetera.

Any OEM will naturally want to make the antenna small as possible eventually due to cost but they need space to make the technology work, therefore the first generation will be larger than current panel antenna. This will apply purely to the panel antenna and not the microwave transmission technology.

From talking to OEMs like Nokia and Ericsson about new technical equipment, no one has yet decided how big the antenna will be or what it will look like, but we know it will need to be bigger and heavier too, as there will be more electronics doing more work. Also 5G sites will be more densely packed – towers 10km apart won’t be sufficient for 5G, so new build to suit will be needed which will need to be purpose designed to take 5G equipment.

The second issue is that the 4G antennas will have to remain in place, as well as 3G in many cases, while 5G is installed as they won’t turn those networks off until much later in the evolution of the network.

Read this article to learn:
- What we know about the next generation of active equipment
- Possible outcomes for 5G equipment rollout
- How extra loading will affect existing European tower stock
- The importance of pre-emptive upgrades on SLAs and revenues
In developing countries you’ll also need 2G in rural environments, as rural communities won’t survive without 2G. So you might end up with 2G, 3G, 4G and 5G technology all on one tower. Of course, it will be rolled out in urban areas first but you still might have three technologies at any point in time before it drops back to two.

So you have two issues: a) the antenna will be bigger, and will increase loading even if it was just a like for like swap and b) it won’t be like for like as the 5G antenna will be in addition to whatever is currently on the towers, so you’re increasing the load by order of magnitude. This hasn’t been factored in by a lot of tower owners, who will just know their tower takes ‘three’ operators, without worrying about the equipment being hung on the tower.

TowerXchange: What are the unknowns about 5G equipment and how accurately can we speculate at this stage vs having to ‘wait and see’ what the outcomes are? Who are we relying on for this information?

Spencer Crawford-White, Chief Technical Officer, Delmec: We know that certain technology providers have been deploying and testing 5G equipment with MNOs, such as the Nokia collaboration with Docomo. We know what the technology has to deliver, we are testing bandwidths, power levels and the distance to cover then working out optimum size they can squeeze that technology into. The question is who will come to market with cheapest, lightest product that meets that requirement?

We know what the bandwidths and requirements will be, that we will be looking at low and high band spectrum depending on what’s available in each market. We know we might have to decommission a technology to put 5G in the 700-800 band range or that high band might bump into other products in the market which might cause conflict. So we know the physics of 5G will work but we don’t yet know who will come to market first with the most economic plug and play solution.

A lot of this will be determined by ICNIRP, the health organisation which sets radio emissions limits. Whilst the technology is clear and we know what it will have to deliver, the setting of these power limits will determine the health and safety impact and in turn what will be agreed with the World Health Organisation in terms of how close you can put these antennas to the public.

OEMs will need to define the antenna, then they will need to get it checked as a public health issue – and as 5G will need more antennas and they will need to be closer to the streets, emissions will be increasingly critical to the public and will need thorough assessment, like antennas on rooftops did when they first rolled out. The traditional rule of thumb is that a panel antenna projects a cone of 120 degrees, with most of the power focussed in the 60 degrees in the middle of that, the acceptable distance for the worker is about 15m and for the public its 25m with the down angle being 15 degrees from the base of the antenna. If any person can get within 25m of that cone of influence, it will need to be assessed. Vodafone and a lot of the other operators use this calculation for ICNIRP compliance for sites, but if the power levels are higher those distances reduce.

Output for a standard mobile antenna is about one watt (relative to a microwave which puts out 800w) and the evidence shows that handsets put out much more. Broadcast sites are monstrous compared to cell sites as they send more over greater distances, but you can see how cellular networks now changing and replacing broadcasting in terms of OTT content so power levels are increasing. OEMs and MNOs rely on health organisations to give this the final go ahead.

It will take some time to align what the operator wants, what the OEM can develop and what the health organisations will accept.

TowerXchange: Let’s think about the average tower stock in Europe – how old is it, what type of towers are most common and what is their current capacity vs current load?

Spencer Crawford-White, Chief Technical Officer, Delmec: A lot of European towers are still in the hands of the MNOs, whose perception can tend to be that they bought a multiple operator structure, and they will expect to get multiple operators on it. While Europeans are accustomed to relying on engineered infrastructure, in African markets operators tend to be more open to discussing the maximum loads for their towers, and are reaping the benefits in terms of health and safety by assessing and overhauling their structures.
Towers don’t tend to fall down in Europe as MNO processes have been more robust from the off, maintenance is better executed and the initial designs were more rigorous, meaning they were stronger in the first place, creating a robust and stable platform for hosting antennas. In developing markets weaker structures have been put in, and towers falling over happens more regularly, but the higher incidence of independent towercos means there’s now a heavier focus on capacity and strength.

The two factors to consider are security and safety, and we look at the design capacity of each tower – specifically at the statistical probability of a worst case event happening in a three second gust over a 50 year period. If you will only have additional loading in place for 18 months to two years before older technology is decommissioned, you will probably have adequate capacity already. It’s a case of proactively assessing your towers and putting some rules in place – as long as you reduce the amount of equipment over a reasonable timescale you probably won’t have to do any reengineering.

In the UK, as an example, legally you can put up a 15m structure in two weeks, whereas larger towers take much longer and are more costly to construct – meaning that a lot of UK infrastructure is only suitable for one tenant anyway. As CTIL and MBNL rolled out there was a need for significant upgrades to support co-location, which now will be fit for purpose.

About 70% of European tower stock will not need any work doing to it. A further 10% will need to be strengthened and there’s a further 20% which will need further assessment. The type, size, age and condition of these towers will all need to be assessed. Typically towers won’t fail because of one issue alone, it’s a combination of errors which creates the failure – a combination of age, condition, installation quality and load will ultimately cause the tower to fail. In developing markets in Africa or Asia, the number which will need to be upgraded is higher – you’re probably looking at a 50/50 split.

TowerXchange: Comparing our projections for 5G equipment with our understanding of current macro towers, what upgrades and strengthening work would Delmec recommend tower owners undertake in order to prepare their portofllos? Can you go into a bit of detail based on tower type and/or tenancy ratio?

Spencer Crawford-White, Chief Technical Officer, Delmec: I think full tower replacement numbers will be quite low and won’t have much impact in traditional European build to suit programmes and the natural attrition rate within any tower owner from things like notice to quit, etcetera – we’ll see a 1-2% turnover if that. Swapping out towers in Europe is so costly it won’t impact current build to suit budgets, we might have the odd one or two towers which will need replaced but shouldn’t impact on an ongoing replacement programme.

Some people might panic about having to replace sites but there’s always a solution, you just have to look at whether it's economically viable. There’s always a solution – you might need to replace every single member, which might seem like overkill but keeps the tower in place while you do those works. Building a new site adjacent means the cost of a new site, new equipment, a hot swap and then decommissioning, plus it can cause issues trying to stay online.

Traditional towers have angled steel legs joined together in a cruciform shape, these angular tower legs can have bits bolted on to make them stronger. Let’s say as a basic cost model a new tower might cost £100,000, plus with the cost of the operator putting new equipment on, the cost of decommissioning old equipment and the old tower it can reach as much as £250,000 to swap towers. When upgrading a big tower you might need 5000-6000kg of steel which could cost you £7,000, so a total of maybe £30,000-40,000 when including labour to reinforce to the level you need. Add to this the fact that you can often rectify conditional issues at the same point, meaning you can dip into another budget and the case for upgrading a tower is strong.

The most complicated problems come from tubular section leg structures which can’t support the load and need to be replaced, so you’re talking maybe £60,000 due to the complexity of the methods which is still much cheaper than swapping out. Guyed masts are more tricky still – their cost of upkeep is 5x what a lattice tower would cost and strengthening is 10x what a tower would be, but they’re not designed for upgrades and not the types
of structures that the 5G will need to be on anyway in most cases.

We’re helping tower owners strengthen their tower across the world. It’s not always triggered by 5G but also for LTE and network sharing. Tower owners also need to think longer term. It might cost £10,000 to strengthen a tower for an additional tenant, but for 10-20% more budget you could strengthen it for two as the labour and transport is already in place. We help tower owners to predict the potential in the area to define the strengthening model the need. The only way to do that is for clients to embrace a full network assessment and know what the towers are like at the beginning of the process.

We have developed a risk profile calculator for tower owners, which will tell them which of their structures with x amount of loading can take x amount of equipment and increase capacity by x% to give them a rough idea which towers will need work. It will give a rough idea but then all the environmental and location factors have to be taken into account. A small tower in middle of nowhere which is protected from wind will be a lot less exposed than the same tower on a clifftop: the same structures will have very different capacities based on the environmental conditions.

What’s the long term effect of higher loading?
It’s still rare to see towers falling over because design codes and adherence are good and we use 60% capacity as a factor of safety on most towers anyway. The big change will be as more and more people start looking at outsourcing their structures, towercos like Arqiva or American Tower etcetera will have less of a headache in keeping on top of it as their asset register is up to date already. Tower stock is getting older and more tired and will start breaking down eventually. The more it goes on, the more equipment we put on, the more the risks and impact. It will give independent towercos the edge as their towers will be more stable and compliant.

TowerXchange: What are your recommendations in terms of timescale? Do tower owners need to begin an assessment of their towers now in order to ensure they’re prepared, or would a ‘wait and see’ stance pay off in the long term?

Spencer Crawford-White, Chief Technical Officer, Delmec: Someone in health and safety will be looking at desktop assessments in the short term, pushing the OEMs they’re working with for feedback on this. The focus from MNOs and towercos will be on what new sites they need, not on the existing ones. Ultimately there will be a reactive process, it will get to the point where towers need upgrading urgently but this will come at a higher cost than doing a full assessment and having modular upgrade kits which can be rolled out when needed. Tower owners are facing budget constrains now, but every £1 spent on preemptively assessing and preparing towers has been shown to pay back three times as much in the long term through risk reduction, continuity in service to customers and payback on an ROI model which has evidence of working.
Vodafone creating a 58,000 tower ‘virtual towerco’ – what could this mean for European towers?

As the incoming Vodafone CEO moots a tower sale, TowerXchange investigates the options open to MNOs looking to monetise their towers

Vodafone are the latest in a snowballing number of European MNOs to state their interest in a tower sale, hoping to reduce their €31bn debt burden by raising as much as €12bn through the sale of 55,000 towers across the continent. They follow European MNOs Altice, Sunrise, Bouygues, KPN, Telefónica, Deutsche Telekom, Turkcell and Telecom Italia in seeking to monetise their tower assets. With several different monetisation models already in place, we look at the options available to European MNOs and anticipate which route Vodafone might choose for their assets.

Keywords: 5G, Acquisition, Altice, American Tower, Anchor Tenant, Brookfield, Business Model, CTIL, Carve Out, Cellnex, Deal Structure, Decommissioning, Deutsche Funkturm, Deutsche Telekom, Digital Colony, Europe, Europe Research, Global Tower, INWIT, IPO, KPN, Lease Rates, MNOs, NetShare, Netgrid, Operator-Led JV, Private Equity, Research, Sale &, Leaseback, Telecom Italia, Telefónica, Telxius, Turkcell, VICTUS Networks, Valuation, Vodafone

What has been proposed?

Vodafone’s CEO, Nick Read, put the cat among the pigeons by moots potentially the biggest tower sale in European history in September 2018. Vodafone owns 110,000 towers across Europe, of which they directly control 58,000, which have been valued at around €12bn by Barclays.

Speaking at the Goldman Sachs conference in New York, Read, who takes the reins in October, opened up the possibility of reversing the stance of his predecessor Vittorio Colao and selling the tower assets if the right deal could be struck.

Vodafone has struggled recently, with a debt pile of €31bn and disappointing Q118 results, the company’s share price has dropped by 20% over the last 12 months and led to activist investor Elliott Management acquiring a stake in the operator.

Read’s proposals, designed to boost market confidence, focussed on the sale of assets and an €8bn cost saving drive for its service centres, involving cutting 1,700 jobs across Egypt, India and Romania – about 8% of the service centre workforce – and floating the New Zealand business in 2019.

Read's suggestion of selling their towers will no doubt have been bolstered by Altice’s recent tower sales in France, Portugal and the Dominican Republic, which raised around €2.7bn and, as part of wider restructuring, have seen the flagging operator’s fortunes stabilise. Vodafone also has recent experience of monetising towers in India, agreeing to merge their 42% stake in Indus Towers

Read this article to learn:
- The footprint of Vodafone’s towers
- How Vodafone Procurement Company adds value to a sale
- What options are open to European MNOs
- The pros and cons of carve out towercos
- Likely bidders for Vodafone’s assets
with Bharti Infratel, and selling 10,200 towers to American Tower India for US$592.9mn. Despite these recent deals, there is no doubt that Vodafone has been well aware of the option to monetise their towers for many years – they had hitherto simply seemed disinclined to do so.

**What we know about Vodafone’s tower portfolio**

Although Vodafone owns 110,000 towers in Europe, they have been proactive in seeking to increase efficiency through the creation of tower joint ventures in many of the countries in which they operate, as well as actively pursuing co-locations and commercial tenancies across their network, most likely resulting in a tenancy ratio above the industry standard for MNO-captive towers of ~1.1x. While their higher tenancy ratio will present more potential cash flow to a prospective buyer, there will be complexities to overcome in unpicking multiple partnership agreements and the opportunity to lease up further may be limited.

Vodafone operates their towers directly in Albania, the Czech Republic, Germany, Hungary, Italy, Malta, the Netherlands, Northern Cyprus, Portugal and they also operate the majority of their towers in Turkey.

**Vodafone infrastructure joint ventures and infraco activities**

**CTIL**

A joint venture with Telefónica (O2 in the UK) created in 2012, CTIL owns and operates some 16,000 towers in the UK. Vodafone and O2’s sites are...
pooled on the CTIL balance sheet. It is believed that CTIL is already being restructured, possibly with a view to a carve-out or sale.

Netgrid
Created in 2013 as Ovidiu Telecommunications, and rebranded to Netgrid in 2014, this joint venture between Orange and Vodafone in Romania was expected at launch to generate savings of ~€10mn over 16 years.

Netshare
Netshare was created in 2012 as a joint venture between Vodafone and Three in Ireland, incorporating around 2,000 sites. Ownership of Netshare shifted wholly to Vodafone following the merger of O2 Ireland with Three in 2015.

VICTUS Networks
A joint venture between Wind Hellas and Vodafone Greece, VICTUS Networks manages around 7,000 sites in Greece.

Universal Services Project
Mandated by the Turkish government, Stage ii of the Universal Services Project is nearing completion as Turk Telecom and Vodafone roll out 2,500-3,000 rural sites in Turkey to push towards the government’s aim of 100% coverage by 2022. Although Vodafone has built and is managing these towers, ownership will ultimately revert to the Turkish government on completion of the project.

Some of Vodafone’s joint ventures may make it harder to sell their towers. CTIL in the UK, for example, which sees Vodafone and Telefónica working closely together, would take a significant amount of work to unpick, but Telefónica has not shown itself to be averse to commercialising its towers, with various tower sales around the world as well as the creation of Telxius in Spain and Germany.

Netshare in Ireland is already effectively operational as a towerco and wholly owned by Vodafone, so may become one of the first assets brought to market, with towers in Portugal, France, Germany and the Netherlands all likely to find interested buyers already in situ.

Vodafone Procurement Company
One advantage that Vodafone has over other MNOs looking to carve out their towerco is the existence of Vodafone Procurement Company (VPC), a huge resource of telecom supply chain management experience which is responsible for a €25bn annual spend for Vodafone and selected third parties. VPC has around 250 procurement, technology and category management experts who buy everything from handsets, to what Vodafone call “Network Site Infrastructure” (NSI), which breaks down into nine categories including power supply, cabinets and shelters; antennas; cables; batteries; towers; air conditioners; civil works; generators and renewables, as well as accessories and consumables, which includes safety equipment such as fall arrest systems and personal protective equipment. VPC focusses on the Total Cost of Ownership (TCO), with technological and commercial due diligence, meaning Vodafone already has a very disciplined and holistic approach to their towers compared to many European MNOs. Their processes for robust contract management, supplier performance management and active demand management are already in place, meaning if Vodafone chooses to sell an equity stake and retain control of their towers, this relationship with VPC could drive growth and financial performance beyond that of their carved out peers over the next few years, particularly as operational excellence becomes a priority in terms of network resilience and 5G rollout.

What options are open to Vodafone?
So far 2018 has failed to see any sale and leaseback deals of scale between MNOs and European towercos, despite four deals (although two were between Cellnex and Bouygues) in 2017 and three in 2016. The much anticipated deal of 2018, that of Altice’s towers in France and Portugal, resulted in the carve-out and creation of two new towercos and major investment from large funds, rather than a consolidation of tower stock by towercos in key European markets.

Infrastructure funds and sovereign wealth funds are attracted by towers’ stable growth and bond-like contracts, but their long holds mean they are often able to accept lower returns than those sought by towercos or smaller private equity investors. Where European towers are forecast to generate ‘infrastructure-type’ returns, we are increasingly
seeing infrastructure funds more able to close deals than strategic buyers.

Over the last few years we have seen several MNOs carve out towers, creating a roadmap of options for subsequent MNOs:

- **Carve out and IPO**: Telecom Italia’s INWIT has been the only towerco to do this successfully, raising €870 through a listing in 2015. Subsequently Turkcell’s Global Tower and Telefónica’s Telxius have attempted to IPO parts of their business but without success.
- **Sale of an equity stake**: Following an unsuccessful IPO attempt in 2016, Telefónica sold 49.9% of their infrastructure business Telxius to KKR for €1.275bn. Altice followed a similar model in 2018, creating SPVs in France and Portugal with KKR, Morgan Stanley and Horizon Equity Partners to raise €2.5bn.
- **Sale and leaseback**: Cellnex has been the major buyer of MNO towers assets in Europe recently, acquiring (or securing BTS contracts for) a total of 4,100 towers from Bouygues in 2016 and 2017 for €1.2bn and 2,339 Sunrise towers in 2017 for €430mn. American Tower and FPS (themselves acquired by American Tower) have also acquired portfolios of MNO towers in Europe in the last five years.
- **Carve out and retain**: Deutsche Telekom’s Deutsche Funkturm was created in 2002 and has remained 100% owned by DT ever since, now announcing plans to expand into the Netherlands and other European countries. Similarly, Global Tower, the infrastructure arm of Turkish MNO Turkcell, remains 100% owned by the parent company and has expanded into a further three geographies (Ukraine, Belarus and Northern Cyprus). However, as successful as this model may be in terms of growth, both MNOs have tried several times to sell a stake and/or list their tower arms, only choosing to retain the assets after taking the temperature of the market. Both MNOs are believed to be reviewing their options again as we go to press.

**What is driving the increase in operator-led carve outs?**

With an increasing number of infrastructure funds keen to put their capital to work in communications infrastructure, the profile of investors in telecoms infrastructure has changed dramatically over the last three to four years. Towers, more than any other kind of communications infrastructure, commands high multiples and has access to a low cost of capital thanks to long-term contracts with credit-worthy tenants, which has drawn infrastructure funds to the asset class through investment in towercos and partnerships with MNOs.

The European market is seen as mature and even overbuilt, with a lower proportion of ground based towers and a higher proportion of rooftops with a finite load capacity exacerbated by EMF regulations. This capacity to drive tenancy ratios from the standard MNO 1.1-1.2x to perhaps 1.6-1.8x with a small amount of organic build alongside adds up to infrastructure-like returns in the low double digits. Whereas towercos and private equity investors are looking for returns of around 17x-22x, infrastructure funds are looking for infrastructure-type returns in a mature market.

The prevalence of Infrastructure Funds in European towers is further illustrated by the fact that American Tower’s European business is a joint venture with Dutch asset manager PGGM, which acquired 49% of the venture in 2016.

With infrastructure funds driving up multiples and MNOs retaining their leased up towers, the carve out model is becoming increasingly popular, with operator-led towercos owning 52.4% of the world’s towers compared to 12.8% being held by pureplay independent towercos (although it must be stated that this number is skewed by China Tower Company, without which the operator-led proportion stands at 8.8%).

However, there are several concerns about the longevity of carve out towercos. While they will continue to tick over, and will achieve some commercial lease up, there will often be strategic hub sites, or sites which represent a critical competitive differentiator – sites which would offer the market the greatest benefit from being shared - which are held back from co-location by the parent company. The chequered record of operator owned towercos IPOs shows they’ve generally valued at about half what pureplay towercos are worth on a global basis. Bharti Infratel trades at around half the value of American Tower’s shares, while IPOs from Telxius and Global Tower failed, and China
Tower halved their asking price to the point where some analysts suggested it was ‘too cheap to ignore’.

Operator-led tower cos, even with a 30-40% equity stake from an infrastructure fund, may not be creating value of the same magnitude as a pureplay independent towerco, and the difference is in the small print: the amount of reserve space the parent MNO hangs on to, discounts when extra tenants are added to a tower, smaller increases in lease price when additional technologies are added by an existing tenant (amendment revenue), and escalators which may apply only to energy and maintenance, rather than the whole lease. All of these factors can combine over the term of a lease to add up to a significant suppression of cashflows and margins. Investors recognise this and discount valuations appropriately.

Vodafone’s dilemma is no different – will they choose to retain control and majority ownership at the expense of maximising the value in selling? A balance sheet re-engineering exercise which carves out the Vodafone towers across multiple markets won’t yield anything like the yield, debt relief, or war chest for 5G rollout that a sale and leaseback would yield as pureplay tower cos create the most value, so attribute the most value to the towers they buy.

We could be reaching the peak of MNO appetite for tower carve out, as they realise the significant difference in the value of the two business models, but the early movers in carving out towers will still gain an advantage in a European market where many MNOs have not yet moved to capitalise on their tower assets – 40.5% of Europe’s towers are still owned by a single MNO. Time will tell how successful the carved out tower cos are in the long term, and whether they will become established in their own right or are seen purely as an interim step for MNOs to build value before selling their infrastructure.

**How could the sale look and who will bid?**

With 55,000 towers across as many as 14 potential markets, Vodafone are unlikely to find a buyer with the digestive or operational capacity to buy them all in one transaction. We would expect to see the towers coming to market in tranches, and most likely sold on a market-by-market basis, with established and proven tower markets such as Italy, Germany and the Netherlands at the top of the list. There will be no shortage of tower cos interested in towers in these markets: Vodafone Italy is the co-locating tenant on a significant proportion of INWIT’s towers, so they already have a strong relationship with Vodafone. Cellnex would doubtless be interested in leapfrogging INWIT to acquire another ~9,000 towers in the Italian market, particularly with a solid anchor tenant and at a time when Iliad’s Free is looking to pursue further rollout.

Likewise in the Netherlands, where Cellnex already has almost 800 towers (the majority acquired from Shere Group, Protelindo and Alticom), there may be room for further consolidation. In addition, Germany’s Deutsche Funkturm has just expanded its reach into the Dutch market, carving its towers out of the recent merger with Tele2, and is seeking further growth in Europe (although there are also rumour circulating that Deutsche Telekom may be looking for a buyer for the asset, which would offer buyers a wealth of choice in the Dutch and German markets). American Tower’s presence in the German market would make them a very strong contender should Vodafone Germany’s towers come to market.

In addition, investors like Digital Colony and Brookfield, with capital at work already in the European market and the expertise to commercialise the towers, will be keen to take a look. U.S. tower cos such as SBA and Crown Castle, who have been known to look at European assets in the last couple of years, may also be interested in specific markets – if the terms on offer enable their business model.

Carving out either several country-specific tower cos, or one international entity would entail a huge amount of work, but Vodafone will benefit on this front from their exceptional existing supply chain management and investment in innovative technologies across their portfolio. Finding a buyer, or consortium of investors, for a stake in new European tower cos may be the preferred option for MNOs who wish to retain control and monetise their assets, but the risk of towerco saturation in several of Vodafone’s key markets, combined with the longer term valuation implications for carve out tower cos, could encourage Vodafone to consider a straightforward sale and leaseback with a reliable counterparty for at least some of their portfolio.
Deutsche Funkturm: Europe’s sleeping giant awakes
Deutsche Telekom announces ambitions to expand towers arm

Right at the end of Deutsche Telekom’s Capital Markets Day 2018, Thorsten Langheim, Executive Vice President of Group Corporate Development, took to the stage for the first time in eight years. A key part of his presentation referred to what he called Deutsche Telekom’s ‘sleeping beauty’ – DT’s tower arm, Deutsche Funkturm, which was carved out in 2002 and has remained relatively static in size and function since. TowerXchange summarises his comments and DT’s plans for the asset here.

Keywords: 5G, Build-to-Suit, Carve Out, Cellnex, Co-locations, Deutsche Funkturm, Deutsche Telekom, Europe, Europe Research, Fibre, MNOs, Manage With License To Lease, Multi-Country Partner, New Market Entrant, Private Equity, Rooftop, Tenancy Ratios, Towercos

What is Deutsche Funkturm?

Founded in 2002, Deutsche Funkturm is Europe’s largest (and possibly oldest) telecom towerco. Originally created in order to sell DT’s towers, Deutsche Telekom have been rumoured to be close to a sale of the assets several times in the last 16 years, but have never actually taken the step of selling, nor have they really put their resources into commercialising in the same way that other operator-captive towercos such as INWIT or Telxius have.

Deutsche Telekom has around 28,000 points of presence in Germany today, of which ~500 are TV towers, ~8,500 are masts and another ~20,000 are rooftop sites. In addition, they created a DFMG-controlled towerco ‘Omega Towers’ in 2016, when Telefonica Deutschland transferred 7,700 rooftops into DFMG’s hands. Current tenancy ratios across the DFMG points of presence is 1.5x on rooftops and other alternative typologies and 2.3x on GBTs.

The German market

Just 20,006 of Germany’s 75,474 cell sites are ground based towers – the rest are rooftops, which can be problematic for tower owners seeking to lease up their assets. Deutsche Funkturm’s rooftop portfolio has a tenancy ratio which is currently 0.8x lower than their GBTs, and this gap could grow as they actively pursue further colocations in the German market; access and landlord contracts make leasing up rooftops a significantly trickier proposition than...
ground based towers. As well as offloading their rooftops towers to Deutsche Funkturm, Telefónica transferred 2,350 German towers into their towerco Telxius in 2016 in a deal valued at €587mn, where these towers sit under management with assets in Spain and CALA, and alongside Telefonica’s sub-sea cable assets.

American Tower have been active in Germany since acquiring KPN’s ~2,000 E-Plus towers for €393mn in 2012. Their portfolio has grown slightly over the last six years to a total of 2,206, mainly through the acquisition of 186 transmission towers from German broadcaster WDR. Although the cost of these towers was not publicised, we estimate that American Tower probably paid around €35-50mn for the assets.

German broadcast towerco Media Broadcast Group owns a further 450 towers in Germany, and was acquired by Freenet in 2016 for €295mn (around 12x EV/EBITDA).

Of the remaining MNOs in the market, we believe Telefonica owns a further ~2,000 ground based towers plus ~12,000 rooftops sites, and Vodafone owns around 4,000 masts and ~18,000 rooftop sites in Germany.

There are a total of around 23,000 co-locations in Germany, most being on Deutsche Funkturm and American Tower’s ground based towers, with tenancy ratios estimated at 2.3x and 1.8x respectively.

Deutsche Funkturm in Germany

At the Deutsche Telekom Capital Markets day 2018, Thorsten Langheim listed DFMG’s strengths, referring to their position as the number one tower operator in Germany, the opportunities for structural growth in Germany, their portfolio of best-in-class sites, their comprehensive and state of the art IT and their potential for significant optimisation.

At the beginning of 2017 DFMG was restructured from 100% subsidiary to a “sister company” of DT. DTremain their prime client but get no volume discount (they charge back on the same commercial terms as any customer). This was the beginning of their appraisal of the asset, which made €864mn in 2017, of which around 60% came from Deutsche Telekom’s subsidiary TDG, giving them a 59% margin of €510mn EBITDA (adjusted). Their tenancy ratio across the portfolio is 1.5x, rising to 2.3x on dedicated masts and towers (as opposed to rooftops and other typologies). DFMG plan to double the number of GBTs, adding another 9,000 masts in Germany between now and 2020.

Thorsten Langheim calls the new DFMG version 2.0 – an entity with a diversified revenue stream, pursuing colocation much more actively than they have in the past.

### Estimated breakdown of ground based towers and rooftops in Germany

**Ground based towers:**
1. Deutsche Funkturm 9,000
2. Vodafone 4,000
3. Telxius 2,350
4. American Tower 2,206
5. Telefonica 2,000
6. Media Broadcast Group 450

**Rooftops:**
7. Deutsche Funkturm 19,000
8. Omega Towers 6,500
9. Vodafone 18,000
10. Telefonica 11,968

Source: TowerXchange presentation, TowerXchange and RBC Capital Markets data
This repositioning of Deutsche Funkturm allows Deutsche Telekom to avoid burdening the opco’s figures with capex at a time when investors are feeling nervous about the capital outlay needed for 5G and future network rollout in Europe. Running the infrastructure as a towerco will further dilute the capex impact of expansion, and add another asset to the portfolio.

Rather uniquely for Europe, Deutsche Funkturm also provide power to their tenants on around 3,000 sites, through another DT subsidiary PASM a partner of DFMG, placing DFMG ahead of other European towercos in some ways in terms of having the infrastructure ready to deliver a ‘service’ to their customers. However, although DFMG provides antenna space, technical space, power and air conditioning, they don’t provide a fibre offering and still have ‘blacklisted’ sites which are blocked for their competitors, with CFO Thomas Dannenfeldt saying: “The question is how to strike the right balance between having a proper and well-up setup in running tower business, … and not giving up the crucial sites, which make a difference in the network potentially. So the balance we are trying to strike here is quite simple, exclude the few ones which make a difference, don’t share that and share the big, big majority of those you can share.”. Whether this will change as DFMG rolls out and begins to commercialise more actively remains to be seen, but it will limit investment opportunities if they are seen to be restricting access to the best sites for their customers.

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<td>Romania</td>
<td>Telekom Romania Mobile Communications</td>
<td>70%</td>
<td>Indirect - shares owned by OTE</td>
</tr>
<tr>
<td>Slovakia</td>
<td>Slovak Telecom</td>
<td>100%</td>
<td>Direct</td>
</tr>
<tr>
<td>UK</td>
<td>BT</td>
<td>12.10%</td>
<td>Direct</td>
</tr>
</tbody>
</table>

*In December 2017 Deutsche Telekom and Tele2 announced plans to combine their Dutch operations. T-Mobile Netherlands’ towers will be retained as a separate entity
International growth plans

To date, DFMG has been focussed on the German market, but Deutsche Telekom now sees an opportunity for its subsidiary to roll out into their other European markets. In the short term, this means towers in The Netherlands and Austria.

In the Netherlands, the Deutsche Telekom towers are being carved out ahead of a merger of T-Mobile Netherlands and Tele2 Netherlands. The new JV is being created to consolidate into a more competitive 20% share of the Dutch market, with ownership by both parent companies. This represents the perfect time for Deutsche Telekom to carve out their towers into 100% owned DFMG ahead of expansion, and to secure a larger and more stable anchor tenant for their asset in the process.

Deutsche Telekom owns ~25,000 towers and points of presence across Europe (outside of Germany), although complex ownership structures in several of their Central and Eastern European opcos may cause an issue with minority leakage. With this in mind, DT is beginning their rollout in countries where their operations (or at least the towers, in the case of the Netherlands) are wholly owned – The Netherlands and Austria are the first markets for DFMG expansion, but there remain several European subsidiaries which may be promising targets for the next wave of expansion.

Another complication for some of DT’s international markets could be their network sharing ventures. Although Poland is 100% owned by Deutsche Telekom, for example, their participation in the NetWorkS! site sharing venture with Orange would be tricky to unpick (although it would also yield an instant tenancy ratio of around 2x, if the details could be worked out). In the UK, where Deutsche Telekom owns 12% of BT/EE, DT see decisions around tower assets as sitting with the BT management, despite their advocacy for unlocking the inherent value in towers. Similarly to Poland, BT’s tower assets are tied up in MBNL a joint venture with Three UK, and unpicking this would be a lot trickier than other markets.

Shifts in the towerco landscape

Langheim observed that the European market is still very fragmented, with DFMG and Cellnex leading the way with 28,000 and 27,000 towers respectively, whereas American Tower owns 150,000 towers leaving considerable room for consolidation and growth in the European market. With a further 25,000 sites across Europe, in solid markets such as the Netherlands and Austria, Deutsche Funkturm could easily consolidate into Europe’s biggest towerco by some margin. Working on the assumption that they would have in the region of 67,000 sites by 2021 (The jump in numbers would be due to the consolidation of assets in other countries as well as the 9,000 build to suit sites expected in Germany alone).

In 2017, Deutsche Telekom Capital Partners co-invested with Cellnex and Swiss Life in the Sunrise Towers in Switzerland. As a relatively small deal, Cellnex did not need capital investment, saying instead that the partnership was mainly strategic. Tobias Martinez, CEO of Cellnex, told us in January 2018: “We don’t have any additional commitment for other countries (I mean with DTCP) but we are both open to consider further opportunities to enlarge our footprint. Everything takes time to deliver, so we need to work with them. It’s more a strategic partnership than a pure financial relationship.”

Although Deutsche Telekom Capital Partners’ primary function is to make a return, there’s no doubt that the positioning of Europe’s two biggest towercos side by side on a deal in neutral territory was a chance for both parties to learn about and from each other.

Deutsche Telekom’s desire to have their cake and eat it (in particular in terms of ‘blacklisting’ sites which they consider of strategic importance) may be at odds with Cellnex’s highly commercial approach to tower assets, but Cellnex have proven themselves flexible and resourceful when it comes to expanding their portfolio, and a close partnership on this scale could catapult them from outside the top 10 to the fourth largest towerco in the world, as well as demonstrating their capabilities in terms of tower management at a time when new markets in the Middle East are opening up to this model – which may be an opportunity for Cellnex to expand into new markets.
Who is investing in European towers?

An A to Z of key investors (or potential investors) in European towers

There are 46 towercos in the European market. Whilst a handful of towercos (American Tower, Cellnex, INWIT and RaiWay) are publically listed and a number of towercos (including Deutsche Funkturm and Global Tower) remain owned by their MNO parent company, the vast majority of towercos sit in the hands of private investors. From pension fund managers to the World Bank, to infrastructure investors and private equity firms, TowerXchange examines organisations currently deploying capital, or with an appetite to deploy capital, in European towers.

Active investors in European towers

3i: A mid-market infrastructure investor, 3i has recently upped their investment in ambitious UK towerco Wireless Infrastructure Group. They also bid unsuccessfully for French towerco FPS in 2016.

ABP Investments: Dutch pension fund ABP acquired 75% of Open Tower Company in 2017.

ADM Capital: Asian fund manager ADM Capital is an investor in Russian Towers.

Alinda Capital Partners: Infrastructure investor Alinda owns Polish broadcast and telecoms towerco Emitel.

AMP Capital: AMP is a global investment manager headquartered in Australia. They own Irish towerco, Towercom, and Spanish broadcast and telecoms towerco, Axion. AMP has also been linked to Finnish towerco, Digita.

APG Asset Management: Dutch Asset Manager APG forms part of the consortium which owns French broadcast towerco, TDF. They are rumoured to be interested in Finnish towerco Digita.

Arcus Infrastructure Partners: Arcus forms part of the consortium, led by Brookfield, which owns French towerco TDF. In 2016, Arcus sold UK-based towerco, Shere Group, to Cellnex for €393mn. Most recently, Arcus was linked to a consortium bidding (unsuccessfully) for UK towerco Arqiva at the end of 2017.
**Brookfield Asset Management:** Leading infrastructure investor Brookfield owns 50% of French broadcast and telecoms towerco TDF. Often linked to new European tower opportunities, including the recent attempted sale of Arqiva, Brookfield also came close to buying Indian Reliance Communications in late 2017.

**Canada Pension Plan Investment Board:** Currently the largest shareholder in the UK’s biggest towerco, Arqiva, with a 48% stake, CPPIB manages the pensions of over 20 million Canadians. Their telecoms infrastructure portfolio also includes 100% ownership of Broadcast Australia. CPPIB were also involved in KKR’s unsuccessful bid for Indus towers in late 2017.

**Deutsche Telekom Investment Fund:** DTIF invested alongside Swiss Life in Cellnex’s acquisition of the Sunrise Communications towers in Switzerland in 2017.

**Digital Bridge:** Digital Bridge invest in telecoms and communications infrastructure worldwide, with a strong focus on future network infrastructure. They currently own Andean Tower Partners, Mexican Tower Partners and Vertical Bridge, as well as assets in data centres and fibre, and recently made their first move into Europe, acquiring Finnish broadcast towerco, Digita.

**European Bank for Reconstruction and Development:** The EBRD is owned by 66 countries from five continents. Founded in 1991, they have invested in countries across Central and Eastern Europe, Central Asia and the MENA region, including investment in Russian Towers and in Turk Telekom’s rollout of mobile broadband infrastructure.

**First State Investments:** First State is an Australian asset manager with assets all over the world, including Finnish broadcast towerco Digita, although this asset is believed to be for sale as we go to print.

**International Finance Corporation:** The IFC is a sister organisation to the World Bank and is the largest global development institution focused exclusively on the private sector in developing countries. The IFC has invested in Russian Towers, as well as in telecoms infrastructure in emerging markets outside of Europe such as Myanmar and the Middle East.

**IFM Investors:** Australian fund manager IFM investors has a portfolio of several infrastructure assets in Europe, North America and Australia, including a 14.8% stake in UK towerco Arqiva.

**InfraVia Capital Partners:** Infrastructure investors InfraVia own ambitious Irish towerco Cignal. They’ve also just acquired Altice’s datacentre assets and have been rumoured to be bidding on Finnish towerco Digita.

**KKR:** Investment firm KKR manages multiple asset classes including private equity, energy, infrastructure, real estate, credit and, through its strategic partners, hedge funds. In Q117, they entered the European tower sector through the acquisition of 40% of Telefonica’s infrastructure arm, Telxius, for €1,275bn. KKR were also close to closing a deal in India with Bharti Infratel for Indus towers for $5bn in Q417, although this deal fell through.

**Macquarie:** Macquarie has an extensive tower portfolio around the world. In Europe alone, Macquarie owns Towercom AS in Slovakia and České Radiokomunikace in the Czech Republic and is a shareholder in Russian Towers, as well as owning 25% of UK broadcast and telecoms towerco Arqiva (albeit an asset which they attempted to exit in Q417).

**Morgan Stanley Infrastructure Partners:** Morgan Stanley Infrastructure Partners form part of a consortium (with Horizon Equity Partners) which owns 75% of Altice’s towerco Towers of Portugal.

**Peppertree Capital Management:** Peppertree Capital Management, Inc. is a private equity firm focused on making investments in growing communication infrastructure companies. Peppertree has more than $1B under management and has made more than 75 investments in communication infrastructure companies in 10 countries. In addition to sponsoring tower, DAS, data center and communication rooftop developers, fiber network operators and spectrum auction participants, Peppertree seeks investments in real
estate related to its areas of focus, non-telecom infrastructure projects and other businesses and assets with contractually recurring revenue.

**PGGM:** Dutch pension fund PGGM created a joint venture, ‘ATC Europe’ with American Tower in 2016, which has thus far acquired FPS Towers in France.

**PPF Group:** PPF is a Czech investment fund which owns CETIN, a Czech infrastructure company carved out of O2 in the country, with 5,200 macro towers in the Czech Republic, as well as several thousand km of fibre. PPF is also on the brink of acquiring Telenor’s CEE opco portfolio, with assets in Hungary, Bulgaria, Serbia and Montenegro, and we may well see them carve out the infrastructure into a separate business along the same lines as CETIN.

**PSP Investments:** Public Sector Pension Investment Board (PSP Investments) is a Canadian investment manager which forms part of the consortium owning French towerco TDF. In 2017, PSP also formed part of a consortium with Digital Bridge and TIAA Investments to acquire Vantage Data Centers. Swiss Life: Swiss Life invested alongside Deutsche Telekom Investment Fund in Cellnex’s acquisition of the Sunrise Communications towers in Switzerland in 2017.

**UFG Asset Management:** UFG hold a diverse Russian portfolio, including the largest stake in Russian Towers, Russia’s longest established towerco.

### Figure one: Investors in Europe’s leading towercos

<table>
<thead>
<tr>
<th>Towerco</th>
<th>Investor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATC Europe</td>
<td>PGGM</td>
</tr>
<tr>
<td>Arqiva</td>
<td>Macquarie, Canada Pension Plan Investment Board, IFM Investors</td>
</tr>
<tr>
<td>Axion</td>
<td>AMP Capital</td>
</tr>
<tr>
<td>Ceske Radiokumincace</td>
<td>Macquarie</td>
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<tr>
<td>CETIN</td>
<td>PPF Group</td>
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<tr>
<td>Cignal</td>
<td>InfraVia Capital Partners</td>
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<tr>
<td>Digita</td>
<td>First State Investments</td>
</tr>
<tr>
<td>Emitel</td>
<td>Alinda Capital Partners</td>
</tr>
<tr>
<td>Open Tower Company</td>
<td>ABP</td>
</tr>
<tr>
<td>Russian Towers</td>
<td>UFG Group, EBRD, Macquarie, ADM Capital, Suitomo, IFC</td>
</tr>
<tr>
<td>Swiss Towers AG (Cellnex)</td>
<td>Swiss Life and Deutch Telekom Capital Partners</td>
</tr>
<tr>
<td>TDF</td>
<td>Brookfield, PSP Capital Partners, APG Partners, Arcus Infrastructure Partners</td>
</tr>
<tr>
<td>Telxius</td>
<td>KKR</td>
</tr>
<tr>
<td>Towercom (Ireland)</td>
<td>AMP Capital Partners</td>
</tr>
<tr>
<td>Towercom AS (Slovakia)</td>
<td>Macquarie</td>
</tr>
<tr>
<td>Wireless Infrastructure Group</td>
<td>3i</td>
</tr>
</tbody>
</table>
Investors previously with capital at work in European towers

An honourable mention goes to funds who have recently realised their European communications assets.

**Antin Infrastructure Partners:** Antin is a private equity firm focused on infrastructure investments. Antin sold French towerco FPS to American Tower in 2016 and Spanish towerco Axion to AMP Capital in 2017.

**Communications Infrastructure Fund:** Dutch investment fund with long-term investments in telecommunication infrastructure including antenna sites, cable and optical fibre infrastructure, data centres and related assets. The fund owned 75% of Open Tower Company with NOVEC until late 2017.

**CVC Capital Partners:** CVC is a private equity firm which invested in Abertis (subsequently carving out Cellnex via IPO in 2015) from 2010 to 2015 and has since been linked to several other telecoms infrastructure sales in Europe.

**Wood Creek Capital Management:** Wood Creek invested in UK based towerco Wireless Infrastructure Group until late 2017, when their stake was bought out by 3i.

Investors linked to European towers
With several deals of scale coming to market over the last 24 months, as well as smaller portfolios on the market who else has been linked to European tower deals?

**4M Investments:** US investor 4M Investments invests across a multitude of industries and countries. 4M’s Principal, Ted Miller, has a well-recognised pedigree as founder of Crown Castle International.

**Allianz:** Germany’s Allianz, was part of last year’s winning consortium in the £11bn battle for National Grid’s gas distribution network, adding to their global infrastructure portfolio which includes further assets in the UK. They’ve been linked to towers including Telxius and Arqiva over the last couple of years.

**Ardian:** Ardian is an independent private investment house with a focus on Europe, North America and Asia. Ardian came close to acquiring the 40% stake in Telxius which came to market in 2017, but was pipped to the post by KKR.

**Borealis infrastructure:** Canadian Borealis Infrastructure has invested heavily in UK infrastructure, acquiring London City Airport and a stake in Thames Water over the last two years at a cost of around £3bn in total. They were linked to the Arqiva sale in late 2017.

**Cheung Kong Infrastructure Holdings:** CKI is a Hong Kong-listed holding company controlled by Asia’s richest man Li Ka-shing. Among many global assets, in the United Kingdom CKI has a comprehensive portfolio of investments including UK Power Networks, one of the United Kingdom’s largest power distributors supplying electricity to London, South East England and the East of England. They are believed to be interested in tower infrastructure, including taking an interest in Arqiva when it came up for sale.

**EQT:** EQT is a Swedish investor with a large global portfolio and a strong background in TMT investment. They were linked with the Digita sale process in Finland.

**GIC:** GIC is a global investment firm and the manager of Singapore’s foreign reserves. GIC has been linked to several telecoms infrastructure deals over the last few months, including Arqiva, Telxius and Indus Towers in India. The company is an investor in MEA towerco, IHS Towers.

Have we missed anyone? If you are an investor with an active interest in the European tower industry who would like to be included in our index, please contact Frances Rose, Head of Europe: frose@towerxchange.com

European towerco CXOs and their investors will be coming together on 9-10 April 2019 at the 4th Annual TowerXchange Meetup Europe, being held at the Business Design Centre, London. Limited places now remain.

For a list of attendees and for more information on registering, please visit: www.towerxchange.com/meetup/meetup-europe/
Meet the European tower industry supply chain

TowerXchange is not only about the views of towerco and MNO strategists. One of our top priorities is to provide a platform for proven passive infrastructure equipment and service to introduce themselves and their activity. From static asset manufacturers to access control systems, site management systems, RMS and backup power solutions, these companies play a critical role in ensuring the efficiency and safety of towercos, MNOs and their employees.

In this section we gather interviews with a selection of the top service, solution and equipment manufacturers joining the TowerXchange Meetup Europe this April.

101 Abloy Oy
105 Accruent
109 Acsys International Ltd
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115 Bladon
120 Capitel
123 Phillips Lytle LLP
125 Polar Power Inc
130 STULZ GmbH
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135 Vinson & Elkins RLLP
Ensuring European site security: how ABLOY’s solutions are fit for a changing landscape

Abloy’s mechatronic master key systems deliver much more than simple lock and key

Telecom towers are increasingly considered a part of critical national infrastructure, and with acts of sabotage reported in Sweden in 2016, securing telecoms sites has never been more important. Tower owners need to deal with this challenge in addition to combating issues such as internal theft, vandalism and the changing shape of their infrastructure in the face of 5G rollout. Aaron Yule, Managing Director of ABLOY UK, shared his experiences in the European market with us, and explained how these challenges can be overcome.

Keywords: 5G, ABLOY, Editorial, Europe, Passive Equipment, Health & Safety, Outdoor Equipment, Site Visits, Small Cells

Read this article to learn:
- Who ABLOY are and what solutions they offer to the telecom industry
- What threats are facing European towers at the moment
- How security solutions can drive efficiencies in site management
- The role of site security and locking as networks densify ahead of 5G

TowerXchange: Please introduce Abloy, your footprint and your offering to the European market

Aaron Yule, Managing Director, ABLOY UK: ABLOY are the leading experts on high quality door/asset locking and functionality.

Our product range includes electric locking, key cylinders, padlocks, small locks, and associated products to ‘secure’ the door or asset. Together, our solutions offer secure, compliant and lasting solutions trusted by organisations throughout Europe and the rest of the world, across a variety of industries – wherever compromise is not an option. We have the capability to offer a complete security solution; from initial surveys and fact finding, to assessments, problem solving and planning through to specification.

ABLOY has major MNO customers using its CLIQ technology in over a dozen European countries, and an installed base of more than 90,000 locking points utilising the CLIQ technology mechatronic locks and keys.

The high security range from ABLOY is capable of securing applications ranging from large corporate headquarters, network buildings, data and media centres, retail outlets, down to the smaller base stations, gates and equipment cabinets as well as anti-climb hatches, road site cabinets, monopoles, masts, hubs, feeders and chamber pits. All of which have their own unique security requirements and a demand for long serviceable life.
The telecoms sector is a dynamic, highly competitive and fast moving corporate market. Any break or interruption to the services caused by physical attack including vandalism, theft or civil disobedience can cause serious downtime which will inevitably prove costly in reputation and future business. At ABLOY we pride ourselves in being able to offer solutions that not only resolve security issues but can also provide significant benefit to the customer.

Solutions such as the ABLOY Protec2 CLIQ electronic key systems are designed to meet the needs of organisations with many off site workers requiring access to many remote sites – sometimes ‘shared’ remote sites. To maintain the necessary security major organisations are benefitting from the following CLIQ® features:

- Authorised access to restricted areas for staff and contractors
- Ability to enable/revoke key authorisation remotely
- Future proofing capability
- Contribution towards asset management and asset data reporting
- Improved operational efficiency and reduced running costs
- Time saved and operational efficiencies in key collection, and reduced aborted visits
- Full audit trail reports
- Deletion of lost/stolen keys
- Integration capability (eg. permit to work)
- 100% control of all keys, 100% of the time

Aaron Yule, Managing Director, ABLOY UK: Carriers play a central role in fighting emerging security threats. In the future, securing the entire internet value chain will be an even bigger priority. Carriers can meet these expectations with a wide array of technical and operational innovations.

The pressing need for secure networks and high service levels is a central challenge that determines the suitability of locking solutions for the telecom sector. The locking solutions need to fulfil strict security standards and protocols, while maintaining efficient access control to ensure effective maintenance of the physical network.

In this case, the overriding challenge involves theft, be it materials or information, which can be perpetrated by external and internal parties. While external theft is usually a costly break-in or a serious act of vandalism, internal theft is a real and widespread problem as contractors and other external partners tend to pay relatively small key deposits. Lost keys are rarely reported and the percentage of returned keys is often smaller than unreturned.

Internal theft often involves either leaving doors open or keys ending up in the wrong hands. In the long term, these seemingly minor lapses in security can render mechanical locking systems obsolete. The simultaneous expiration of patents for different locking systems also increases the risk of keys being copied without the system owner’s knowledge. This incurs sizable costs as keys and cylinders need to be replaced in addition to the loss of equipment and wiring. Carriers should also take into account the cost of possible system outages and damage to reputation.

Mechatronic master key systems overcome these challenges by not only providing a high level of physical security in the key mechanism but also full flexibility in the electronic element. System owners can maintain full control of keys, thereby preventing any unauthorised access. The full audit trail, from either key or locking point, enables the owner to narrow down who has gained access and when to counter the threat of internal theft.

TowerXchange: Is tower security in Europe driven by economic factors, or are there regulatory and governmental pressures to meet certain standards?

Aaron Yule, Managing Director, ABLOY UK: Successfully maintaining telecom networks poses a major challenge to locking solutions. Current requirements may be more economically driven however, in the future carriers may have an imposed set of parameters to ensure they are able to continue providing high quality, reliable and affordable data and voice services.

Communication networks worldwide depend on their ability to deliver services 24/7. Any break or interruption to this service caused by vandalism, physical attack or random disruption in the network will prove costly in reputation and finance. Networks also require continuous upkeep and maintenance, which should be done fast and cost-effectively.

Recent years have seen the importance of the
Recent years have seen the importance of the telecoms sector rise to the levels of critical national infrastructure and we soon expect to see various governing bodies start to enforce a certain level of security standard to ensure satisfactory protection of the operator’s assets.

The locking solutions of today bring with them a host of benefits not just in terms of improved system security but also in financial benefits brought about through the investment from greater efficiency and productivity of personnel, reduced aborted visits, and improved management of contractors on site.

Mechatronic locking systems are equipped with an audit trail functionality that allows supervision of when maintenance staff visit the location and for how long. Particularly useful since contractors usually charge telecommunication companies based on the number and duration of service visits. With mechatronic locking, the time and money that was used before on key distribution can be efficiently used for maintenance. For unplanned visits, access can be granted remotely and in real time, utilising the most local/efficient resource available at the time.

Using mechatronic locks in combination with mechanical ones offers high security levels cost-efficiently. Utilising mechatronic locks to secure tower premises allows for the full security & transparency of mechatronic locking. Costs can then be optimised by using regular mechanical locks within the premises. Sophisticated mechatronic locking systems, allow the same mechatronic key to be used in both the mechatronic locks, as well as the mechanical ones.

**TowerXchange: Tell us about how Abloy can help drive efficiencies within telecoms infrastructure.**

**Aaron Yule, Managing Director, ABLOY UK:** The telecom industry is changing rapidly. The market is becoming more and more fragmented; big remote telecom towers are turning into smaller local cell sites; and, customers want a better return on investment. Today’s data and voice services have to deliver exceptional quality and reliability at an affordable price, and there are a host of challenges from markets, consumers, and evolving technologies. Whether big or small, companies need to reduce costs, improve quality, and build for flexibility and scalability, all of which affects your choice of locking solution.

Downward trends in return on invested capital make profitability a top priority for service providers. This also makes cost efficiency a key success factor in the telecom industry.

Remote granting of access rights by using a mechatronic locking system minimises operational costs as technicians can access towers and repeaters more quickly. Indeed, the region based engineer can become a ‘thing of the past’ as due to remote programming of keys the entire team could potentially be granted access to any of the locks required. This reduces downtime and provides transparency of movement throughout the network. The latest app based mobile solution allows for instant access requests being decentralised to enable fast authorisation managed locally. With ABLOY CLIQ REMOTE audit trail functionality it can be seen when maintenance staff visited the location and for how long. For unplanned visits, access can be granted remotely and in real time.

All locking systems require occasional maintenance although it’s rarely carried out. Mechatronic systems allow more effective maintenance management through continual monitoring of lock usage and
can provide an audit trail of implemented lock maintenance. This in turn can improve asset knowledge and management.

**TowerXchange: What is the role of your solutions in asset data and reporting?**

Aaron Yule, Managing Director, ABLOY UK: We can see that all players in infrastructure sectors have a desire and a need to improve asset management and the operational data that can then contribute towards improved operational efficiencies and asset utilisation. The ABLOY solution can provide a detailed asset database by linking locking solutions per site to a separate asset log.

ABLOY CLIQ provides a range of data that when integrated with other business systems, including HR, H&S, conformance and compliance training, can automate operational decisions using rule based software.

**TowerXchange: How do you see the densification of networks as 5G rolls out affecting the security of telecoms infrastructure?**

Aaron Yule, Managing Director, ABLOY UK: With 5G the whole infrastructure would see a new set of needs being addressed - smaller cell sizes, smaller sites, increase in cabinet usage, new potential locations, etc (eg street light poles). The number of locking points will increase dramatically, and nature of locking will move from a site gate or door to securing more enclosures and small cabinets. Access needs will remain similar however our thoughts are that from an access control management perspective there would be a need for more accurate ‘cluster size’ applications to ensure access into the correct enclosure/cabinet. ABLOY has a very long history with enclosure locking and huge co-operation with cabinet manufacturers so potential solutions are already in place – utilising the latest technology electromechanical key system. Having a piece of software that can enable management of these new locking points will be essential.

Similarly, there should be some security requirements put in place by the industry on these new enclosures / cabinets to ensure they reflect the privacy and security of data needs relevant to the comms.

**TowerXchange: Can you give us some insight into Abloy’s vision for the future?**

Aaron Yule, Managing Director, ABLOY UK: The ABLOY vision is to continue to be the World-leading locking solutions provider. To maintain this position we will continue to listen to the end users in our core markets and understand how our solutions can be developed in conjunction with the customer’s ambitions for security and efficiency.

To maintain this position we will continue to listen to the end users in our core markets and understand how our solutions can be developed in conjunction with the customer’s ambitions for security and efficiency.

We recognise that this will mean continuing the development path from mechanical keys to electromechanical keys to online keys to the next generation products; and to ensure this journey is successful, will be the integration partner to key telecoms operators and service providers.
Siterra’s purpose-built site management solution for telecoms evolves to support the global tower market

Proven platform scales from 100 to over 100,000 towers, and now supports users in multiple languages

Whether you’re an MNO seeking to manage your telecom real estate and assets, a small towerco seeking to migrate from spreadsheets to an affordable SaaS platform to manage sites, or a large towerco with international aspirations, the purpose-built Siterra platform from Accruent should be on your shortlist of prospective solution providers. In this latest interview, TowerXchange focused on the scalability of Siterra in conversation with Accruent’s General Manager of Telecom, Kevin Reichle.

Keywords: Accruent, Asset Lifecycle Platform, Asset Register, Capacity Enhancements, Infrastructure Lifecycle Management, Infrastructure Sharing, Job Ticketing, KPIs, Monitoring & Management, Multi-Country Partner, NOC, O&M, Operational Excellence, RMS, Site Level Profitability, Site Management System, Siterra, Transfer Assets, Who’s Who

Read this article to learn:
- Understanding and monetising available space on towers
- Standardising project management best practices across the supply chain to improve quality and time to market
- Scaling Siterra from rapid market deployments for small towercos to multinational deployments

TowerXchange: Please reintroduce Accruent and Siterra for readers not familiar with your company.

Kevin Reichle, General Manager of Telecom, Accruent: Accruent is a leader in real estate and facilities management software. Whereas some software developers are analogous to Swiss Army Knives, adaptable to multiple industries, Accruent builds industry specific suites, and Siterra is our purpose-built, market-leading software-as-a-service solution for site, project, lease, and asset management for the telecom industry.

TowerXchange: The first question our readers always ask is “how proven is the solution?”

Kevin Reichle, General Manager of Telecom, Accruent: Siterra manages over 1 million telecom sites, 750,000 leases, and 1.7 million projects for our customers. In the U.S., Siterra is used by the top MNOs.

In addition to our MNO clients, our towerco clients range in size from small regional towercos to a large U.S.-based towerco that is actively pursuing portfolios internationally. We’ve deployed Siterra for them in six countries, and are currently scaling up teams in additional countries. We’ve worked with regional towercos with as few as 100 towers to multi-national towercos with portfolios over 75,000.

TowerXchange: As independent towercos become increasingly multinational, how does Siterra support that globalisation?
Kevin Reichle, General Manager of Telecom, Accruent: Many of our towerco clients already operate in multiple countries and languages, and they have found their operations in those countries achieve more traction when they make the local language a pillar of doing business.

The underlying architecture of Siterra has always supported configurable languages, and we’ve found that even at a user level people want to specify which language they use. Now in 2015, Siterra supports this user-level choice. For example, there is a clear distinction between requiring that all users interact with your site management system in German, versus enabling your project administrator and local project team to interact in French while the corporate office interacts in German. Users can be more flexible and deliver work more efficiently and productively when the key piece of software they are using is in their native language.

Being on a single instance across multiple countries makes Siterra the system of record. This improves operations by sharing PMO best practices across multiple countries, enabling our clients to rollup assets, leases, vacancies, tenancy ratios and other KPIs on a consolidated regional or country level.

International towerco executives need the visibility and tracking to provide accurate financial forecasts and portfolio valuation across multiple countries. Quite simply, without a tool like Siterra, this type of exercise becomes guesswork at best.

TowerXchange: What are the benefits of this global standardisation of systems?

Kevin Reichle, General Manager of Telecom, Accruent: Our clients are starting to realise significant cost savings through a reduction of

International towerco executives need the visibility and tracking to provide accurate financial forecasts and portfolio valuation across multiple countries. Quite simply, without a tool like Siterra, this type of exercise becomes guesswork at best.
five different countries may have five different methods to manage build to suit (BTS) projects. With Siterra you can standardise workflows to support global rigidity with local flexibility, resulting in project management, asset and reporting efficiencies across all countries.
hundred towers, managing sites, assets, leases and projects soon becomes highly complex: they see the train coming at them and want to be able to move quickly to avoid a crash!

**TowerXchange: One of the first questions a towerco asks when it acquires a new portfolio is what space is on each site? How does Siterra help towercos consolidate asset registers and determine available space?**

Kevin Reichle, General Manager of Telecom, **Accruent**: After acquisition, towercos will typically audit and re-baseline their asset register. Once that is complete, by utilising a single system our clients are able to control and manage those assets more effectively, dramatically reducing discrepancies going forward.

The ability to manage depreciable and non-depreciable assets provides towercos with visibility to all the equipment on the tower. Siterra provides a view of what space is available as quickly as possible: the specifications of the tower, the capacity, and what space is occupied, vacant, and/or reserved. For example, one of our global towerco clients uses Siterra to standardise all the attributes they use to describe their sites and the related equipment on their sites that helps them understand vacancies and available space. They consolidate tower, site and equipment data (both owned equipment and tenants’ equipment) down to a granular level with information on the make and model, maintenance schedule, and warranty information. Understanding what’s on a site, what it looks like, and what capacity exists for additional tenants is core to a towerco’s business model.

In addition, after an acquisition, towercos using Siterra can run an asset inspection project which will systematically lead the field force through an inventory of the acquired assets. The results of the asset inspection drive future maintenance schedules, planned upgrades, and visibility into available space.

Our MicroStrategy business intelligence compares leases versus capacity at a regional, portfolio, or global level. Based on these reports, users can take actions to improve availability of space and to monetise the available space on their towers faster.

**TowerXchange: How do you integrate Siterra’s ILM ‘dashboard’ with remote monitoring systems (RMS) in the field?**

Kevin Reichle, General Manager of Telecom, **Accruent**: We are growing our partnerships with RMS vendors.

Through our partnerships, RMS data (including alarms) is pushed into Siterra via web services. Once the RMS data is in our data warehouse you have access to powerful business intelligence via MicroStrategy.

While we see a lot of synergies with RMS, Siterra is a software not a hardware solution – we are looking at ways to better integrate with and standardise gathering and consolidating data and alarms from third party sensors.

**TowerXchange: Please summarise the benefits to towercos of utilising Siterra to manage cell sites.**

Kevin Reichle, General Manager of Telecom, **Accruent**: In simple terms: we provide a single system of record that towercos need to maximise their revenue per tower. Siterra’s Site and Asset Management provides a consolidated view of the sites in a towerco’s portfolio and the equipment that is installed. Siterra’s Project Management drives process around site development and modification, co-location, and maintenance. Siterra’s Lease Administration module delivers the ability to manage license and lease activity, while creating accountability around critical dates and payments. We enable spend control – ensuring suppliers are paid for work that’s done, and we enable the efficient ongoing maintenance of the tower – avoiding costly emergency maintenance. Our best in class project management tool enables collaboration through the supply chain and ensures more projects are completed on time and on budget.

It’s easy to focus on a Site Management systems’ ability to drive co-location and tenancy ratios – the ability to increase profitability by improving the speed and quality of BTS and co-location execution. But we think there is at least as much value in standardising processes, proof of task completion, and optimising ongoing maintenance.

Ultimately, consolidation of systems drives bottom line cost savings.
Enhanced security and operational efficiencies through improved access control

An interview with leading access control provider - Acsys

TowerXchange: Please can you describe some of the limitations of mechanical locks and keys?

Rani Ariss, VP Sales EMEA, Acsys: There are several limitations in the use of mechanical locks and keys; keys can be copied, lost and forgotten or unreturned and the cost of replacing the lock is often higher than the lock itself. In managing keys, operators need to employ numerous amounts of workers who require training and the wrong keys can be given to the vendor. With traditional mechanical lock and key there is no way to prevent collusion, and users can forget to close sites (intentionally or not).

Regular audits need to be undertaken to ascertain the amount of keys in use and the keys’ location and the management of keys and locks requires dedicated space and security. Managing keys on weekends or during an emergency is a problem as staff will not be present, it is critical to be able to respond quickly to downed sites but if access is prevented in the absence of keys then the only way is to cut the locks which will require a lock replacement and sites can stay unsecured for quite some time.

When keys are copied it is difficult to detect when a theft or loss occurs and with picking and bumping there is no proof of break and entry and as such there are high insurance premiums. The result of these inefficiencies is that some vendors eventually make their own copies of the keys to gain access.

Keywords: Access Control, Acsys, Africa, Health & Safety, Job Ticketing, KPIs, Logistics, Masts & Towers, MLA, MNOs, Monitoring & Management, NOC, O&M, Operational Excellence, RMS, Site Level Profitability, Site Surveys, Site Visits, SLA, Towercos

Read this article to learn:
- Limitations with mechanical locks
- Challenges in controlling access to NOCs
- The importance of access control in enforcing SLAs
- How mechatronic locks can contribute to increased efficiency
- Safety and security benefits afforded by mechatronic locks
TowerXchange: In relation to controlling access and NOCs, what are some of the operational challenges faced?

Rani Ariss, VP Sales EMEA, Acsys: The NOC deals with a complex set of equipment that is scattered around a region and is impossible to control efficiently with mechanical locks. The NOC also deals with a large amount of vendors, who are responsible for site maintenance. It is hard for the NOC to respond efficiently to emergencies as they don’t know where the vendors are located and false alarms can cause disorder.

Access to the NOC is impossible to control. Vendors are requested to do maintenance and only do it when they are able to do it, not necessarily when the NOC has requested that they do it. When sites are down it can be difficult to find the vendor, the NOC then needs to call other support to get someone to the site.

The NOC is looking for a solution whereby tickets are issued and acted upon as quickly as possible in a first phase. In a second phase the NOC needs to rely solely on the vendors assertions.

TowerXchange: What challenges can poor access control systems have on SLA implementation and adherence?

Rani Ariss, VP Sales EMEA, Acsys: MNOs and towercos will have SLAs in place with their vendors to regulate site maintenance. These SLAs have escalation clauses that dictate when a vendor should arrive on location. It is hard for the NOC to see when vendors are going to the sites and if they completed the job correctly making SLAs redundant.

The lack of data prevents an operator from setting operational KPIs to benchmark the performance of the various vendors between each other. The fact that there is no or little data from the performance on the SLA also means that the NOC and operator need to rely on the vendor to obtain performance information which creates a conflict of interest. SLAs fees are being paid when the services that need to be provided aren’t being carried out. Vendors invoke the problems of collecting and returning keys as a valid reason for non-compliance with SLAs.

TowerXchange: What are the advantages of implementing mechatronic locks for remote site management?

Rani Ariss, VP Sales EMEA, Acsys: Mechatronic locking systems cannot be picked/bumped, hacked, copied or corrupted in any way. Telecom customised software enables the NOC to manually or automatically control where users can go, for how long wirelessly and in real-time with minimal cost.

Mechatronic solutions allow the NOC to control precisely what assets can be opened and when. All keys and locks memorise the last thousand actions giving an incorruptible record of the user’s actions, providing the NOC and operator with valuable operational data.

The mechatronic locks combine four important solutions into one system; a wireless and real-time access control system, a high security lock and key solution, a time and attendance solution and a key management solution.

TowerXchange: What are some of the basic practical advantages of mechatronic locks?

Rani Ariss, VP Sales EMEA, Acsys: The solution is a standard padlock and Euro-Din cylinder configuration meaning that no modifications are required to install them. The padlocks and cylinders can be fitted on all equipment and no maintenance is required. The stainless steel plating prevents corrosion on the padlock body and cylinder and what’s more anyone can use the solution.

The operational advantages of using mechatronic locks are instantly visible after deployment and lasting over time, uptime is increased and the solution prevents keys being copied, stolen, lost or unreturned, locks being picked, issues around collecting and returning keys, the requirements for lock and key audits and unauthorised access.
TowerXchange: How do mechatronic locks contribute to increased efficiency?

Rani Ariss, VP Sales EMEA, Acsys: Users can service more sites in one day and a user’s position and length on site is controlled and monitored. The NOC can have a real-time view of site status looking at the number of sites, which sites have guards and are they present or not, which site is in need of maintenance and for what reason and which and how many vendors are on the site.

By implementing mobile apps, the NOC is now able to receive real-time site information and user performance, such as when did the user receive the task, accept the task, arrive on and leave the site. This system can also monitor what the user did on the site (watermark GPS pictures) and can also receive information on whether the user closed the locks after leaving the site.

This data has significant value to determine SLA adherence because the tower owner can now see exactly what is happening on their site. Being able to understand who is going where and for how long means that the owner can make smarter business decisions. Data collected by mechatronic locks gives concrete undisputable data on whether the vendor has been meeting the SLAs. Furthermore upon additional analysis of the data, site operators can create and negotiate more suitable SLAs using the information collected.

TowerXchange: How do mechatronic locks increase site and user security and reduce theft?

Rani Ariss, VP Sales EMEA, Acsys: With regards to safety and security, as the NOC knows who is on the site and for what reason, in the case a vendor does not request a locking code (because of a fall or injury) the NOC is able to act on that.

In relation to thefts, most thefts are caused by people who had a mechanical key at one stage and copied it. The mechatronic keys can have an embedded feature that monitors where the key is being used, if the user tries to fraudulently use the key three times, the key will automatically block themselves thereby forcing the user to go back to the NOC or programmer to update his key.

TowerXchange: What information can be collected to monitor behavioural patterns and how does this translate into more cost effective operations?

Rani Ariss, VP Sales EMEA, Acsys: The NOC will be able to download the access logs stored on the key through programmers and study what sites or assets were accessed and when, how long the vendor spent on each site, whether the user tried to access sites or assets without authorisation and on which day, time or location.

By collecting data on user performance the NOC and operator are now able to obtain site maintenance benchmarks which in turn allow them to set KPIs for certain tasks.

In addition, mechatronic locks allow for increased flexibility. When a technician is unavailable, another can be called as a substitute with no wasted time or resources. A temporary access can be instantly granted ‘on the fly’ for a site normally outside of this technician’s work zone.

By collecting data on behavioural patterns, the financial department is also able to control how much time was spent on site by users, thereby gaining a better control over payment of billable hours to vendors.

TowerXchange: How will the data that mechatronic locks provide influence the way in which the telecoms sector works?

Rani Ariss, VP Sales EMEA, Acsys: Using the data that mechatronic locking systems provide effectively will lead to more efficient access policies, enhanced SLA agreements and increased productivity. The data collected does not only benefit the site owner, but is also valuable for tenants and vendors. The data helps build relationships between the ecosystem by aiding their understanding and giving evidence of site activities. The more a database is built and the further it is integrated the more valuable it becomes to its users.
Ensuring RMS systems work in the field

How Asentria bring extensive expertise in trials to ensure a solution is fit for purpose

Asentria, with over 100,000 sites in operation have become an integral part of their customer’s cell site optimisation efforts. Bringing extensive experience from working on fully operating networks, Asentria’s application engineers understand what is essential to get a network up and running successfully and cost effectively, with proper trials fundamental to this process. Asentria’s Jon Baars examines why RMS projects can often fail and explains where Asentria’s successful track record in such projects stems from.

Keywords: Asentria, Monitoring & Management, O&M, Operational Excellence, RMS, Site Level Profitability, Site Surveys, Skilled Workforces, Who’s Who

Read this article to learn:
- How Asentria has evolved into more than just a hardware supplier
- The number of sites using Asentria systems in operation worldwide
- The mistakes many companies make in selecting an RMS system
- How trials and selection processes should be designed to minimise the risk of failure
- What differentiates Asentria from its competitors

TowerXchange: Please can you introduce Asentria and their portfolio of solutions for the telecom sector - what is the company’s origins?

Jon Baars, Director of Sales and Marketing, Asentria: Asentria is a thirty year old hardware manufacturer based in Seattle, WA USA. We began by designing and manufacturing hardware devices to integrate to PBX (voice) switches, and deliver alarm and telemetry data. Telecom operators began to use our devices for different purposes than just for PBX. The US military was also an early user. We began to transition to working more specifically with US-based mobile network operators to monitor their remote locations; power, security, and environmental issues at cell sites primarily. We have installations with two US based MNOs with approximately ~10,000 sites apiece currently in operation, and other worldwide networks with hundreds or thousands of sites deployed. Our current customers refer to us as part of “cell site optimisation” efforts. It is far beyond just alarming now.

TowerXchange: What is Asentria’s go to market strategy?

Jon Baars, Director of Sales and Marketing, Asentria: We are used in many different telecom networks; rail or highway projects, oil and gas, utilities, and others. Our focus, however, is on MNOs and tower companies. There is a large amount of upfront integration and support necessary in order to get the most sophisticated projects up and running. The primary product we sell is hardware, but there is
also a large component of services and integration that go with that hardware to get a project up and running within the operational environment of a large network operator. With larger network operators, the projects really never end, it is more of a partnership. We seek large networks as the large scale enables us to devote significant upfront time to integration, proof-of-concept, and rollout plans. We help people who are motivated to solve a variety of operational issues at those sites optimise their sites. We’re broadening the geographic scope of our market seeking these large networks and the people responsible who want to make their networks better.

TowerXchange: The first question our readers usually ask of any vendor in the RMS category is “how proven is your solution in the field”?

Jon Baars, Director of Sales and Marketing, Asentria:
We have over 100,000 sites in operation at this moment. The largest deployment we have had was approximately 18,000 sites at its peak for a US based MNO; it was a pretty sophisticated solution. Our hardware device was in a smaller cabinet, and we allowed wireless (EDGE) access to the cabinets, and enabled them to reboot individual -48VDC powered devices within the cabinet. The initial goal was to reduce truck rolls and mean time to repair, but the solution evolved to where we were managing many other things at the site; antenna tilt, managing power usage, and general network troubleshooting. Our current largest ongoing project is for a US based MNO, and it is more focused on issues tower owners would be concerned with; power, security, and environmental monitoring and integration to all the various sub-systems at the site. We “flatten” all this data into a usable form so that operational decisions can be taken. We are doing a project for hundreds of sites in the Middle East primarily for security purposes. We have a current project in the EU for what will eventually be thousands of sites that is based primarily on wireless modem access to sites.

TowerXchange: Why do you think it is that RMS projects often fail?

Jon Baars, Director of Sales and Marketing, Asentria:
At this point, we have a lot of experience in what is actually being done successfully and cost-effectively. We expect to do a trial for any large network; go to a site and deploy our solution so we test our assumptions and prove that we work. Sometimes decisions are made regarding an RMS system solely based on paper RFQ document. It is difficult for us to know what exact solution we would propose until we actually go to a few sites. We expect to go to one site, then move on to deploying to a few sites, testing our deployment documents, and then support the process as it moves on to a broader deployment. As previously mentioned, we look at this as an ongoing process.

Trials are a must; it is very difficult for us to come up with realistic pricing until we can agree with the customer what the solution is. Very rarely do
we decide in advance what the solution is, and the
scope of the solution doesn’t change during the trial
phase. If we had our preference, there would be an
initial request for information phase, where some
broad data could be given by the RMS vendors. A
short list of vendors could be created and some
small budget could be dedicated to getting the short-
listed vendors to come do a trial at a small number
of sites. Using this method, I think failures would be
much more rare. Everyone could agree in advance
of a large rollout what was to be delivered and the
RMS vendor could deliver a much more accurate
price based on a promised solution.

TowerXchange: Finally, what differentiates
Asentria from other RMS providers?

Jon Baars, Director of Sales and Marketing, Asentria:
We have a lot of experience doing these systems.
We expect every large project to run through a trial
phase and we have application engineers whose
job is to successfully create these trials. People in
this application engineering role have generally
worked on many other fully operating networks,
and have a very good idea of what the standards are
that are necessary to get a network up and running.
We are aware of what other network operators
are doing successfully and cost-effectively, and we
will push to make our trials model the ideas that
others are currently making work. We bring a lot of
value at the trial phase, just for the opportunity to
show what our solutions can do. We have a broad,
flexible, and high quality product, and have thirty
years of experience successfully implementing
these projects.
Micro Turbine technology makes once a year site maintenance visits a reality

Cost effective innovative solution has up to 8,000 hour service intervals, is cleaner, quieter and can use multiple fuels including diesel, kerosene or paraffin or a mixture to reduce costs and deter fuel theft by up to 60%

It’s not often TowerXchange comes across a genuinely innovative alternative to a traditional diesel genset that provides primary or backup power to many emerging market cell towers, but when we heard about Bladon’s Micro Turbine gensets (MTG), we had to find out more! While the MTG is cleaner and quieter than a traditional DG what makes the MTG particularly interesting to towercos is the fact that they require as little as once a year maintenance. A key business requirement we continuously see from mobile operators and towercos is to reduce site visits to once a month or less.

Read this article to learn:
- How Bladon harnessed the power of microturbines for telecom power solutions
- The advantages of Micro Turbine Gensets (MTGs) over conventional DGs
- How the product addresses the weakness in all hybrid genset solutions – reinventing the diesel genset
- More about the ultra-low maintenance solution: no engine oil, no water, only one moving part
- The importance of an energy efficient solution that compliments your existing supply chain – MTGs can run on almost any liquid or gas fuel
- Time to breakeven/crossover in different scenarios, compared with traditional DGs
- Details of the World’s only EURO V emissions standard compliant diesel genset (12kW)

TowerXchange: Where does Bladon fit in the telecoms infrastructure ecosystem?

Stuart Kelly, VP Market Development, Bladon: We have invested considerably in R&D over the last 5 years and perfected the design and manufacture of a genset that has a microturbine technology at its core. A Micro Turbine Genset (MTG) is an evolutionary step in replacing conventional diesel gensets in a prime power, hybrid or standby power application. Without making any drastic changes in business process, supply chain or taking a risk on new technologies towercos can drastically reduce their daily fuel and maintenance costs and see those reductions immediately. The MTG’s superior reliability and performance along with its multifuel capabilities nicely positions it to be the ideal replacement of noisy, inflexible and high maintenance diesel generators. Bladon’s MTGs are ultra-quiet, cleaner and greener, which is critical for towercos and mobile network operators alike that have strong corporate social responsibility and environment friendly agendas.

Gas turbines aren’t new. This is a 70 year old technology, and is the method of choice for providing ultra-reliable power as a utility to millions of people and businesses globally. Bladon has innovated the application of turbines to telecom tower power by making a microturbine fit into the space where normally diesel gensets are situated. Our secret sauce is not so much a new technology as a manufacturing methodology that enables us to produce microturbines economically in
volume. One of our most important manufacturing techniques is a process to cut turbine blades from a single piece of material. We’ve been able to manufacture to a price point such that our MTGs are commercially viable compared to reciprocating diesel gensets.

TowerXchange: How did your micro turbine engines evolve as a solution for cell sites?

Stuart Kelly, VP Market Development, Bladon: Bladon has been working on turbine and gas turbine technology for over 10 years now, with special projects for the automotive industry funding a large part of that work. Then realising that almost 20% of the 2,000,000 diesel gensets sold globally are purchased by the telecoms market we saw an opportunity. An opportunity to show off Bladon’s technology in a single vertical market and evolve the way distributed power is deployed on telecom tower sites. Realising that the lion’s share of opex incurred by telecom towers was in fuel and maintenance costs we knew immediately that Bladon could offer a compelling value proposition.

TowerXchange: Which telecom markets are you targeting and why?

Stuart Kelly, VP Market Development, Bladon: The amount of activity in rejuvenation, investment and growth in the telecom tower market is most impressive in Africa, especially sub-Saharan Africa. That’s why we are using the TowerXchange in Johannesburg to formally launch our 12kW Micro Turbine Genset (MTG). We have conducted field trials in Africa over the last year and learned valuable feedback from our partners there. Some of our field trial units have been running nonstop for 3000+ hours without ANY filter changes or servicing. Whether an MTG is deployed as a primary power or hybrid installation servicing the MTG will be maximum once a year. That’s a really compelling proposition to towercos that are crippled with genset maintenance costs.

We have attended TowerXchange Meetups around the world to share Bladon’s vision with MNOs and towercos. With so many assets changing ownership in Africa, there is a new focus and financial drive to leverage tower assets harder. When towers are bought, or being prepared for sale, audits often reveal the assets aren’t operating as efficiently as the owner might have thought. But the new owners don’t want to create too much turbulence in the supply chain, so it’s important that our
solution complements the existing energy supply chain in developing markets. The Bladon MTG allows MNOs and towercos to evolve their energy strategy, take advantage of serious opex savings without drastically changing the business model or increasing their energy capex budgets.

**TowerXchange: Tell us about your solution’s maintenance requirements.**

**Stuart Kelly, VP Market Development, Bladon:** Microturbine engines are an ultra-low maintenance solution. Unlike a diesel reciprocating engine, there is no engine oil and no liquid coolant. The turbine itself consists of just one moving part, which runs on air bearings. Maintenance is a key issue at remote sites that might be many hours’ drive on a lousy road – the cost to get there can kill the TCO – so a technology with the potential to dramatically reduce site visits can be very compelling. There is a very low skill requirement to maintain our MTGs – in the highly unlikely event of a turbine failure, our strategy is remove and replace, not rebuild onsite. For lesser maintenance issues, such as filter changes, the O&M subcontractor can readily maintain a stock of fuel and air filters.

As well as reducing fuel and maintenance costs, thieves are less inclined to steal our MTGs as there are few, if any parts, they can recycle. Aspiring ESCOs that are currently in the business of maintaining traditional diesel gensets have an opportunity to profit handsomely by deploying a more reliable solution like ours – their goal of selling at a price per kWh rate becomes more achievable. Our MTG unit has robust telemetry built in, so you need fewer field engineers as many of the MTG settings can be changed remotely. From the NOC you can see if units are operating outside of their tolerances, enabling preventive maintenance rather than waiting for it to break. Also, and not insignificant for the tower operator, is the use of telemetry to know where the unit is, as well as having the inbuilt electronics to stop the unit operating if moved without permission – the same technology as a tracker system on a car. We have standardised also on the DeepSea Controller 7320 MKII to make it even easier for towercos and MNOs to fold the MTG into their estate and manage it through their NOC will minimal disruption.

**TowerXchange: Okay, so what are the advantages of microturbines over other alternate energy solutions such as fuel cells or solar?**
Stuart Kelly, VP Market Development, Bladon: There is no reliable or sustainable supply chain to support hydrogen or methane fuel in Africa yet. As a technology that is hostile to the current supply chain, the practical challenges of keeping fuel cells running are prohibitive to embracing that particular alternative energy solution in more than perhaps 20% of the estate. We don’t see our solution as an alternative to a 200sqm PV array; our solution is so much more compact that the use cases differ significantly.

Solar has to be a part of the future, but in the context of telecom towers it’s not a killer app, it’s a point solution. Our MTGs can be used to smooth power from solar as well as replacing a chugging tractor engine based generator. When renewables work the MTG can become a part core part backup, there are no start up issues even if it’s left idle for some considerable time between uses. The fuel will contaminate before the genset has a problem! But the important thing is that this is an evolution not a revolution – the MTG can be adapted to any local fuel supply resource. Bladon gensets, in keeping with all turbine based solutions, run on a wide range of fuels, including green alternatives such as natural gas and biofuels as well as diesel and kerosene. Bladon MTGs will also tolerate a blend of fuels like diesel mixed with kerosene thus making the mix useless for thieves planning on using it for other diesel engines.

TowerXchange: How does the capital outlay for your MTGs compare to traditional DGs, and when does the Total Cost of Ownership (TCO) crossover?

Stuart Kelly, VP Market Development, Bladon: The capital outlay for an MTG is currently slightly higher than a quality diesel genset solution, but the price difference is a double not triple digit percentage. Running for 12 hours a day in SSA in 30° heat then within 15-19 months the TCO will crossover having recovered the difference in capital outlay through fuel and maintenance cost savings.

TowerXchange: What is the sweet spot in terms of the load your solutions can support?

Stuart Kelly, VP Market Development, Bladon: Our Bladon MTG12 MTG delivers up to 12kW, with 230V AC output. Most telecom sites need somewhere
between 3kW and 6kW for constant power, maybe 9kW if there is a hybrid arrangement requiring battery bank charging. Since the MTG runs at variable speed to match the load, our efficiencies are much better at partial loads compared to conventional DGs.

TowerXchange: How do you ensure modularity as power requirements increase with the addition of multiple tenants?

Stuart Kelly, VP Market Development, Bladon: Given that operators are trying to drive power consumption down, a new BTS might need 1kW when the last model needed 2kW. At the moment the applications we see don’t consume more the 3kW in total, so it should be possible to add a second tenant without upgrading the MTG. Because our unit doesn’t de-rate over time, its ability to deliver continuous power is stronger. The MTG is a more reliable means of delivery of consistent power than a conventional DG for a multi-tenant site. If additional tenants are added beyond what one MTG can provide, the answer is to add a second unit in a daisy chain. And if the power requirement reduces again, our units are relatively easy to relocate to another tower.

TowerXchange: How do you bring Bladon to market – do you sell direct or through channel partners?

Stuart Kelly, VP Market Development, Bladon: Our model is to sell through partners. Towercos and MNOs need the credibility of boots on the ground to provide after sales service, even with a low maintenance solution such as ours. We are targeting key managed service providers on the front lines of tower builds, upgrades and maintenance, with the objective of creating a pipeline for thousands of unit sales.

TowerXchange: Finally, please sum up how you would differentiate Bladon from other cell site energy solution providers.

Stuart Kelly, VP Market Development, Bladon: We’ve taken a well-known form of power generation in the reciprocating engine, turned it on its head and married it with another established technology in gas turbines, then developed a manufacturing process to bring to market an innovative solution with a lower TCO business case for telecom tower operators. Micro jet engines are ultra-reliable, super durable, low maintenance, and generally have a TCO runway in Africa and India from 9 to 19 months. The MTG is designed to support the current supply chain, which means our solutions can be easily introduced with an expectation of a short term payback. The fact that it’s an exciting jet engine is only so interesting – what matters is reducing fuel bills, and the ability to deploy it into the field easier and cheaper than a regular diesel genset.
The drivers for growth in Europe

Capitel Inc forecasts significant change in the European market

Capitel Inc advise on TMT infrastructure transactions across Asia, EMEA and the USA, advising on deals worth over $3bn in recent years. TowerXchange spoke with Pankaj Agrawal, a partner with Capitel who advises on TMT infrastructure transactions in Asia and EMEA markets, with a focus on identifying key strategic considerations in the transaction, risks and valuation and Ashima Kohli, a consultant with Capitel who has worked on evaluating multiple tower, fibre and data center deals in India, China, South Asia and Europe, with a focus on techno-commercial due diligence and financial modeling.

TowerXchange: Please introduce Capitel, your background and remit.

Pankaj Agrawal, Partner, Capitel Inc.: We are a techno-commercial transaction advisory firm with a focus and specialization in the TMT infrastructure and services sector. Our clients include major Private Equity funds, hedge funds, towercos, fibercos and service providers in India, China, S Asia, Europe and U.S. We have advised on 20+ transactions with $500mn+ deal value, with some of the recent deals in the $3bn+ category.

TowerXchange: As a global company, it would be great to get your insight in the European market in a global context. What trends in communications infrastructure do you see as universal and do you see any European idiosyncrasies?

Ashima Kohli, Consultant, Capitel Inc.: Our recent engagement experience shows that the nature of network infrastructure demand is shifting globally, especially in two ways: a) Operators are increasingly deploying networks on high frequency bands such as 2300MHz, 2600MHz, 3400MHz and beyond which is resulting into denser networks, and b) Operators are deploying higher capacity networks, with 50MHz+ spectrum on access side, which makes a fibre-based backhaul mandatory, along with network capacity solutions such as small cells. Please refer to Figure 1 for the stages of network evolution, with developed markets in the capacity stage.

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Ashima Kohli, Consultant, Capitel Inc.: Our recent engagement experience shows that the nature of network infrastructure demand is shifting globally, especially in two ways: a) Operators are increasingly deploying networks on high frequency bands such as 2300MHz, 2600MHz, 3400MHz and beyond which is resulting into denser networks, and b) Operators are deploying higher capacity networks, with 50MHz+ spectrum on access side, which makes a fibre-based backhaul mandatory, along with network capacity solutions such as small cells. Please refer to Figure 1 for the stages of network evolution, with developed markets in the capacity stage.

Both these trends have significant implications for towercos and network infrastructure providers –

Keywords: 5G, Capitel, Carve Out, Consolidation, DAS, Data Centre, Deal Structure, Edge, Europe, Exit Strategy, Fibre, Investment, IoT, Lawyers & Advisors, Operator-Led JV, Sale & Leaseback, Small Cells, Smart Cities, Valuation

Read this article to learn:
- How European towercos are developing compared to their global counterparts
- How towerco models will evolve and converge in coming years
- The effect 5G will have on communications infrastructure
- How towercos can increase their value
the networks of future will look very different from the current macro grids. We expect to see more street furniture, wall mounts, low capex monopoles, partner sites such as ad billboards (such as Cellnex and JCDecaux in Italy and Spain), and also a lot more fibre and capacity infrastructure.

Finally, we see new entrants entering the market for 5G, small cells and fibre players who will directly compete with towercos, and we expect towercos to also look at different business models with greater ownership of fibre, active assets such as access spectrum, mm wave spectrum for backhaul and edge data centers among other areas.

Europe is following China, the US and some Asian markets, although we expect the network evolution to be on similar lines. Towercos such as Cellnex are also developing offerings aligned to the shift in network demand.

TowerXchange: One fairly unique thing about Europe is the number of different models of tower ownership. Do you think MNOs looking to monetize their towers and manage opex should be looking at a sale and leaseback or a carve out and minority stake sale?

Pankaj Agrawal, Partner, Capitel Inc.: The cost of 5G spectrum remains very high, as we just saw in the latest 5G auction in Italy. Also, the network capex for 5G is expected to be high with dense deployments. As the 5G capex intensity goes up, operators are likely to divest some of their non-core assets such as towers, fibre and data centre infrastructure, in addition to fixed line, cable broadband and DTH assets in some cases.

The structure of the transaction will depend on the specific needs of the MNO as well as the mandate of the investor, but we can expect to have more transactions and increasingly independent ownership of infrastructure assets.

TowerXchange: 5G is bringing huge change to towers globally. What do you predict will be the biggest shifts in European tower ownership and deals over the next three years?

Pankaj Agrawal, Partner, Capitel Inc.: As we discussed above, the deployment of 5G will a) change the network architecture making it dense and capacity-oriented, b) increase independent ownership of network infrastructure assets, and c) increase partnerships among various stakeholders.

We expect to see more street furniture, wall mounts, low capex monopoles, partner sites such as ad billboards (such as Cellnex and JCDecaux in Italy and Spain), and also a lot more fibre and capacity infrastructure.
In terms of opportunity, 5G is a combination of technologies, with current use cases focused on enhanced mobile broadband, massive IoT and URLLC critical IoT. The gains to towercos and their required resources and investments will vary depending on which of these three use cases are being targeted.

Enhanced mobile broadband presents an opportunity for incremental tenancies for towercos with high frequency deployment on 3.4GHz band. Additionally, as fibre becomes an integral part of the network structure, there will be opportunities to monetize shared fibre backhaul as well.

Massive IoT leads to an increase in number of devices, with low data usage per device. As lower bands are used for massive IoT, the tenancy upside for towercos will be limited, with amendments and overlays as the primary revenue source.

Finally, URLLC (Ultra Reliable Low Latency Communication) can be a big value driver for towercos as the data processing moves from core to the edge and towercos have a clear benefit on the edge in terms of presence of passive infrastructure as well as ability to provide active equipment such as edge data centers.

**TowerXchange: We’re seeing increasing convergence with Cellnex acquiring small cell, fibre and data centre assets and Digital Colony moving into Europe. Tell us more about this trend and how it might develop.**

Ashima Kohli, Consultant, Capitel Inc.: These initiatives are aligned to the trend of high density and high capacity networks, and these towercos are making their networks future-proof. We are seeing a similar trend in other markets as well with towercos such as Crown Castle and Vertical Bridge investing in data centre technology and fibre as they plan to bring edge computing to their cell sites in US and other markets.

In some markets we are also witnessing the emergence of specialist small cell providers (Extetel) who are investing in fibre and competing directly with operators and towercos. We expect higher competition and larger number of infrastructure providers for 5G, and also a greater breadth of resources, skill sets and partnerships for the traditional towercos.

**TowerXchange: The European tower landscape is very fragmented and ripe for consolidation. What should towercos seeking to be acquired do in order to boost their value?**

Ashima Kohli, Consultant, Capitel Inc.: In order to increase their valuation, towercos will have to demonstrate long-term stable cash flows. These cash flows will be driven by a) a future-proof product offering with access to capacity assets such as fibre b) independence and strong governance and c) geographically diversified tower portfolio. Please refer to Figure 2 for a framework for valuation of towercos, in particular the ones with multi-market portfolios.

### Figure 2: Valuation and market evaluation framework for multi-market towercos

<table>
<thead>
<tr>
<th></th>
<th>1. ORGANIC GROWTH</th>
<th>2. SCALE UP OPPORTUNITY</th>
<th>3. FFO PREDICTABILITY</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>1.1 Tenancy growth</td>
<td>2.1 Inorganic growth: macro assets</td>
<td>3.1 Investment grade tenants</td>
</tr>
<tr>
<td></td>
<td>1.2 Provider of choice</td>
<td>2.2 Inorganic growth: macro supplement</td>
<td>3.2 Market stability: Political / Macro</td>
</tr>
<tr>
<td>Defining features</td>
<td>Growth in smartphone adoption and data usage</td>
<td>Availability of macro tower assets that can be acquired over the long term</td>
<td>High quality, well-capitalized operators that can form long term partners</td>
</tr>
<tr>
<td></td>
<td>Potential to be one of the leading towercos (no multiple entrenched competitors)</td>
<td>Availability of macro supplements (e.g. fiber) that can be acquired over the long term</td>
<td>Predictability of events in the market, either through government, policy or macro-economic decisions</td>
</tr>
<tr>
<td>Contribution to valuation</td>
<td>Revenue and EBITDA growth</td>
<td>Margin expansion</td>
<td>Margin expansion, and revenue growth</td>
</tr>
</tbody>
</table>

Source: Capitel, company reports, engagement experience
Leading the way for future networks

Doug Dimitroff of Phillips Lytle and member of the United States Federal Communications Commission’s Broadband Deployment Advisory Council, shares his experience on recent US deployments.

With offices in New York, Washington D.C and Canada, Phillips Lytle has worked with communications infrastructure owners across North America, and has been involved in some of the critical transactions which are laying the foundations for future infrastructure. Drawing on his experience with the United States Federal Communications Commission’s Broadband Deployment Advisory Council, and specifically as the Chair of its Model Code for Municipalities Working Group, Doug shared with us his thoughts on how the US and European markets compare, and where infrastructure owners can pursue growth as the network landscape changes.

Keywords: 5G, Acquisition, Active Infrasharing, Crown Castle, Data Centre, Deal Structure, Densification, Digital Bridge, Editorial, Fibre, Lawyers & Advisors, North America, Phillips Lytle, Small Cells, USA

TowerXchange: Please introduce Phillips Lytle, your footprint and your work in communications infrastructure.

Doug Dimitroff, Partner, Phillips Lytle: Phillips Lytle LLP is a premier US law firm that is recognized nationally for its legal excellence. With offices in New York State, Washington, D.C., and Canada, our attorneys serve a multinational client base. Our Telecommunications Industry Team has extensive expertise with deployment of telecom infrastructure projects in the United States, as well as projects in Canada and Central and South America. Our attorneys have represented wireless network operators, neutral host DAS providers, tower companies, small cell providers, fiber providers and property owners in transactions and other matters touching all parts of the telecom infrastructure ecosystem, and in various settings: large venues, campuses, public rights of way, mass transit systems, commercial multi-tenant environments and residential multi-dwelling units.

TowerXchange: Tell us about your background, Doug, and your work in this space.

Doug Dimitroff, Partner, Phillips Lytle: A major focus of my practice is telecommunications law. I lead our firm’s Telecommunications Practice Team. I have over 20 years of experience in telecommunications matters, representing leading telecommunications carriers, infrastructure providers and numerous other clients involved in the telecommunications industry. I assist with transactional and litigation matters involving...
deployment of telecom infrastructure, including supporting a major mobile network operator in development of its DAS and small cells programs. I am a member of the United States Federal Communications Commission’s Broadband Deployment Advisory Council, and the Chair of its Model Code for Municipalities Working Group.

TowerXchange: Despite the growth of towercos in the European market, independent towercos penetration is still much lower than in the US. Can you share a little of your experience in each market, and whether you feel the European market will ‘catch up’ to the US or follow its own route?

Doug Dimitroff, Partner, Phillips Lytle: I do not have direct experience with the European towercos market. Nevertheless, my sense is the regulatory and market barriers, although not identical, are similar and thus the European market should be able to “catch up”, especially given the network demand for broadband infrastructure and the desire of the EU and member countries to promote broadband adoption and deployment.

TowerXchange: European towercos are increasingly talking about moving towards a ‘service agreement’ model, in light of changing MNO needs and IFRS 16 implications. What do towercos need to consider as they move away from MLAs towards MSAs?

Doug Dimitroff, Partner, Phillips Lytle: They will need strong partnerships with MNOs that provide flexible MSA terms, including the ability to protect against unanticipated needs to adjust applicable statements of work.

TowerXchange: With one eye on 5G rollout, many European towercos are starting to move into small cells, fibre or data centres to position themselves for the future needs of their tenants. We generally assume the US is further ahead on this – what examples can you share with us about how US towercos are preparing for future infrastructure needs? Do you feel they’re leading the way?

Doug Dimitroff, Partner, Phillips Lytle: Small cells are “big”! Crown Castle’s US acquisition of Lightower and integration of Lightower with its other fibre assets is a good example of how US towercos are preparing for 5G and future telecom infrastructure needs. Another example is Digital Bridge’s move into wholesale data centres in 2017. I believe US towercos are leading the way.

TowerXchange: Future networks will involve new stakeholders and new dynamics between existing players in infrastructure as well. Can you share your thoughts on how this transition can be managed, and what future relationships between stakeholders might look like?

Doug Dimitroff, Partner, Phillips Lytle: In the US, initial deployment of small cells is, in large part, being handled by MNOs without relying on towercos in the same way towercos were relied upon for macro site deployment. This is a reflection of MNO interest in learning the most efficient ways to deploy small cells, as well as reducing reliance on towercos to provide passive infrastructure for this emerging technology. New stakeholders could include governmental entities - small cells will need to be deployed in the public rights of way in many areas and that could drive governmental entities to participate in deployment in a different way. In addition, new niche players may evolve to deploy in certain settings and to deploy components of future networks, such as in-building (passive and/or active) network operators...
Polar Power: solutions for demanding industries, made in the USA

How telecom customers can benefit from high-end products suited for the military and marine sectors

Polar Power is a leading vertical manufacturer and provider of energy solutions for demanding industries such as telecom, military, industrial, telecom and marine sectors, among others. Thanks to Polar Power’s expertise in complex sectors, telecom operators worldwide can take advantage of robust DC generators, proven in the most challenging operating environments. Interestingly, back in 1979, at the very beginning of its history, Polar Power’s first product was a solar powered vaccine refrigerator/freezer for remote areas… Something that TowerXchange absolutely loves!

Keywords: Americas, Argentina, Asia, Australia, Bangladesh, Brazil, Capex, Chile, DC Generators, Energy, Energy Efficiency, Hybrid Power, India, Lithium Ion battery, Mexico, Off-Grid, On-Grid, Opex Reduction, Panama, Photovoltaic, Polar Power, Shelters, Solar, The Caribbean, United States, Unreliable Grid

Read this article to learn:
- Polar Power’s background and current range of solutions
- High-end products with an edge: offsetting costs by manufacturing and distributing
- Specifying DC generators for the telecom industry
- The perks of choosing Polar Power: global and technical expertise

TowerXchange: Please tell us about yourself, your background and your role within Polar Power.

Arthur D. Sams, President and Chief Executive Office, Polar Power: In 1979, I co-founded Polar Power and started delivering solar photovoltaic power systems to remote locations worldwide. Today Polar Power is a leading end-to-end designer, manufacturer and distributor of DC generators for the telecom, marine, oil and gas, military and automotive industries. Actually, our first product was a solar powered vaccine refrigerator for use in remote areas worldwide, developed in cooperation with the World Health Organization, NASA, and the U.S. Agency for International Development.

To date, Polar Power, is publically traded on Nasdaq under the symbol POLA. This gives our customers transparency on Polar’s financial strength along with the confidence that we will be around for long into the future to service their needs. Polar directly employs 125 employees comprising of manufacturing, engineering R&D, customer service, and administration. Most of the company’s management is made of highly experience engineers. We are a very hands-on team and we do understand the real technical challenges of our customers. One of my favourite pastimes is to visit rural communities to explore (and put into practice) ways to improve the lives of people by providing power.

In the 1990s we pioneered Hybrid Solar Systems using DC generators and this enabled us to lower both the capex and opex while improving upon the system reliability. In 1995, Polar was the first
company in the telecom industry to introduce DC generators as a prime power replacement to AC generators. Polar was also the first to incorporate DC generators into Solar Hybrid systems.

Since 1995 and continuing, our focus has been improving every component within the system through engineering innovation, new production tooling and raw material sourcing. A few very simple components can cause a functional problem that requires one or two maintenance trips to the site for corrective action.

Within our Los Angeles headquarters, we manufacture in volume our own alternators, controls, engine accessories and enclosures.

TowerXchange: Can you tell us more about Polar Power's customer base and offering for the telecom industry?

Arthur D. Sams, President and Chief Executive Office, Polar Power: We serve mobile network operators in the U.S., India, Australia, Mexico, Chile, Brazil, Argentina, Panama, the Caribbean, India and Bangladesh. These include, AT&T, Airtel, Telstra, Verizon, Grameenphone and Sprint just to name a few.

Not long ago, Polar had been distributing its products through OEMs and VARs so it was hard to spot the Polar brand in the field. The problem we had with OEMs and VARs was poor integration of our products into their systems, or their limited resource to finance and manage their projects.

Our current path is direct relationship with the customer and the use of “channel partners” to provide the field service and maintenance. Managing and training our channel partners, along with customer service to the telecom carrier or tower operator, is being handled for full time Polar employees on a local basis. We have learned that it’s very important to have direct staff in country or near by.

This will not only improve the relationship with our customer base but also offset the cost of our products. Since Polar Power’s DC generators are high-end products, designed and manufactured by us in the United States, becoming a direct distributor will contribute to making our price point more competitive.

In terms of their characteristics, our DC generator and our Solar Hybrid solutions based on our DC generator technology optimally serve the industry thanks to their reduced size which is anything between half to a third of the size of a conventional AC generator or Hybrid system. On backup or prime power applications our natural gas models can function with very low gas pressure (as low as 4” of H2O) and our DC generators utilise low horsepower engines which helps when it comes to acquiring permits and installation, which is a huge plus in certain markets!

Our products are designed to meet the requirements to top customers worldwide and we’ve set ambitious goals for ourselves such as reducing fuel consumption by 30 to 70% on most sites, halving the carbon footprint and reducing site maintenance costs. There are further cost reductions by removing the need for transfer switches along with third party monitoring equipment.
footprint and reducing site maintenance costs. There are further cost reductions by removing the need for transfer switches along with third party monitoring equipment. Very few options are required to install a Polar DC generator. These goals greatly contribute to increasing the ROI for our telecom customers.

TowerXchange: The first question our readers will want to know is ‘how proven is the solution in the field’ – please tell us about the performance of your solution in the field – who is using it and what results have been achieved?

Arthur D. Sams, President and Chief Executive Office, Polar Power: Certain industries such as the military demand extremely high levels of reliability and durability with temperatures as low as -50°C and as hot as 65°C, along with subjecting our generator to simulated nuclear EMP pulse. Our marine applications push the requirement for a high degree of corrosion resistance. Specialty vehicles demand light weight, compact size and high fuel efficiency. We have generators for offshore buoys that float in the Atlantic ocean and remote hybrid systems that are accessible only by helicopters and these sites demand maintenance schedules of once to twice a year.

We of course have telecommunications sites worldwide but our solutions in the field can be best proven by some of our extreme applications where conditions are really pushing the limit. There is not much differentiation in terms of industries so our telecom customers benefit from the extremely demanding requirements of other fields.

On the other hand, the simple fact is that we’ve been in the business for over 35 years, and over 20 years in telecom, our business is growing and we are profitable, so our products and services must be working well!

TowerXchange: What is your installed base at cell sites worldwide?

Arthur D. Sams, President and Chief Executive Office, Polar Power: Having provided systems for over 25 years, we’ve lost count... I’d say that my best guess is over 10,000.

TowerXchange: What’s the sweet spot for your solutions in terms of grid availability and the load your solutions can support?

Arthur D. Sams, President and Chief Executive Office, Polar Power: Our sweet spot is for the difficult installations; off-grid, weather extremes, very remote, high cost of fuel. However we are cost competitive on the simpler backup requirements when connected to a reliable grid.

Our DC generators and systems can handle loads as small as 500 W to as large as 30 kW. This year Polar is planning to tap deeper into the telecom and Cloud-type data sites with our range of 200kW DC systems.

TowerXchange: How has your solution been designed to maximise autonomy and minimise the number of site visits required?

Arthur D. Sams, President and Chief Executive Office, Polar Power: Using integrated controls and providing complete remote monitoring and control of key elements adds to the autonomy. We can monitor every components such as the cells in the battery bank, engine functions, alternator controls, security, ambient temperatures, cooling functions et cetera.
To reduce visits to the site, we provide 14 litre oil sumps, extra-large coolant reservoirs for the engine radiator, oversized fuel and engine oil filters, connections and control modules use weather-tight connectors and electrical assemblies, enclosures are all aluminum, particle separators are used to keep sand, dirt, animals, and rain out of the enclosures.

Also the Polar system does not require a starting battery.

**TowerXchange:** How is your solution scalable to accommodate the increasing power requirements as multiple tenants are added to a site?

**Arthur D. Sams, President and Chief Executive Office, Polar Power:** The Polar system is modular. Additional DC generators, batteries, and solar can be added at any time. Our systems occupy very little space so that adding more capacity is quite easy.

**TowerXchange:** How has your solution been ‘hardened’ to protect against fuel and equipment theft?

**Arthur D. Sams, President and Chief Executive Office, Polar Power:** The fuel tank is concealed within a cabinet and there is not a fill point visible. There is a single three-point door lock to provide access and all the side doors can only be opened through the single door.

Starting battery theft is also a major problem, Polar has overcome the problem by designing a generator without the need for a starting battery. We use a capacitor instead of a battery.

**TowerXchange:** Should M2M technology be built into energy systems, or should third party remote monitoring be used to provide visibility into performance?

**Arthur D. Sams, President and Chief Executive Office, Polar Power:** Since Polar is a vertical manufacturer of each component of the generator, we are able to build the M2M technology into the system. Another benefit of a single source for system controls and monitoring is that all software is compatible. Using third party monitoring typically reduces the number of essential points monitored, also the cost of hardware and installation greatly increases.

**TowerXchange:** What is the typical asset life-cycle of your solutions and how can it be maximised?

**Arthur D. Sams, President and Chief Executive Office, Polar Power:** I’d say that 20 to 30 years is the typical lifecycle. At Polar Power we are extremely conscious about the environment and the eco-impact of our products. So we’ve gone the extra-mile to ensure our generators last as long as possible by designing them so that only the engine requires replacement when needed. This is something that AC generators are not engineered for; toward the end of life AC generators are engineered to be replaced as a whole unit and typically not rebuilt.
Scalable solutions for a converging infrastructure landscape

STULZ is building on a strong pedigree in cooling to offer shelter and edge solutions to evolving customers

As tower owners face increasing pressures to improve efficiency in their passive infrastructure and prepare for 5G rollout across their networks, STULZ have leveraged their 40 year history in providing cooling solutions for MNOs, towercos, datacentre providers and other infrastructure owners to offer modular, scalable solutions which meet modern infrastructure needs. TowerXchange caught up with Johann Mater, Global Key Account Manager at STULZ, to find out more about how STULZ has seen the market developing and how their new solution will help infrastructure owners avoid costly mistakes.

Keywords: 5G, Air Conditioning, Energy Efficiency, Europe, IoT, Operational Excellence, Outdoor Equipment, Passive Equipment, Rectifiers, STULZ, Site Visits

TowerXchange: Please introduce STULZ, your footprint and background.

Johann Mater, Global Key Account Manager, STULZ: STULZ was founded in 1947, and has been providing solutions for mission critical cooling since the 1970s, so we look back to more than 45 years of experience in this area. Though being a family business in the third generation, we are a truly global company, with a footprint in over 140 countries, by which I mean more than just a sales office or box movers: we can cover a full cycle of services, working through tenders, preparing shipments, installing and maintaining equipment in each country where we operate. The further developed idea of this holistic approach can also be found in our claim, which at the same time reflects our philosophy. “ONE STULZ. ONE SOURCE.” stands for the comprehensive range of our portfolio – From Room Cooling and chillers to Airhandling Units and self-developed DCIM software to our EDGE solutions called ”True Edge”.

TowerXchange: STULZ is a global brand, with operations all over the world. Tell us more about the specific dynamics of the European market and what your European clients are looking for?

Johann Mater, Global Key Account Manager, STULZ: For MNOs we’ve seen a huge increase in demands for mission critical cooling, particularly in terms of hyperscalers entering the European market and changing the way they see cooling requirements. The scale of their needs is much bigger and influenced by ideas we have seen over the last two to three years in America and Asia.

Awareness of the TCO is also becoming more and more important. If you look back five years, all of
the conversations we had were about CAPEX, we were always finding the most effective solutions and training our partners and consultants to look at the TCO but procurement teams were only paying attention to CAPEX. They didn’t pay the electricity bills so they had no awareness or personal interest in going for the most efficient units. Over the past couple of years this attitude has changed a lot, the hyperscalers and big datacentres are using so much power that we’re talking about a cost difference of six figures in some cases, so it’s playing a much bigger role. Europe still has cooling with a raised floor but new ideas are coming from datacentres and we will see this change soon.

**TowerXchange: We find European tower owners are starting to pay much closer attention to squeezing operational cost savings/efficiency out of their networks. Tell us how STULZ can deliver measurable results to mature tower portfolios?**

**Johann Mater, Global Key Account Manager, STULZ:** We’ve worked with European MNOs for many years. Eight years ago we set up a joint development with an MNO partner to help them become the most efficient telecom operator in terms of towers. We provided specialised equipment for shelters with integrated free cooling to cope with efficiency requirements in non-urban areas. Through this joint development we were able to save up to 95% of energy costs per container by using a unit paid off within half a year. Joint dev allows us to dev what companies really need.

**TowerXchange: The European market has changed rapidly over the last five years and 2019 is set to evolve further. Do you see a distinct difference in the way MNOs, towercos and other infrastructure providers approach the way their portfolios are managed?**

**Johann Mater, Global Key Account Manager, STULZ:** They have always been quite focussed on energy, the awareness was always there, but it’s increased recently. I actually don’t see a big difference, I see that people are more looking at serviceability and service capabilities, and specialised service is playing a big role as well.

**TowerXchange: As 5G rolls out we’re going to see new equipment placed on towers and much higher demands placed on the network. How ready do you think European tower infrastructure is, and what advice would you give to tower owners wanting to prepare their networks?**

**Johann Mater, Global Key Account Manager, STULZ:** The challenge with 5G is that there are no fixed parameters and definitions yet. I would really like to see what the speakers say about it at Meetup Europe. Nevertheless, 5G is a great opportunity for us: it’s the start of IoT, connected vehicles etcetera, and we are looking forward to creating a future with 5G companies and helping them find the right solutions. With our True Edge system we are perfectly prepared for the requirements of providers and towercos that are specialized on 5G and Edge development. The STULZ portfolio offers everything from cooling on a component level up to turnkey solutions. At the moment, we are just waiting for our customers to give us the go-ahead so that we can start planning and realizing their projects.

When it comes to the demands of 5G, everything is going to change: densities in shelters will increase, telecoms equipment has new requirements, cooling equipment will need to change. Particularly looking at the energy efficiency trend and evolution of cooling equipment over the last few years – if it’s over five years old it might be worth considering new technology. It might even make sense to think about a holistic conversion towards a turnkey solution. STULZ can help with their tools to identify the TCO and ROI of these new systems.

**TowerXchange: We’re seeing a shift towards infill and convergence between communications infrastructure networks, particularly in urban areas. How has this affected your offering and what can clients expect from you in future?**

**Johann Mater, Global Key Account Manager, STULZ:** Our portfolios starts with cooling solutions from 500W to 2MW, so we can offer anything from watts to kilowatts to megawatts. The full range is there and can be implemented into our turnkey solutions. When it comes to infill and convergence, we have edge solutions so we can go from one solution with fire suppression, UPS backup and cooling up to a full datacentre made of modules. Scalability is important as customers want to start small and pay as you grow. Scalability is a given. We have been working on this solution for the last three years and 2019 is the year when we will bring the whole solution to market. Despite the fast pace of the 5G market, our “True Edge” solutions are scalable and modular, so they are designed to meet the needs of our customers in an ideal way - for every conceivable scenario. By combining the customer’s expectation with our expertise, we will be able to customize our solutions to make it fit for their environment – turnkey means you can scale what you like instead of re-inventing the wheel each time.
Tarantula: swiftly adapting to IFRS 16 and always innovating for its large customer base

Cutting-edge lease modules, critical projects across Asia and more

Tarantula has a long history of successes in providing towerCos across the globe its cutting edge portfolio management solutions. In this interview, Anders Smedberg, who has been recently appointed CEO and Head of Sales for the company, shares with TowerXchange some of the latest addition to the company’s product portfolio such as the new IFRS 16-ready lease module and the innovative small cell module as well as insights into some of the most complex projects they have been working on.

Keywords: Asia, Asset Register, Build-to-Suit, Business Model, DAS, Infrastructure Sharing, Job Ticketing, KPIs, Logistics, Monitoring & Management, Operational Excellence, RoI, Site Management System, Small Cells, Southeast Asia, Tarantula, Valuation

Read this article to learn:
- Introducing Tarantula’s new Chief Executive Officer
- Tarantula’s latest products suitable for small cell portfolios and IFRS 16 standards
- The company’s engagement in Asia and examples of latest regional projects
- Why towerCos shouldn’t manage their portfolios via Excel sheets

Anders Smedberg, CEO, Tarantula: I joined Tarantula at the beginning of 2018, taking on the dual responsibilities of CEO and head of the Sales team. I have over 25 years of experience in leading telecom, IT, and financial market companies and I was previously working with Ericsson where I was responsible for their BSS portfolio.

At Tarantula, I’ve been working closely with our customers since I started and establishing contacts in the towerco industry with the aim to secure our position as market leader in the telecom site management software space. Based on the feedback, we have adapted our go-to-market model to suit the market needs of rapid deployment, quick turnaround times and a flexible license model that suit small, medium, and large towerCos. The response from the market and customers has been very positive and we already see a steady demand growth for our solution and expertise.

Tarantula was launched more than 15 years ago with the objective of creating site-sharing solutions for the operators and tower companies in the UK. At a time when telecom infrastructure sharing concepts were still considered to be a novelty, we offered web-based solutions with embedded workflows to simplify the process of site sharing. We have come a long way since then, having developed an end-to-end, purpose-built site portfolio management solution for tower
site owners to help them monetise their towers with efficiency and control. Additionally, with our value-based services, we strive to advise and lead our customers to maximise the value of their businesses.

We were acquired last year by Volaris Group, an operating arm of Constellation Software Inc., a Toronto-based software and services provider. The new ownership has opened avenues for us to enter new markets such as South America and Eastern Europe while enabling us to expand our product marketing capabilities. We have offices in Sweden, Singapore, and India while our customer footprint spans 15 countries. Our customers include both towercos that are in the growth phase as well as larger towercos operating in multiple markets with a mature business model.

TowerXchange: What is your latest innovation and product and what should potential customers know about them?

Anders Smedberg, CEO, Tarantula: The most time-critical concern for all infrastructure owners is the new IFRS 16 standard, which comes into effect after 1 January 2019 and will require organisations to include all leasing contracts with a contract term longer than one year on their balance sheets.

With most of our customers operating a large number of lease contracts across their portfolios, it was imperative for us to provide the tools for them to be compliant with this regulation. We have worked closely with our customers to understand the specific requirements of IFRS 16, the relevance for tower companies and MNOs, and developed an IFRS 16 add-on which will be deployed with our lease module. The add-on will enable our customers to recognise all assets and liabilities for all their leases and quickly move them to the new accounting standard.

The ultimate objective for any towerco is to enable its customers to search, order, and follow the deployment process of their equipment online. We have strengthened this capability in our solution to offer a “theatre booking” system where towercos can order tower space by assessing availability online. This is now operational with a couple of our clients already and we are certain this unique capability will spread across all of our customers.

We have also been working on developing a small cell module for organisations that deploy large-scale small cell deployments. Delivering a small cell module with standardised process templates that can be swiftly configured has been a key focus of this module. We believe this will be well-received by the new and upcoming infrastructure companies especially across mature markets.

We are also keenly aware that with the onset of modern technologies and hardware, most infrastructure owners are striving to keep
operational costs low while harnessing modern tools such as drones to oversee and conduct their field audits. With that end goal in mind, we are setting up partnerships with drone operators and site audit vendors to ensure that the information gathered from the field gets synced back to the central data repository of our platform and gets converted into actionable data.

TowerXchange: Could you give us an update on some of your recent activities in the Asian market? Is there any new project that should be highlighted to our readers?

Anders Smedberg, CEO, Tarantula: We have been focused on strengthening our engagements across the Indian sub-continent as well as in Southeast Asia. Whether it is problem solving urgent issues or deploying new modules, our teams remain driven by a common goal of empowering tower site owners to build profitable and sustainable businesses. We believe that keen engagement from our customer end users alongside regular interactions from our account management and engineering teams can lead to a mutually beneficial partnership with our customers. We are rolling out programs such as user forums and webinars to enable our customers to highlight their ongoing requirements to us as well as share best-practice knowledge with their peers. This initiative has been well received by all our customers.

A major accomplishment for us this year has been the automation of billing for one of the largest towercos in Southeast Asia. Our billing module deployment enabled the towerco to achieve complete control over their cash flow across multiple markets, with built-in support for multiple currencies, FX conversion, and complex billing mechanisms. Additionally, we also helped the organisation achieve optimisation and streamlining of their existing business processes across all markets through simplification and configuration of the process workflows. This exercise will simplify the daily tasks of most functional groups, helping them to increase their speed to market. Our next objective is to enable the organisation achieve control and visibility of their fixed asset register through a single source of data.

TowerXchange: What are the key markets where you operate in Asia and what are the characteristics of the portfolios that use your solutions?

Anders Smedberg, CEO, Tarantula: Our core markets in Asia are India and Southeast Asian countries including Malaysia and Indonesia. We have a strong local presence in both the Indian sub-continent as well as Southeast Asia, thus allowing us to expand with greenfield as well as mature organisations, in some of the most and least developed nations. We are closely following developments in places such as the Philippines and Bangladesh where the market is opening up for towercos.

We also understand that while most tower companies and MNOs typically follow similar ways of working, they also have unique differences due to the diversity in the region. Our product platform provides a baseline for organisations to get started rapidly with using a professional toolset for site portfolio management. At the same time, the configurable layer offers a capability to tweak the tool to suit specific business requirements, thus enabling us to provide a flexibility typically not available in most large-scale ERP systems. This flexibility allows us to solve customer problems with the same efficiency, be it for new entrants in the process of rolling out towers in an under-developed market or mature organisations in the process of securing their investments and maximising profitability.

TowerXchange: What would you say to MNOs and towercos who manage their assets via an Excel or a less specialised platform? And how does your solution help manage different stakeholders within the tower supply chain, from tenants to subcontractors?

Anders Smedberg, CEO, Tarantula: Usage of Excel spreadsheets and homegrown project or asset management tools is an all-too-frequent phenomenon that we see in all markets, big or small, irrespective of the nature of the infrastructure owner company. Used efficiently and accurately, there definitely is some advantage in managing one’s business through one or more simple tools. However, these organisations will reach a stage where the amount of information becomes too massive to be managed in spreadsheets. Alternatively, the information sits in various silos spread across the organisation’s functional groups with no alignment or integration between the data streams. As the volume of information grows, discrepancies in data increase, leading to revenue leakage.
This is where having a central repository of all site information can be highly beneficial. We offer the capability to store comprehensive information regarding sites, assets, projects, and contracts in a single, centralised data hub, thus maintaining complete integrity of the data. Moreover, these data streams are interlinked in such a way that the information flows through the entire quote to cash value chain. Additionally, we integrate our platform with third-party tools such that information always gets updated from the appropriate sources. The value of having accurate information over your assets is tremendous, paving the way for a high valuation of the tower portfolio.

Our solution is designed keeping in mind that multiple stakeholders are involved in the management of a site. We can create different user groups to record contract information, capture real-time site data, complete various tasks and generate reports, or provide electronic approvals in line with different processes. This enables towercos to know who is involved in what activity and provides a project contact list with all stakeholders recorded.

We also enable access to contractors and field staff who need limited access to data so that they can perform the tasks assigned to them. The proactive management of subcontractor work with tracking of key milestones increases efficiency so that all stakeholders know what they need to do, what’s next, and whether any changes are required.

**TowerXchange: How can your solution be configured to adapt to different towercos’ unique business processes and workflows?**

**Anders Smedberg, CEO, Tarantula:** Our end-to-end purpose-built site asset management solution is built on the foundation of a configuration engine, which provides a highly flexible and time-efficient way of adapting our solution for every customer’s business needs. The configuration layer offers an efficient way to configure business workflows, add user-defined data forms, define service level agreements, and generate reports from the same information. Moreover, the configuration is achieved through an easy-to-use interface, eliminating the need for code development and speeding up the time to market for any changes required on the default functionality. A critical part of our deployment for every customer is analysing their requirements and automating their business processes through quick configuration.

**TowerXchange: How can a robust approach to asset registers and asset lifecycle management improve the valuation of tower assets? And how has Tarantula contributed to increasing the valuation of assets of some of your customers?**

Some of our customers that used our solutions for many years were successfully able to not only scale but also sell their businesses at a healthy premium. Examples include VIOM Networks with more than 42,000 towers that sold its tower portfolio to American Tower Corp. in 2016 and KIN Towers with more than 1,400 towers in Indonesia sold its tower portfolio to Protelindo in 2018.

**Anders Smedberg, CEO, Tarantula:** For a towercos, having complete and accurate knowledge of its assets, being able to know where they are installed and by whom, and tracking a history of the entire asset lifecycle is crucial to get an accurate valuation of its business. Additionally, if the asset data is linked with the master lease agreements as well as the tenancy billing, a clear picture of the recurring cash flow becomes visible. Our product design is centred around these key principles of optimising tower cash flow.

We have witnessed first-hand the benefits of having a robust fixed asset register with end-to-end management of the asset lifecycle. Some of our customers that used our solutions for many years were successfully able to not only scale but also sell their businesses at a healthy premium. Examples include VIOM Networks with more than 42,000 towers that sold its tower portfolio to American Tower Corp. in 2016 and KIN Towers with more than 1,400 towers in Indonesia sold its tower portfolio to Protelindo in 2018.
The Sale & Purchase Agreements & Master Lease or Service Agreements that underpin tower transactions

A closer look at two important parts of the contractual framework for infrastructure sharing

The devil is in the detail – the detail of painstakingly constructed and hard negotiated Sale and Purchase Agreements (SPAs) and Master Lease or Service Agreements (MLAs) that define the main terms in any tower transaction. Jeff Eldredge and Rob Dixon, Partners at Vinson & Elkins, have advised on numerous sale and leaseback transactions in the last few years across Africa, Asia and Europe. Rob and Jeff kindly agreed to meet with TowerXchange and to provide us with an overview of tower sharing SPAs and MLAs.

Keywords: Anchor Tenant Privileges, Due Diligence, Infrastructure Sharing, MLA, Novation of Leases, Regulations, SLA, Service Level Agreements, Transfer of Assets, Vinson & Elkins

Read this article to learn:
- The conditions precedent that need to be fulfilled before assets are transferred
- What happens to towers that aren't transferred in the first close
- Why the real value lies in the MLA
- How critical towers are sometimes treated differently

TowerXchange: What are the key components of a Sale and Purchase Agreement (SPA) in a tower transaction?

Rob Dixon, Partner, Vinson & Elkins: There are of course many components common to all SPAs, but let's concentrate on those components which are unique to towers deals. A key example is the structure and content of the conditions to closing. First, we'll typically have a set of transaction conditions precedents that need to be fulfilled before the deal can happen at all. These would include any over-arching regulatory requirements (for example an operating licence or a competition approval). It's in the tower company's interests, however, to close as swiftly as possible to minimise asset deterioration in the interim period.

Secondly, we'll typically have a set of conditions precedent that need to be fulfilled (or waived) before a specific tower can be transferred. These would normally include good title, satisfactory ground lease arrangements (for example, the right to sub-lease the tower to third party co-locators and to assign leasing arrangements in security) and compliance with regulatory requirements (for example, building permits and environmental consents)... It's potentially a long list!

The buyer will require a certain number of towers before the deal is economically viable. Typically, therefore, the deal will be structured so that closing does not happen unless and until a certain number of towers are ready to be transferred (i.e. the tower-specific conditions precedent are satisfied or waived).
Jeff Eldredge, Partner, Vinson & Elkins: One key point in the process is the extension of ground lease terms. Towers deals can involve thousands of different parcels of land. Different ground leases will expire at different times, giving uncertainty on future costs. The buyer will therefore seek to have the ground leases extended for a reasonable period as part of the transfer process.

Rob Dixon, Partner, Vinson & Elkins: As a result of that and certain other conditions taking time to satisfy, there are typically a number of closings as the tower-specific conditions are gradually satisfied. In the interim, the buyer might take over the operation of the non-transferred towers on a managed services basis. Different deals are of course structured differently – some deals go further to synthesise the buyer’s ownership of non-transferring towers from first closing.

TowerXchange: What happens to any towers for which the CPs cannot be satisfied?

Rob Dixon, Partner, Vinson & Elkins: The treatment of ‘stub sites’ depends on the deal. The operator is unlikely to have the ongoing capability (or desire) to maintain and operate the sites so the towerco may agree to manage the sites (with the operator retaining ownership). The buyer is likely to conduct legal diligence on a representative sample of sites so that it has a reasonable idea of the position before signing the deal. The SPA is, of course, only one part of a sale and leaseback deal. It’s relatively short-lived compared with the MLA which will often govern the parties’ relationship for many years. The MLA needs to be as future proof as possible.

TowerXchange: So tell us about the critical consideration when drafting Master Lease Agreements.

Jeff Eldredge, Partner, Vinson & Elkins: The MLA is where the real value is for the tower company and where most of the real complexity lies in a deal. It’s a long term contract (with a significant initial term and then options to renew) and a large value contract. The operator needs sufficient flexibility to manage its needs to deploy and maintain equipment, while the towerco needs sufficient control to maximise the co-location opportunities and create a robust long term revenue stream – that’s how they build value. Thus, there’s a natural tension that needs to be resolved to everyone’s satisfaction. Effective governance mechanisms are important.

The MLA is an umbrella agreement which – traditionally – defines the operator’s rights as anchor tenant in terms of leasing space and capacity (wind load) on the transferring towers and the towerco’s obligations to the anchor tenant in terms of such space and capacity (including the service levels which apply). Different rights and obligations typically apply to different towers. For example, network planners can get very nervous about sharing particularly critical towers with other operators and therefore a small number of the towers might be identified as exclusive to the anchor tenant.

Rob Dixon, Partner, Vinson & Elkins: The service levels for different classes of towers are also likely to vary and be closely negotiated. These will typically be set out in a service level agreement, which may form part of the MLA. The impact of IFRS16 on the way in which tower companies provide services is a key topic. There are also of course other agreements which are important in most towers deals – for example the Build to Suit Agreement – but perhaps all of that is for another time!

Capacity crunch

Operators err on the side of caution when it comes to reserving capacity on towers for future upgrades. But every square meter the operator reserves is a square meter less for the towerco to sell, and that goes directly to the value of the tower. When it comes to the Master Lease Agreement, “it’s important to help operators avoid reserving more capacity than they really need for upgrades”, to use the words of one senior towerco executive.

Phased close

It’s common practice to have at least two phases of closing a sale and leaseback transaction, giving extra time to finalise documentation for troublesome towers. As Alan Harper, CEO of Eaton Towers explained “With Warid, 90% of the towers were included in the first close, but we take over 100% of the towers whilst the last complicated paperwork is finalized.”
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See you at our future events!

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