Asia’s MNOs and towercos talk business

TowerXchange Asia Dossier 2017
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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.

After this final free edition, TowerXchange is moving to an enhanced distribution strategy and a subscription model. 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.

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### Selected Asian tower market size comparisons

<table>
<thead>
<tr>
<th>Country</th>
<th>Market Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>123 GB</td>
</tr>
<tr>
<td>New Zealand</td>
<td>42 GB</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>105 GB</td>
</tr>
<tr>
<td>India</td>
<td>200 GB</td>
</tr>
<tr>
<td>Indonesia</td>
<td>150 GB</td>
</tr>
<tr>
<td>Myanmar</td>
<td>60 GB</td>
</tr>
<tr>
<td>Pakistan</td>
<td>80 GB</td>
</tr>
</tbody>
</table>

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**TowerXchange Meetup calendar**

- TowerXchange Meetup Asia, December 12-13, 2017
- TowerXchange Meetup Europe, April 17-18, 2018
- TowerXchange Meetup Americas, June 20-21, 2018
- TowerXchange Meetup Africa, October 9-10, 2018

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www.towerxchange.com/meetups/meetup-asia | TowerXchange Asia Dossier 2017 | 3
TowerXchange’s analysis of the independent tower market in Asia

Selected Asian tower market size comparisons, Q3 2017

1,992,467 of Asia’s 3,047,847 towers are owned or operated by towercos representing 65% of the total inventory of assets.

Over in China, the world’s largest towercos China Tower Corporation (CTC) celebrated its third anniversary in July and continues to drive towards a public listing in Hong Kong. It was reported by Reuters that CTC had picked China International Capital Corp Ltd (CICC) and Goldman Sachs to lead its IPO, pending final board approval; more banks could also be added to the final sponsor team. And while CTC is keen to list by the end of the year, it will likely take place in Q1 2018. This summer also saw the formation of the China Independent Tower Alliance, currently with 60+ member organisations. China’s 200+ independent towercos have been lifted by a government document recognising and legitimising their role in the country’s “co-build, co-share” system.

The Indonesian tower market remains strong, with new builds and co-locations being added. There’s a lot of business as usual in this mature market, however, also a bit of buzz with the refinancing of KIN and STP. The major players have typically complemented their organic growth with acquisitions and with a good number of smaller towercos in the ecosystem, consolidation will continue to be expected. Myanmar on the other hand is seeing a surge of new entrants rolling out BTS for fourth operator Mytel, while the existing towercos are enjoying a boost in tenancy ratios also through Mytel and increasingly MPT. However, current political turbulence is making it more difficult to attract international investment.

The regulatory environment for towercos and infrastructure sharing varies from mature tower
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markets such as India and Indonesia, where the regulatory regime is well established, to regulatory environments still drafting policy such as Bangladesh and Nepal, where independent towercos are a relatively new business model.

**Afghanistan:** An average of 500 towers are added to the Afghan tower network every year, which totalled 5,897 towers in mid-2015; TowerXchange would estimate the total count is now around 7,000. While Roshan, Etisalat and MTN all retain their towers, all have been linked with prospective tower divestitures / outsourcing in recent years, with AWCC going so far as to carve out ~1,500 towers into their subsidiary towerco, Frontier Tower Solutions.

As of the end of September 2016, there are over 27mn GSM subscribers, with 21mn of them being active. Mobile telephone base stations total 6,861 providing approximately 89% population coverage. Services in rural areas and villages are being rolled out under the Telecommunication Development Fund (TDF), which has grown to US$74mn, with more than 55 sites to be built through the TDF subsidy in the next two years and an additional 100 sites planned for the future. To date, most rural sites are off grid, and even many urban and suburban.

**Australia:** Axicom (formerly Crown Castle), Broadcast Australia and a handful of smaller independent towercos own around 2,600 towers of the total pool of 15,100 towers in the Australian market. The majority of towers are owned by Telstra, with Optus and Vodafone playing catchup, particularly in rural areas. In urban areas Vodafone...
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Return on Investment < 16 months

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www.exeron.com
## Tower deals in Asia 2008-2017 (excluding carve-outs)

**Source:** TowerXchange

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Seller</th>
<th>Buyer</th>
<th>Tower count</th>
<th>Deal value US$</th>
<th>Cost per tower US$</th>
<th>Deal structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>Pakistan</td>
<td>Pakistan Mobile Communications Ltd (Jazz)</td>
<td>edotco &amp; Dawood Hercules Corporation Ltd.</td>
<td>13,000</td>
<td>940,000,000</td>
<td>72,307.69</td>
<td>SLB</td>
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<tr>
<td>2017</td>
<td>India</td>
<td>Nettle Infrastructure (Bharti Infratel)</td>
<td>Secondary share sale on BSE and NSE</td>
<td>39,211</td>
<td>402,000,000</td>
<td>10,215.54</td>
<td>Secondary share sale on BSE and NSE</td>
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<tr>
<td>2017</td>
<td>Pakistan</td>
<td>Tower Share (Tanzanite Tower)</td>
<td>edotco</td>
<td>700</td>
<td>88,900,000</td>
<td>127,000</td>
<td>Company acquisition</td>
</tr>
<tr>
<td>2017</td>
<td>India</td>
<td>Ascend Telecom Infrastructure</td>
<td>IDFC Alternatives</td>
<td>5,222</td>
<td>91,200,000</td>
<td>17,500</td>
<td>Acquiring 33% stake</td>
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<tr>
<td>2017</td>
<td>India</td>
<td>Bharti Airtel (Infratel)</td>
<td>Nettle Infrastructure Investments (Bharti)</td>
<td>90,255</td>
<td>1,061,500,000</td>
<td>11,782</td>
<td>Acquiring 11.32% stake</td>
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<td>2017</td>
<td>India</td>
<td>Bharti Airtel (Infratel)</td>
<td>KKR/CPPIB consortium</td>
<td>90,255</td>
<td>951,600,000</td>
<td>10,552</td>
<td>Acquiring 10.3% stake</td>
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<td>2017</td>
<td>Australia</td>
<td>Southern Cross Austereo</td>
<td>Axicom</td>
<td>56</td>
<td>9,500,000</td>
<td>169,643</td>
<td>SLB</td>
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<td>2017</td>
<td>Malaysia</td>
<td>edotco Group</td>
<td>Kumpulan Wang Persaraan</td>
<td>1</td>
<td>100,000,000</td>
<td>100,000,000</td>
<td>Acquiring 5.4% stake</td>
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<td>2016</td>
<td>Malaysia</td>
<td>edotco Group</td>
<td>Innovation Network Corporation of Japan</td>
<td>1</td>
<td>400,000,000</td>
<td>400,000,000</td>
<td>Acquiring 21.5% stake</td>
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<td>2016</td>
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<td>edotco Group</td>
<td>Khorazmah Nasional Berhad</td>
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<td>200,000,000</td>
<td>200,000,000</td>
<td>Acquiring 10.7% stake</td>
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<td>2016</td>
<td>India</td>
<td>Reliance</td>
<td>Brookfield</td>
<td>43,379</td>
<td>1,700,000,000</td>
<td>39,030</td>
<td>Acquiring 51% controlling stake</td>
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<tr>
<td>2016</td>
<td>Vietnam</td>
<td>VNI (SEALTH)</td>
<td>OCK Group</td>
<td>1,972</td>
<td>50,000,000</td>
<td>25,355</td>
<td>Company acquisition</td>
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<td>2016</td>
<td>Indonesia</td>
<td>XL Axiata</td>
<td>Protelindo</td>
<td>2,500</td>
<td>250,000,000</td>
<td>100,000</td>
<td>SLB</td>
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<td>2016</td>
<td>India</td>
<td>Viom Networks</td>
<td>American Tower</td>
<td>42,200</td>
<td>1,180,000,000</td>
<td>28,000</td>
<td>Acquiring 51% controlling stake</td>
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<td>2015</td>
<td>Myanmar</td>
<td>Digicel MTC</td>
<td>edotco</td>
<td>1,250</td>
<td>221,000,000</td>
<td>176,800</td>
<td>Acquiring 75% controlling stake</td>
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<tr>
<td>2015*</td>
<td>Australia</td>
<td>Crown Castle</td>
<td>MIRA-led consortium</td>
<td>1,772</td>
<td>1,600,000,000</td>
<td>902,934</td>
<td>Company acquisition</td>
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<td>2015</td>
<td>India</td>
<td>KEC International</td>
<td>American Tower</td>
<td>381</td>
<td>13,000,000</td>
<td>34,121</td>
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<td>2014</td>
<td>Malaysia</td>
<td>KJS</td>
<td>YTL Power Int'l</td>
<td>309</td>
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<td>48,544</td>
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<td>3500</td>
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<td>131,429</td>
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<td>2013</td>
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<td>Hutchison</td>
<td>STP</td>
<td>300</td>
<td>68,000,000</td>
<td>226,667</td>
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<td>Hutchison</td>
<td>Protelindo</td>
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<td>2012</td>
<td>Indonesia</td>
<td>PT Central Investindo</td>
<td>Protelindo</td>
<td>152</td>
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<td>2012</td>
<td>Indonesia</td>
<td>Indosat</td>
<td>Tower Bersama</td>
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<td>519,000,000</td>
<td>207,600</td>
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<td>Infratel</td>
<td>Tower Bersama</td>
<td>595</td>
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<td>2010</td>
<td>India</td>
<td>Essar Telecom Infrastructure</td>
<td>American Tower</td>
<td>4450</td>
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<td>97,079</td>
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<td>Protelindo</td>
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<td>165,900,000</td>
<td>111,943</td>
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<td>2010</td>
<td>India</td>
<td>Aircel</td>
<td>GTL Infrastructure</td>
<td>17500</td>
<td>1,800,000,000</td>
<td>102,857</td>
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<td>2009</td>
<td>India</td>
<td>Viom Networks</td>
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<td>18000</td>
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<td>133,722</td>
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<td>2009</td>
<td>India</td>
<td>Transcend Infrastructure</td>
<td>American Tower</td>
<td>327</td>
<td>23,000,000</td>
<td>70,336</td>
<td>Company acquisition</td>
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<td>2009</td>
<td>India</td>
<td>XCEL Telecom</td>
<td>American Tower</td>
<td>1730</td>
<td>170,000,000</td>
<td>98,266</td>
<td>Company acquisition</td>
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<td>2008</td>
<td>Indonesia</td>
<td>Bakrie</td>
<td>STP</td>
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<td>34,000,000</td>
<td>62,615</td>
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<td>2008</td>
<td>Indonesia</td>
<td>Hutchison</td>
<td>Protelindo</td>
<td>3692</td>
<td>500,000,000</td>
<td>135,428</td>
<td>SLB</td>
</tr>
</tbody>
</table>

**Totals / average** | 387,736 | $15,852,600,000 | $127,757.85

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* Crown Castle Australia (now Axicom) transaction excluded from totals and averages as it not a natural comp for the other S and SE Asian transactions
** Bharti Airtel (Infratel) tower count inclusive of its shares in Indus Towers
*** Average cost per tower is calculated only on deals involving 100% acquisitions/SLB
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and Optus share RAN. A further 1,800 towers have been recently erected by nbn, the Government-owned new broadband network, while a handful of government agencies and small local wireless operators and ISPs represent a further 2,000 between them. Ground based towers, primarily used for rural coverage, are supplemented by around 20,000 rooftop sites, although not all of these are occupied.

In late February 2017, Axicom purchased 56 towers (45 transmission sites) from Southern Cross Austereo for A$12.6mn (US$9.25mn) in a sale and leaseback deal. This is the first deal involving a tower portfolio between a broadcaster and an independent towerco. The portfolio will help Axicom, which now owns over 1,900 sites in the country, expand its footprint into five regional markets in NSW, Queensland, Victoria, South Australia, and Tasmania.

Competition is also heating up as the fourth operator TPG Telecom enters the market. TPG spent A$1.26bn for two blocks of 700MHz spectrum and will spend A$600mn to build out its network, with an initial 2,400 sites to start. There will likely be some co-location opportunities for independent towercos. For now the regulator ACCC has decided against mandatory infrastructure sharing in rural areas, which would’ve allowed TPG to access Telstra or Optus’ networks.

**Bangladesh:** Estimates vary between there being just under 30,000 and 35,000 towers in Bangladesh, of which 6,500+ have been shared amongst the

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**Estimated tower count for Bangladesh**

- Grameenphone: 7,800
- Banglalink: 6,000
- edotco: 8,300
- Airtel: 3,800
- Teletalk, CityCell and non-traditional MNOs: 4,100

Sources: TowerXchange research, edotco, Hardiman Telecommunications

**Revenue market share of MNO in infra-sharing in Bangladesh**

- Grameenphone: 45%
- edotco: 36%
- Banglalink: 12%
- Airtel-Robi: 7%

Source: Market Intelligence
Active Network Design & Build
Managed Services Packages
Structure Design and Steelwork
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operators to date. TowerXchange believes the actual total to be around 29,900. As of June 30, 2016, there were 69,009 base transceiver stations across the country according to the government.

There are currently four operators in the country with Telenor’s Grameenphone (GP) as market leader with 55mn+ subscribers. GP’s network covers 99%+ of the population, with 12,000+ 2G sites and 10,000+ 3G sites; the split for greenfield sites versus rooftop is 55% to 45%.

Meanwhile, VEON (formerly VimpelCom) is preparing Banglalink’s towers for sale, with the portfolio set to be optimised through ongoing consolidation of sites duplicated by the edotco portfolio. There are 5,890 assets, excluding in-building solutions (IBS), which Banglalink may add to the process, bringing it up to about 6,000 total. Out of that, about 50% are green field sites which predominantly service suburban and rural areas, with the other 50% being urban rooftops.

In light of the particular climate of Bangladesh, especially during monsoon season, the autonomy of cells sites is of particular concern in the country.

edotco operates a network of 8,300 towers, the majority of which were transferred from Axiata’s Bangladeshi opco Robi. As a result of the Robi and Airtel merger, edotco is currently assessing which sites of the 3,000+ in Airtel’s portfolio it will absorb into its portfolio.

One of the most anticipated developments in the country is the towerco licensing regime. A final draft of the guideline was submitted by the Bangladesh Telecommunication Regulatory Commission (BTRC) to the government for approval in July 2017. Industry consultation on the framework began in 2016 and after a few revisions now propose the issuance of three licenses for telecom infrastructure management, 60% foreign direct investment and exclusion of MNOs from being eligible for application. edotco Bangladesh currently operates under a statement of non-objection. Assuming edotco applies and receives one of the licenses, this opens the door for either a new local towerco to enter the market and/or acquisitions by towercos seeking expansion and growth beyond their home markets.

Infrastructure sharing in Bangladesh started back in the early 2000s, when the first barter arrangements took place between two MNOs CityCell and Aktel (now Robi). Commercial tower sharing then kicked in following the introduction of tower sharing guidelines by the BTRC Grameenphone was the pioneer, establishing its wholesale business division back in 2010, followed by others in 2013 and 2015.

Cambodia: With a crowded mobile market consisting of six operators serving a population of 15.5mn, and a regulator that supports infrastructure sharing, there is continued potential for the 9,250+ site tower market in Cambodia to grow.

There has been an influx of Chinese operators and vendors prepared to invest heavily in this market. While on the operational front, challenges still remain including 20% of sites being off-grid and the risk of landmines in the more remote areas.

edotco operates a portfolio of 2,000 towers in Cambodia, and manages a further 1,000. As of January 2017 local tower builder Camtowerlink Communications has built six towers around the Angkor Wat temple UNESCO World Heritage complex, with an agreement with the Aspara Authority to build an additional 18 camouflaged towers in the park. Some operators in this market, such as Mfone, have fallen victim to the intense competition and price wars leaving some infrastructure assets abandoned.

China: Now covered in China FAQs

India: India is in the midst of a new wave of market restructuring and TowerXchange estimates that around 130,000 towers are likely to come to market in the near future.

State-owned MNOs

Among the latest news, BSNL has received the green light for the carve out of its 65,000 towers into a separate infrastructure unit while the other State-run MNO, MTNL, is considering divesting its 10,000 tower portfolio in an attempt to reduce its debts. BSNL’s carve out could be valued up to US$3bn and analysts are excited by the potential of these towers coming to market as many are in prime locations with considerable tenancy ratio growth potential, having not been proactively marketed before.

BSNL has leased out 6,505 of its towers to other...
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telecom operators, suggesting a tenancy ratio around 1.1x. Out of the 6,505 spaces that it has rented out, Bharti Airtel accounted for 2,251 slots. It was followed by Reliance Jio with 1,440 slots and Idea and Vodafone with just above 900 towers each. Reliance Jio has led the rollout of 4G and has opted to self-deploy as many as half the sites in their network, including constructing over 25,000 new structures, most of which are micro sites.

Vodafone and Idea Cellular
Additionally, while Vodafone and Idea Cellular keep pursuing their merger plans, their tower portfolios are up for sale with American Tower and Brookfield still head to head as the most likely buyers. And Brookfield isn’t only eyeing this deal but is also in the process of acquiring a 51% stake in Reliance Infratel for US$1.7bn.

The Vodafone-Idea merger could also precipitate a restructurings of the ownership of joint venture giant Indus Towers.

GTL Infrastructure and Tower Vision
GTL Infrastructure is in talks with investors and planning to switch its ownership by March 2018. The company is reportedly been evaluated at US$1.5bn. There are also rumours that Tower Vision, an independent towerco with 8,400 towers owned by a group of international investors, has been up for sale.

MNO consolidation
In the meantime, upcoming MNO consolidations may also include the merger of Aircel and Reliance Communications.

Further rational consolidation is welcomed by towercos who would prefer to see spectrum holdings consolidated into four or five companies with the capital and appetite to rollout. With India’s 3G overlay around half finished and expected to reach 95% coverage in the next 18-24 months, the 4G rollout has already started in tier one and tier two cities. In the near term, the 4G rollout is expected to have a marginal impact on the profitability of Indian towercos, whilst the majority of BTS are added through ‘loading’ - the addition of a second set of antenna by an existing tenant - but when 4G rollout progresses to adding infill sites for densification, expect to see a significant increase in tower cash flow.

Indonesia: Indonesia remains one of the most mature tower markets in the world, with solid tenancy ratios, excellent organic growth, and strong market caps boasted by three major towercos; Protelindo (14,614 towers), Tower Bersama (13,375) and STP (7,000). IBS Tower, KIN, Centratama (formerly known as Retower), Persada Sokka Tama and Balitower also have some scale in Indonesia.

Indonesia’s towercos build 3,000-5,000 towers, rooftops and infill sites per year, tenancy ratio growth compares favourably to many other global tower markets, with around 0.13 tenants added per tower per year.

XL Axiata has completed the sale of 2,500 telecommunication towers to Protelindo for Rp3.56 trillion (US$250mn) in cash. XL signed a deal to leaseback most of the towers for ten years.

The future of Telkom-owned Mitratel and their 13,113 towers remains uncertain with the
cancellation of the proposed share-swap acquisition of Mitratel by Tower Bersama at the behest of the commissioner. Telkom still has a further 18,000 towers on their balance sheet, of which 13,000 could potentially be sold at an unspecified point in the future, although it remains unclear whether some of these towers are being marketed by Mitratel.

One of the big news over the summer was the refinancing of STP and KIN, who reportedly retained Morgan Stanley and HSBC respectively for the process. Providence Equity who is believed to hold 40% stakes in KIN is apparently exiting the Asia market, following its moves in scaling back on India also.

Protelindo and Tower Bersama are holding firm against downward pressure on lease rates, which are believed to average around US$1,200 in Indonesia.

Meanwhile, the new battleground for competition between Indonesia’s towercos seems to be microcells and fibre, as illustrated by Protelindo’s acquisition of iForte. STP also has substantial fibre and microcell portfolios after its acquisition of fibre company Bit, while Balitower have also added substantial stock of smaller sites to their portfolio. TowerXchange has also identified a company by the name of PEKAPE who has a partnership with Alfamart and offers a mix of assets including microcell poles, self-supporting towers and nano-sites.

A spectrum auction for the 2.1GHz and a 2.3GHz bands was planned for the first half of 2017 but the project has been delayed as announced back in May by Indonesia’s Ministry of Communications and Information Technology (MCIT).

Japan: Japan is one of the most sophisticated mobile markets in the world. Yet towers are still seen as a source of competitive differentiation, which perhaps explains why initial interest in carving out a towerco a few years ago seems to have tailed off, and why tower count data is so hard to find — readers should consider our estimate a very rough guide. Japan is famous for having the fewest number of subscribers per tower in the world – reportedly around 500 – suggesting a staggering tower count of around 220,000 for a nation of

---

### Indonesia’s four publicly listed towercos’ key stats for 2016 year-end

<table>
<thead>
<tr>
<th></th>
<th>Towers/sites</th>
<th>Sites leased/tenants</th>
<th>Tenancy ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protelindo</td>
<td>14,562</td>
<td>24,144</td>
<td>1.66</td>
</tr>
<tr>
<td>Tower Bersama</td>
<td>12,610*</td>
<td>20,415</td>
<td>1.62</td>
</tr>
<tr>
<td>STP</td>
<td>6,898</td>
<td>11,416</td>
<td>1.65</td>
</tr>
<tr>
<td>IBS Tower</td>
<td>3,677</td>
<td>4,108</td>
<td>1.12</td>
</tr>
</tbody>
</table>

*12,539 are tower sites, while 71 are DAS networks

Source: Company reports

### Estimated tower count for Indonesia

<table>
<thead>
<tr>
<th>Towerco-owned</th>
<th>Operator-captive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitratel</td>
<td>Telkom + Telkomsel</td>
</tr>
<tr>
<td>Tower Bersama</td>
<td>XL</td>
</tr>
<tr>
<td>Protelindo</td>
<td>Indosat</td>
</tr>
<tr>
<td>STP</td>
<td></td>
</tr>
<tr>
<td>IBS Tower</td>
<td></td>
</tr>
<tr>
<td>KIN</td>
<td></td>
</tr>
<tr>
<td>Persadasokka Tama</td>
<td></td>
</tr>
<tr>
<td>Centratama Menara</td>
<td></td>
</tr>
<tr>
<td>Balitower</td>
<td></td>
</tr>
<tr>
<td>Gihon</td>
<td></td>
</tr>
<tr>
<td>PEKAPE</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
</tbody>
</table>

Source: TowerXchange

---

---

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127mn people and a landmass of just 378,000sq km. LTE was launched as early as 2011 by former State-owned monopoly NTT DOCOMO and in 2012 by the other MNOs, SoftBank and KDDI (au). DOCOMO has already started rolling out LTE-A. Japan’s three leading MNOs are believed to have each added up to 30,000 microcells and small cells as infill sites. TowerXchange understand several tower companies are trying to establish themselves in the Japanese market, but to date their penetration remains negligible.

**Laos:** The 7,473 towers in Laos all remain operator-captive, but there are possible opportunities to acquire towers from all but the market leading MNO Unitel, which owns 4,000 towers, and is a 51-49% joint venture between the State and Viettel. The State also owns 51% of number two operator LTC, whose co-investor Shenington Investments may seek an exit. 100% State owned MNO ETL is heavily indebted and needs cash for 4G rollout, while Veon has long sought to exit Beeline Laos, whose towers could potentially be monetised by an acquirer.

**Malaysia:** Towercos own roughly 63.8% of Malaysia’s towers, led by edotco’s 3,800 towers carved out of Celcom/Axiata. A further 3,200 towers are owned by 14 different State-backed and other independent towercos, while turnkey infrastructure provider OCK Group owns ~200 sites in this market with plans to build an estimated 70 to 100 more sites in the country. Naza Communications and Omnix Malaysia are also active.

There are an estimated 22,682 towers now in

---

**Estimated tower count for Laos**

<table>
<thead>
<tr>
<th>Operator</th>
<th>Tower Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTC</td>
<td>1,950</td>
</tr>
<tr>
<td>Unitel</td>
<td>1,100</td>
</tr>
<tr>
<td>ETL</td>
<td>423</td>
</tr>
<tr>
<td>Beeline (VimpelCom)</td>
<td>4,000</td>
</tr>
</tbody>
</table>

**Estimated tower count for Malaysia**

<table>
<thead>
<tr>
<th>Category</th>
<th>Tower Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>edotco</td>
<td>3,900</td>
</tr>
<tr>
<td>State-backed towercos</td>
<td>3,200</td>
</tr>
<tr>
<td>YTL</td>
<td>5,000</td>
</tr>
<tr>
<td>Naza Communications</td>
<td>300</td>
</tr>
<tr>
<td>OCK</td>
<td>202</td>
</tr>
<tr>
<td>Omnix</td>
<td>148</td>
</tr>
<tr>
<td>Unaccounted for</td>
<td>1,732</td>
</tr>
<tr>
<td>Operators</td>
<td></td>
</tr>
<tr>
<td>DiGi</td>
<td>3,400</td>
</tr>
<tr>
<td>Maxis</td>
<td>3,800</td>
</tr>
<tr>
<td>Telekom Malaysia</td>
<td>1,000</td>
</tr>
</tbody>
</table>
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Malaysia, representing almost 2,000 mobile subscribers per tower. A new ground based tower in Malaysia costs around RM300,000 (US$69,000).

Around 1,000 new towers went up in 2015, with Celcom building through edotco and Maxis and DiGi building their own – although DiGi has since signed a collaboration agreement with edotco which includes co-location and new BTS sites. The State-backed towerco also continued to expand, including through over 2,000 rural sites supported by Malaysia’s Universal Service Provision Fund.

It has been estimated that an additional 8,000 structures may be needed in Malaysia for 4G, although much of that demand will be met by microcells, lamp-poles, DAS and IBS.

Mongolia: In 2013 the government separated telecom service providers from infrastructure providers in the challenging 3mn population, 1.5mn sq km Mongolian market. The infrastructure providers, including State-owned ICNC, Mobi Network and Sky Network, run towers, active equipment, fibre and microwave backhaul. More than half Mongolia’s ~1,000 towers are shared.

Myanmar: Currently 60% of the cell sites in the country are owned by towercos. The 13,620 sites in Myanmar are unequally spread across seven towercos and three MNOs. State-owned MPT owns 3,500 sites, while Telenor and Ooredoo have about 1,500 between them, though mostly rooftops. The fourth operator consortium, led by Viettel may utilise consortium partner Star Holdings Corporation’s ~400 captive towers (up to 1,000

---

**Estimated total number of sites in each Myanmar MNOs network**
(inclusive of co-locations)

<table>
<thead>
<tr>
<th>MNO</th>
<th>Total Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPT</td>
<td>5,300</td>
</tr>
<tr>
<td>Telenor</td>
<td>7,200</td>
</tr>
<tr>
<td>Ooredoo</td>
<td>4,500</td>
</tr>
<tr>
<td>Mytel</td>
<td>1,000</td>
</tr>
</tbody>
</table>

Source: TowerXchange

**Breakdown of ownership of the 13,620 towers TowerXchange estimates have been built to date in Myanmar**

<table>
<thead>
<tr>
<th>Towerco</th>
<th>Independent towerco towers</th>
<th>MNO captive towers</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGT</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>Apollo</td>
<td>1,800</td>
<td></td>
</tr>
<tr>
<td>edotco</td>
<td>1,400</td>
<td></td>
</tr>
<tr>
<td>PAMEL</td>
<td>1,250</td>
<td></td>
</tr>
<tr>
<td>OCK</td>
<td>620</td>
<td></td>
</tr>
<tr>
<td>EFT</td>
<td>550</td>
<td></td>
</tr>
<tr>
<td>MIG</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>*Telenor</td>
<td>1,200</td>
<td></td>
</tr>
<tr>
<td>*Ooredoo</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Mytel</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>MPT</td>
<td>3,500</td>
<td></td>
</tr>
</tbody>
</table>

*Telenor and Ooredoo portfolios are primarily rooftops

Source: TowerXchange
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including co-location with MPT), which were previously utilised by MECtel. The new MNO will operate under the Mytel brand with formal launch in 2018, and it will use a combination of co-location with towercos and MNOs, as well as BTS and own build in order to rollout its network. The split between co-locations and new builds will be around 50/50.

TowerXchange has learned of several new towercos now active in the market place including New Tower Development (NTD), Myanmar Technology Gateway (MTG), MNTH, DLRE, CommBiz, ITMB, MAPCO, along with potentially a handful more others. Out of the list, MTG was also a previous sub-contractor for Ooredoo and Telenor, building about 200 towers. We are in the process of crystallising all the new entrants; as expected, there are several connections to the consortium of minority stakeholders in Mytel.

The word on the street is most have been awarded BTS with Mytel, in the range of 75 to 100 sites, growing up to 300 sites for the next round.

Existing towercos OCK has also confirmed an order of 300 towers from Mytel, to be delivered by the end of 2017, with a further 70 co-locations on existing sites built for Telenor. To date, OCK has completed 550 of an original order of 920 sites for Telenor.

At the same, KBZ Towers is operating as a rooftop-only player, offering space from KBZ Bank branches across the country.

In general tower building activities were quite muted for the last few months, likely due to the rainy season, as well as negotiations for BTS and co-locations with Mytel.

On average, most of the mature towers that are two-plus years old have a tenancy ratio around 1.6, with some portfolios reportedly as high as the 1.8 to 1.9 range. By late 2017 and beginning of 2018, the Myanmar market will certainly have some portfolio tenancy ratios growing to 2.0 once Mytel rolls out.

Grid power is unreliable even in major cities and in rural areas often non-existent, so Myanmar’s towers typically have robust backup power systems. Lithium batteries are now being tested and solar integration will also be explored. Ooredoo’s dalliance with retaining power assets is now behind them, so all new towers are built on a tower+power business model. TowerXchange is also picking up signals of potential ESCO plays.

The MNOs are ramping up 4G rollouts as MPT, Telenor and Ooredoo each acquired the 1800MHz spectrum, valid for 12 years, at a cost of US$80mn.

Nepal: Axiata Group has closed the acquisition of a majority stake in Nepalese market leader Ncell from TeliaSonera, in a deal believed to be worth US$1.365bn. There have been no tower deals in Nepal to date, but this move by the Axiata Group may pave the way for edotco to enter the market in the near future.

In fact, there is a draft Infrastructure Development and Sharing Regulation put together by the Nepal Telecommunications Authority (NTA) that is currently under review by the Ministry of Information and Communications (MoIC). It introduces a license for the provision of telecommunications infrastructure, though some concerns were raised as the draft appears to suggest that should such license be extended, it would not be available to another provider for five-years, effectively creating a monopoly.

Some infrastructure sharing appears to be underway, as Nepal Telecom (NT) had indicated in June it will extend coverage to 175 locations within a year, with 138 with “base transceiver stations (BTS) or network extension platforms that will be shared with other phone companies.” The State-owned operator is said to be at the final stage of inviting bids for the procurement of equipment including BTS towers.

TowerXchange will be looking to undertake further market studies for a dedicated report on Nepal’s telecom infrastructure landscape.

New Zealand: There are early signs of a nascent tower industry emerging in New Zealand, where Spark and Vodafone New Zealand have substantial but ageing tower networks, newer entrants 2degrees have leveraged co-location where possible while building a few hundred towers. 2degrees may have an appetite to sell their towers and partner with a towercos on BTS. Parallel infrastructure is substantial, while the need for improved rural coverage, particularly on the South Island where tourist and agribusiness drive demand, has prompted the government’s
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**Estimated tower counts for Pakistan**

<table>
<thead>
<tr>
<th>Tower Operator</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>edotco*</td>
<td>13,700</td>
</tr>
<tr>
<td>Telenor</td>
<td>7,100</td>
</tr>
<tr>
<td>CMPak (Zong)</td>
<td>6,100</td>
</tr>
<tr>
<td>Ufone</td>
<td>7,400</td>
</tr>
</tbody>
</table>

*Jazz remains the anchor tenant on the majority of edotco towers. Jazz has retained a small number of strategic sites, the count for which is undisclosed.

Source: TowerXchange

Rural Broadband Initiative to invest in over 100 towers. A total of around 4,000 ground based towers are supplemented by around 7,000 rooftop sites, primarily used in the larger cities.

**Pakistan:** Roughly 40% of Pakistan’s towers will soon be owned and operated by edotco, which is consolidating 13,000 towers from Jazz (Mobilink+Warid) together with Tanzanite Towers’ 700 sites, both acquisitions coming at a cost of a little over US$1bn. edotco’s acquisition of Pakistan’s largest and most pervasive tower network, securing the market leading MNO as their anchor tenant, is a milestone in the country’s increasing adoption of infrastructure sharing. With over 10,000 co-locations on Pakistan’s ~36,300 towers, tenancy ratios are already over 1.25, and growing at around 0.06 per year, driven by 3G and more recently 4G rollout.

While #2 and #3 MNOs Telenor Pakistan and CMPak (Zong) have been pioneers in RANsharing, neither is under pressure to divest their towers. However, Telenor has co-locations on over 1,500 towers. #4 MNO Ufone may be more inclined to monetise their 6,100 sites.

There are opportunities to create efficiencies by decommissioning parallel infrastructure in Pakistan, for example 2-3,000 of edotco’s sites are believed to be within 250m of each other. However, many sites may be retained for the densification of the network as MBB penetration rises from a relatively low base of 24%.

Pakistan’s MNOs have called for neutral hosts to deliver up to 100 IBS.

Power remains the number one operational challenge in Pakistan, although grid conditions are improving.

For more information, see TowerXchange’s updated Pakistan tower market study, which appears later in this Journal.

**Philippines:** There are currently no independent tower companies in The Philippines. The glass ceiling on tenancy ratios created by the market structure - a cosy duopoly between Globe and Smart, neither of which urgently needs to raise capital - means towercos are unlikely to prioritise the country, despite its scale (over 100mn subscribers). A reportedly burdensome tax regime, compounded by complex permitting processes, further disincentivises investment in The Philippines by international towercos.

The prospective entry of SMC as a third MNO, in a joint venture with Aussie giants Telstra, recently faltered, although SMC are reportedly in dialogue with Telenor in a renewed attempt to enter the market. The new Philippine government may look more favorably on increasing competition than the previous incumbent.
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Operational costs in The Philippines are phenomenal, largely as a function of the geography of the country: a maintenance visit to a remote tower can require a flight, a boat and a donkey ride up a mountain! This has resulted in substantial outsourcing to managed services subcontractors. To counteract the opex challenge, both Globe (which has an estimated 7,300 towers) and Smart (9,000) are currently investing in substantial network modernisation programmes, including the upgrade of backup power solutions.

**South Korea:** According to GSMA Intelligence, SIM penetration was at 113% among a population of 50.4mn in Q4 2015. South Korea boasts one of the most sophisticated telecommunications infrastructures in the world, cultivating an insatiable demand for high speed mobile broadband among its citizens. Mobile broadband penetration in South Korea is above 99% and fibre has been widely deployed. South Korea is a three operator market featuring SK Telecom, KT and LG Uplus. The Ministry of Science, ICT and Future Planning (MSIP) has tried multiple times over the years to license a fourth MNO, however, failed again in February 2017 as none of the three applicants (Sejong Telecom, K Mobile, and Quantum Mobile) met the criteria. South Korea was the first market in the world to migrate the majority of users to LTE, with LTE-A rollout now well under way. SK Telecom recently noted it will invest KRW 6tn in infrastructure for network leadership in 2017, while maintaining overall capex similar to 2016. Meanwhile, KT is looking to make the 5G experience available at the 2018 Winter Olympics. TowerXchange is starting to pick up the first faint signals that towerco activity may be emerging in South Korea.

**Sri Lanka:** As of 31 July 2017, edotco owns 2,200 towers and manages a further 1,200 towers in the country. High levels of bilateral sharing means tenancy ratios are closer to two than one all over the country. Sri Lanka is now mostly covered with 3G, and 4G is driving need for cell site densification. Dialog and Mobitel hold all of the 4G spectrum, and any other players that want to offer this will need to engage in RANsharing. There are around 7,500 towers in the country.

Bharti Airtel had been rumoured to be looking at selling its 2,500 towers, but seems to have cooled on the idea.

**Thailand:** Thailand has a tower market unlike any other in the world! Ownership of towers is in dispute as a function of BOT (Build-Operate-Transfer) concessions that are now expiring. Thailand’s three commercial MNOs were due to transfer 2G infrastructure back to SOEs CAT and TOT. The 2G equipment has little value, but of course the towers do. CAT, which ran the concessions for the 850 and 1800MHz bands, failed to reach an agreement with majority stakeholder DTAC to create a 49-51% JV towerco, into which 11,000 disputed towers were to be injected. Negotiations to create a prospective 12,000 tower
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Estimated tower ownership in Thailand

<table>
<thead>
<tr>
<th>Tower Type</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed DTAC-CAT towerco</td>
<td>11,000</td>
</tr>
<tr>
<td>DTAC towers built outside concession</td>
<td>12,183</td>
</tr>
<tr>
<td>AIS disputed towers built under CAT concession</td>
<td>10,000</td>
</tr>
<tr>
<td>AIS disputed towers built under TOT concession</td>
<td>800</td>
</tr>
<tr>
<td>AIS towers built outside concession</td>
<td>5,000</td>
</tr>
<tr>
<td>DIF (formerly TRUEIF)</td>
<td>1,500</td>
</tr>
<tr>
<td>True disputed towers built under CAT concession</td>
<td>800</td>
</tr>
</tbody>
</table>

Source: AEC Advisory and TowerXchange

JV towerco between AIS and TOT, which ran the 900MHz concession, were called off late in 2015, but the process has resumed with the recent creation of a committee to pave the way for the creation of the joint venture.

CAT and TOT have started to discuss an informal partnership without a merger, and may consolidate some of their similar core businesses to remain competitive in the post-concession era. At the same time, AIS and TOT are expected to sign a contract signalling the launch of a joint-trial commercial service on the state agency’s 2.1GHz spectrum. TowerXchange estimate there are 52,483 towers in Thailand, of which 12,183 sit on the balance sheet of DIF, formerly TRUEGIF, a towerco created by True Corp and SCB Asset Management and successfully listed on the Thai stock exchange. DIF has little debt, a high leverage ceiling, and an appetite to consolidate more Thai towers – especially if True reduces their shareholding to increase the perceived independence of the entity.

A further 10,000 towers were built by AIS and 800 by DTAC outside the concession for 3G usage. True’s non-concession towers sit on DIF’s balance sheet...

It all gets very confusing!

The steady lease-up of DIF’s towers is a good sign, but there is little progress towards any joint ventures. With one auction for 900MHz spectrum cancelled after the successful bidder Jasmin failed to pay its first instalment, a re-auction was held in which AIS was the only bidder. The Thai market continues to be complex and unpredictable; this and the 49% FDI limit may deter some investors.

Towards the end of 2016, TOT announced its intention to sign a partnership contract with Advanced Wireless Network (AWN) to help grow its existing 5,320 base stations in the 2.1GHz band. Under the agreement, AWN would roll out 11,000 new base stations for TOT, for which TOT would later purchase the total capacity of the network at the set budget of Bt10bn. AWN is also leasing towers from TOT at Bt3.6bn per year for 15 years, as well as TOT’s 2G-900MHz at Bt2bn per year for a duration of five years.

A September 2017 note by Daiwa Capital Markets suggested growth to the DIF portfolio as TRUE may add more telecom towers and optical fibre into the fund.

Vietnam: Malaysia-based OCK Group completed its acquisition of Vietnam’s largest independent towerco Southeast Asia Telecommunications Holdings Pte. Ltd. (SEATH) in January 2017 for US$50mn. SEATH has 1,983 towers in the country. OCK has allocated US$5mn to US$8mn for its expansion, with plans to build 200 to 250 sites per year in the country. OCK may seek to consolidate other members of a fragmented group of around 30 local towercos who between them own ~10,000 towers. Alcazar Capital and ASEAN Towers’ Vietnamese subsidiary Golden Towers’ has around 350 towers in the country, and may also
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- Suitcase-sized form factor for simplified logistics and installation
- Reliable network data for highest sustained performance

Flexenclosure’s eSite x10 is the world’s first hybrid power system purpose-built to withstand the most challenging outdoor telecom site environments.

Designed as a single unit for all site types, eSite x10 greatly simplifies logistics and delivers 24/7 uptime and industry-leading OPEX reductions.

eSite x10 is patented and delivers a number of ground-breaking technical innovations including passive cooling, protective soft power switching and no need for maintenance. The future of hybrid power has arrived.

www.flexenclosure.com/eSite
be engaged in consolidating existing independently owned towers in Vietnam. TowerXchange has learned of another player that may sit between OCK and Golden Towers, with potentially 600-700 towers.

JTOWER, an in-building solution (IBS) specialist recently expanded beyond its home market in Japan to Vietnam as it acquired the IBS portion of SEATH for US$10.2mn. This is said to be the largest IBS portfolio in the country, which included over 120 IBS. JTOWER is optimistic on the Vietnamese market and sees opportunities for further consolidation on this side of things.

In October 2016, 4G licenses were granted to three of the major MNOs: military-run Viettel, Government-owned MobiFone and VNPT. The licenses are valid through 2024 and allow the operators to roll out LTE services using the 1,800MHz spectrum. Six months later, Viettel rolled out 36,000 BTS across the country and launched its 4G LTE network with ‘nation wide’ coverage of 95% of the population. To date, towers have not been widely shared in Vietnam, hence considerable parallel infrastructure with an estimated 70,000 towers in the country.
Treating “Data as an Asset”
Increasing Customer’s Enterprise Value Using Data

Total Sites: 100,000+
Fuel Tracking per year: 42 Million+ Litres
Bills Reconciled: $23 Million+
Assets Reconciled: 700,000+
Note: Russia is covered under Europe; we estimate it to have a 5% towerco penetration and we expect it to be a growth market.
ABOUT NANHUA

NANHUA is an independent enterprise with modern management which is located in Shanghai. We design, manufacture and sell world leading signal, lighting and control products which be applied in industrial areas since 1990, and focusing on aviation obstruction light system for telecom towers from 2007, has full experience in the complete line of cost-effective obstruction lighting and control solutions. NANHUA products have been proven to be professionally designed and highly reliable.

NANHUA will continue to maintain reliable, safety and simple R&D concepts, combine with the latest technology, commit to developing new products to help customer solve problems and enhance customer value.
China is home to the world’s largest towerco China Tower Corporation (CTC), as well as a fragmented but good-sized ecosystem of 200+ independent towercos. While the State-owned enterprise remains eager and committed to IPO in Q4 2017, there is chatter this is more likely to happen in the first quarter of 2018. Estimated tower builds this year so far by CTC are ~200,000. Meanwhile, optimism is on the rise for independent towercos in China following a government document legitimising their role alongside CTC in the country’s vision for “co-build, co-share.” Read on for your one-stop shop on the shape of the exciting Chinese tower marketplace.


Read this article to learn:
- What is China Tower Corporation, how does it operate, and what does it own?
- Lease rates for China Tower and independent towercos
- Growth opportunities and regulatory landscape
- Valuation benchmarks, tenancy ratios, and investibility

Market context

What are current levels of mobile / SIM penetration and ARPU?

According to data released by the Ministry of Industry and Information (MIIT), as of the end of August 2016, there are 1.309bn mobile phone subscribers in China. This represents 95% SIM penetration.

Mobile ARPU for the three MNOs in 2016 ranged between CNY¥47 to CNY¥60.

What are the number of 4G customers in China?

As of June 2017, China Mobile reported 593.65mn 4G customers, while China Unicom had 138.81mn 4G subscribers, and China Telecom indicated 152.02mn 4G “terminal users.”

How many new towers were built in China in 2016?

For context, prior to CTC, there were approximately 1.38mn towers built by the three operators over 30 years between 1985 to 2014.

It was reported that asset transfers of roughly 1.5mn towers happened around the end of 2015 and beginning of 2016.

By September 2016, CTC was quoting roughly 1.63mn towers, and by year end around 1.7mn towers.
NorthStar ACE® – The future of energy storage management

Visit us at TowerXchange Meetup Asia 2017 - Booth 216

www.northstarbattery.com
As such, CTC build volume for the year would be between 200,000 towers.

In terms of independent towerco output, estimates would be in the range of 20-30,000.

How many towers are in China and who owns them?

China Tower Corporation owns ~1.9mn towers as of August 2017.

The roughly 200+ third-party towercos will own approximately 40-50,000. We now know of one towerco with towers with a five-digit count, with a handful of others in the four-digit count.

What is the future growth of in China?

CTC still has a lot of building to do, including plans to provide coverage on the 56 subway lines and 59 of the high-speed train lines within the next three years.

CTC has also developed strategic partnerships with 22 provinces and autonomous regions to better integrate network planning and construction into local planning, as many are keen to drive economic development through enhanced mobile and broadband coverage. Reportedly the new arrangements have been better compared to what operators were dealing with in the past. This theoretically paves the way for faster and more build out.

There is some speculation that within three year's

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### Mobile ARPU and service revenues for China’s three MNOs in 2016

<table>
<thead>
<tr>
<th></th>
<th>China Mobile</th>
<th>China Unicom</th>
<th>China Telecom</th>
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<tbody>
<tr>
<td><strong>Mobile ARPU</strong></td>
<td>CNY¥59.5</td>
<td>CNY¥46.8</td>
<td>CNY¥55.5</td>
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<td><strong>Mobile service revenues</strong></td>
<td>CNY¥598bn</td>
<td>CNY¥145bn</td>
<td>CNY¥138bn</td>
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Data source: Nomura

### Approximate tower ownership in China by operator 2014E

![Diagram showing tower ownership by operator](image)

- **China Mobile**: 752,000 towers
- **China Telecom**: 388,000 towers
- **China Unicom**: 246,000 towers

Total = 1,386,000

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### China Tower Corporation tower counts by year

- **1985-2014**: 1.38mn towers
- **2015**: 1.5mn towers
- **2016**: 1.7mn towers
- **2017 YTD**: 1.9mn towers

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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.
time tower construction could slow down in China. The standards for 5G are yet to be defined and many commentators have indicated that 4G is more than enough for the general mobile consumer. Generally 5G would mean higher site density and smaller equipment mounted at lower heights.

On the independent side, one source estimates that there could still be 50,000 to 100,000 towers available to build given the size of the country.

The need for macro towers will decrease over time as major coverage projects get completed. Ultimately, tower growth will be dependent upon the operators’ demands.

Major cities will need more infill sites to provide the density needed for heavy data need. More light-pole integrated tower designs that are sleeker, smaller, and faster to deploy will likely play a role, as well as microcell and small cell.

What is the vision behind creating China Tower Corporation?

With the approval of the General Office of the State Council (国务院) and led by State-owned Assets Supervision and Administration Commission of the State Council (SASAC, 国资委) and the Ministry of Industry and Information Technology (MIIT, 工信部), the joint venture was formed to promote a culture of infrastructure sharing in China. Also referred to as “co-build, co-share.”

CTC was formally created on 15 July, 2014 to

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consolidate and share existing towers, to construct shared additional towers, and to save land and tower resources.

In 2015 alone, compared to MNOs own build, CTC was able to realise savings of 265,000 sites, 13,000 acres of land and CNY ¥50bn of investment.

One of the goals of CTC is to improve the customer experience from, in some cases, a few hundred KB per second, to as much as 20MB per second once 4G is fully deployed.

CTC is also seen as a mechanism for reducing the gap between competing MNOs by providing China Unicom and China Telecom with access to China Mobile’s vast tower network, enabling them to accelerate and catch up their 4G rollout. If 4G coverage were complete, using VoLTE could enable refarming of valuable spectrum.

The formation of CTC not only allows China to accelerate 4G rollout, but also enable the implementation of the country’s mobile broadband network strategy.

The creation of CTC is also a reform of sorts, to drive efficiency and inject new energy into the industry.

Opportunities to diversify CTC into other shared infrastructure, and the sheer scale of the business, means the vision is less to create the world’s largest and most valuable towerco, but to create one of the world’s largest and most valuable infrastructure companies.

**Shareholders in China Tower Company**

<table>
<thead>
<tr>
<th>Shareholder</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>China Mobile</td>
<td>38%</td>
</tr>
<tr>
<td>China Unicom</td>
<td>28.1%</td>
</tr>
<tr>
<td>China Telecom</td>
<td>27.9%</td>
</tr>
<tr>
<td>China Reform Corporation</td>
<td>6%</td>
</tr>
</tbody>
</table>

**Does CTC also own assets beyond the macro network, such as rooftops, IBS, DAS and transmission infrastructure?**

CTC has absorbed most, if not all, China’s legacy towers, monopoles, and rooftops. There is an appreciation at CTC that the co-construction and sharing model can extend beyond towers to transmission infrastructure, but that does not seem to have been incorporated yet.

**IBS are widely deployed in China, but there are not many DAS.**

We did hear of one towerco with a substantial streeetlamp project in one of China’s major cities – they called them “information poles” and spoke of how they were supporting the Smart City vision.

**Does China Tower Corporation only own and lease up the towers, or do they undertake O&M too?**

CTC is responsible for the construction, operation, and maintenance of towers. Having said this, given engineering design, construction, and the likes are also included as service categories on the online procurement platform, it would be reasonable to expect a certain level of sub-contracting of O&M.

**Who are the principal stakeholders in China Tower Corporation – who are they answerable to?**

China Mobile is the largest stakeholder of CTC at 38%, while China Unicom and China Telecom own 28.1% and 27.9% respectively. China Reform Corporation, likened to a sovereign wealth fund...
with a particular focus on reforming State-owned Enterprises, owns the remaining 6%.

While the Ministry of Industry and Information Technology (MIIT) defines policy, CTC is effectively answerable to SASAC, the State-owned Assets Supervision and Administration Commission.

**What is the governance structure of CTC?**

There are currently nine members total on the board.

Mr. Liu Aili (刘爱力) is the Chairman of the board. He is also the Executive Director and Vice President of China Mobile, principally in charge of planning and construction, network operation, and business support.

Mr. Tong Jilu (佟吉禄) is the General Manager of CTC and the only board member formally employed within the organisation.

We’ve been able to identify one other board member Sun Kanmin (孙康敏) who is an executive with China Telecom. CTC does not wish to disclose the identities of the rest of its board members at this time.

This governance structure is unlike the past, where more company members would also be part of the board, and was created specifically to avoid inefficiency and abuse of power.

**What is the organisational structure of CTC?**

There are 15 business units/departments within CTC, including management, construction and maintenance, finance, human resources, business partnerships, operations and development, audit, telecommunications technology research institute, information technology research institute, and more. There are three levels of CTC management: Headquarters in Beijing, provincial branches, and city/municipal offices. In total, there are 377 branch offices across the country.

**How is the financial performance of CTC?**

China Mobile’s networking leasing costs to CTC for 2016 was CNY¥28.1bn, with 1.11mn towers rented, while China Unicom paid CNY¥19.5bn to access 690,000 towers, and China Telecom spent CNY¥14.0bn for the rental of 610,000 towers, according to a Nomura March 2017 report.

CTC chairman and general manager Liu Aili also reported CTC breaking even last year, with a net profit of CNY¥80mn. Goldman Sachs noted CTC becoming profitable in Q42016, with EBITDA at 59%. Moving forward, CTC is expected to enjoy

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**CTC balance sheet comparison**

**China Tower Corporation (in CNY, 100mn’s)**

<table>
<thead>
<tr>
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<th>30 June, 2017</th>
<th>31 Dec, 2016</th>
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<tbody>
<tr>
<td><strong>流动资产 / Current assets</strong></td>
<td>302.8275</td>
<td>395.6546</td>
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<tr>
<td><strong>非流动资产 / Non-current assets</strong></td>
<td>2,811.5359</td>
<td>2,721.0294</td>
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<tr>
<td><strong>资产合计 / Total assets</strong></td>
<td>3,114.3634</td>
<td>3,116.6840</td>
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<tr>
<td><strong>流动负债 / Current liabilities</strong></td>
<td>1,736.1566</td>
<td>1,715.6810</td>
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<tr>
<td><strong>非流动负债 / Non-current liabilities</strong></td>
<td>111.4865</td>
<td>145.4843</td>
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<tr>
<td><strong>负债合计 / Total liabilities</strong></td>
<td>1,847.6430</td>
<td>1,861.1654</td>
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<tr>
<td><strong>净资产 / Net assets</strong></td>
<td>1,266.7203</td>
<td>1,255.5187</td>
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<tr>
<td><strong>营业收入 / Operating income</strong></td>
<td>332.7218</td>
<td>255.4041</td>
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<tr>
<td><strong>净利润 / Net profit</strong></td>
<td>11.2016</td>
<td>-11.7299</td>
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**Ending 30 June, 2017**

**Six months period**

**Ending 30 June, 2016**

**Six months period**

Source: U學在線, citing CTC 1H2017 reports
Translation to Chinese by TowerXchange
operating leverage from tenancy ratio growth as the three MNOs continue to rapidly deploy their 4G networks.

**How and what does CTC buy?**

The Tower Online Platform officially launched in the summer of 2015, one year after the creation of CTC. As of 5 September, 2016, there are 723 suppliers officially registered in the system, with 74% having been shortlisted and 58% having successfully received purchase orders; spending also reached CNY ¥26bn.

The platform was created to increase supply chain transparency and efficiency, allowing CTC staff to see who made a purchase, from which manufacturer, at what costs, plus comments and ratings on product quality, delivery, service, et cetera.

It hosts 27 major supplier and five service categories, including the likes of tower, air conditioning, shelter, battery, iDAS, engineering design, construction, and more.

Suppliers can register on the platform for free, as long as they hold a valid manufacturing license in China (for product providers), are registered with the State Administration for Industry and Commerce of the People's Republic of China (SAIC), and pass a third-party audit.

A lot of smaller players are not on the platform for one reason or another, but instead work through those that are and act as sub-contractors; this type of partnership arrangement could provide a point of access into CTC as well for international vendors.

For further details, please refer to our article “What and how China Tower Corporate buys.”

**Does CTC have some kind of right of first refusal to build new towers for the three State-owned MNOs?**

Some sources told us that all build to suit (BTS) processes were supposed to be open. Other sources told us that the official structure of the Chinese tower market is that the MNOs are no longer building their own towers, and all the work is being undertaken by CTC. While MNO builds have more or less halted, the reality is that CTC currently lacks the capacity to meet 100% of MNO demand, which in a practical sense means in some cases third parties are contracted to build sites which are then are transferred to CTC's balance sheet.

In other instances it seems that the independent towerco steps in as a fallback option if CTC lacks the capacity, or gets too bogged down in process, to meet MNO demands on time. “China’s private tower companies are often more energised and faster to market,” said one interviewee.

In other instances it seems the independent towercos simply undercut CTC, as a function of lower management costs. On still other occasions it seems that independent tower companies might have better local site hunters, and are able to leverage relationships with MNO network planners at provincial or municipality level to secure direct orders.

“CTC has a scale advantage from the legacy towers, but no significant advantage when competing for new BTS contracts,” said one interviewee.

“In some provinces the carriers are more open to new entrants as they don’t feel it’s in their interests to have a monopolistic towerco, whereas in other provinces CTC are more entrenched,” said another interviewee.

A Right of First Refusal type arrangement isn’t necessarily the primary risk to the independent sector’s organic growth potential. Rather it’s the relationships and economics that may affect a towerco’s ability to survive and thrive. Towercos with good connections to local government and/or operators will continue to secure projects and tenants. From there it’s having the cash flow to maintain day-to-day operations and financing to continue building. New builds are now subject to the lease rate benchmarks set out by CTC, resulting in a more challenging environment compared to the past.

**Is it easy to get a new tower built?**

While China’s citizens once welcomed towers and coverage, radiophobia and NIMBYism (not in my back yard) now exist in China. To combat the former, CTC has relied on a more concerted and integrated effort from the government, operators, and media to propagate educational messaging around radiation, comparing tower emissions to common household appliances. One supplier has also mentioned having to move fast in getting a tower up and/or disguising the tower as some other
unrelated light pole or billboard. Towercos who have good local government relations can often circumvent the issue also, as they are building with their approval and support.

In general though the environment in China is conducive and favourable to tower building: there is a mature steel and metal processing industry; the grid is reliable and stable so downtime is insignificant, reducing opex; and the vendor network is strong having supplied 1mn+ base stations already. Fibre is also used for backhaul so there is seldom need to accommodate microwave dishes.

**What is the mix of GBTs versus rooftops in China, and how has CTC affected tower design?**

CTC has standardised tower designs, reportedly from 1,000 down to 155 (each design at different heights would represent one). CTC also made an effort to introduce designs of different aesthetics, functions, and heights to suit various environments. For example, the “Urban Flower” sits at 25m, can be integrated with lighting for the city and incorporate CTC’s logo and branding. It also has a 40m tower suited for stadiums, large public spaces, et cetera, that can be a landmark structure with LED lights at the top. There is also a more simple and sleek multi-purpose tower meant to be integrated with street lighting, sensors, data, and analysis.

Around two thirds of China’s sites are GBTs (Ground Based Towers – mostly monopoles), the other third are rooftops.

**Approximately how many of China’s towers are currently shared? What are the tenancy ratios?**

Prior to the establishment of CTC, tower sharing was around 20% in the country. By the end of 2016, total tower sharing reached 40%, with the new towers at 70% based on stats shared by CTC chairman and general manager, Liu Aili. In some regions, tower sharing amongst the three operators were supposedly as high as 91%, and at 100% along high speed and subway lines.

One local media reported 68.1% sharing rate for all sites completed in 2016 by CTC, with a tenancy ratio of 1.39 across the portfolio by the end of the year.

In an exclusive interview with the People’s Post and Telegraph (人民邮电报) in August 2017, Liu Aili noted tower sharing has rapidly increased from 14.3% to 73% over the three years of CTC’s existence. More specifically, sharing between new builds for China Mobile, China Telecom and China Unicom have grown from 3.6% to 48.6%, 36.6% to 90.1%, and 20.9% to 92.4% respectively.

**What is the typical capital outlay for a new tower in China?**

Of course much depends on the nature of the structure, but the average seems to be in a CNY ¥250-350,000 (US$37-51,800) range.

**What would be the impact of consolidation from three to two MNOs?**

Consolidation from three MNOs to two would certainly lower the glass ceiling on prospective tenancy ratios in China, and would be value destructive to both CTC and independent towercos.

While there has been rumor of MNO consolidation, the government’s current strategy appears to be to accelerate China Unicom and China Telecom’s 4G rollout by providing access to China Mobile’s towers, and in doing so start to even out the competitive imbalance.

If the creation of CTC does not have the desired effect in terms of competitive rebalancing, only then would the issue of MNO consolidation return to the agenda.

The scope of a China Unicom-China Telecom merger would likely be limited to their wireless businesses, given that a combined entity would have 80-90% share of the wireline market.

**Are there any significant “non-traditional tenants” on China’s telecom towers?**

The usual mix of MVNO, enterprise industrial communications equipment, traffic monitoring, first responder networks and Wi-Fi equipment are all prospective additional tenants. CTC has made repeated mentions of business diversification and innovation to include the likes of billboard ads, sensors, weather monitoring, et cetera, so the opportunities are there given the size of its network.

**Is there any prospect of active infrastructure sharing in China?**

The only infrastructure sharing agreement of scale
in China before CTC was China Telecom and China Unicom’s deep collaboration to improve economics in low utilisation, remote areas. To date, the two operators are said to be actively sharing 600,000 4G base stations and 14,500km of fibre transmission network.

Regulation

Are China’s independent towercos licensed?

No, there is no licensing regime for towercos in China, and no immediate prospect of a licensing regime being introduced. One towerco recently confirmed this again based on notification from and communications with MIIT.

Does the Ministry of Industry and Information Technology (MIIT), regulator or “National Telecommunications Infrastructure Co-construction and Sharing Office” have the right to define the pricing of lease rates?

No. In July 2016 CTC finalised its leasing and pricing agreements with China Mobile, China Telecom, and China Unicom, which essentially set the marketplace benchmark. The formula offers discounts for co-location and covers acquired towers, newly constructed towers, indoor distribution systems, transmission products, and service products.

This has put pressure on the independent towercos who can’t charge more than what CTC is charging, especially for new towers, unless they are in highly coveted locations. All pricing on previously signed contracts are still being honoured.

So while no government body or agency per se has defined lease rates, CTC has markedly influenced industry pricing.

What is the pricing formula used by CTC?

The formula to be used for “newly-added telecommunications towers” is:

Product price = base price × (1 – co-sharing discount rate 1) + (site cost + electricity input cost) × (1 – co-sharing discount rate 2)

Base price = (standardised construction cost × (1 + impairment rate) + maintenance expense) × (1 + cost markup rate) useful lives of depreciation

It was also confirmed there is an escalator, “an inflation adjustment factor” which is common in tower agreement contracts.

What type of co-sharing discounts are available for operators through CTC?

On new towers, a 20% discount will be applied for sites shared by two lessees and a 30% discount for those shared among three lessees, with the first sole occupier (“anchor tenant”) benefitting from a further 5% discount. When it comes to site cost and electricity, a co-sharing discount of 40% will be applied for two lessees and 50% for three lessees. Again, the anchor tenant would enjoy an additional 5% discount.

For further details, please see our article “The implications of China Tower Corporation pricing.”

What is the status of rural coverage in China?

Despite the huge land area, rural coverage in China may be better even than the US; even in low population density areas of Tibet you will see coverage signs.

How are tower companies taxed?

There was no reported special tax status for tower companies in China.

China fully implemented its VAT reform on 1 May 2016 and replaced all business tax with the value-added tax (VAT).

The construction services sector’s new applicable VAT is 11% (general) and 3% (small-scale).

In terms of the sale and importation of goods, logistic services, modern services, transportation, repair and processing services, asset leasing, the standard applicable rate is 17%, and 13% for some products.

State-owned enterprises have sometimes been affording special tax treatment, enabling them to consolidate. There was no clear indication yet whether this might apply to CTC.

Is document number 586 (2014) the latest regulation governing co-construction and sharing? Is it now fully enforced?

This is the most recent document, and it has been fully implemented. But document 586 is an
agreement not a regulation. It was proposed by the MIIT and agreed with China’s three MNOs to improve resource utilisation; reducing occupation of land and improving the appearance of the landscape.

A couple of excerpts from document 586 (please forgive any translation imperfections):
“From January 1, 2015, in principle, the three basic telecom carriers shall no longer build towers and other base facilities themselves, as well as IBS in subways, railways, highways, airports, railway stations and other public transportation key sites and large venues and multi-owner commercial buildings, government office buildings and other key sites.”

“The MIIT, SASAC or the province telecommunication authorities will severely punish the three basic telecom carriers, if the following behaviors were found. Basing on severity such punishment could be recommended to upper level unit to fire the related management. Such dismissed staff shall not be engaged within three years.

i. Without the approval of the provincial coordination agencies, construct towers and other ancillary facilities, as well as IBS in public transport and construction of buildings and other key areas

ii. Without the consent of the provincial coordination agencies, refuse to open sharing when the existing telecommunications infrastructure is suitable for sharing

iii. Without the approval of the provincial coordination agencies, build parallel infrastructure

iv. Independently build new infrastructure when joint construction should be carried out

v. Violation of requirement of infrastructure sharing in key areas (key areas including key public transportation sites, key buildings, scenic parks and other places identified by local communications administration, and inter-province key fiber cable construction, and the domestic extension of international transmission)

vi. Violate national standards on optical fiber “To-Home” construction

vii. Sign exclusivity agreement with the third parties in the construction of telecommunications infrastructure (including leasing)”

Clause vii. above calls attention to the fact that MNOs would appear to not have permission to sign exclusive agreements with third parties (towercos), suggesting a degree of limitation on deep build to suit partnerships.

Who owns the land under Chinese towers and on what basis is tenure granted to infrastructure firms to build towers on that land?

All land in China belongs to the government, but “Land Use Rights” can be secured for a 15-year term for industrial use, usually at a reasonable cost. As renewal fees cannot be defined up front, there is some exposure to risk of lease escalations when renewing after 15 years, but in general it was felt that escalations would be fair in a market where a State-owned Entity was dominant.

Above ground level, the telecom structures themselves belonged to China’s MNOs and now belong to CTC, or they belong to the independent towerco.

Land lease fees could also differ from region to region, project by project. One towerco mentioned not having to pay land fees in one city but paying by usage square footage in another. But this could be more the case for street/highway projects, where lighting is incorporated into the tower.

How complete is the paperwork on China’s towers?

It was widely acknowledged that not all the towers in China, whether CTC or independently owned, had a complete set of licensing, permitting and leasing paperwork. It appears to vary depending on the local government and project.

We know of one region where the towerco has a full set of papers stamped by the authorities, from meeting minutes with city planning officials outlining project requirements, to construction permit, construction plan, et cetera. This was described as “a tower’s most complete legal process and best protection.” This also means should the government for whatever reason takes down a tower, the towerco would be compensated. In this particular case, the land belongs to the government, for public use.

The permit follows, No. 40 of the Urban and Rural Planning Act, which grants construction rights.
### China tower market end FY15

- **CTC**: 1,500,000 (98.7%)
- **Independent**: 20,000 (1.3%)

### China tower market end FY16

- **CTC**: 1,700,000 (97.5%)
- **Independent**: 45,000 (2.5%)

### China tower market forecast end FY17

- **CTC**: 2,100,000 (96.2%)
- **Independent**: 80,000 (3.8%)

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**Independent tower market**

Who are the independent tower companies in China? How much market share do they have? How fast are they growing and what is the top end for their potential market share?

With the exception of four or five towercos with quadruple digit tower counts, China’s independent towercos are highly fragmented and localised, with five to ten towercos in each of China’s 31 Provinces. There are currently 200+ towercos in China.

A lot of the independent towercos thrive on having strong local government and/or operator relations, enabling them to build quicker than State-owned CTC.

At the end of 2014, China may have had as few as 10-20 independent towercos owning ~5,000 towers. By the end of 2015, those numbers had increased to ~20,000 towers among as many as 200 towercos. Independent towercos built ~10% of China’s new towers in 2015, a proportion which bullish commentators feel could reach 30% within a year.

It is axiomatic to say, but readers must be reminded of the sheer scale of China; an independent towercos can still thrive even with less than 2% market share. At the beginning of 2016 TowerXchange have spoken to a few bullish towercos leaders who feel the glass ceiling on the scale of the independent towercos in China could be as high as 20% within five years – that could represent 400,000 towers, the equivalent scale of the entire tower market in the European Union!

While there are independent towercos active in China’s largest cities, Shanghai, Beijing, Tianjin, Guangzhou and Shenzhen, perhaps the highest penetration of independent towercos can be found in Provincial capitals, tier two and tier three cities in some of which TowerXchange has heard unconfirmed reports that independent towercos have a market share significantly in excess of 50%.

However, a reality check is required now that CTC is in the full swing of tower building and leasing (it’s only really been operational since 2015), and perhaps flexing its muscle a bit. There are some reports of negative consequences for MNO staff that gave contracts to independent towercos, and reports of delays in payments to towercos. But there are still opportunities for smart and strategic towercos. While major coverage projects will likely be concluded in the next three to five years and less
new macro towers will be needed, difficult sites will always exist and the independents have the flexibility to get the job done.

Are there any valuation benchmarks set by towerco financing or tower sales?

One source suggested that Chinese towers with an average tenancy ratio of 1.5 were changing hands for an average of CNY ¥450-500,000 each (US$65-70,000 each). Another source put the figure at CNY ¥700,000 (US$100,000) with a tenancy ratio of 2.0. A third source suggested a 51% stake in a portfolio of several hundred towers with a tenancy ratio above 2.0 had been acquired at a valuation again of CNY ¥700,000 (US$100,000) per tower.

Guodong, which TowerXchange believe is China’s largest independent tower company, secured a CNY ¥700mn (US$100mn) investment reportedly at a high teens valuation they were very proud of.

The transfer of China Mobile, China Unicom and China Telecom’s towers to CTC reportedly yielded an average of just US$22,000 per site, significantly below replacement cost. But an asset transfer between entities all fundamentally State-owned (and owned by each other) is a poor valuation benchmark. The low acquisition cost reflects the depreciation of an inventory of ten plus year old towers, which were built to gain market share and with less of a view toward longevity and structural capacity, so significant improvement capex will be required. The low price point also reflects the mixed bag of assets being transferred, inclusive of everything from substantial ground based towers, a great many monopoles, rooftops, and even small Wi-Fi offload sites.

Around October 2015, China Daily had reported the transfer of CNY ¥203.5bn (~US$31.5bn) worth of telecommunication tower assets, while the Wall Street Journal noted analysts valuing the venture at CNY ¥214bn (~US$33.1bn). An article from the Mobile World Live cited yet another estimate at CNY ¥230bn (~US$35.6bn). More specifics emerged out of a March article this year in Chinese media Caixin, which noted actual asset transfers taking place on 14 October, 2015, whereby 1.52mn towers changed hands, for a value of CNY ¥231.4bn.

As part of the carve out, China Telecom (which had the least number of towers out of the three MNOs) received only equity as part of the deal (29.9%), while China Mobile and China Unicom received both equity (40% and 30.1% respectively) and a combined CNY ¥91.9bn (~US$14.2bn) in cash. The Caixin article also noted that the original agreements required CTC to pay all outstanding payments and interests to China Mobile and China Unicom by the end of 2017.

To learn more, read “China Tower Corporation’s valuations from inception to future IPO” which appears later in the Journal.

Is China Tower Corporation a potential buyer of independent tower companies’ towers?

At one point CTC were believed to have made an offer to acquire Chinese towers at ~US$80,000 each. Whether that valuation is still current remains unclear, and whether such a valuation may be attractive to current owners depends on tenancy ratio, TCF, and uniqueness of location.

At this point however, multiple sources have confirmed CTC has not acquired any independent towercos or their assets.

There has been much talk of monopoly since the creation of CTC, though our sources believe the Party is keen to encourage competition, and currently CTC and the independent sector co-exist to serve the market place.

Chairman of the Board at CTC, and China Mobile executive, Liu Aili has also publicly acknowledged the presence of independent towercos. “CTC is not the exclusive provider of towers in China, there are 200+ third-party companies building and operating towers. Therefore CTC will be rejected by the market if it doesn’t deliver on low costs, good service, and competitive rental prices,” he said.

While tower acquisitions are not completely out of the picture, at this time, CTC is wholly focused on integrating assets and new builds to meet the operator’s demands and prepare itself for an IPO in 2017.
Do China’s tower companies have much appetite for International opportunities?

China's tower sector seems largely pre-occupied with their huge and changing domestic market. However, for the handful of Chinese tower cos with appetite for opportunities overseas, capital may be accessed for opportunities within the ‘One Belt, One Road’ footprint through associated investment firms such as the Silk Road Fund and the Asian Infrastructure Investment Bank.

What are typical lease rates and terms in China?

Lease rates are a complicated formula based on height and weight of equipment, desirability of location et cetera. At the beginning of year, most interviewees agreed that a range of CNY ¥4,500-6,000 pcm was common (US$665-885). The lowest we heard was CNY ¥3,500 pcm (US$515) in less developed cities, rising to CNY ¥11,000 pcm in (US$1,625) on high rental cost sites in major cities. However, the creation of CTC and the finalisation of the pricing formula in July 2016 have put downward pressing pressure on the market.

On the independent side, rates are now between CNY ¥2,300 pcm (US$340) to CNY ¥5,400 pcm (US$800). Again, desirable and highly coveted sites can still yield good rates. We were also told that the rate could also sometimes be higher if no one responds to an RFP.

CTC lease rates are significantly lower than anywhere else in the world, with estimates around CNY ¥26,000 per tower on an annual basis or CNY ¥2,166 pcm (US$320). This figure is surprisingly low and suggests a business model calibrated in favour of the MNOs. Since the summer, another industry report came out suggesting per tower leasing fee of around CNY ¥3,900 pcm (US$575) for CTC in 2015, and CNY ¥3,000 pcm (US$445) for 2016.

Like India, when additional tenants are added to Chinese towers, existing tenants’ leases are discounted.

Lease terms are typically 10+10 years. Down payments for new sites have been reduced to a single year since the advent of CTC, adversely affecting independent towerco cash flows.

U.S. versus China macro tower build economics

<table>
<thead>
<tr>
<th></th>
<th>One tenant US</th>
<th>Two tenants US</th>
<th>One tenant China</th>
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<td>Construction costs</td>
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<td>$50,000</td>
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<td>74%</td>
<td>42%</td>
<td>58%</td>
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<tr>
<td>ROI</td>
<td>3%</td>
<td>13%</td>
<td>4.3%</td>
<td>9.5%</td>
</tr>
</tbody>
</table>

Source: US illustration drawn from an American Tower presentation, June 2015; does not reflect any American Tower financial data. China data from TowerXchange, based on our own research and reviewing the models of Goldman Sachs and others.

How do the economics of a single tower in China compare to the USA?

See “U.S. versus China macro tower build economics.” Note that when an additional tenant is added, lease rates are discounted for both the new and original tenant in China. This is not the case in the US.

We must emphasise that you must treat this table with a pinch of sale – China data is averaged based on multiple sources but all sources are subjective.

Who owns China’s broadcast towers are MNOs colo-locating on them too?

China Broadcasting and Media Group has the 700 MHz license and owns most of China’s broadcast towers. TowerXchange have not yet been able to ascertain if these towers are offered for co-location by China’s MNOs.

Investment

How can early stage towercos in China access capital?

China offers a challenging path to scale for local
tower entrepreneurs. Raising debt from Provincial financial institutions is complex, time consuming, and expensive. While private, domestic investment is gradually becoming more available to debt-funded infrastructure firms with contracted long term cash flows, like towercos, Chinese capital markets have historically been predisposed to invest only in profitable companies, at the expense of business models like telecom towers that naturally lend themselves to a degree of leverage. Small tower companies in particular struggle with the fact that towers are not securable.

State and provincial level investment funds may not be inclined to invest in entities which compete with State-owned CTC.

Please explain the latest rules regarding foreign ownership of, or investment in, communications infrastructure?

TowerXchange understand, but have been unable to confirm, that passive infrastructure is not considered a sensitive asset class, so FDI may be possible into Chinese joint ventures, particularly those in free trade areas, or through VIEs. We have heard unconfirmed reports of one foreign investor acquiring a 51% stake in a towerco.

An interested investor called attention to the VIE (Variable Interest Equity) structure, which enables foreign investors to invest in sensitive infrastructure, do investors still need to use this or is more direct investment now permitted given the recognition that passive infrastructure is less sensitive?

One TowerXchange source defined VIE as a mechanism for foreign direct investment in China via an international holding company, a WOFE (Wholly Owned Foreign Enterprise), in which USD, EUR or other currency could be invested, which could be registered in the Caymans, Delaware et cetera, and which could be listed on the NASDAQ or other international stock exchange.

The VIE structure was apparently first used in this sector over 20 years ago to facilitate investment in China Unicom, with subsequent VIE investments in Alibaba, Tencent and Baidu.

A critical question when leveraging a WOFE to invest in China is where the IP sits, at holding company or local subsidiary level? If the latter, international investors could be exposed to risk.

“A VIE would be a viable but suboptimal route to investing in a Chinese tower company,” said one interviewee. “Yes you can do it, but it may adversely affect valuation.”

What would foreign investors options be to repatriate capital?

In the event a foreign investor was seeking exit from a listing entity, they might seek to sell their equity to the domestically listed entity, releasing capital at an agreed exchange rate.

About document No. 92

Perceived as a turning point for the independent towercos in China, the document was released by MIIT and SASAC following an industry consultation meeting. This provided a much needed boost to the towercos who were facing challenging market conditions, roadblocks to securing and executing BTS, questions on the legitimacy of their presence in the market place, as well as difficulties with contracts and account receivables.

Document No. 92 spelled out some key points, among them that independent towercos, along with CTC, were to be included and part of the system supporting the country’s “co-build, co-share” vision; that should CTC lack the capacity or be unable to deliver on tower builds as agreed, it would revert the order back to the MNOs in a timely manner; that should inappropriate and anti-competitive tactics be used and thereby create a monopolistic market place, MIIT would take action to address and set forth corrective action. The document also noted other opportunities such as DAS and street poles that towercos could explore, to provide additional services within the general “co-build, co-share” framework.
What are the potential exit strategies for investors in Chinese towers?

As in any market, exit strategies tend to focus on potential IPO or trade sale.

CTC may be a prospective trade sale counterpart, although management is very much focused on new builds and improving operations in its bid to IPO in Q4 2017. At least one of the Indonesian tower companies is believed to have an appetite to invest in China, while TowerXchange has learned of two domestic rollup plays.

Could a major international strategic investor be interested in acquiring Chinese towers? Probably not at the current scale of the independent market, where the largest independent towerco just hit five-digit tower count. But if an independent towerco could build or rollup 30-50,000 towers, they may attract interest from some of the more acquisitive international towercos.

When considering exit through IPO, the perception remains that Chinese companies need three years of profitable trading history to list as an A-share on the Shanghai Stock Exchange. There was some suggestion that unprofitable companies might soon be allowed to list, but apparently that potential reform will not take place imminently.

Some sources suggested that entities listed on that stock exchange can only accept investment in CNY, meaning foreign investors would have to exit at the time of listing, or setup a new entity. More recently it seems that qualified international investors can invest in companies listed on the Shanghai Stock Exchange.

There is one listed tower company on the Shenzhen Stock Exchange, Beijing Miteno Communication Technology Company Limited (300038), with at least one planning to list in Shanghai. It should be noted that there is approximately a two-year wait to list on the Shanghai Stock Exchange.

While the Shanghai Stock Exchange opens access primarily to domestic investors, a listing, or dual listing, on the Hong Kong Stock Exchange offers more exposure to international liquidity and an increased level of transparency with which international investors are more comfortable. Most of China’s large infrastructure entities are listed in Hong Kong.

Most stakeholders TowerXchange spoke to assumed a better valuation would be achieved on the Shanghai Stock Exchange (“the P/E multiple in Shanghai might be 30-50x compared to 10x in Hong Kong”), but there are precedents where higher valuations were realised in Hong Kong (e.g. in the insurance industry), while the current appetite of international investors for towers as an asset class, and the valuation of natural comps, may also contribute to a potential healthy valuation of a tower company on the Hong Kong stock.

Will it be possible to invest in CTC? Is there a plan to list China Tower Corporation on the stock market in future?

It’s been made clear that CTC is driving towards an IPO by the end of 2017 as a means of repaying China’s three MNOs the full value of injected legacy assets.

It seems increasingly likely that CTC will list on the Hong Kong stock, making it easier for international investors to buy equity.

Power

Are power costs passed through from China Tower Corporation to the MNOs?

According to the finalised pricing formula in July 2016, electricity input cost is part of the “product price,” aka lease rate to the operators. It is to be priced on a lump sum or itemised basis.

What proportion of the cell sites are on-grid, on unreliable grids or off grid?

Almost all sites are on-grid. Multiple sources confirm China has one of the world’s most reliable electricity grids. Unlike most countries, its supply exceeds demand.

What backup power solutions are typically on cell sites? Are towercos or MNOs responsible for them?

Towercos provide backup battery banks, typically with 4-8 hours float. Most batteries are lead-acid. There are very few backup DGs.
CTC is also recycling the battery from electric vehicles for site usage. Compared to lead-acid batteries, they are described as withstanding up to 60 degrees Celsius versus 35 degrees, is half the size and weight, and rechargeable up to no less than 500 times versus 300 times.

**Are remote monitoring systems typically deployed on cell sites?**

RMS is deployed on some, not all cell sites. CTC is considering making RMS a National standard.

**Who is responsible for site modernisation and air conditioning, towercos or MNOs?**

CTC is responsible for shelters and air conditioning. While most new sites are built with outdoor equipment, few legacy sites have been modernised with, for example, free cooling.

**Is there distributed renewal energy in China?**

In September 2016 CTC reported having 10,177 solar and wind generation sites across the country, with annual capacity of 120mn kwH. There is also news that CTC has plans to deploy solar on a large scale in line with the government’s objectives in reducing carbon emissions.

TowerXchange’s who’s who in Asian towers

TowerXchange presents an updated A to Z of MNOs, towercos, investors and advisors who are key stakeholders in the Asian tower industry.

TowerXchange takes a deep dive into the Asian tower industry, providing an updated (October 2017) edition of its comprehensive directory of the key MNOs, towercos, investors and advisory firms active in the market. Note that stakeholders in the Russian and Central Asian tower markets are covered in the TowerXchange’s European who’s who.


Read this article to learn:
- Who’s who of the top towercos active in China, Southern and Southeast Asia
- The history of MNOs’ tower transactions across the region
- An introduction to some of the most credible current and prospective investors into Asia towers
- Profiles of the TMT advisory firms with experience of Asian tower transactions

Aird Towers: Towerco established in 2016 with a formal launch in early 2017 to serve the Australian and New Zealand markets. It is looking beyond ground-based towers and rooftops to consider small cell and other RAN solutions to support the rollout of 4G and, in future, 5G.

Alcazar Capital: Alcazar Capital Limited (ACL) is an investment advisory firm based in Dubai and focused on private investments advisory and asset management; Alcazar’s current portfolio of investments and assets under management exceeds US$1bn. ACL advised on several projects in the tower industry including Irrawaddy Green Towers in Myanmar and Golden Towers in Vietnam.

Altman Vilandrie & Co: AV&Co. has extensive tower industry experience spanning tens of engagements (including Latin America, Africa, Asia, North America, Europe) over ten years, including tower operator strategies as well as tower transaction due diligences. Their recent work has addressed a number of relevant topics such as the impact of small cells, the future opportunity for DAS and the changing role of rooftops.

American Tower: The world’s largest independent commercial towercos, American Tower need no introduction within this publication. With its headquarters in the U.S., American Tower operates a global portfolio of ~150,000 sites composed of towers in advanced, evolving and developing wireless markets, in the U.S., Central and South America, Africa, Europe, and Asia with its growing presence in India.
American Tower has combined organic with selective inorganic growth in Asia, where to date they have focused on India. The company's M&A activity in India began with the acquisition of 1,730 towers from XCEL Telecom for US$170mn in 2009, continued with the acquisition of 4,450 towers from Essar Telecom for US$432mn in 2010, and culminated in the acquisition of Viom Networks and their 42,200 towers, announced in October 2015, for US$1.17bn, taking a 51% stake in the company. The deal provided American Tower Corporation an all-India footprint and a portfolio of over 57,000 towers, to which they are rumored to be in negotiations to add a further 19,812 towers from Vodafone India and Idea Cellular, driving the company to scale in India, and enabling them to look for new investment opportunities in other markets across Asia.

American Tower employs a three-pronged approach to evaluating potential international acquisitions: identifying relatively stable political and macroeconomic environments, seeking markets with robust wireless sectors, and finally pinpointing compelling transactions opportunities including a high quality counter-party, good location, sound assets, and an attractive valuation.

Analysys Mason: Marco Cordoni and his team at Analysys Mason are among the ‘go-to-guys’ for tower market analysis and due diligence on a global basis.

Apollo Towers Myanmar: Apollo Towers runs a portfolio of 1,800 sites in Myanmar. Apollo Towers is chaired by serial towerco entrepreneur Sanjiv Ahuja, who was the original Chairman of Eaton Towers in Africa and who is a former CEO of Orange. Ahuja’s Tillman Global Holdings and Texas Pacific Group are the majority shareholders of Apollo Towers Myanmar, while OPIC (the Overseas Private Investment Corporation) undertook the single largest U.S. direct investment in Myanmar when they invested US$250mn in Apollo. Apollo provides a ‘full service’ tower and power offering.

Ascend Telecom: Incorporated in 2002, Ascend Telecom is an independent Indian towerco providing world-class passive telecom infrastructure on a shared, multi-tenancy basis for the mobile services and wireless sector. Ascend Telecom provides site location, design, execution and maintenance of infrastructure for telecom network operators, and is the first Indian company to offer sites with complete passive infrastructure to MNOs, on build-own-lease model (BOL) basis. As at 30 August 2017, Ascend’s portfolio included 5,645 towers at a tenancy ratio of 2.04.

Axiata Group: Axiata is a leading telecommunications group in Asia and has controlling interests in six mobile operators under the brand names of Celcom in Malaysia, XL in Indonesia, Dialog in Sri Lanka, Robi in Bangladesh, Smart in Cambodia and Ncell in Nepal. Axiata also has strategic interests in Indian’s Idea and M1 in Singapore. Axiata carved out the first pan-regional towerco, edotco, which operates in six countries to provide optimised, shared telecoms infrastructure, amassing a portfolio of over 31,000 towers and 12,000 km of fibre.

Axicom: Axicom is Australia’s leading provider of independently owned wireless infrastructure. The company owns, operates and manages a portfolio of approximately 1,900 towers in Australia. Crown Castle’s Australian subsidiary was renamed Axicom following the U.S. towerco’s sale of the business for US$1.6bn to a consortium including Macquarie Infrastructure and Real Assets, UniSuper and UBS Global Asset Management. In early 2017 Axicom acquired 56 communications towers from broadcaster Southern Cross Austereo for A$12.6mn (US$9.25mn) to expand its footprint.

Bangladesh Telecommunication Regulatory Commission: BTRC was formed on 31st January of 2002, under the Bangladesh Telecommunication Regulatory Act 2001. Its vision is to facilitate connecting the unconnected through quality telecommunication services at an affordable price by introducing new technologies. BTRC has been working on tower sharing guidelines (including a licensing regime), with a draft submitted for final government approval. Additional guidelines in the works include 4G rollout and associated fees.

Barclays: Barclays’ global investment banking division offers a leading Technology, Media and Telecoms (TMT) franchise. The TMT team has significant experience representing leading tower operators as well as telecom service providers around the globe on buy and sell side assignments. In this capacity, Barclays has supported its clients in
the valuation and/or marketing of tower portfolios as well as the negotiation of various agreements associated with these transactions.

**Balitower:** Founded in 2006, PT Bali Towerindo Sentra Tbk is a telecommunication tower company that originated in the Indonesian province of Bali. Balitower was listed on the stock market in 2013, and in 2015 began to expand its footprint outside of Bali, mostly through its partnership with the government of Jakarta, managing the CCTV system in return for rights to exploit the poles as small cell locations. Through year end 2016, its portfolio consisted of 856 light poles (MCPs), 72 monopoles and 112 self-supporting towers (SSTs).

**Beijing Miteno Communication Technology:** One of China’s leading independent towerCos with an estimated 4,500 towers. Miteno also has international ambitions and is an active bidder on tower transactions in Southeast Asia. The company is also a leading tower designer and manufacturer.

**Beijing RLZY:** Beijing Rui Lan Zuo Yue Technology began operations as a service provider to the three MNOs in China back in the early 2000s, before expanding its business to include tower leasing. It currently has 1000+ assets in its portfolio, which includes a mix of monopoles/towers, rooftops and streetlights.

**Berkshire Partners:** Berkshire was an early investor in Crown Castle, and currently has active investments in Protelindo (the largest towerco in Indonesia), Torres Unidas (in the Andean region of CALA) and Tower Development Corporation in the U.S. and Puerto Rico.

**Bharti Airtel:** Bharti Airtel is an Indian mobile network operator, and ranks as one of the top four MNOs globally with operations across 20 countries in Africa and Asia. In India, Bharti Airtel carved out its own towerco, Bharti Infratel, and is a partner in the Indus Towers joint venture towerco. Bharti Airtel initially followed a similar strategy in Africa, creating “Africa Towers” subsidiaries in several countries, before subsequently selling towers in the majority of countries to a variety of African towerCos.

Over the summer, Airtel received approval to purchase the assets of Telenor India, then in Q3 2017 announced it will pick up Tata’s mobile business, leading to a merger of three MNOs, allowing Airtel to consolidate a strong number two position when the Vodafone-Idea mega-merger concludes.

**Bharti Infratel:** One of the pioneers of shared telecoms infrastructure, Bharti Infratel was created in 2007 as an independent tower company to provide compelling capex saving opportunities to telecom service providers, while optimally utilising Bharti Airtel’s large tower base in India.

Infratel has 39,000+ towers, across eighteen states, and eleven telecom circles, and is still growing. Bharti Infratel also manages Bharti Airtel’s 42% stake in Indus Towers which was created as a joint venture between Bharti Airtel, Vodafone and Aditya Birla Telecom to hive off the towers business in fifteen telecom circles.

Bharti Infratel’s goal is the “disarmament of MNOs”; the creation of end-to-end tower solutions including fibre, small cells and active equipment, and supporting the continued development of telecoms across India, including the creation of smart cities.

There are currently rumors of a proposed major investment in a combined Bharti Infratel-Indus Towers entity by a KKR-led consortium, with the transaction believed to require Bharti Infratel to first buy out the 58% of Indus Towers held by others (Idea, Providence Equity Partners and Vodafone) and then KKR to increase its interest in Bharti Infratel from 10% to around 45%.

**Broadcast Australia:** Broadcast Australia owns and operates one of the most extensive terrestrial broadcast transmission networks in the world. With a diverse portfolio of structures ranging from 30m to over 230m masts, and as one of the most mature portfolios, it has the best regional and rural penetration among Australian tower companies across its 600+ sites. Servicing not just broadcasters, it provides infrastructure leasing and related services to the majority of the MNOs, NBN Co., as well as other telecommunications players. It is part of BAI Communications, which provides connectivity solutions in various metropolises in North and South America.

**BSNL:** BSNL is the State-owned telecommunications provider in India. It is the largest provider of
fixed telephony and broadband services with more than 60% market share and fourth largest mobile network operator in India. BSNL has begun the process of carving out its own towerco, and has received “in-principle” approval from the Department of Telecommunications which will establish an inter-ministerial group to work out the capital and organisational structure of the new company, once a market valuation of BSNL’s 65,000+ tower assets is carried out. Its merger with the other State-run operator MTNL has long been mooted.

**Canada Pension Plan Investment Board:** CPPIB is the professional investment management organisation that invests the funds of the Canada Pension Plan on behalf of its 20mn contributors and beneficiaries. CPP’s tower investments include 10.3% stakes in Bharti Infratel with KKR, bought at US$951.6mn. It is also part of the consortium led by KKR in talks to buy a significant stake in a combined Bharti Infratel and Indus Towers.

**Carlyle Group:** Founded in 1987 in Washington, DC, the Carlyle Group is a global alternative asset manager with US$170bn of assets under management across 299 investment vehicles. In 2012 it acquired ~25% stake in Indonesian towerco PT Solusi Tunas Pratama TBK (STP) for a reported US$100mn, but is now in the process of selling its shares.

**Cam Towerlink:** Established in 2013 in Cambodia by a group of three Malaysian shareholders, Cam Towerlink provides turnkey telecommunications infrastructure solutions for operators, including designing, constructing and operating telecoms towers and small cell sites. One of Cam Towerlink’s first projects is to deploy telecoms coverage for the first time around the Angkor Wat temple complex. The company plans to expand its footprint into neighbouring municipalities.

**CAT Telecom:** CAT Telecom is a Thai fixed and mobile network operator, and one of three State-backed companies operating a nationwide network. Thailand’s leading MNOs operate their networks under build-operate-transfer (BOT) partnerships with both CAT and their counterpart TOT, which has led to disputes about tower ownership as the BOT relationships conclude. CAT Telecom and DTAC have been in ongoing discussions to create a joint venture towerco, and transfer 9,000 disputed concession towers into it.

**Centratama:** PT Centratama Telecommunication Indonesia TBK is a listed towerco providing passive telecoms infrastructure for service providers, along with its subsidiary PT Centratama Menara Indonesia, formerly known as PT Retower Asia. As of June 2017, the company owned 968 towers with an additional 805 DAS.

**China Independent Tower Alliance (CITA):** The China Independent Tower Alliance was inaugurated on 30 June, 2017, created under the leadership and guidance of the Communications Network Operation and Maintenance Committee (COMC) and in partnership with private towercos, telecom infrastructure builders, equipment and service providers, design consulting firms, academic and research institutes, and more. Its current membership consists of more than 60+ organisations. It also established a provincial presence in Zhejiang this October.

**China Mobile:** Leading State-owned telecommunications services provider in Mainland China with the world’s largest mobile network and mobile customer base. The MNO reported total customer base of 877mn+ ending September 2017, with 621mn+ being 4G customers. It is listed on both the Hong Kong and New York Stock Exchange (HKEX and NYSE). China Mobile owns 38% of China Tower Corporation, to which all its towers have been transferred.

**China Reform Corporation:** State-owned fund and asset manager. In October 2015 it injected CNY¥7.7bn (~US$1.2bn) in cash for a 6% stake in China Tower Corporation.

**China Telecom:** State-owned telecommunications services provider in Mainland China with the largest fixed-line service. Of the three MNOs in the country, China Telecom is third-ranked, with 240mn+ mobile subscribers ending third quarter 2017, of which 167mn+ are 4G users. All China Telecom’s towers have been transferred to China Tower Corporation, in which China Telecom owns a 27.9% stake.

**China Tower Corporation:** Established in July 2014, China Tower Corporation is the largest towerco in the world with 1.9mn towers. It is owned by China Mobile (38%), China Unicom...
China Unicom: State-owned telecommunications services provider in Mainland China, ranked second behind China Mobile and ranked fourth globally by subscriber base. For the first nine months of 2017, it boasted ~277mn subscribers with ~58% as 4G customers (160mn+). All of China Unicom’s towers have been transferred to China Tower Corporation, in which China Unicom owns a 28.1% stake in. Of the three State-owned MNOs in the country, China Unicom was selected along with other SOEs to take part in the “mixed ownership” reform, to bring in additional investments (and potential resources) from private investors such as tech giants Alibaba, Tencent and Baidu.

Citi: One of the world’s leading tower transaction advisory groups can be found within the TMT team at Citi.

Common Tower: Common Tower Technologies Sdn. Bhd is an independent tower owner and operator in Malaysia, and is also one of the nation’s largest providers of professional site development services to companies in the telecommunications industry. CTTSB owns, operates and manages over 260 tower sites in Sabah following its appointment as the ‘State Backed Company’ to undertake the TIME2 Project in Sabah since 2005.

Delmec: The tower experts in consultation and engineering, providing global solutions to operators, towercos and regulators on standards, guidance and due diligence for portfolio management. Engaging audit, assessment and analysis for structural enhancement, capacity and maintenance as individual activities or by way of managed services.

Delta Partners: Delta Partners’ expertise in tower transactions includes M&As, capital raising, due diligence and strategy support to towercos, telecom operators and investors on network sharing, tower monetisation, transaction execution, structuring and operational streamlining. Most recently, it acted as the sole strategic and financial advisor to edotco on its acquisition of the Towershare portfolio in Pakistan (Tanzanite).

Deutsche Bank: Deutsche Bank provides M&A advisory services as well as financing services in the tower space, including both equity and debt products. Deutsche Bank has been involved in the tower sector on a global basis, successfully executing transactions in North America, South America, Europe, Africa and Asia.

DIF: The Digital Telecommunications Infrastructure Fund, formerly known as TRUEGIF or TRUEIF, is a towerco solution created by Thai MNO True. It is Thailand’s first telecommunication infrastructure fund which invests in telecommunication infrastructure assets such as telecommunication towers, fibre optic cable system, transmission equipment, broadband system and/or revenue incurred from the assets, with extensive coverage nationwide. The purpose is to support the sharing use of telecommunications infrastructure, reduce investment redundancy in telecommunication infrastructure and enhance competitions among operators to help increase efficiency of network services. The fund was listed in late 2013.

True has injected 6,000 of their own towers into the infrastructure fund/towerco which for year-end 2016 totalled 12,138 tower assets and 60,343km of fibre. DIF could see inorganic growth in the coming months as True is reportedly looking to inject more tower and optical fibre assets into the fund.

Eco-Friendly Towers (EFT): EFT is a subsidiary of diversified Myanmar conglomerate Young Investment Group. EFT secured an order for roughly 700 phase-three towers from Telenor, with ~550 sites built to date. EFT was initially the only towerco able to deploy and manage towers in several Northern Myanmar states, where security can be challenging, but TowerXchange sources have confirmed that EFT’s phase three contract is nationwide.

edotco: edotco is the first pan-regional tower services provider in Asia, and is committed to deploying cost-efficient telecommunications infrastructure across the region by enabling competitive access for the industry and connectivity for communities. edotco is a subsidiary of Malaysia’s Axiata Group. Through private placements totalling US$700mn with INCJ, Khazanah and KWAP, Axiata’s share is now 62.4%.
With a regional portfolio that includes 31,600 towers in Malaysia, Sri Lanka, Bangladesh, Cambodia, Pakistan and Myanmar, edotco strives to deliver outstanding operational efficiency in telecommunications infrastructure services and solutions. edotco's tower portfolios in all six countries are managed in real-time at their headquarters in Kuala Lumpur by the state-of-the-art echo monitoring service.

edotco has been growing steadily since its founding in 2012, both organically through tower rollouts across its footprint, and inorganically through acquisitions, and continues to evaluate new opportunities for growth in Asia based on their merits. In 2017, it acquired ~700 towers from Towershare in Pakistan, shortly followed by a landmark buy and leaseback of 13,000 towers with MNO Jazz, in transactions totalling US$1.0289bn.

**Etisalat:** Emirates Telecommunications Corporation operates in 16 countries across Asia, the Middle East and Africa. The telecommunications service provider has three opcos in Asia. Pakistani subsidiary Ufone has been exploring the sale and leaseback of its towers for a while now; while there may also be appetite to monetise, carve out or outsource their towers in Afghanistan. Etisalat’s Sri Lankan subsidiary retains their towers.

**EY:** TMT strategy and corporate finance advisory team with extensive experience of advising on tower transactions.

**FMO:** Dutch development bank 51% government owned, 49% by commercial banks and financial institutions. FMO arranged a subordinated loan of US$13mn to Irrawaddy Green Towers in Myanmar via its Infrastructure Development Fund.

**Frontier Tower Solutions:** Founded as an independent tower company by the corporate “parent” of Afghan Wireless Communications Company (AWCC) in 2012. At last count it operated 1,500 towers in Afghanistan, and also has operations in Iraq.

**Gihon:** PT. Gihon Telekomunikasi Indonesia (Gihon) was established in Jakarta in 2001, and currently has around 700 tenants on ~500 towers.

**Golden Towers:** Golden Towers is an independent tower company incorporated in Vietnam focused on acquiring existing telecommunications tower assets in the Vietnamese market. As of December 2015 Golden Towers owned and operated approximately 340 towers. Golden Towers plans to build its telecommunications tower portfolio mostly through acquisition of existing towers and limited construction of new towers is envisaged, not exceeding 10% of the total portfolio.

**GTL Infrastructure:** GTL Infrastructure is a publicly-listed tower company in India with a portfolio of ~28,000 towers across the country, serving all major telecoms service providers. Founded in 2004 and listed in 2006, GTL Infrastructure began expanding its portfolio in 2008 and acquired 17,500 towers from Aircel. However, the cancellation of 122 operator licenses by the government, slow uptake of 3G and price wars between service providers have left GTL Infrastructure with a heavy debt burden. The towerco is currently refinancing its residual debt (approximately US$721mn) and plans to switch ownership around March 2018.

**Guodong Network:** The largest independent towerco in China with a tower count of ~15,000, all through organic growth. Headquartered in Shanghai, it has nationwide presence in the country.

**Hardiman Telecommunications:** A unique consultancy equally capable advising on engineering and operational issues as they are on commercial strategy and corporate finance. Extensive experience advising on both the buy-side and sell-side in tower transactions.

**Herbert Smith Freehills:** International law firm that advised edotco on its transactions with Towershare and Jazz in Pakistan.

**Hutchison:** Hutchison 3G is an MNO with a presence in multiple countries across Europe and Asia. In recent years, it has been involved in tower transactions in Australia, where some of its assets were sold to Crown Castle Australia (now Axicom), and in Indonesia where it negotiated a sale and leaseback deal of 3,692 towers with Protelindo.

**IBS Tower:** Founded in 2006 and listed in August 2012, PT Inti Bangun Sejahtera Tbk (IBS) is one of Indonesia’s “big four” publicly traded independent
tower companies. Starting as an in-building system solution provider, IBS has since focussed its resources on ground based towers, earning it a significant presence in the market. At end of 2016, IBS had 3,677 towers.

**Idea Cellular:** India’s third ranked MNO is in the midst of a high profile merger with #2 MNO Vodafone India. The transaction seems likely to shake loose Idea’s 8,886 captive towers, held in Idea Cellular Infrastructure Services, as well as potentially Idea’s stake in Indus Towers.

**IDFC Alternatives:** Private equity arm of IDFC group that manages over US$3.4bn on behalf of leading institutional investors from across the world. In April 2017 it purchased a 33% stake in Ascend Telecom for US$91.2mn. The deal involved Rs 365 crore of shares and Rs 220 crore of convertible debentures, as well as IDFC Bank refinancing Ascend Telecom’s loans of Rs 620 crore.

**Jio:** Reliance Jio Infocomm Limited is the brainchild of billionaire Mukesh Ambani, which launched in the fall of 2016 as a 4G LTE mobile network operator in India. Its entry into the marketplace has created severe disruptions due to its aggressive pricing and marketing strategies, leading to mergers between Vodafone and Idea Cellular, as well as Bharti Airtel with Telenor India and Tata.

While Jio has leveraged substantial co-location on towerco sites, around half the ~100,000 towers in their network are self-deployed city poles.

**Indus Towers:** Incorporated in 2007, Indus Towers is a joint venture towerco founded by Bharti Infratel, Vodafone India, Aditya Birla Telecom (Idea) with a portfolio of ~123,000 towers. Its mission is to provide passive infrastructure services to telecom service providers in India on a non-discriminatory basis, delivering best-of-class operational efficiency and opex reduction.

Indus Towers has won awards for its approach to supply-chain management and operational excellence, its drive to reduce the carbon footprint of its tower portfolio, and is also playing a part in helping the government reach its goals for nationwide coverage, small cell deployment, and the creation of smart cities in India.

A consortium led by KKR is rumored to be seeking to buyout the towerco and merge it with Bharti Infratel, a transaction valued at US$11bn.

**ING:** Leading Dutch bank with considerable experience of providing debt finance to the tower industry.

**Innovation Network Corporation of Japan:** INCJ was launched in July 2009 and is a unique public-private partnership aimed at promoting innovation and enhancing the value of businesses in Japan. It has a market cap of JPY300bn, with the Japanese government injecting JPY286bn and 26 private corporations providing a further JPY14bn. The government will also provide guarantees up to a total of JPY1,800bn for INCJ investments, giving it an investment capability of approximately JPY2,000bn.

INCJ will be established for a period of 15 years. It was part of edotco’s private placement in late 2016, investing US$400mn for a 21.5% stake in edotco. It also invested in IBS firm JTOWER when it first launched.

**International Finance Corporation (IFC):** The IFC is a member of the World Bank Group, the world’s leading DFI. The IFC has invested around half a billion dollars in debt and equity into eight towerco across emerging markets, with an objective to double that total investment by 2018. In June 2017, it closed its investment in Myanmar towerco Irrawaddy Green Towers (IGT) of US$95mn (including a parallel loan of US$42.5mn).

**IPT Powertech:** IPT PowerTech Group delivers specialised solutions to the power, industrial and telecom sectors in Africa, Middle East and Southeast Asia. The group is recognised as a global leader in the provision of Guaranteed Savings and T-ESCO models, including operating the energy equipment across the footprint of Ooredoo Myanmar.

**Irrawaddy Green Towers:** IGT had an order of 2,000 towers in phases one and two for Telenor in Myanmar; it then reportedly secured an order for a further 1,000 phase-three towers, this time from Ooredoo. To date it is the largest towerco in Myanmar with 2,500 towers. IGT provides a ‘full service’ tower+power offering. The principal shareholders of Irrawaddy Green Towers’ parent company Irrawaddy Towers Asset Holdings are affiliates of Blu Stone Management and M1 Group. Local Myanmar company Barons Telelink owns a stake in the operating subsidiary.
Jazz: Created from the merger of Warid and Mobilink in early 2017, it is the largest MNO in Pakistan by subscribers. In late August, Jazz entered a sale and leaseback of its 13,000+ towerco subsidiary, Deodar, with edotco, who partnered with local firm Dawood Hercules for the deal. The transaction is valued at US$940mn. The portfolio was established over 20+ years of operations, featuring a balanced urban-rural mix, and mainly tracks with the population concentration of Pakistan along the Indus valley with greater concentration of sites in the Central region, followed by the South and Baluchistan and KPK and North regions. About 80% are ground-based as opposed to rooftop structures.

JTOWER: Founded in 2012, JTOWER is the sole provider of in-building telecom infrastructure sharing solutions in Japan. Its proprietary in-building Distributed Antenna Systems (DAS) are used in prominent establishments across Japan, including commercial complexes and office buildings, by all three major mobile network operators (NTT DOCOMO, KDDI and Softbank). The system is MIMO-ready active DAS and covers six bands used by the Japanese MNOs.

In late July 2017, JTOWER purchased the IBS component of the SEATH portfolio (120+ IBS in Vietnam) for US$10.2mn, marking its first expansion outside of Japan; it is also exploring other regional opportunities.

JP Morgan: Leading TMT advisory team with extensive experience in towers, including some of the landmark transactions. It was the sole placement agent for edotco’s transaction with Khazanah, INCJ and KWAP.

Khazanah Nasional Berhad: It is the strategic investment fund of the Government of Malaysia. Khazanah holds and manages selected commercial assets of the Government and undertakes strategic investments on behalf of the nation. It is involved in sectors such as power, telecommunications, finance, healthcare, aviation, infrastructure, leisure and tourism, and property. In December 2016 the fund invested US$200mn in exchange for a 10.7% stake in edotco.

KJS: KJS is a State-backed towerco created in partnership with the Malaysian state of Selangor. KJS processes all applications related to telecoms in Selangor, and builds and leases telecoms infrastructure to service providers. KJS has built towers, monopoles and lamp poles on private and state agency land in Selangor and owned and operated approximately 300 structures as of Q3 2014.

Kohberg Kravis & Roberts (KKR): Kohberg Kravis & Roberts is a leading global investment firm that manages multiple alternative asset classes, including private equity, energy, infrastructure, real estate, credit and, through its strategic partners, hedge funds. In March 2017, KKR and Canada Pension Plan Investment Board (CPPiB) bought a 10.3% stake in Bharti Infratel for Rs 6,193 crore (US$951.6mn). KKR previously invested in the Indian towerco between 2008 and 2015. Right now KKR is believed to be in talks to lead a consortium of buyers including CPPiB, Abu Dhabi Investment Authority and GIC Singapore to buy a significant stake in a merged Bharti Infratel and Indus Towers deal, valued at ~US$11bn.

Komet Infra Nusantara (KIN): KIN is a rollup towerco trading solely in Indonesia, having consolidated the assets of Tara, Komet, Corona, Telematika, and Ida Lombok since 2014. To date, KIN has a portfolio of ~1,300 towers, a product of both organic and inorganic growth. KIN is owned by Indonesian infrastructure giant PT Nusantara Infrastructure and management, with IDR460bn injected by Providence Equity, who is now looking to exit Indonesia (and Asia in general, having shut down operations in India and Singapore).

KPR Consult: Renowned ‘tower doctors’ – go-to guys for structural and technical due diligence, improvement capex planning, decommissioning and just about anything to do with tower design and maintenance.

KWAP: Kumpulan Wang Persaraan is the second largest pension fund in Malaysia. KWAP took part in edotco’s private placement exercise, investing US$100mn for 5.4% stake in the towerco.

Macquarie Group: Serial towerco investors, with capital at work in Europe within Arqiva and Russian Towers, and farther afield with Axicom (formerly Crown Castle Australia), Mexico Tower Partners and Viom Networks (being integrated into ATC India). Macquarie Capital also has an excellent TMT
advisory practice with experience of advising on tower transactions, however, it has recently shifted to focus on its main investments in Asia, rather than advisory.

Myanmar Infrastructure Group (MIG): MIG is a joint venture between majority shareholder Singapore Myanmar Investco (SMI) and Golden Infrastructure Group (GIG). MIG had proved themselves building rooftops and poles for both Telenor and Ooredoo in Yangon, as well as executing a substantial DAS project within Yangon's airport, off the back of which they secured a contract to build 503 towers in phase three of Ooredoo's rollout. MIG had access to the capital markets via SMI's Singapore stock exchange listing. MIG provides a full service tower+power proposition. In October 2016 the sale of MIG to Shining Star International (headquartered in Kunming) for US$12.7mn was announced; unfortunately a few months later, the deal collapsed with the towerco now being run in “maintenance mode.”

Mitratel: Founded in 1995, PT. Dayamitra Telecommunications (Mitratel) is a wholly-owned subsidiary of PT. Telekomunikasi Indonesia, Tbk (Telkom). The company was to be transferred to Tower Bersama Group under an innovative share-swap structure, but the deal was overruled by the Indonesian government in Q3 2015.

Mitratel's current tower count is ~13,000+. Mitratel is said to receive approximately 50% of Telkomsel's BTS orders.

MPT Myanmar: Myanmar Post and Telecommunications (MPT) is the State-backed incumbent operator in Myanmar, and is also backed by the KDDI-Sumitomo joint venture KGSM. MPT remains the market leader, although its market share declined from 66.6% to 44% from Q4 2014 to now.

In the first half of 2016, MPT started to share its infrastructure with the other MNOs. It has also changed its capex model, shifting to build-to-suit (BTS) with the towercos rather than building through turnkey providers such as Huawei and ZTE. As it awards BTS contracts to various towercos as a test, awarding more orders subject to proven success, MPT was also described as likely to do more co-locations down the road. Since the MPT-KGSM partnership in 2014, MPT has built approximately 1,200 to 1,300 new towers.

MTNL: Indian State-owned operator currently considering the divestment of its 10,000 tower portfolio as well as a merger with the other State-owned MNO BSNL.

Myanmar Investments International Limited: (AIM: MIL) The first Myanmar-focused investment company to be admitted to trading on the AIM market of the London Stock Exchange. MIL was established in 2013. Its largest investment (US$21mn cost for a 9.3% shareholding) is in Apollo Towers.

Myanmar National Tele & Communications (Mytel): The recently licensed fourth operator in Myanmar is a joint venture between Vietnam's Viettel and a consortium of 11 local companies (Myanmar National Telecom Holding Public Limited). Mytel received its license in January 2017 and will operate under the brand name Mytel, effective early 2018. Mytel has announced it will invest US$1.3bn and focus more on rural coverage. The license is for 15 years and the MNO will operate in the 900MHz and 2.1GHz bands. Mytel requires approximately 2,500 co-locations plus up to 2,500 to 3,000 new builds to launch its network. Mytel is believed to have contracted with a number of new local towercos.

National Tower Development (NTD): NTD is a new towerco in Myanmar, launching in 2017 to take advantage of the new fourth operator Mytel's network rollout in the country. It also has exclusive rights to build monopoles and lamp posts in the Mandalay region.

Naza Communications: Formerly known as Premium Radius, Naza Communications is part of privately-held Naza Group in Malaysia. Started in 2014, the towerco is positioning itself to be more than just a site-based asset provider to the mobile network operators in the country, investing in RAN sharing solutions on top of tower leasing.

New Silk Route: New Silk Route is a US$1.4bn private equity firm that invests in private companies in India, Asia, and the Middle East. Its investments in the telecommunications infrastructure industry include Ascend Telecom in India.
**Nordic Teleservices:** Founded in 2014, NTS has grown to become one of the leading companies in Myanmar to provide green technology solutions at the lowest carbon footprint in the market for both telecom operators and towercos. NTS specialises in hybrid power solutions, site management and maintenance services for the telecom industry, and are believed to be one of the country’s two largest T-ESCOs.

**Norton Rose Fulbright:** Norton Rose Fulbright is a global law firm with more than 4,000 lawyers in 59 offices across Asia, Australia, Africa, Canada, Europe, Latin America, the Middle East and the United States. Out of Singapore, the firm acts for state-owned enterprises, local corporates, multinational conglomerates and global financial institutions. The firm has advised the lenders in the financing of Tower Bersama in Indonesia and separately on financing deals for Pan Asia Majestic Eagle and Irrawaddy Towers, in Myanmar. Norton Rose Fulbright’s other clients in the financing space include various DFIs and commercial lenders.

**OCK Group:** Founded in 2000 in Malaysia, OCK Group’s telecommunication network service provides end-to-end full-turnkey service that includes the designing, building and maintenance of telecommunications infrastructure. It was listed on the ACE MARKET of Bursa Malaysia Securities Berhad in July 2012. Since then it has expanded into new markets, including Cambodia, Indonesia, Myanmar and Vietnam.

OCK operates as a towerco in Malaysia, Myanmar and Vietnam. In Myanmar it won a contract with Telenor in 2015 to deploy 920 towers, of which ~620 have been built to-date. In April 2017 it secured ~90 co-locations with MPT and in July ~70 co-locations and 300+ new BTS with new operator Mytel, with delivery for end of year.

First announced in August 2016 and finalised in January 2017, OCK purchased the largest towerco SEATH in Vietnam for US$50mn. The portfolio was made up of 1,972 towers. Moving forward, OCK is said to have allocated US$5mm to US$8mm for its growth in Vietnam, targeting 200 to 250 tower builds per year. It also seeks to increase tenancy ratio from 1.26 to 1.3 by the end of 2017.

**Omnix:** Omnix was established in 2011 as an independent towerco to meet the operator demand for mobile coverage in urban and suburban areas of peninsula Malaysia. One of its main value propositions is the land bank it secured through government and private site ground tenancy agreements with the Islamic Council in Malaysia, giving it access to highly coveted but difficult to acquire sites. Over the summer it also secured an agreement with the Ministry of Education.

**Ooredoo:** Ooredoo, formerly known as Qtel, is the incumbent mobile network operator in Qatar, and also has extensive international operations in Indonesia (Indosat) and Myanmar, where it was one of the original two international operators to receive a license to build telecommunications infrastructure.

Ooredoo had 9.9mn subscribers in Myanmar at the end of Q3 2017, good for 19% market share. It has ~300 tower assets on its own balance sheets (mostly roof tops and RDUs), with a total of ~4,500 sites including co-locations. Like MPT and Telenor, Ooredoo also picked up the 1800MHz spectrum this year to expand its 4G network.

**Overseas Private Investment Corporation (OPIC):** The U.S. Government’s development finance institution. It mobilises private capital to help address critical development challenges and in doing so, advances U.S. foreign policy and national security priorities. In June 2016, OPIC provided a US $250mn debt facility to Apollo Towers.

**PAMEL:** Pan Asia Majestic Eagle Limited (PAMEL, sometimes referred to as Pan Asia Towers or PAT) built 1,250 towers for Ooredoo in Myanmar in phases one and two. Along with Michael Gearon, PAMEL has management DNA in common with Indonesia’s Protelindo, but remains a distinct entity. In 2014 PAMEL secured US$85mn in financing from a consortium of five banks: DBS, ING, OCBC, Standard Chartered and Sumitomo Mitsui. PAMEL has not built any towers in phase three of the Myanmar rollout, and has been subject to consolidation speculation.

**PEKAPE:** PT. PERMATA KARYA PERDANA was founded in 2013, beginning operations in mid-2014, with the vision to be a premier telecommunications infrastructure provider in Indonesia. Its mission is to facilitate faster and more economic roll-out of wireless operations throughout Indonesia including countryside and remote areas, as well as urban city centres. Through its partnership with Alfa Mart, one of the leading retailers in the country, PEKAPE
is uniquely positioned to offer some of the best locations desired by MNOs for coverage, infill and capacity.

**Persada Sokka Tama:** Established in 2006, PT. Persada Sokka Tama started off with build-to-suit activities before becoming a tower provider in 2008 and offering co-locations for telecoms service providers in Indonesia. The company has ~1,000 towers mostly concentrated in Java and Nusa Tenggara.

**Protelindo:** Brainchild of Michael Gearon and his loyal management team, Protelindo is the largest towerco in Indonesia where they own ~14,600 towers after their most recent acquisition of 2,500 towers from XL Axiata in Q1 2016. Over the last two years, Protelindo has significantly improved its scale and credit profile. Its leverage has strengthened through EBITDA growth, enabled by a significant increase in the number of tenancies on its towers. Protelindo has also begun to diversify into microcell assets and fibre to support the continued organic and inorganic growth of its portfolio. The company acquired iForte in June 2015 along with its 450 microcell towers, seven hotel BTS and 700km of fibre with over 180 PoPs in the city centre and business districts in Jakarta and Surabaya.

**Providence Equity Partners:** A global private equity and credit investment firm with more than US$50bn in capital under management; Providence are communications and media investment specialists. Providence announced it was existing the Asian market in 2017, which may affect its 4.8% stake in Indus Towers. Over the summer Providence’s KIN portfolio in Indonesia was also put on the block; while Indonesia does have foreign direct investment restrictions, through an innovative investment structure, Providence effectively owns a substantial stake in the portfolio. Providence also has capital at work in Brazil with Grupo TorreSur.

**PT Wellington Capital Advisory:** PT Wellington Capital Advisory (WCA) is a privately-held, fully-independent professional services firm, with offices in Jakarta and Singapore. They assist clients to develop and leverage significant investments in the TMT space within Indonesia and throughout Southeast Asia, with particular emphasis on opportunities in the rapidly-evolving tower industry.

**Q Towers:** Independent towerco with ~120 towers and an impressive tenancy ratio of 2.8 in China; one of its backers is a Texas-based hedge fund.

**Redpeak Advisers:** Based in Singapore with a core team of ex-Macquarie Capital staff, including Anupam Garg and Kingston Pang, Redpeak is a boutique corporate finance adviser focused on the TMT sector in the ASEAN region.

**Reliance Communications:** Reliance Communications (RCOM) is currently the sixth largest telecommunications provider in India, and part of the Reliance Anil Dhirubhai Ambani Group. However, the wireless business unit of RCOM seems increasingly likely to cease trading, potentially leaving their carve out towerco, Reliance Infratel (which was to be rebranded Towercom), in limbo without an anchor tenant.

**Reliance Infratel (aka Towercom):** In an effort to reduce debt, RCOM has been trying to sell its ~45,000 towers since late 2015; a period of exclusive negotiations with TPG Capital and Tillman Global Holdings fell through due to a dispute over the valuation of assets; more recent dialogue has been with Brookfield Asset Management.

**SACOFA:** SACOFA is a State-backed towerco providing BTS services and is based in the Malaysian state of Sarawak. SACOFA has over 700 towers across Sarawak, and has signed an agreement with Malaysian MNO U Mobile to expand their network coverage in this state. In addition to its tower portfolio, SACOFA also operates a 950km submarine cable between Sarawak and West Malaysia, and a 4,000km fibre optic trunk network between Kuching and Lawas in Sarawak.

**Saurava Towers:** Saurava Towers is an Indian towerco founded in 2008, providing managed services and passive infrastructure for telecoms service providers. Services include site acquisition, tower deployment, and site operation and maintenance. At the end of Q2 2016, Saurava had 55 towers.

**SEATH:** The largest towerco in Vietnam was Southeast Asia Telecommunications Holdings (SEATH), itself the product of rolling up three smaller towercos with a reported book value of US$58.7mn in Q2 2016. SEATH was a holding company owned by VNI (VinaCapital’s Vietnam Infrastructure Limited). According to the company’s
report from Q1 2015, they had 1,924 towers in Vietnam with a tenancy ratio of 1.2, an EBITDA margin of 54.1% and net margin of 15.2%. In January 2017, the tower portion of the portfolio (1,972) was sold to OCK Group for US$50mn, with Japan-based JTOWER purchasing the IBS portfolio for US$10.2mn over the summer.

**Sino Netstone:** Independent towerco in China created in 2013. Headquartered in Beijing it has an estimated portfolio of ~1,800 towers.

**SREI Infrastructure Finance:** SREI Infrastructure Finance Limited is a leading infrastructure financing conglomerate in India, and one of the first companies to lay the groundwork for telecoms infrastructure sharing. Prior to the sale to American Tower, SREI was the managing shareholder in Viom Networks, and merged with associate company Quippo in 2010. Founded by the Kanoria family, Quippo provides construction equipment rental, energy rental, oil and gas equipment rental and telecom tower infrastructure rentals. Quippo is currently exploring tower and telecom infrastructure opportunities outside India.

**Solusi Tunas Pratama (STP):** Listed on the Indonesian stock exchange in 2011, Solusi Tunas Pratama’s (STP) consolidated its position as the third largest independent towerco in Indonesia with its acquisition of 3,500 towers from XL in December 2014. This followed the acquisition of existing portfolios from other local operators such as Axiata, Bakrie and Hutchison. STP started building its own towers in December 2012 to achieve organic growth in addition to acquiring existing portfolios; it now owns and operates approximately 7,000 sites. Shareholders Carlyle and Southern Capital who collectively own ~69% are currently seeking an exit.

**Tata DOCOMO:** Tata DOCOMO is an Indian cellular service provider and product of a strategic joint venture between Tata Teleservices and NTT Docomo in November 2008. Recently Tata Teleservices (Tata) announced its intention to exit the wireless market and close down its mobile service unit. According to American Tower’s press release on the matter, Tata “accounted for approximately US$80mn, or 5%” of the towerco’s consolidated property revenue and for “approximately US$40mn” in gross margins as of the end of Q2 2017. Tata was the anchor tenant (and a 33% shareholder) on most of Viom Networks’ sites which were acquired by American Tower in April 2016, which acquired a 51% controlling stake. Most of the non-cancellable contracts between Tata and what was Viom are still valid for a period in excess of six years.

**Telkomsel:** PT Telekomunikasi Indonesia is the incumbent telecommunications provider in Indonesia, and holds the largest share of the market. Telkomsel has Indonesia’s largest and most pervasive tower network, some of which remain on its own balance sheet, some of which have been transferred to wholly owned towerco subsidiary Mitratel. Telkom explored the transfer of Mitratel and its assets to Tower Bersama Group in a unique share-swap deal which was ultimately refused by the government in mid-2015.

**Telenor:** Telenor is the incumbent telecommunications provider in Norway, and owns networks in twelve countries and has operations in 29 countries including India, Bangladesh, Pakistan, Thailand and Myanmar. Historically, Telenor has tended to partner with towercos rather than sell and leaseback towers.

In Thailand, Telenor’s subsidiary DTAC is in the process of negotiating a joint venture towerco with State-backed Thai operator CAT Telecom.

In Myanmar Telenor was one of the first foreign operators to obtain a license to build and operate telecommunications infrastructure in this greenfield market, and launched 4G services in the nation’s capital Nay Pyi Taw in July 2016. It has been expanding its 4G services steadily since picking up the 1800MHz spectrum in May 2017 at the price of US$80mn. It currently has a network of ~7,400 towers, the majority of which are tenancies on private towerco towers, and their network covers roughly 90% of the country’s population and townships. It also has retained assets of 1,200 sites, which are predominantly rooftops, which are believed to be up for sale. Total investments in the country are said to be over US$1.5bn. Telenor Myanmar’s subscriber base has grown to ~19mn for Q317, and it holds 37% market share.

**Tillman Global Holdings (TGH):** Multinational tower and infrastructure investment and operations firm led by Sanjiv Ahuja, former Chairman and co-founder of Eaton Towers and ex-CEO of Orange. TGH has a substantial stake in Apollo Towers Myanmar, which Ahuja chairs, and a joint venture partnership with JC Decaux, giving them the
opportunity to locate points of service, particularly small cells, on over 1mn prime locations worldwide.

**Tillman Global Tower Solutions:** Tillman GTS is a joint venture with Global Tower Solutions, created to tackle both utility scale ground mounted solar solutions, and also to offer financing to or operate Energy Services Companies (ESCOs). Tillman GTS proposes to take the risk, and invest the capex in telecom ESCO projects in Asia and Africa. Tillman is planning to deploy ~US$700mn of capital for this venture over the next three to five years, either working to finance contracts for existing ESCOs or building and operating the ESCO themselves with O&M partners.

**TOT:** State-backed Thai MNO which has entered into discussions with Thai MNO AIS to create a joint venture towerco, but to date no major announcements have been made. Thailand’s leading MNOs operate their networks under build-operate-transfer (BOT) partnerships with both TOT and their counterpart CAT, which has lead to disputes about tower ownership as the BOT relationships conclude.

**Tower Bersama:** Based in Indonesia, the Tower Bersama Group comprises several rolled up towercos including PT Tower Bersama, PT United Towerindo, PT Telenet Internusia, PT Batavia Towerindo, PT Bali Telekom, PT Prima Media Selaras and PT Triaka Bersama, all operated seamlessly under one management team. The group’s infrastructure extends to Java, Bali, Sumatra and Batam and is currently being expanded into Kalimantan and Sulawesi.

Tower Bersama has steadily grown its tower portfolio organically, as well as through acquisitions of smaller towercos, and with buy and leasebacks with Indonesia’s operators. A share-swap to gain control of Telkom subsidiary Mitratel was planned, but was overruled by the government in Q3 2015. Tower Bersama currently has a portfolio of 13,000+ towers and plans to roll out ~1,250 new towers for 2017.

**Towershare:** Towershare is a leading independent owner and operator of wireless communications infrastructure focusing primarily in the Middle East, North Africa and Southern Asia, or MENASA markets. Towershare generates revenue from three primary businesses: build-to-suit, sale and leaseback and value-added services.

Towershare expanded its footprint into Pakistan (local entity known as Tanzanite) in 2015, building up to a portfolio of ~700 towers, mostly through acquisitions and with the majority of towers coming from previous WiTribe assets. The portfolio consists of over 70% urban, with 40% being ground based towers, and has a colocation ratio of 1.6x. In June 2017, edotco agreed to purchase 100% of Tanzanite for US$90mn.

**Tower Vision:** Tower Vision is an Indian towerco specialising in the provision of passive infrastructure to the wireless telecommunications industry with expertise in tower roll outs, operation and maintenance. Tower Vision owns and operates ~8,400 sites and offers greenfield towers, rooftops, and in-building distributed antenna systems to MNOs across India. Tower Vision has been rumoured to be a consolidation target for several years.

**TrueMove:** TrueMove is a State-backed Thai MNO, and one of three companies given a concession to build and operate a nationwide 900 MHz band and 1,800 MHz band network in the 1990s. True has created a separate entity for its tower assets in DIF, an infrastructure fund. To date True hasn’t engaged in negotiations with other operators to create a joint venture towerco.

**Ufone:** Ufone is the mobile arm of the incumbent telecoms provider in Pakistan, PTCL, and is the fourth largest operator in the country by subscribers. Ufone has been exploring the potential sale and leaseback of its towers in Pakistan for some time. The process was stalled by the de facto merger of PTCL and Ufone, and associated management changes, but Ufone could yet contribute over 6,000 further assets to the pool of commercially shared towers in the country.

**Veon:** Formerly knowns as VimpelCom Ltd., Veon is a leading global provider of connectivity and internet services headquartered in Amsterdam and serving more than 235 million customers. It has operations in Russia, Ukraine, Kazakhstan, Uzbekistan, Kyrgyzstan, Armenia, Tajikistan, Georgia, Algeria, Pakistan, Bangladesh and Italy (as a JV with Hutchison Group).

In late August 2017, Veon and Global Telecom Holding announced that their subsidiary in Pakistan, Jazz, has signed an agreement for the sale of its tower business for approximately US$940mn,
subject to adjustments. This transaction involved Jazz selling its wholly-owned tower company, Deodar, with a portfolio of approximately 13,000 telecommunication towers, to edotco together with partners Tanzanite Tower and Dawood Hercules Corporation.

Meanwhile Veon is also preparing its tower portfolio in Bangladesh for sale.

**Viettel:** Vietnamese military-controlled Viettel is one of the world’s most expansive MNOs, having recently secured a prominent role in the consortium behind Myanmar’s soon-to-be-launched fourth MNO. Viettel seems to be warming to the idea of partnering with towercos but to date retains all their towers in their other Asian opcos; Cambodia and their home market of Vietnam.

**VimpelCom:** See Veon.

**Vinson & Elkins:** Vinson & Elkins is one of the oldest and largest international law firms, with approximately 700 lawyers located in 15 offices around the world. Its global telecommunications team has extensive experience advising on international telecoms and telecoms infrastructure transactions in numerous countries.

**Vodafone:** Vodafone Group plc is an international telecommunications company, with headquarters in London, UK. Vodafone owns and operates networks in 26 countries and has partner networks in over 50 additional countries. Vodafone India is one of the partners in Indus Towers, the world’s second largest joint venture towerco; it is currently in the process of merging with Idea Cellular and looking to monetise the towers on its own balance sheets, as well as the majority of its shares in Indus. Vodafone also has an opco in Australia, which sold part of their tower portfolio several years ago.

**Warid:** Warid Pakistan is owned by Warid Telecom International, an Abu Dhabi-based mobile telecommunication investment firm. Warid Pakistan reportedly entered into a sale and leaseback agreement with Towershare for ~4,500 towers in Q2 2015, although the deal never closed. In early 2017 Warid completed its merger with Mobilink (a subsidiary of Veon) which now operates as Jazz.

**XL Axiata:** XL is a mobile operator in Indonesia, and a fully owned subsidiary of the Axiata Group. XL has sought to reduce its tower footprint over the past few years, selling 3,500 towers to STP in 2014, and more recently 2,500 towers to Protelindo in 2016. XL retains a few thousand strategic sites.

**Yiked Bina:** Yiked Bina Sdn Bhd is a State-backed towerco active in the Malaysian state of Kedah. To date Yiked Bina owns and operates over 200 towers in Kedah, and clients include telecommunications service providers such as Telekom Malaysia, Celcom Axiata, Maxis, DiGi Telecommunication, U-Mobile, Sapura and Wi-MAX operators such as Packet One and YTL Communications.

**Zong:** Formerly knowns as CMPak, Zong is China Mobile’s Pakistan opco. It ranks third by subscribers and has around 9,100 sites, of which around 2,000 are co-locations.
David and Goliath: how agile private towercos can survive and thrive in competition with the tower industry’s giants

Differentiate, but don’t deviate: success stories and cautionary tales of independent telecom tower companies worldwide

This article serves as a world tour of private towercos, extracting lessons learned in China, India, Latin America, Africa, Europe, Myanmar, USA and Indonesia. We explore three key growth vectors for private towercos: organic growth, rollup and diversification into alternate site typologies. And we examine some of the perils and pitfalls facing tower entrepreneurs, and offer advice on how to overcome them.

Keywords: Africa, Americas, Asia, ASPIMTEL, Bankability, Best of TowerXchange, Buit-to-Suit, China, Chinese Independent Towerco Alliance, Consolidation, Debt Finance, Europe, European Wireless Infrastructure Association, Exit Strategy, India, Indonesia, Infrastructure Developers Forum, Investment, MLA, Multi-Region, Myanmar, Private Equity, Research, Tower and Infrastructure Providers Association, TowerXchange Research, Towercos, USA, Wireless Infrastructure Association

Read this article to learn:
- The market structure and share of private towercos worldwide
- The challenge raising capital for private towercos
- The role of local tower industry associations in giving private tower entrepreneurs a unified voice
- The perils of deviating too far from established lease rates and contractual norms
- The merits of innovating the business model – new services and new site typologies

The ‘long tail’ of private towercos

According to TowerXchange’s proprietary research, 2,936,086 (68.2%) of the world’s 4.3mn towers are owned by the 264 towercos we’ve identified to date. Of that total, 22 towercos that are either publicly listed, or soon to be listed, own 2,310,689 towers. A further 53 towercos with institutional owners (State or MNOs) own 417,683 towers. A ‘long tail’ of 190 private towercos own 207,714 towers, or 5% of the world’s total.

Just a handful of towers can generate a healthy, pensionable income – indeed there are many hundreds of small, often family-owned portfolios of 1-10 towers that are not included in TowerXchange’s count of 190 private towercos. But scaling beyond a single digit tower count means competing with listed and institutionally-owned towercos for locations, search rings, and acquisition opportunities – competing with companies with decades of experience, and access to low cost capital.

One of the growing pains most cited by private towerco entrepreneurs is the challenge raising capital to progress from the first dozen or so towers, to the 500-1,000 towers which makes a towerco investible by the 100+ private equity firms identified by TowerXchange as having an appetite for the asset class.

Private towercos typically progress through multiple rounds of private equity, supplemented by debt, before scaling to the point they can either consider their own IPO, or sale to a strategic acquirer.
TowerXchange has created our InvestmentXchange service to ease this growing pain by facilitating introductions between private towercos and prospective financial and strategic investors.

**A world tour of private towercos: first stop, China**

The livelihood of hundreds of tower entrepreneurs in China may be under threat. Three years ago, the State mandated the carve-out of towers from the country’s three MNOs, creating what is now a 1.9mn site monster towerco; China Tower Corporation. China’s 200-300 independent towercos, who own and operate ~50,000 sites between them, were both excited at the crystallisation of a culture of shared infrastructure, but at the same time threatened by the emergence of their giant State-owned competitor.

China offers a challenging path to scale for local tower entrepreneurs. Raising debt from Provincial financial institutions is complex, time consuming, and expensive. While private, domestic investment is gradually becoming more available to debt-funded infrastructure firms with contracted long term cash flows, like towercos, Chinese capital markets have historically been predisposed to invest only in profitable companies, at the expense of business models like telecom towers that naturally lend themselves to a degree of leverage. TowerXchange are aware of at least three private Chinese towercos which are at various stages of public listings – their experience will provide a

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**Ownership of the world’s 4.1mn towers**

- **MNO captive** 1,363,914
- **Listed or soon to be listed towercos** 2,310,689
- **Institutionally owned towercos** 417,683
- **Private towercos** 207,714

Source: TowerXchange

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**China tower count divided into MNO-captive, listed, institutional, private**

- **MNO captive** 0
- **Listed and soon to be listed** 1.9mn
- **Institutional** 0
- **Private** 50,000

Source: TowerXchange
bellwether for their peers. Small Chinese tower companies in particular struggle with the fact that towers are not securable, while State and provincial level investment funds may not be inclined to invest in entities which compete with State-owned CTC.

TowerXchange has worked directly with a couple of international private equity investors studying investment opportunities in private Chinese towercos. Both firms reached the same conclusion; private, independent towercos in China can be perceived as operating in a ‘grey market’, at risk of the Nationalisation of their assets if private towerco competition with CTC is forbidden. While the likelihood of assets being Nationalised seems to be receding, the best way to mitigate this risk would be for China’s private towercos to be licensed under a fair and equitable scheme.

China’s private towercos may own less than 3% of the country’s towers, but they play a pivotal role in several Provinces, and serve to amplify the construction capacity of CTC – China’s private towercos are estimated to have built 10% of the country’s new towers in the last year.

The formation of the Chinese Independent Towerco Alliance (CITA) is a promising step in conferring a voice to the important private segment of the Chinese tower industry – experiences in India illustrate the value of creating a trade body to represent towerco interests.

India illustrates that the industry giants will define contract structures and prices

In 2008 the emerging Indian tower industry formed its own trade body, the Tower and Infrastructure Providers Association (TAIPA). TAIPA enabled the tower industry to speak with a unified voice, lobbying State and Federal government, enabling industry stakeholders to influence regulation and taxation including clarifying rights of way, accelerating permitting, and ensuring fair fees and Federal and local levels.

While India is a useful benchmark for China illustrating the importance of forming trade bodies, the country also provides the world’s closest comparison in terms of the influence an MNO-led towerco can have in defining the business model. Much like CTC does in China, India’s MNO-led towercos (led by Vodafone-Idea-Bharti Airtel joint venture Indus Towers and Bharti Airtel’s own Bharti Infratel) instigated a contract structure that shares the benefits of infrastructure sharing by discounting leases when additional tenants are added to towers. In India lease rates are relatively low compared to global benchmarks (typically Rs 30,000-35,000, around US$500pcm).

Most recently, TAIPA facilitated an important refinement to the Indian business model and Master Service Agreement; instead of escalators of 2.5% being applied annually, the rate card price is now increased by 2.5% annually – this ensured price parity where previously anchor tenant lease rates had escalated beyond those of new tenants, and in doing so eased the path to lease renewals.

India tower count divided into MNO-captive, listed, institutional, private

- MNO captive 145,661
- Listed or soon to be listed 125,062
- Institutional 176,616
- Private 13,677

Source: TowerXchange
It should be noted that, due in large part to the aforementioned tenancy discount structure, Indian towercos typically trade at a multiple which is around a 40% discount compared to their North American peers.

With the Indian tower industry approaching its ten-year anniversary, it can be considered relatively mature. This is evinced by the relatively small number of remaining private towercos, many of which have been acquired by consolidators, particularly American Tower.

The monetisation of private towercos in India reveals one universal truth in M&A: timing is critical. After inflating to a high of over US$133,722 per tower prior to the restructuring of India’s MNO licensing in 2012, Indian towers are now changing hands at valuations closer to $76,000 per tower, and valuations remain under downward pressure due to the proposed merger of #2 and #3 MNOs Vodafone and Idea, and the associated surplus of towers coming to market. TowerXchange heard reports that, five years years ago, one of India’s remaining private towercos rejected an offer that probably represents twice their current valuation.

Central and Latin America illustrates that disciplined private towercos can thrive alongside giants

Central and Latin America (CALA) is home to one of the largest and most successful pools of private towercos, some of which are growing at 30-50x the speed of the listed towercos in the region. Yet CALA is also the source of several cautionary tales of private towercos that deviated too far from the established towerco playbook, to the detriment of their profitability and investibility.

While private towercos own just 12.5% of CALA’s towers, between Q115 and Q117, private towercos added 47% of the new towers added to portfolios.

While private towercos can out-build public and institutional entities, CALA also provides many examples of the perils of competing on price, and/or cutting corners on quality, permitting and contractual terms. The tower markets in Colombia and, to a lesser extent Brazil, became a “race to the bottom” in terms of lease rates, leaving many towercos uninvestible with too little margin between ground rent and lease rate to create adequate tower cash flow to attract a successful exit.

The same private towercos that competed too aggressively on price were also often guilty of meddling with Master Lease Agreement best practices: discounting or omitting escalators, granting anchor tenants excessive reserve space thus limiting the amount of wind load capacity that could be sold to new tenants, or granting RANsharing rights at little or no cost. Perhaps most importantly, concessions were often granted in cancellation and transferability clauses, which in the event of acquisition by a large public or institutional towerco, would enable tenants to transfer off the private towerco towers onto the larger entity’s portfolio.

CALA’s most successful private towercos are not
deviating far from the established towerco playbook – companies like Torrecom are building quality structures in attractive locations, in investible markets, and leasing them up to credit worthy tenants. Other towercos are even ‘cleansing’ smaller portfolios of less investible towers – rolling up assets at a discount, investing improvement capex to enhance structural capacity, investing time to plug gaps in permitting paperwork, and to renegotiate terms with landlords and tenants. Digital Bridge trades as Mexico Tower Partners and Andean Tower Partners, and achieved a compound annual growth rate in tower count in excess of 50% between Q115 and Q117. Leveraging substantial M&A, Phoenix Tower International is growing even faster, achieving a tower count CAGR of 506% over the same period.

Africa’s private towercos prove they are better able to manage towers than MNOs

When TowerXchange first studied the Sub-Saharan African tower market in 2011, towercos owned less than 5% of the continent’s towers. That figure has now risen to 39%, of which 31% are owned by private towercos! Despite less than 50% penetration, the SSA tower market is approaching ‘sold out’ – why? Towercos don’t want all the towers – there is finite value in acquiring parallel infrastructure, and there is considerable risk in acquiring towers from an anchor tenant that might not prove credit worthy. Africa’s towercos have acquired the majority of towers from MTN and Airtel, plus a significant proportion from Millicom and Orange, and have little appetite to acquire towers from ‘tier two’ MNOs who often struggle to achieve good market share and margins.

Africa illustrates how well-funded private towercos can scale rapidly by buying and leasing back established MNOs’ towers, while at the same time absorbing the majority of new build. The three largest private towercos in SSA (IHS, Helios Towers Africa and Eaton Towers) are on the brink of being classified as “soon to be listed”, having scaled from near zero to 22,961 towers, 6,477 towers and 5,000 towers respectively.

The towercos in Africa provide more than vertical real estate: much of their complexity – and value add – is derived from energy management. Africa’s towercos would contend that as a function of improvements in uptime and time to market, they have proved they do a better job of managing towers than the MNOs from which they were acquired.

Expanding the definition of a cell site, while pushing the boundaries of the business model in Europe

Apart from MENA, Europe is the world’s least mature towerco market. Apart from a few local tower builders and a couple of small buy and leasebacks, the European tower industry kicked off in 2012 with the first of a series of acquisitions by Cellnex, which had a successful IPO in 2015.

Cellnex and American Tower are acquiring many
Europe's largest private towercos (Cellnex acquired Protelindo Netherlands and Shere Group, American Tower acquired FPS), driving valuations to the point where Europe looks very much like a seller’s market. These acquisitions notwithstanding, many towers remain on MNO balance sheets or on the balance sheets of MNO-captive towercos and infrasharing joint ventures in Europe.

Moreso than in other regions, European towercos value creation is driven as much by decommissioning of parallel infrastructure as it is by new build. Europe’s largest towercos are consolidating hundreds of towers per year, saving opex and driving the tenancy ratios and profitability of remaining sites.

Another innovation for which European towercos are renowned is engagement with alternate site typologies, from relatively conventional rooftop poles (which are more prevalent in Europe as a function of urbanisation), to deployment of small cells and DAS, and even use of electricity pylons, smoke stacks and church towers.

Russia offers some particularly interesting lessons for private towercos. Here the likes of Russian Towers, Vertical and Service-Telecom are rolling out hundreds of ‘city poles’ every month – urban infill sites to densify networks for 4G that increasingly provide an holistic set of information services beyond cellular connectivity. But Russia also offers up a cautionary tale: beware investing time and

money chasing MNO tower sales – millions of Rubles and countless hours of management time has been spent pursuing the acquisition of Russian MNO towers, with no acquisitions yet realised.

Europe’s towercos have also created a trade association; the European Wireless Infrastructure Association, which facilitates networking, promotes investment and represents the industry’s interests in matters of public policy with the European Union and other regulatory stakeholders.

Myanmar: private towercos go where the giants fear to tread

Private towercos can play a critical, and highly rewarding, role de-risking virgin tower markets. Myanmar stands out as the obvious example.

With 46% of the country’s towers, private towercos play a larger role in Myanmar than almost anywhere in the world. Why? They were lead by tower entrepreneurs, and backed by investors, with a higher risk tolerance than institutional or publicly listed towercos, and they were prepared to invest in an unproven market with an immature regulatory environment (now much improved). Myanmar’s private towercos, led by Irrawaddy Green Towers, Apollo and PAMEL, have quickly built high quality sites in good locations, leveraging local expertise and relationships.

Check in with Myanmar in five years and expect to see a different market dynamic: with towers being leased up and local suppliers and O&M contractors

| Source: TowerXchange |
trained, and with a fourth MNO MyTel entering the market with the promise of increasing tenancy ratios, Myanmar’s private towercos may be ripening toward exit, with edotco at the head of a queue of prospective acquirers.

**Thriving ‘tower exchange’ underpins U.S. market**

The world’s oldest independent towerco market, the USA, may be dominated by the three publicly listed towercos American Tower, Crown Castle and SBA Communications, but the country also hosts over 120 private towercos. Private towerco entrepreneurs range from owners of local tower portfolios who have no intent to monetise their ‘pensionable assets’ to serial ‘build to flip’ specialists, who build or acquire portfolios of hundreds or indeed thousands of towers with a preconceived notion of selling them to one of the publics (for example Richard Byrne is on the third iteration of his simply named ‘TowerCo’).

The U.S. tower market was also birthplace of the roll-up towerco, most famously represented by Global Tower Partners (GTP), which painstakingly rolled up and built 15,700 towers in North and South America, eventually selling them to American Tower for US$4.8bn. GTP has since effectively been reincarnated as the aforementioned Digital Bridge, while Phoenix Tower International has much management DNA in common with GTP.

Another tower-related business model that originated in the U.S. is the ground lease aggregator.

Sometimes seen as the nemesis of the towerco, ground lease aggregators target the land leases under the most attractive towers, offering landlords a lump sum to buy them out, thus securing control of a highly lucrative piece of real estate for which they can increase rental fees. Towercos increasingly mitigate the threat of ground lease aggregators by extending leases, securing rights of first refusal, or buying outright the land under their most lucrative towers – indeed investing in the land under towers can generate excellent returns at relatively low risk, albeit a painstaking process to negotiate site by site, landlord by landlord.

Public and private towercos in the U.S. are brought together by their trade association, the Wireless Infrastructure Association, under whose wing the Infrastructure Developers Forum represents the interests of the country’s private towercos.

**It’s all happening in Indonesia**

Many of the lessons to be learned for private towercos are summed up by an Indonesian tower market so mature that most of the private towercos are now listed (albeit many have a relatively small float on the Indonesia Stock Exchange).

Indonesia’s most successful towercos have utilised every strategy we’ve discussed to drive to impressive scale. From an early stage, pioneers like Protelindo and Tower Bersama have rolled up dozens of smaller private towercos. Outside of China, there are no other tower markets where towercos regularly build 3,000 to 5,000 new towers.

**Myanmar tower count divided into MNO-captive, listed, institutional, private**

- **MNO captive** 5,400 (46%)
- **Listed or soon to be listed** 620 (9.4%)
- **Institutional** 1,270 (4.6%)
- **Private** 6,200 (46%)

Source: TowerXchange
Indonesia tower count divided into MNO-captive, listed, institutional, private

- **MNO captive 30,500**
- **Listed or soon to be listed 39,475**
- **Institutional 13,113**
- **Private 5,812**

**Conclusions: three strategies, ten lessons learned**

Entrepreneurs have generated both wealth and efficiency by creating hundreds of private towercos worldwide. But not all have succeeded. TowerXchange would humbly advocate that entrepreneurs take one of three clear paths when founding, or investing in, a private towerco.

1. **Build to keep** a small portfolio of low risk, pensionable assets – an entrepreneur can retire on the cash flow from 10 towers.

2. ‘**Build to flip’** – raise debt and equity finance, build, buy, drive to scale (typically 500+ towers), then sell to a consolidator, typically a larger listed or institutionally owned towerco, or a rollup towerco.

3. **Or become a rollup towerco**, leverage organic growth, but be prepared to painstakingly acquire dozens of small portfolios of towers, be prepared to ‘clean up’ bad contracts and incomplete sets of permits. Some rollup towercos achieve the scale necessary to list, others ultimately sell to a consolidator.

**Whichever pathway to growth you choose, here are ten lessons learned from the private towercos worldwide:**

1. **If you have a tower industry association, join it. If there isn’t one, create one**

2. **In most cases, the market sets standard lease rates and contractual terms. Don’t compete on price or on escalators; compete on time to market and quality**

While Indonesia’s towercos have ridden successive waves of growth, the market is not without its challenges. MNO margins are shrinking, putting downward pressure on lease rates, whilst increasing ground rent pinches towerco margins. Indonesia’s mobile market is dominated by State-owned Telkomsel, whose own towerco Mitratel captures the lion’s share of new build, and has scaled to a portfolio of 13,113 towers. Tower Bersama tried to buy Mitratel in 2015, using an innovative share swap agreement, but the politics proved too complex and the deal was overruled by government.

However, regulatory policy has been key to towercos in Indonesia since tower sharing was mandated in 2006. And Indonesia's towercos have formed their own trade body to lobby for their interests too – the Asosiasi Pengembang Infrastruktur Menara Telekomunikasi (ASIPMTEL).
3. Don’t deviate too far from contractual norms; be particularly wary of the value destructiveness of concessions in reserve space, RANsharing, cancellation and transferability clauses
4. But do deviate from the standard vision of macro towers – a significant proportion of the world’s new sites will be microsites, small cells and DAS – consider adding these to your catalogue
5. Urban rooftop sites can be as valuable as ground based towers, but it is critical that the towerco control all four corners of the rooftop to ensure exclusivity
6. Consider leveraging alternate site typologies such as electricity pylons, transportation structures, smoke stacks and street furniture
7. Seek to control the cost of the land under your towers, either by extending leases or buying out the land
8. A transparent tower industry is a more investible tower industry. If tower transaction and valuation benchmarks are readily available to prospective investors, the asset class becomes more attractive
9. Proactively manage your industry’s profile with prospective investors – communities like TowerXchange can help connect you with hundreds of experienced tower investors with US$billions to invest in new tower and small cell ventures
10. Private towercos must be faster, more agile, and take greater risks than their listed and institutional-owned competitors – seek first mover advantage and create lean operations and strong local partnerships to accelerate time to market
Towerco CFOs: the anchor to the vision and shepherd of growth
Managing the cost of capital, debt levels and internal rate of return critical to success

The Chief Financial Officer (CFO) is critical to a company having the financial means to achieve its vision and plan. Working alongside the CEO, a towerco CFO is the main link to investors, banks, lenders, credit rating agencies, and shareholders, and the one in charge of accessing and retaining capital with the ultimate goal of optimising the cost of capital. Naturally, the role of the CFO as well as the options available to ensure financial stability varies depending on the country of operations, geographical risk, regulatory environment, scale and future plans of the towerco, ownership structure, current liquidity, and more. With Asia being one of the most active regions for towerco start-ups, growth and deals, TowerXchange connected with multiple industry stakeholders to shine a light on the role of the CFO.

Keywords: Apollo Towers, Asia, Build-to-Suit, CIMB Securities, CTC, Capex, Cashflow Finance, China, China Merchants Bank, China Tower Corporation, DBS Vickers, Debt Finance, Due Diligence, edotco, Exit Strategy, Indo Premier, Indonesia, Infrastructure Funds, Innovation Network Corporation of Japan, Investment, Investors, Khazanah Nasional Berhad, Kumpulan Wang Persaraan, Leasing & Permitting, MLA, Malaysia, Meetup Preview, Myanmar, NCIJ, OPIC, Overseas Private Investment Corporation, Private Equity, Protelindo, Sale & Leaseback, TBIG, TOWR, Tower Bersama, Towercos

Read this article to learn:
- The role of the CFO through different stages of towerco growth
- What are some of the financial instruments available to towercos
- What are some of the key challenges of a towerco CFO
- Regional examples of financing done by towercos

Role of towerco CFO

Compared to other industries, the towerco business is less about working capital and capex cycles, and more about the cost of capital. Towercos are highly leveraged companies who act as providers of capital to operators through build-to-suit (BTS) programmes. This means towerco CFOs need to have a strong understanding of how to optimise the cost of capital, debt levels and internal rate of returns (IRRs), and continually look at managing the balance sheet to minimise costs and operating expenses. This is perhaps best exemplified by what one industry source pointed out, that unbeknownst to most, the biggest cost for Indonesia’s Tower Bersama is actually interest costs.

Optimal balance sheet and capital structure management are required due to the long-term nature of investments and contracts that towercos undertake. Once contracts are locked in for five to ten years, there is limited opportunity to change; towerco CFOs have little room for error from the outset.

The CFO shepherds the financial management of the company, with a key role in coordinating capital raising and with credit rating agencies. They need to be good at working with investment banks, coordinating investors and shareholders and have a strong understanding of corporate finance and the financial instruments available to them.

The team under the CFO can then support him/her with respect to accounting and reporting. CFOs keeps the management team grounded,
ensure procedures are followed and investment assumptions are well supported and tested. It goes without saying that the CFO’s partnership with the CEO is critical to the success of both. At the same time, outside of their company, the CFO can be instrumental in mitigating the concerns of a customer’s CFO and determining which is the best course of action to take.

Having the support of the right, best qualified team matters, but also ensuring that the right systems and procedures are in place to manage the asset register, documentation and reporting; this is critical to the CFO having the appropriate conversations with stakeholders and getting good terms when they are fundraising.

### What has changed for the towerco CFO in recent years?

“With the conversion to REIT status of the US-listed towercos, the CFO role has expanded to include outreach to REIT investors and conversion, where necessary, of internal and external reporting systems to conform to REIT standards.” – **Senior analyst**

### The stages of financing

Much like companies in other industries, towercos in their initial phases of growth raise capital privately, usually through angel investors, private equity (PE) or venture capital (VC). When they reach scale and have the balance sheet to support it, they can start to engage with the banks to provide or underwrite capital, perhaps first on a bilateral basis and then through a club deal or syndicated loan if

### Countries in Asia that have adopted the US REIT approach

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<th>Country</th>
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<tbody>
<tr>
<td>Australia</td>
<td>India</td>
<td>Japan</td>
<td>Hong Kong</td>
<td>Malaysia</td>
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<td>New Zealand</td>
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<td>Taiwan</td>
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Source: www.reit.com

### Countries in Asia considering REITs

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<th>Country</th>
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<tbody>
<tr>
<td>Cambodia</td>
<td>China</td>
<td>Indonesia</td>
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Source: www.reit.com
they require debt financing. They may also have the option to access the local or US dollar bond markets before or after they go public, such that they are not dependent only on bank debt, and sometimes they do this to achieve longer tenor debt. Eventually they could IPO and raise equity capital from institutional investors and the public markets.

**The role of the CFO through the different stages**

When a towerco is starting up and raising capital, the CEO at this point is typically the visionary, while the CFO needs to be practical, conservative, and rooted in current reality. Typically they tend to work very closely at this stage of capital raising and may well attend every meeting together. As the company progresses to access financing from banks and lenders, the CFO is now the person who is dispatched to liaise with the financiers and promote the company’s best interests, whereas the CEO becomes more of a figurehead. One of the first ways a towerco raises capital is often through private equity or venture capital, and when the time comes for these investors to exit, the CFO must decide whether they will refinance or IPO and take responsibility for the marketing of the company to the potential new PE / VC investors, or the capital markets.

**Some regional examples of debt financing for towercos**

In December 2016, China Tower Corporation (CTC) issued its first asset-backed note (ABN) with China Merchants Bank as the lead underwriter. The 1-year ABN at 2.86% per year allowed CTC to raise CNY¥5bn on the back of its receivables from the three operators. CTC is also looking to IPO on the Hong Kong Stock Exchange, originally with a desired 2017 year-end listing, but increasingly more likely in Q1 of next year (2018).

Some of the Independent towercos in China are accessing financial leasing at rates of 6.5 to 8.0%, with an average of 3-5 years on the projects according to one of our sources.

In April 2017 Tower Bersama secured IDR700bn in bonds and then followed up in August with three-year bonds at 8.4% interest rate, worth IDR500bn; this was led by Indo Premier, DBS Vickers and CIMB Securities. The towerco also secured a US$300mn loan facility extension to June 2022 this year. In May, Fitch Ratings affirmed the Long-Term Foreign- and Local-Currency Issuer Default Ratings (IDR) for Tower Bersama at ‘BB-’. At the same time, Fitch Ratings Indonesia had affirmed the National Long-Term Rating and national senior unsecured rating at ‘AA-’(idn).

In November 2016, Protelindo executed a bond issuance of IDR800bn, with tenor of 3.5 and 7 years, which partly helped to lower its foreign currency debt exposure.

Malaysia-based edotco raised US$700mn in late December 2016 through to early 2017 with Khazanah Nasional Berhad, Innovation Network Corporation of Japan and Kumpulan Wang Persaraan. This was a private placement and totaled 37.6% in equity for the three funds.

**When does a towerco decide to buy versus sell?**

“It really depends on a towerco’s shareholders whether they are buyers or sellers. With private equity firms you know that they need to monetise one day. Strategic investors typically are committed to their towerco for a long time, but sometimes the synergies can be very compelling or they need the cash, so they sell out.” – **Senior banking executive #1**

**What might be some of the markets in Asia of interest to investors?**

“It depends on a number of factors, but some of the core ones are regulatory, tele-density and which phase of technology evolution the country is in, i.e. 3G, 4G, and of course the competition. Whilst competition is healthy, irrational players can significantly impact the market dynamics. MNO consolidation could also cause concern in terms of market growth as there is usually a pause to ensure integration is done first. Markets in which there is growth in terms of both penetration and technology would be of high interest.” – **Established towerco CFO #1**

**What is the biggest gratification for a towerco CFO?**

“Helping the company expand in a financially sustainable manner that ensures we can keep our commitments to our customers and employees.” – **Established towerco CFO #2**

Apollo Towers Myanmar secured a US$250mn loan facility from US government agency Overseas Private Investment Corporation in mid-2016, while private equity firm TPG invested close to US$200mn.
What might be some of the markets in Asia of interest to investors?

“It partly depends on market dynamics, the stability of cash flows, etc. A market with competition in pricing, more towerco players, and unclear direction of consolidation means investors may be more reluctant to deploy capital. If the market is more stable and with clear commitment by operators to expand their networks, then investors are interested.” – Senior banking executive #2

Challenges and opportunities for the towerco CFO

Towerco CFOs often struggle with getting local banks to understand the tower model. These banks may see new tower builds as capex for example. Or they look at the last full year audited EBITDA (earnings before interest, tax, depreciation and amortisation) rather than taking LQA (last quarter annualised). As a result, towercos may start with international banks who have experience in other markets.

The good news for towerco CFOs is that over the past few years, the finance community has grown in its familiarity and comfort with the sector, resulting in more financial institutions entering the market with dry powder. The current favourable financial environment also means more competition among capital providers, more financial instruments and more availability for towercos. For example, a larger towerco with scale could tap into the bond market (public debt finance), where the lender is not a bank but debt investors. International institutional investors are also starting to express interest in Asia, having become familiar with the tower sector in the US and Europe. The geographical / political risk profile of Asia is relatively low too, which bodes well.

Another challenge is around the management of currency exposure, and hedging becomes critical if the towerco has foreign debt. One source noted that CFOs can struggle to get hedging right, and the existing advice from banks may not be sufficient to optimise their strategies.

When it comes to acquisitions, towercos that are involved with sale and leasebacks (SLBs) have much more complexity to deal with than a towerco-on-towerco transaction. With SLBs, there is not only the valuation of the assets, but other factors such as escalators, inflation, and the macro environment to consider.

Whether towercos are raising equity or debt, due diligence will be required, at which point the CFO and towerco team often struggle to get all the documentation in place, especially when going from being privately held to publicly listed. This includes MLAs with operator clients, ground lease contracts, environment licenses, and more. The gaps could impact not only the funding or financing process, but also the towerco’s credit rating. Due to varying levels of public administration around land ownership compared to markets like the US or Europe, towercos of all sizes in Asia face significantly more hurdles on securing documentation.

For more in-depth discussions on the role of the CFO and towerco funding and financing, join us at the TowerXchange 4th Annual Meetup Asia, to be held 12-13 December, 2017 in Singapore at Marina Bay Sands.
TowerXchange brings the tower industry to you!

Connect with us today and discuss available opportunities for our Meetups across Africa, Asia, Europe, Americas and China! Exhibiting or sponsoring at TowerXchange Meetups is the best investment you can make to showcase your products and expertise in front of the global telecom tower industry.

Email Annabelle Mayhew, CCO, at amayhew@towerxchange.com today to find out more.

TowerXchange Meetup calendar

TowerXchange Meetup Asia 2017,
December 12-13, Marina Bay Sands, Singapore

TowerXchange Meetup Europe 2018,
April 17-18, Business Design Centre, London

TowerXchange Meetup Americas 2018,
June 20-21, Boca Raton Resort & Club, Florida

TowerXchange Meetup Africa & ME 2018,
October 9-10, Sandton Convention Centre, Johannesburg

Visit our website at www.towerxchange.com
Meetup Asia 2017
12-13 December, Marina Bay Sands, Singapore
The one and only must-attend event for top Asian telecom infrastructure executives

To discuss your participation, contact Annabelle on +44 7423 512588 or email amayhew@towerxchange.com
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<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>10:15</td>
<td>Networking coffee break</td>
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<tr>
<td>10:45</td>
<td>Executive panel: India</td>
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<td>Moderator: Jonathan Atkin, Managing Director, RBC Capital Markets</td>
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<td></td>
<td>Sudhir Prasad, Chief Operating Officer, Asia, American Tower</td>
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<tr>
<td>11:30</td>
<td>Roundtable session I / Technology working group A (energy)</td>
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<tr>
<td>12:30</td>
<td>Networking lunch</td>
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<tr>
<td>13:00</td>
<td>Keynote address</td>
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<td>Bimal Dayal, CEO, Indus Towers</td>
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<td>14:15</td>
<td>Executive panel: Myanmar</td>
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<td>Vijay Watson, Country Managing Director, edotco Myanmar</td>
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<td>Patrick Tangney, Co-founder &amp; Director, Irrawaddy Green Towers</td>
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<td>14:45</td>
<td>Streaming TFN content: Defining the business model for neutral host HetNet deployment</td>
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<tr>
<td>15:00</td>
<td>Strategic partner panel: site management best practices</td>
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<td>16:00</td>
<td>Strategic partner panel: operational excellence at cell sites</td>
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<td>17:00</td>
<td>Networking coffee break sponsored by tarantula</td>
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<tr>
<td>18:00</td>
<td>Roundtable session II / Technology working group B (site design)</td>
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<td>19:00</td>
<td>Close of day one and drinks reception sponsored by eco</td>
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<tr>
<td>20:00</td>
<td>Networking dinner (registration required)</td>
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*Attendance by invitation only. Contact us if you are interested in joining the briefing*
TowerXchange Meetup Asia preliminary agenda
Marina Bay Sands, Singapore | 12-13 December 2017

Wednesday, 13 December | Day Two

8:30 Registration and morning coffee

8:50 Opening remarks

9:00 Keynote address
   ■ Akhil Gupta, Chairman, Bharti Infratel; Board Member of Bhart Airtel

9:20 Co-creation in the 5G era: Connecting dreams, for a richer future with 5G
   ■ Shigeo Nomura, Manager R&D Strategy Department, NTT DoCoMo

9:40 Executive panel: The Future Network: What role will small cells play in the future of cellular networks? / Towerco deployment of small cells and DAS

10:20 Networking coffee break

10:50 Executive panel: Opportunities and investibility of the Asian tower market
   ■ Moderator: Brandon Amber, Managing Director, Palladium Partners
   ■ Manish Kasliwal, VP and Chief Business Officer, Asia, American Tower
   ■ Carson J Wolfer, M&A Advisor, edotco Group
   ■ Tucker Grinnan, Executive Director, Asian TMT Research, J.P. Morgan Asset Management
   ■ Sachin Gupta, Managing Director, New Street Capital Asia
   ■ Senior Representative, Tillman Global Holdings

11:30 Strategic partner panel: lessons learned in energy management

11:50 Roundtable session III / Technology working group C (monitoring and optimisation)

12:40 Networking lunch

1:50 Keynote address
   ■ Speaker TBA, SoftBank

2:10 Executive panel: Indonesia
   ■ Moderator: Gulfraz Qayyum, Managing Director, Citigroup
   ■ Tomy Sudwiwijono, Tower Management Group, Indosat Ooredoo
   ■ Steve Weiss, CFO, Protelindo
   ■ HS Lim, CEO, Putra Mulia Telecommunication

2:50 Roundtable session IV / Technology working group D (small cells/DAS)

3:50 Networking coffee break

4:10 Executive panel: Bangladesh and Pakistan
   ■ Moderator: Carlos Katsuya, Chief Investment Officer & Head TMT Asia & EMENA, IFC
   ■ Md. Mainur Rahman Bhuiyan, Director and Head Infrastructure Business, Grameenphone
   ■ Hammad Rabbani, Stream Head - Towers and Special Projects, Jazz
   ■ Manish Kasliwal, VP and Chief Business Officer, Asia, American Tower
   ■ Arif Hussain, Country Managing Director, edotco Pakistan
   ■ Rahul Chaudhary, Country Managing Director, edotco Bangladesh

4:10 Streamed TFN content: Panel discussion: Bleeding edge heterogeneous network solutions - South Korea, Japan, Singapore, India

4:55 Close of TowerXchange Meetup Asia 2017

More speakers to be joining us in the coming weeks!
Confirmed roundtables and moderators:

Country focus: Australia & New Zealand
- Tom Andrews, Managing Director, Aird Towers

Country focus: China #1
- Hu Gang, GM of Finance & Administration, Guodong Networks

Country focus: China #2
- Guo Fang, VP of Infrastructure and Development, Miteno

Country focus: Indonesia
- Kingston Pang, Managing Director, Redpeak Advisers

Country focus: Malaysia
- Wan Zainal Puteh, Chief Country Officer, edotco Malaysia

Country focus: Sri Lanka
- Mohan Villavarayan, Country Managing Director, edotco Sri Lanka

Country focus: Vietnam
- Wai Khee Yap, Group CEO, OCK Group

In-building solutions (IBS): market evolution and lessons learned from Japan and Vietnam
- Atsushi Tanaka, Director Representative, JトOWER

CFO Forum
- Thivanka Rangala, CFO, edotco Group

Tower monetisation: charting your strategic sale and/or IPO path
- Kingston Pang, Managing Director, Redpeak Advisers

Lessons learned on reducing cost of towerco financing
- Sander Hamersma, Managing Director, Head of TMT Asia Pacific, Mizuho Bank

Funding and financing your business growth: one towerco’s journey
- David Higate, Managing Director, Omnix

CSMO Forum
- Darryll Sinnappa, Director of Sales, edotco Group

Pricing considerations and common pitfalls to avoid with your commercial negotiations
- Simon McFadden, GM Sales, Product & Business Development, Broadcast Australia

Additional provisional roundtable topics

- Country focus: Cambodia
- Country focus: Thailand
- Country focus: Myanmar
- General Counsel Forum
- CTO Forum
- Negotiating smart MLAs
- Reducing total cost of ownership
- Energy management excellence
- Accelerating network rollout and deployment
- Operational best practices
Technology working groups

Designed to enable peer-led evaluation of technologies by tower owners themselves, seats at the central table are strictly reserved for executives from MNOs and towercos or invited event sponsors and exhibitors.

Our priority for these sessions is to elicit the requirements and experiences of MNOs and towercos – to learn from their challenges and successes. If you are an MNO or towerco in attendance we invite you to take part in these highly constructive debates as we map out product limitations, requirements and trials, and act as a focused industry task force. Similarly, if you are in the process of evaluating different suppliers prior to making a procurement decision, the working groups will equip you with vital information and key questions to ask when assessing different vendors.

After information gathering from the MNOs and towercos, we invite selected vendors to enter the discussion, succinctly sharing their perspectives and tailored solutions/product developments to address some of the issues raised.

All vendors will be notified prior to the event as to their eligibility to join this session.

Contact Annabelle Mayhew, Chief Commercial Officer at: amayhew@towerxchange.com to get involved.

A: Energy management and optimisation
- Rajesh Bansal, National Head of Energy, Indus Towers
- Steven YuXuan, Head of Collocations & Technical Advisor, Protelindo
- Handi Prabowo, Head of O&M, Protelindo
- Ir Nalini Subramaniam, Director of Engineering, edotco Group
- PT Pawar, Head of Energy Management, edotco Group

B: Site design and improvement
- Toshiharu Nakamura, Manager, Communication Technology & Engineering Division, MPT Joint Operation
- Ir Nalini Subramaniam, Director of Engineering, edotco Group
- Anita Anwar, Head of Property, Protelindo
- Sander van Litsenburg, Head of Engineering & Quality, Health, Safety, Protelindo

C: Site monitoring, management, and optimisation
- Sushil Agarwal, National Head Operations & Deployment, Indus Towers
- Muniff Kamaruddin, Director of Operations, edotco Group
- Anita Anwar, Head of Property, Protelindo
- Handi Prabowo, Head of O&M, Protelindo

D: Small cells and DAS
- Toshiharu Nakamura, Manager, Communication Technology & Engineering Division, MPT Joint Operation
- Steven YuXuan, Head of Collocations & Technical Advisor, Protelindo
- Ir Nalini Subramaniam, Director of Engineering, edotco Group
- Denny Hendaya, COO, iForte

More towerco and MNO representatives to join us!
Regulatory focus group:
Characterising and tackling threats to the independent towerco market globally

Tuesday 12 December 2017

In order to facilitate open dialogue, this session is for towerco management teams exclusively and will be held under Chatham House rule.

Globally, TowerXchange track 275 towercos. It’s a small community and a community often poorly understood by third parties it comes into contact with; from landowners and local communities to regulators and government departments.

Often incorrectly grouped with spectrum holding operators and increasingly subjected to new taxes and local ownership stipulations, such classification and treatment of the sector presents a threat to the towerco business model.

This December we invite towerco management teams and legal and regulatory departments to join a focus group designed to look at some of the emerging threats to the towerco industry and how we can collectively, as industry, look to address them.

This is the second in a global series of regulatory working group meetings, aggregating to create a global knowledge and best practice sharing resource for regulatory, legal and government liaison professionals within towercos.

Key discussion points:

- Regulatory overreach being observed in the towerco sector globally and the perception on how this could evolve
- Challenges dealing with multiple federal and local jurisdictions and the taxes and permits imposed
- The level and structure of engagement with regulators in participant jurisdictions: is this currently working?
- What key issues are keeping regulatory and legal teams up at night?
- Experience of working with local telecom associations: How extensively do MNO and towerco needs converge? Is – there are a need for multiple local or regional towerco bodies?
- What outside support / insight would be useful in tackling some of the challenges raised?
- How are towercos licensed / how should they be licensed?

Host: Eric Crabtree, Chief Investment Officer, IFC
edotco Group Sdn Bhd

Established in 2012, edotco is the first regional and integrated telecommunications infrastructure services company in Asia, providing end-to-end solutions in the tower services sector from tower leasing, co-locations, build-to-suit, energy, transmission and operations and maintenance (O&M).

With a regional portfolio that includes over 25,000 towers across our core markets of Malaysia, Sri Lanka, Bangladesh, Cambodia, Pakistan and Myanmar, we strives to deliver outstanding performance in telecommunications infrastructure services and solutions. Our value-added services are supported by state-of-the-art real time monitoring service, echo, which has improved field operations while maximizing operational efficiencies in terms of battery, energy and fuel consumption for telecoms infrastructure.

Through our operations in developing Asian economies, the Group has established a strong track record in nation building. edotco has progressively invested in industry best practices, providing a broad portfolio of infrastructure solutions and offering value-added services to enhance efficiencies and connectivity for communities. At edotco, we are committed to conducting our business in a responsible and sustainable manner for the benefit of our customers, employees, communities and developing nations.

For more information on edotco, kindly visit www.edotcogroup.com
Our sponsors

**GOLD SPONSOR:**

**METKA IPS**

METKA IPS results from the combination of resources and expertise of METKA and International Power Supply (IPS), building on the strong technical expertise of IPS in the R&D and precision manufacturing of power electronics and energy conversion technologies, backed by the project execution capability and know-how of METKA, as a leading international EPC contractor, in addition to its robust financial resources. Through this joining of forces, METKA IPS is well positioned to meet the challenges of the rapidly growing hybrid and off grid power market, serving the needs of customers around the world with affordable and efficient solutions suitable for a wide range of applications, such as: telecoms, mini-grid, industrial, etc.

For more information please visit [www.exeron.com](http://www.exeron.com)

**SILVER SPONSOR:**

**Acsys Technologies Ltd**

Acsys designs simple, yet powerful solutions, with a focus on power-independent locking systems and workforce management software and applications. These technologies are combined to reduce theft, better manage vendors, create fairer and stronger SLAs, and simplify operational workflows. Our solutions equate to increased uptime.

European-rooted with the benefits of China-based production and a highly-specialised and diverse team from around the world, Acsys pushes the boundaries of how technology can be embraced within complex industrial environments for better security and staff management. With a customer-centric, customised approach Acsys follows the belief to think ‘outside the box’ to deliver easy-to-deploy, highly durable and cost effective solutions for the most challenging scenarios.

[www.acsys.com](http://www.acsys.com)

**SILVER SPONSOR:**

**Siterra, An Accruent Product**

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 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 5,400 customers in 120 countries.

[www.accruent.com](http://www.accruent.com)

**Tarantula**

Tarantula is a proven world leader in telecom site management software and the trusted partner of leading telecom infrastructure operators in 20 countries. Through its specialised site management platform, Tarantula is a fundamental pillar of support behind the management of more than 350,000 mobile towers and assets worth US$25 billion around the world.
AUSONIA

AUSONIA is leader in customized power solutions, specifically designed to meet MNOs and TowerCos power requirements and performance needs.

Among its products portfolio – entirely made in Italy – AUSONIA offers High Efficiency DC Gensets and Hybrid Power Systems fully integrated with Solar & Wind, for off-grid and poor-grid indoor/outdoor sites.

Extended maintenance intervals, very low fuel consumption levels and a complete web-based Remote Monitoring System allow Ausonia Customers to significantly cut their OPEX and reduce their TCO.

The use of Ausonia Power Systems in OPEX model is certified by 13 years of operation in Europe and already replicated in Africa and LATAM.

Vinson & Elkins RLLP

Vinson & Elkins is one of the oldest and largest international law firms, with approximately 700 lawyers located in 16 offices around the world. Our global telecommunications team has extensive experience advising on international telecoms and telecoms infrastructure transactions. We have significant industry experience, advising on telecoms transactions in numerous countries, including across Africa and the Middle East. 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 and service level arrangements; and have played a prominent role in complex fibre transactions.

Red Cube is the industry standard for end-to-end tower lifecycle management. It is built around 30+ real-world, best practice towerco processes that have been brought to life through persona-based workflows, linking together towerco data such as assets, leases, billing, and financials into one central business model. This functionality is available straight out of the box, allowing companies to quickly deploy an optimised towerco business model.

Delmec

Specialists in providing extra capacity in your active and passive networks. The Delmec team have been solving customers capacity issues globally for over 30 years. Our multiskilled international team are all telecoms focused creating and delivering engineering solutions that work. Our expertise has led us to become a renowned provider of engineering services to the telecommunications sector. Services include due diligence, inspection, audit, analysis, design, radio & transmission planning, rollout, upgrade, install and commissioning.

The company is headquartered in Ireland with local offices and operations dispersed throughout Europe, Africa, Asia, Middle East & South America. Delmec’s reputation has led to repeat business in over 40 countries where key services have been provided to a wide range of clients many of whom see us as their primary source of expert knowledge.

Delmec strive to provide practical cost effective services ensuring the client is given the best customer service, maintaining a high efficiency and always to a high quality. Client feedback statements have concluded that we are “The best in the world at what we do”.

Vincent & Elkins RLLP

Vinson & Elkins is one of the oldest and largest international law firms, with approximately 700 lawyers located in 16 offices around the world. Our global telecommunications team has extensive experience advising on international telecoms and telecoms infrastructure transactions. We have significant industry experience, advising on telecoms transactions in numerous countries, including across Africa and the Middle East. 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 and service level arrangements; and have played a prominent role in complex fibre transactions.

www.velaw.com
Our sponsors and exhibitors

Telecom market, we have developed a 48V lithium ion battery module that has outstanding cyclic life and charge acceptance that can reduce the runtime of generators and the total cost of ownership of telecom base stations. With 37 affiliates in 17 countries, GS Yuasa has a worldwide presence operating under the GS Yuasa, GS, and Yuasa brands.

www.gs-yuasa.com/jp/index.asp

Exhibitor:

Infozech

Infozech is a leading provider of technology-led and data analytical solutions to Telecom – Infrastructure providers, Operators and Communication service providers. Infozech has been delivering cost optimization and revenue management solutions for past 17 years to 80 customers across 25 countries.

Infozech’s innovative offering iTower (Infozech Tower Product Suite) provides an end to end solution for managing and reducing operational costs through tracking real time tower operations, meaningful analytics and helping take smarter decisions. iTower won the prestigious Aegis Graham Bell Award 2015 for being most Innovative solution for telecom tower infrastructure. iTower enables tower companies to drive 99% uptime with minimum operational cost.

www.infozech.com

Exhibitor:

Abloy

ABLOY is one of the leading manufacturers of locks, locking systems and architectural hardware and the world’s leading developer of products in the field of electromechanical locking technology. We develop safe, aesthetic and easy-to-use locking solutions which satisfy the needs of end-users and our construction industry partners for security, safety and ease-of-access. ABLOY protects people, property, and business operations on land, at sea, and in the air – in all circumstances.

Solutions created for users’ individual need extend from locking of homes to sites of operations requiring professionally provided high security.

Both the trust users place in us and our pioneering position are based on long-term endeavours – continuously developing new and innovative locking solutions and door-opening technologies that facilitate smooth entry and exit.

The position of ABLOY as one of the four global brands of ASSA ABLOY Group supports our internationalization process and empowers us to strengthen our business in existing markets and to expand into new areas.

www.abloy.com

Exhibitor:

Flexenclosure

Flexenclosure provides sustainable Internet infrastructure – designing and manufacturing prefabricated data centres and intelligent power management systems for the ICT industry.

Flexenclosure’s eSite x10 is the world’s first hybrid power system purpose-built for outdoor telecom sites and to outdoor telecom standards. It is a patented, sealed, tamper-proof unit with passive convection cooling, no filters, no moving parts and it requires no maintenance. eSite x10 is the future of hybrid power.

Flexenclosure is based in Sweden and has additional offices in Malaysia, Mexico, Myanmar, Nigeria and South Africa.

www.flexenclosure.com

Exhibitor:

GS Yuasa

GS Yuasa is a Japanese company formed in 2004 by the merger of two large 100 year old battery manufacturers, Japan Storage Battery and Yuasa. At US$3.5B in sales, GS Yuasa is one of the worlds largest battery manufacturers. GS Yuasa manufactures a full line of technologies including lithium, lead acid, nickel metal hydride, and nickel cadmium for the automotive, industrial, and specialty battery markets. Especially for qualified to provide both models of Guaranteed Savings and ESCO. Our self-manufactured enclosures allow us to create customized energy efficient/hybrid and renewable energy solutions, and to implement new concepts in site renovation.

With offices in 11 countries, our solutions are delivered to more than 80 operators, tower companies and vendors in more than 50 countries.

www.iptpowertech.com

Exhibitor:
Our exhibitors

Exhibitor:

NANHUA Electronics Co., Ltd.

NANHUA is an independent enterprise with modern management which is located in Shanghai. We design, manufacture and sell world leading signal, lighting and control products which be applied in industrial areas since 1990, and focusing on aviation obstruction light system for telecom towers from 2007, has full experience in the complete line of cost-effective obstruction lighting and control solutions. NANHUA products have been proven to be professionally designed and highly reliable.

NANHUA will continue to maintain reliable, safety and simple R&D concepts, combine with the latest technology, commit to developing new products to help customer solve problems and enhance customer value.

www.nanhua.com

Exhibitor:

NorthStar Battery

NorthStar is a global leader in designing, manufacturing and deploying a wide range of batteries and energy storage solutions. Our mission is to deliver reliable and sustainable power to the world. Using advanced technology, our products have been built to ensure longer battery life, lower operating costs and reduced environmental impact. We maintain a global presence with major operations in Sweden, USA, China and the Middle East and distribution and service centers in Latin America, Europe, Africa and APAC. Visit our booth for more information about our new innovative products including NorthStar ACE™; the future of energy storage management!

www.northstarbattery.com

Exhibitor:

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Redflow Limited is an energy storage specialist that has developed the world’s smallest flow batteries. Redflow’s unique flow batteries are designed for stationary energy storage applications ranging from its ZCell home battery to its ZBM battery range for commercial, telecommunications and grid-scale deployment. Redflow is a publicly-listed company (ASX: RFX) that operates R&D facilities in Australia, as well as offices in the US and Europe. Produced in North America by Flex, one of the world’s largest supply chain solution companies, Redflow’s high energy density batteries are sold, installed and maintained by a global network of system integrators. Redflow batteries connect directly to the telco bus, experience no damage from regular power outages, are 100% depth of discharge and their full capacity is usable over lifetime.

www.redflow.com

Exhibitor:

Enatel Energy

Enatel Energy delivers an expansive portfolio of configurable systems designed to meet every telecommunication network power requirement. Solutions offer flexibility and scalability, by way of hot pluggable combinations of modular Rectifiers, Inverters, Converters, Solar/Wind Chargers and encompass advanced energy management. Enatel’s SYNERGi hybrid solutions include unique patented generator control capabilities allowing dynamic optimisation to accommodate off-grid site variables so ensure the highest levels of network uptime, ease of deployment and OPEX savings. Renewable energy inputs can be integrated simply and blended intelligently. Enatel Energy offers renowned support, reliability, and system efficiencies. Solutions are New Zealand made to guarantee design, manufacture and process integrity.

www.enatelenergy.com

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Supplying affordable energy to a growing population, addressing climate change and meeting new customer expectations are the three main challenges Total must meet as an energy major.

www.total.com
Our exhibitors

Exhibitor:

Leoch Battery

We, Leoch Battery Pte. Ltd, established in 1999, located at 1 Tech Park Crescent, Tuas, Singapore 638131. We're an international new high-tech enterprise listed on the Main Board of the Hong Kong Stock Exchange (stock code: 842), specialize in research and development, manufacturing, sales and marketing of full categories of lead-acid battery.

www.leoch.com

Exhibitor:

Saft

Saft backup solutions range from 30 seconds to a whole day. Saft backup batteries for telecom equipment suppliers and network operators ensure continuity of customer service. Since more than one decade Saft's portfolio meet telecom energy needs everywhere in very hot or cold climates, urban settings or remote, hard-to-access locations.

For low network stability we can offer a solution with good cycling capabilities and good chargeability. Where network stability is high, we have solutions with float charging and a long service life.

Lithium-ion technology offers significant advantages at extreme temperatures, cycling capability, energy density and zero maintenance.

www.saftbatteries.com

Exhibitor:

Ascot Industrial

Ascot Industrial is an energy solution provider that proposes the right answer to your energy needs thanks to a complete portfolio of leading power solutions specifically designed for telecom application (AC, DC and Hybrid Gensets).

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www.ascotinternational.com/hybrid-generators/

Exhibitor:

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http://serenergy.com

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:

Orissa Wicomm (M) Sdn Bhd

Our strength lies in our ability to customise solutions for any type of applications in the industrial energy field. With our experience and understanding of industrial specifications and complexities, our goal is to provide complete integration of system solutions to meet the greatest expectations of our customers.

www.orissawicomm.com
Our exhibitors

Exhibitor:

ITD / ClickOnSite

IT-Development (ITD) provides Mobile Network Operators (MNOs) with an innovative end-to-end solution to efficiently manage network rollouts and operations.

We have 12,000 daily users across 20 countries. #MakeTheEverydayBetter summarizes our philosophy to keep ITD products easy to use. Our flagship is ClickOnSite, a SaaS tool specialised in site rollout (project management) and site maintenance (asset management, trouble ticketing, work orders), with remote monitoring capabilities under development. ITD aims to be the #1 provider of software for managing site rollouts and operations to MNOs in Europe, Africa, Middle East and SE Asia, and become a significant player in the towerco community.

https://en.it-development.com

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Heterogenous is an Intelligent Industrial IoT Platform that offers powerful hardware and software products to help operators and service providers of all sizes to leverage the power of the “Always On” Internet. We partner with clients to help them tap into the “Internet of Things” by introducing new and powerful applications to expand their user base, access new markets, and improve customer experience. As a sensor and radio agnostic platform, we can help acquire data from any source, over any network, and aggregate it in the cloud with context, to power analytics and bi-directional decision support for remote assets.

www.heterogenous.com

Exhibitor:

Eltek Power Pte Ltd

Eltek is a strategic technology partner for power solutions. The company reported revenue of NOK 4.3 billion in 2015, and has approximately 2,000 employees and operations in almost 40 countries. The company focuses on power electronics markets, where it is one of the leaders in telecom power and a growing force within industrial applications. Eltek is headquartered in Drammen, Norway and became part of Delta Group in 2015, a leading power and thermal management provider.

Eltek's hybrid solutions are based on the HE technology for optimal utilization of all energy resources. Visit @: http://www.eltek.com/energy_saved_he.epl to see our live HE saving!

Exhibitor:

REDDOT Electronics

REDDOT is focusing on developing and manufacturing aviation obstruction light(also called aircraft warning light) for towers and tall structures, marine lantern for maritime and portable airfield light for airstrip and helipad.

REDDOT advantages are providing complete obstruction lighting solution and materials as a package for tower companies, deploying wireless monitoring system for obstruction light, build the most efficient solar obstruction light solution according to solar irradiation in different locations.

ICAO Certified, REDDOT obstruction lights have been used for telecom sites in more than 90 countries.

www.reddotsignal.com

Exhibitor:

New Street Research

New Street Research is an independent research firm specializing in telecommunications equity and debt research. We apply an in-depth, fundamental approach to research that draws on decades of telecom, technology, and policy expertise. We strive to develop differentiated investment insights that impact institutional investors, company executives, and government policy-makers. Our team of 20 dedicated analysts based in New York, London, and Singapore, giving us a truly global and unique perspective on trends across the telecom landscape.

www.newstreetresearch.com

Exhibitor:

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
Our exhibitors

**TowerShield™**

TowerShield™ is an unique upgrading solution for existing and new build towers. TowerShield™ is the first solution to use shape factor to reduce wind load on the tower, enabling almost unlimited capacity for new antennas. Reduced wind load diminish the need of upgrading the tower and foundation!

The TowerShield™ is an invention by GSM Towers, a Norwegian tower supplier offering its own optimized designs for tower, capacity controls of existing structures, and energy solutions on three continents. GSM Towers provides a wide range of in-house engineered tower models tailored to local requirements as well as a full range of accessories.

[www.towershields.com/](http://www.towershields.com/)

See you at our future events!

<table>
<thead>
<tr>
<th>Meetup Asia 2017</th>
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<tr>
<td><strong>12-13 December,</strong> Singapore</td>
<td><strong>17-18 April,</strong> London</td>
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<th>Meetup Americas 2018</th>
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<td><strong>20-21 June,</strong> Boca Raton</td>
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Media partners:

Country-specific analyses

In this edition of the exclusive TowerXchange Asia Dossier, we offer our readers an updated overview of Asia key markets in light of the many changes occurring throughout the region, from Bangladesh to China and beyond.

China is gearing up for the much awaited IPO of China Tower Corporation while the independent tower sector has come together and created its own association (CITA). In the meantime, the Indian telecom market is going through a complete makeover likely to considerably reduce the number of MNOs and force towercos to also rethink about their strategies. Further insights include an updated analysis of the Indonesian tower market, mature and yet evolving, and snapshots of the tower markets in Australia, Bangladesh, Pakistan and Myanmar.

Don’t miss:
95 Australia and New Zealand
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www.towerxchange.com
Analysis of the tower markets in Australia and New Zealand

MNO competitive dynamics, 4G rollout, and broadband coverage extension priorities could combine to create opportunities for towercos

As the world’s sixth largest country, Australia has a total area of roughly 7.7mn km² but a population of just 23.2mn, with most concentrated in coastal cities and towns such as Brisbane, Melbourne, Sydney, and Victoria. Mobile phone penetration has reached 90%, of which 17% use only mobile for their connectivity for both voice and data. New Zealand is much smaller in size, at 268,021 km² and a population of roughly 4.75mn, with mobile phone penetration at 110%. With infrastructure sharing building momentum, industry stakeholders explored both the challenges and opportunities in both countries at TowerXchange’s 3rd Annual Meetup Asia in December 2016.

Keywords: 2 Degrees, 3G, 4G, AAPT, Acquisition, Arqiva, Asia Insights, Asia Pacific, Australia, Axicom, BellSouth, Broadcast Australia, CPP, Cable & Wireless, Canadian Pension Plan Investment Board, Capacity Enhancements, Chorus, Construction, Crown Castle Australia, Crown Fibre, Deal Structure, Decommissioning, Hutchison, IBS, Infrastructure Sharing, Investment, KAW, LTE, MLA, Macquarie Bank, Market Overview, Masts & Towers, NBN, NTL, National Broadband Network Co, Network Rollout, New Zealand, On-grid, One.tel, Optus, Postmaster General, Queensland Rail, Regulation, Rooftop, SLA, Singtel, Small Cells, Spark, Structel, TPG Telecom, Telstra, Transgrid Power, Trilogy International Partners, Urban vs Rural, Valuation, Vodafone

Read this article to learn:
- MNO and towerco landscape in Australia
- Towerco transaction history in Australia
- Small cell and in-building developments in Australia
- Telecom landscape in New Zealand
- Tower build environment in New Zealand

Australia

MNO landscape

Telstra is the incumbent carrier previously government owned and now partially privatised. It has the largest number of sites both in terms of towers and rooftops, and has recently commenced some small cell deployments. It switched off GSM 2G on 1 December, 2016, and now runs its 850MHz Next G and also 4G on the LTE platform. It sold its legacy copper and hybrid fibre-coaxial (HFC) networks to National Broadband Network Co (NBN Co) in late 2014.

With the deregulation of the telecommunications industry in the early 90s, Optus was formed via a consortium that included UK firm Cable & Wireless and US firm BellSouth. It was later acquired and is now owned by Singtel. Optus is the country’s second largest MNO by both subscriber and coverage footprint. It is currently working on rural deployment to improve regional coverage of 3G and 4G.

The third operator is Vodafone, which in Australia is actually a joint venture between Vodafone and Hutchison. The third-placed MNO suffered badly when its core network gave problems leading to the notorious “Vodafail” period that saw the company lose considerable market share. Since then Vodafone Australia has invested in urban areas and improved its 3G network while rolling out 4G, as well as expanding regional coverage. It is
now gaining customers quite rapidly as it focused on addressing its network quality over the last few years, and is now looking to expand its coverage footprint.

It is worth noting that in urban areas Optus and Vodafone have a multi-operator radio access networks (MORAN) sharing agreement using very large ten or 12 port antennas.

There is also a new carrier TPG Telecom joining the scene as it recently purchased spectrum. For now its rollout plans remain unclear. It owns a lot of fibre, is the second largest Internet service provider, and enjoys success as the largest mobile virtual network operator (MVNO).

NBN Co is a Government Business Enterprise formed in 2009. It is not an MNO but a fixed wireless network provider. Main cities and large population centres will have their national broadband delivered by fibre/copper and very, very sparse areas will have theirs delivered by satellite, with the lightly populated areas in between being serviced by a fixed wireless broadband network which is essentially LTE with mobility disabled.

Defunct MNOs

There are former MNOs who are worth noting as there are still rooftop assets and some towers tied into them:

AAPT started roll out of a CDMA network in the late 90's. Some of its sites were sold to Hutchison and others where the lease could not be broken remain leased as quiet sites.

One.tel started major roll out of GSM 2G in the late 90s, but crashed due to funding issues. Some of its sites were sold off, some abandoned, but most have been removed or reused since then.

Hutchison built a 2G CDMA network using the Orange brand, then 3G using the H3GA and “3” brand. It ran an early infrastructure sharing programme with Telstra before the Hutchison and Vodafone merger. There was a high level of site duplication, mainly on rooftops, with leases unable to be broken so many are still running. Tower selection and sharing posed less of an issue. The Australian government has funded two tranches of mobile blackspot tower provisioning, with funding awarded to the MNOs for providing coverage in nominated blackspots.

TowerCos

Australia has an interesting mix of public and private companies that are effectively towercos.

Axicom was formally Crown Castle Australia (CCA) until a high value sale in 2015 and subsequent rebranding by the new owners Macquarie Bank consortium. CCA was established in 2001 when they
paid Optus US$135mn for 700 towers, a value of US$192,857 per tower, and also paid US$130mn for 670 towers from Vodafone, a value of US$194,029 per tower. Both of these deals were very high at the time, but both Optus and Vodafone were in capex intensive network rollouts at the time so welcomed the cash injection. This set MLA standards/tower rents very high in Australia. CCA added a services arm by purchasing and growing two key companies: KAW, specialising in site acquisition and access consent, and Structel, an industry leader in tower structural engineering. A well-managed tower portfolio combined with strong customer MLA and cost reduction programmes such as ground lease reduction and ground lease buyouts added to a growing EBITDA.

In May 2015, Macquarie purchased Crown Castle Australia and renamed it Axicom for AU$2 billion (US$1.6 Billion) for 1,854 towers and a handful of rooftops. However this can’t be used as a representative Australian tower valuation mechanism as it was for the whole company not just the assets. But it does demonstrate the growth in value in the country.

Broadcast Australia was formally the NTA or the national provider of towers to the ABC broadcaster. Originally the NTA had been part of the Postmaster General (now Telstra) and was a government entity until NTL (now Arqiva) from the UK purchased them in the 90s. In 2004 NTL Broadcast was purchased by Macquarie Bank and the name Broadcast Australia replaced NTL. Subsequently the company was purchased by the Canadian Pension Plan Investment Board in 2009. Overall tower numbers are around 600, however, many are well-loaded or are MF (radiating) structures so an effective site share pool of almost 400 towers is a more accurate number. The majority of these sites are large broadcast towers.

There are also a few government-owned concerns that are effectively tower companies, with Queensland Rail and Transgrid Power as the best two examples. The rail company has about 300 towers along rail lines that it successfully rents out; it has an astute commercial attitude when it comes to tower sharing. The Queensland government does not want to privatise infrastructure, as such this asset is unlikely to come to market. Transgrid Power has built an extensive network for their own use, mainly for smart metering purposes.

There are several other smaller private tower or rooftop management companies operating in Australia and wireless Internet service providers that utilise their tower assets. Examples include AP Wireless (50 to 100 towers) and Vertel (25 to 50 towers).

**Tower counts**

All in all there are approximately 15,000 towers in Australia, with Telstra owning about half. There’s also a further 10,000 towers that non-MNOs use and 20-25,000 rooftop sites, some of which are dormant sites awaiting lease time out.

The cost to build to build per tower in Australia is around US$150,00-175,000, with most of the sites connected to the grid.

**Small cell and in-building solutions**

Telstra has some small cell solutions in major cities and are experimenting regionally. A local town in Australia could be two stores and a population of six, which is not economically viable to cover with a tower! However, coverage could be provided with a small cell, especially since there is commitment from NBN to support the MNOs with backhaul.

There are reportedly repeated attempts by others to create an in-building network which never played out. The incumbent carrier has a working agreement for in-building solutions. The Sydney Metro Railway also has a set up where MNOs share infrastructure and take turns being the lead carrier to design and install each building. The model is described as hard to break as the carriers enjoy a lot more clout when they band together to negotiate with landlords. With shopping centres, MNOs have been able to successfully pitch their coverage and services as being essential to the shoppers and their shopping experience, and in the process slash rental prices. New developers are thus often paying for in-building systems.

**New Zealand**

New Zealand has good 3G coverage in all major
population centres and 4G/LTE is progressively being deployed into these centres as well. Rural coverage is patchy and the government has run blackspots programmes to help this.

There are approximately 4,000 tower sites in New Zealand, however, there is a lot of duplication and considerable consolidation would be required before economic towerco activity could take place. All towers currently sit on MNO balance sheets.

The earthquake of 2011 that had a huge impact in Christchurch has seen the MNOs co-operate and develop ad-hoc small cell or small shared macro cell solutions on street furniture such as streetlights.

**MNOs**

There are three main MNO’s in New Zealand with Vodafone as the leader in terms of number of subscribers and coverage. It started as the BellSouth network until Vodafone took over in the late 90s.

Spark was originally Telecom New Zealand owned by the government, which in 2008 was separated into three divisions covering telecom retail, telecom wholesale, and network infrastructure (Chorus). Spark took on the mobile network and Chorus took on fibre/broadband. Spark has expanded its coverage mainly by building its own sites and capitalising on the rural exchanges from the Telecom days.

2 Degrees is the youngest MNO in the country and currently in coverage catch up mode. They have rolled out their own sites in major population centres and have extensively co-located with Vodafone on their regional sites. 2 Degrees is owned by Trilogy International Partners, and has been rumored to be interested in divesting towers.

Crown Fibre is a development entity of the government charged with the provision of high speed broadband throughout New Zealand. While most of this will be achieved by fibre, it is likely that there will be edge elements of rural populations that will have some kind of wireless solution either fixed or mobile.

**Tower build environment**

New Zealand is described as having an onerous resource management act, which means getting approvals to put up a new tower can be challenging. Supposedly there is some relaxation on the rules given blackspot and fast broadband expansion programmes, but while timelines may be a bit compressed, the expectations on tower aesthetics and structural integrity remain. Towers need to be rigorously engineered in New Zealand as it is on a fault line and the towers are likely to get shaken at some point. There are opportunities to build more towers since many popular tourist destinations could use the coverage, plus search and rescue and police also require reliable communications networks in the bush.
TowerXchange market study: Structuring infrastructure sharing in Bangladesh

Amid a healthy culture of infrastructure sharing, will regulations be conducive to towerco investment?

Keywords: 3G, 4G, Airtel, Asia, Asia Research, Bangladesh, Banglalink, Citycell, Decommissioning, edotco, Grameenphone, Infrastructure Sharing, Market Overview, Network Rollout, Pass-Through, RMS, Regulation, Research, Solar, Tax, Telenor, Teletalk, Tenancy Ratios, Tower Count, TowerXchange Research, Transfer Assets, Valuation, Veon, VimpelCom

Demographics

With a population of around 160mn packed into a land mass just under 150,000km² (smaller than Iowa!), Bangladesh is one of the most densely populated countries in the world. According to the CIA Factbook, GDP per capita PPP was just US$3,900 in 2016, although the economy has grown at an average rate of around 6% in the last twenty years. At 73%, mobile penetration is good for such a poor country, and extends well even in rural areas, but ARPU remains among the lowest in Asia.

MNOs and their networks

There are currently four significant mobile network operators in Bangladesh, with Grameenphone (GP) the market leader with 59.3mn subscribers. Telenor owns 56% of the equity in GP, Grameen Telecom Bangladesh owns 34% and the remaining 10% is traded on the stock market. GP's network covers 99%+ of the population, with 12,000+ 2G sites and 10,000+ 3G sites; with a blend of approximately 55% green field towers, 45% rooftops. GP has been leasing out their ~7,800 towers on a commercial basis since 2010, and claims to have 45% revenue market share from infrastructure sharing.

Veon (formerly VimpelCom) is preparing #2 operator Banglalink's towers for sale, with the portfolio set to be optimised through consolidation of sites duplicated by the edotco portfolio. Banglalink has been promoting their towers for co-location since 2015 and is believed to have a tenancy ratio a little over 1.2x. Banglalink has 5,890...
sites, around half of which are suburban and rural green field towers, the half urban rooftops, plus a hundred or so in-building solutions (IBS).

#3 operator Robi, majority owned by Axiata, and #4 operator Airtel merged in 2016 and the integration of their networks is well under way. Axiata now own 68.7% of the combined entity, Airtel retain 25%, while NTT DoCoMo owns a further 6.3%.

Axiata's towerco edotco entered Bangladesh in 2013 and trades under a certificate of no objection from the BTRC. edotco now operates a network of 8,200 towers, the majority of which were transferred from Robi. As a result of the Robi and Airtel merger, edotco is currently assessing which sites in the ~3,800 Airtel portfolio it will absorb into its own portfolio, with a significant proportion of overlapping sites likely to be decommissioned.

Banglalink and edotco are also in the early stages of analysing overlap, and hope to identify over 1,000 sites which could be consolidated and decommissioned.

Of Bangladesh's other MNOs, Teletalk is a state-owned MNO that leans heavily on co-location in their network planning strategies. CDMA operator Citycell has both nominal market share and tower count, and as recently as October 2016 was temporarily shut down by the BTRC for non-payment of fees. Speculation continues that Citycell will be sold.
A healthy crop of ISPs, WiMAX and other non-tradition operators also co-locate on hundreds of towers.

**Culture of infrastructure sharing**

A well embedded culture of infrastructure sharing exists in Bangladesh, with bi-lateral swaps since the early days of GSM rollout, and towers leased on commercial terms since the Bangladesh Telecommunication Regulatory Commission (BTRC) released their amended guidelines on the matter in 2011. With around 6,500 tenancies on 29,900 towers and rooftops, the prevailing tenancy ratio in Bangladesh is around 1.22x.

Around 1,000 towers are built every year, but there is substantial parallel infrastructure in Bangladesh, leading some commentators to speculate that decommissioning alone could result in the removal of 5,000+ towers and yield an uptick of 0.2-0.3x in the prevailing tenancy ratio.

GP’s 3G rollout is nearing completion but the next significant impetus for adding points of presence will be deploying 4G, with spectrum auctions scheduled later in 2017 – although the auctions have been postponed in the past. The need to raise capital for 4G spectrum and rollout, and the drive to rollout more efficiently on shared infrastructure, may see more towers built by, and sold to, independent towercos.

GP report that it takes around 130 days to build a ground based tower, or 110 days for a rooftop, assuming technical acceptance and receipt of a non objection certificate from landlord. In contrast a tower co-location can take as little as 15 days.

Source: TowerXchange

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**Timeline of infrastructure sharing in Bangladesh**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>Citycell and Warid commence first barter tower sharing</td>
</tr>
<tr>
<td>2008</td>
<td>BTRC publishes first infrastructure sharing guidelines</td>
</tr>
<tr>
<td>2010</td>
<td>Grameenphone establishes wholesale division, signs infrastructure sharing deals with Banglalink, Robi and Warid</td>
</tr>
<tr>
<td>2010</td>
<td>Airtel acquires majority stake in Warid Bangladesh</td>
</tr>
<tr>
<td>2011</td>
<td>BTRC publishes amended guidelines for infrastructure sharing</td>
</tr>
<tr>
<td>2011</td>
<td>Robi agrees infrastructure sharing deal with WiMAX operator Qubee</td>
</tr>
<tr>
<td>2012</td>
<td>Robi creates infrastructure subsidiary BCIL and agrees infrastructure sharing deals with Summit Communications, Fiber@Home and RanksTel</td>
</tr>
<tr>
<td>2013</td>
<td>Robi and Teletalk agree to share infrastructure</td>
</tr>
<tr>
<td>2013</td>
<td>3G services launched by Bangladesh’s MNOs</td>
</tr>
<tr>
<td>2013</td>
<td>edotco enters Bangladesh, managing and leasing Robi/BCIL’s towers</td>
</tr>
<tr>
<td>2014</td>
<td>Airtel and Teletalk agree passive infrastructure sharing deal</td>
</tr>
<tr>
<td>2015</td>
<td>Banglalink carves out its towers, begins leasing them up, and commences process to monetise the assets</td>
</tr>
<tr>
<td>2016</td>
<td>BTRC industry consultation on draft towerco licensing guidelines</td>
</tr>
<tr>
<td>2016</td>
<td>Bangladeshi MNOs commence 4G trials</td>
</tr>
<tr>
<td>2016</td>
<td>BTRC approves edotco increasing their shareholding in their Bangladeshi subsidiary to 80.01%</td>
</tr>
<tr>
<td>2016</td>
<td>Merger of Robi and Airtel completed</td>
</tr>
<tr>
<td>2017</td>
<td>Citycell services temporarily suspended for non-payment of fees – talks continue with prospective buyers</td>
</tr>
<tr>
<td>2017</td>
<td>Technology neutral spectrum auction planned, featuring 2×15MHz in the 2100MHz band, plus frequencies in the 1800MHz and 900 MHz bands</td>
</tr>
</tbody>
</table>

Source: TowerXchange
Regulator has unique opportunity to attract tower industry investment into Bangladesh

Given the appeal of Bangladesh’s culture of infrastructure sharing, and the efficiencies towercos can generate, why have we not seen more towercos invest in the country?

The lack of defined regulatory guidelines for towercos is currently the number one inhibitor of tower company investment in Bangladesh. The attractiveness of the market is compromised by mooted restrictions on MNO equity participation in towerco ventures, restrictions on foreign direct investors acquiring majority ownership of assets, and by a tax regime which currently disincentivises operators from leasing independent towers in favour of bi-lateral swaps.

The BTRC’s amended infrastructure sharing guidelines of 2011, which remain in force at time of writing, effectively mandated infrastructure sharing, and the Commission has made commendable progress toward engendering a culture of infrastructure sharing – more than 20% of towers built by Robi, Bangalink and Airtel have been shared since the guidelines were issued in 2011, compared to very few prior to the publication of the guidelines.

The BTRC are currently considering industry feedback to a 2016 consultation process, with a view to drafting guidelines for the licensing of independent towercos in Bangladesh.

Taxation challenges

There are three tax challenges to be overcome for towercos wanting to invest in Bangladesh; taxation of the initial tower transaction, the differential treatment of VAT between leased and swapped sites, and potential revenue levies.

When transferring tower assets MNOs have two options; demerger or outright sale. A demerger may be more tax efficient, but can take a year or more to complete. However, expediting the investment by pursuing an outright sale exposes the transaction to both VAT and capital gains tax on any value beyond that which is recorded in the seller’s books, thus incurring significant taxation.

Towercos also face an operational taxation issue in Bangladesh. If an operator leases a site from a towerco, they must pay VAT, but if they lease a site from another operator they are eligible for a VAT rebate. At present the law prohibits an equivalent rebate on the commercial rental of infrastructure. This constitutes a significant disincentive to MNOs leasing towerco sites.

The BTRC are also considering implementing a revenue levy at a rate which is an order of magnitude higher compared to, for example, Myanmar, where a fixed fee of ~US$12,000 plus 0.5% of revenues are payable annually. Towercos have played a critical role in accelerating rollout in Myanmar, where the network has expanded from ~1,500 towers three years ago to 9x that figure today.

It is not fair to critique the Bangladeshi towerco licensing and taxation regime before the guidelines have been released. The BTRC has already made significant progress in the promotion of bi-lateral and commercial infrastructure sharing, and tower companies are already investing in the country.

There is no such thing as a perfect regulatory regime to encourage investment in telecom infrastructure – different stakeholders will lobby for different priorities, and the interests of the tower industry and their MNO partners are only
two parties to consider, alongside the interests of consumers, landlords, and the need to maximise taxation revenues for the public purse. However, with at least two international tower companies standing poised and ready to invest substantially in the market, and with three of Bangladesh’s MNOs intent upon creating deep partnerships with towercos, what is needed more than anything else is clarity of what the regulatory regime will be in Bangladesh.

Operations and energy

The electricity grid in Bangladesh is relatively reliable; most outages are planned and are the result of load shedding due to exponential growth in demand. Only around 25% of sites (mostly core, hub, HVC and remote sites) need backup DGs, although backup battery banks are widely deployed. Cell site autonomy is increased at sites that are difficult to access during monsoon rains. edotco have shared some interesting anecdotes about delivering portable generators by boat to maintain uptime during rainy season!

edotco has also pioneered the use of solar technology across “a large number of sites” in non-commercial power (off-grid) zones. edotco has rolled out their Invendis-powered RMS solution ECHO to over 1,200 sites in Bangladesh.

Power is currently a pass through, but some MNOs are pushing towercos to provide energy as a fixed cost.

Conclusions

What does the future hold for Bangladeshi towers?

The market is primed for towerco participation on many levels: a deeply rooted culture of infrastructure sharing proven by substantial initial lease up, an opportunity to add value both by densifying networks for 3G and soon 4G, but also to make the network more efficient by sharing resources and decommissioning parallel infrastructure. If a conducive regulatory licensing and taxation policy can be implemented, the tower industry stands poised and ready to invest hundreds of millions of dollars into Bangladesh, releasing capital for 4G spectrum and rollout and helping to realise the country’s National Broadband Plan.
A guide to the changing structure of the Indian MNO and tower ecosystems

As the market continues to reshape, TowerXchange offers some clarity

India is a mature tower market but also an evolving one whose shape is likely to change considerably over the next few months. With as many as 43 broadband service providers, many of which only operate in a handful of circles, it comes as no surprise that the top MNOs look at ways to improve their financial efficiency, resulting in merger talks between Vodafone and Idea Cellular, Bharti and Tata Teleservices, MTNL and BSNL (as well as the now collapsed Reliance Communications and Aircel deal) all hitting the news.

If consolidation is good news for MNOs, what are the implications for towerco contracts and cash flow? Let’s look at the biggest deals in turn to see what we know about each of them.

The implications of Tata Teleservices exiting the mobile industry

In recent news, Tata Teleservices (Tata) announced its intention to exit the wireless market and close down its mobile service unit. According to American Tower’s press release on the matter, Tata “accounted for approximately US$80mn, or 5%” of the towerco’s consolidated property revenue and for “approximately US$40mn” in gross margins as of the end of Q2 2017.

Tata was the anchor tenant (and a 33% shareholder) on most of Viom Networks’ sites which were acquired by American Tower in April 2016, which acquired a 51% controlling stake. And most of the non-cancelable contracts between Tata and Viom are still valid for a period in excess of six years.
In a press release on the matter, American Tower stated that it expected to “fully enforce the average non-cancelable remaining contract terms on the leases with Tata Teleservices as well as the other contractual provisions included in the Viom transaction.” But the towerco is likely to experience churn levels above the usual as a result of Tata’s departure from the telecom sector as well as other consolidation processes likely to considerably reduce the number of MNOs active in India.

Interestingly, the operator planned to go ahead with the shutdown in spite of expected costs of approximately US$5bn and the reasons behind it didn’t seem related to a bankruptcy. In fact, Tata has been affected by the ongoing loss of market share, lack of high-speed spectrum and poor financial results.

Not long ago, Tata used to be the second largest MNO in India but is now in ninth place as a result of its lack of investments in LTE services.

The Q2 2017 Indian Telecom Services Performance Indicators report published by the Telecom Regulatory Authority of India (TRAI) stated that “Tata Teleservices recorded the highest decline of 5.21 million subscribers during the QE Jun-17” as shown in Figure 2.

**A twist in the tale**

Tata’s exit announcement shook the Indian market for just days before Bharti Airtel came to the rescue. In fact, the leading MNO agreed to acquire

### MNOs in India by subscribers (end of Q2 2017)

<table>
<thead>
<tr>
<th>Company</th>
<th>Subscribers (mn)</th>
<th>Rate of growth</th>
<th>Market share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bharti</td>
<td>284.53</td>
<td>2.53</td>
<td>23.50</td>
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<tr>
<td>Vodafone</td>
<td>212.09</td>
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<td>17.52</td>
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<tr>
<td>IDEA</td>
<td>196.36</td>
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<tr>
<td>Reliance Jio</td>
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<td>13.51</td>
<td>10.19</td>
</tr>
<tr>
<td>BSNL</td>
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<td>9.69</td>
</tr>
<tr>
<td>Aircel</td>
<td>90.32</td>
<td>-0.63</td>
<td>7.46</td>
</tr>
<tr>
<td>Reliance Communications</td>
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<td>0.02</td>
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</table>

Source: Telecom Regulatory Authority of India (TRAI)

### Figure 2 Tata market performance (end of Q2 2017)

<table>
<thead>
<tr>
<th></th>
<th>March 2017</th>
<th>June 2017</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subscriber base (mn)</td>
<td>50.74</td>
<td>45.54</td>
<td>-5.21</td>
</tr>
<tr>
<td>Market share (%)</td>
<td>4.25</td>
<td>3.76</td>
<td>-0.49</td>
</tr>
</tbody>
</table>

Source: Telecom Regulatory Authority of India (TRAI)
Tata Teleservices Limited and Tata Teleservices Maharashtra Limited’s consumer mobile businesses. Indian news outlets report that Bharti Airtel has agreed to a cash-free and debt-free deal, exception made for some of Tata’s unpaid spectrum liabilities.

The transaction is still subject to regulatory approval and will entail the takeover of operations in nineteen circles. And while Bharti Airtel will acquire Tata’s 40mn subscribers and spectrum, Tata will retain its stake in Viom Networks.

Sunil Mittal, Bharti Airtel’s Chairman, was quoted saying “On completion, the proposed acquisition will undergo seamless integration, both on the customer as well as the network side, and further strengthen our market position in several key circles. ... The acquisition of additional spectrum made an attractive business proposition. It will further strengthen our already solid portfolio and create substantial long term value for our shareholders given the significant synergies.”

And if anyone is wondering why Bharti Airtel is interested in acquiring ill-fated Tata, the answer is simple... Fighting hard to keep its spot on the podium while Vodafone and Idea keep moving forward with their merger and plan to become the largest operator in India, and while Reliance Jio continues to claim growing market share.

Bharti Airtel’s move comes after the collapse of the merger between Aircel and Reliance Communications, a merger planned to save both companies from piling debts and falling market share. Reliance Communications’ other plan to monetise and sell its tower portfolio to Brookfield is still ongoing as per the binding contract signed with the financial institution back in December 2016.

Vodafone-Idea merger talks progress

If I could pick one word to describe the Indian telecom industry at this moment in time, that would be volatile. And while we know all so well that consolidation often results in healthier and stronger organisations, we just cannot get over how dynamic negotiations and changes have been in India lately.

In fact, Idea Cellular’s shareholders have approved the merger scheme with Vodafone during a meeting held on October 12. And the next step for the two MNOs is to seek the final approval from the Department of Telecom.

If approved, the merged entity will become the largest MNO in India with over 35% market share and a valuation around US$23bn. And while the two MNOs aim at joining forces to dethrone Bharti Airtel of its spot as first MNO by market share, Vodafone and Idea tower portfolios are coming to market with Brookfield and American Tower as two of the most likely acquirers.

And whoever buys the portfolios will not only acquire towers but also tenants. In fact, Idea’s 8,886 towers have a tenancy ratio of 1.7 with 15,418 tenants and Vodafone’s 10,926 towers a tenancy ratio of 1.5 with 15,846 tenants.

MTNL-BSNL: could two become one?

The two State-owned MNOs have been in the news for their intentions to monetise their tower portfolios. In fact, while BSNL received the green light to carve out its 65,000 sites into a new entity, MTNL was considering the divestment of its 10,000 tower portfolio.

MTNL has been reporting losses for five fiscal years in a row and struggling to gain market share in the two circles where it operates (Delhi and Mumbai). And recent Indian news have reported the possibility of MTNL’s wireless business merging with BSNL.

The option of a merger between the two State-run operators has been discussed for many years now and has appeared once again in local news outlet over the past couple of weeks. BSNL doesn’t operate in the two circles where MTNL is active, which could allow the two to merge their operations rather than going through complex analysis to combine networks, reduce staff et cetera. However, since MTNL is a listed entity and BSNL is now, the two would need to go through a reverse merger process.

While Indian news outlets revive the possibility of a merger, the fate of their tower portfolio isn’t being
What could change in the Indian market

1. Bharti takes over Tata ➔ 27.3% market share ➔ 330mn subscribers
2. Vodafone and Idea merge ➔ 33.7% market share ➔ 436mn subscribers
3. Vodafone and Idea sell towers ➔ 20,000 towers for sale
4. MTNL and BSNL talk merger ➔ 10.27% market share ➔ 124mn subscribers
5. MTNL could sell towers ➔ 10,000 towers for sale
6. BSNL could carve out towers ➔ 65,000 towers into a new entity
7. KKR could take over Bharti Infratel and Indus ➔ creating a 162,000 tower entity
8. GTL Infrastructure refinancing ➔ new ownership by March 2018
9. Reliance Communications sells 51% of Infratel to Brookfield ➔ New entity named TowerCom Infrastructure

Reliance Jio increases its tariffs

On a positive note for other MNOs, Reliance Jio has finally increased its tariffs by around 15%. The MNO has steadily hiked the price of its plans in an attempt to finally gain profitability. And this comes as good news for other MNOs who have been hit hard by the entrance of Reliance Jio in the Indian mobile landscape with its aggressively priced offering. It must be noted that with the new price increase, the MNO will see its ARPU reaching just half of what it had planned to achieve by now (Rs141 or US$2.17). Since its commercial launch in September 2016, Reliance Jio has shocked the Indian market with its highly successful marketing strategy, which has earned the MNO more than 123mn subscribers in less than a year of operations. According to the aforementioned TRAI report, “During the QE Jun-17, Reliance Jio Infocom Ltd. recorded the highest net addition of 14.68 million subscribers followed by Bharti Airtel (7.01 million).”

Reliance Jio’s 4G LTE network (the MNO doesn’t offer 2G/3G services) aimed at creating a new approach to data consumption by enticing subscribers to 5Gb or even 10Gb of monthly data usage and the MNO has been working relentlessly to fibreise its sites, building (via build-to-suit and not) a variety of site typologies including In-Building Solutions (IBS), light monopoles, small cells and more.

Towercos completing the Indian makeover

While the competitive landscape among India’s MNOs is undergoing a total makeover, the towerco landscape is likely to reshape quite considerably as well. In fact, a consortium led by KKR and formed by the Canada Pension Plan Investment Board, the Abu Dhabi Investment Authority and GIC Singapore is eyeing a US$11bn transaction to acquire Bharti Infratel and Indus Towers.

According to the Economic Times, the transaction would first require Bharti Infratel to buy out the 58% of Indus Towers held by others (Idea, Providence Equity Partners and Vodafone) and then KKR to increase its interest in Bharti Infratel (from 10% to around 45%).

Bharti Infratel and Indus Towers have always been potential bedfellows - there is almost zero overlapping sites between their two portfolios, their company cultures are similar, their headquarters are in close proximity, and Bharti Infratel manages Bharti Airtel’s stake in Indus Towers, hence financials are already somewhat consolidated.
The proposed combined Infratel-Indus entity would operate over 162,000 towers across India and would jump one step ahead as the second largest towerco in the world behind China Tower Corporation and in front of American Tower.

On separate news, GTL Infrastructure is currently refinancing its residual debt (approximately US$721mn) and plans to switch ownership around March 2018. In the meantime, talks for a takeover by a private equity fund of a controlling stake in Tower Vision, which appeared in the news at the beginning of 2017, seem to have stalled.

**Positive long term perspectives**

If consolidation among MNOs tends to be seen as a threat in the immediate turn by both towercos and investors, the effects in the long run are often positive. In fact, streamlining the shape of the market by reducing the number of players means adding strength to those who remain active, increasing their subscriber base and their competitiveness.

The Indian telecom industry has been debt-ridden for quite some time now and the consolidation process should improve the financial health of MNOs, leaving only four large players to compete (Bharti-Tata, Vodafone-Idea, Reliance Jio, BSNL-MTNL) followed by a pool of smaller MNOs. India remains an evolving playground for MNOs and towercos and TowerXchange will keep reporting as it restructures into a new, more efficient shape.
Revisiting Indonesia: a mature tower industry with an evolving landscape


Read this article to learn:
- Current structure of the towerco market in Indonesia
- Exclusive insights on historical and current tower lease rates
- The shift towards value-added products and services in the towerco business model
- How the telecom industry manages energy requirements and what could change

The Indonesian MNO landscape

There are currently eight MNOs in Indonesia, who are a mix of local (Telkomsel, Internux, Sampoerna Telekomunikasi, Smartfren Telecom and Berca Hardayaperkasa) and foreign-backed companies (Indosat, XL Axiata and Hutchison 3 Indonesia). Telkomsel remains the market leader, claiming ~45% market share, with an even greater lead on a share of revenue basis.

The Indonesian tower market

Towercos in Indonesia are divided into three categories by size: big entities with 2,000+ sites, medium-sized entities with portfolios between 500 and 2,000 sites and small firms with less than 500 sites.

Five to six years ago, there were an estimated 80+ towercos but the market has since consolidated to 50-60 companies. The four “big” players are Protelindo, Tower Bersama, Mitratel and STP, while players in the middle market include Centratama, Persada Sokka, KIN, and GIHON. There are believed to be at least 40 niche towercos with portfolios between 50 and 100 sites.

Mitratel has been growing steadily with an estimated tower count of 13,000+ and is starting to be a force in the Indonesian tower market. According to one source, Telkomsel awards approximately 50% of its orders to Mitratel, 40% to Tower Bersama, then 10% to the rest of the towercos.
Indonesia sees waves of new towercos emerging but large players are also driving consolidation. For example STP has acquired over ten smaller towercos over the years as part of its growth strategy, on top of organic growth. Some of the new players were civil contractors that have taken on build-to-suit (BTS) to evolve into towercos, in some cases leveraging relationships with local network planners at MNOs, in other cases simply identifying a new opportunity in the space.

While the barrier to entry in the tower market was described by one source as access to the operators, there is a considerable opportunity to operate in local markets, just focusing on a few islands, especially in light of Indonesia’s distinctive geography. In fact, while main cities and islands such as Jakarta might be a crowded and competitive market, new towercos can secure BTS in other parts of the country where coverage might be limited, especially if they are able to offer low prices. Another source also noted that MNOs proactively encourage the creation of new towercos.

**How do towercos operate in Indonesia?**

Replicating the gold standard of the U.S. market, towercos in Indonesia operate under a grass and steel model, owning and operating only the ‘vertical real estate’ to the exclusion of energy equipment, which makes the business model relatively low on risk and complexity.

Building a tower in Indonesia costs between US$70,000 and US$100,000, with an average around US$80,000.

Land rental agreements tend to be for ten-year terms. Site acquisition, like in most markets is challenging, and can take up to 40 days of the typical 60-90 days required to deploy a new site, including securing permits and negotiating with landlords. The tower construction portion is described as the easy component, taking roughly two to three weeks. The full process, from order of BTS to delivery tends to be in the 90-120 day range, going up to 150 days in some cases.

Over the years, towercos in Indonesia have grown to include rooftops, microcells poles (MCPs), IBS and DAS, especially for densely populated areas where there is simply no land available for traditional ground-based towers (GBTs).

One example is Balitower’s collaboration and partnership with the Jakarta government, for which it received the rights in 2015 to provide microcellular pole infrastructure. Starting with 2,500 poles equipped with CCTV cameras, Balitower continues to seek opportunities to expand its network through similar procurements. Areas that have been installed with CCTV include DKI Jakarta, Pekalongan, Sukabumi, Surakarta, Sleman and Bantul.
How do telecom players manage their energy requirements?

For macro sites, MNOs are responsible for managing their own energy services. However, this tends to be outsourced to the big OEMs. For the last three years, XL has outsourced all operations to Huawei, which provides end-to-end services, including planning, design, optimisation and operation. Hutchison is also said to be a client of Huawei, which is responsible for most of the maintenance.

Indosat handed its end-to-end power management over to ZTE, which handles most operational aspects from planning to design and implementation. Where necessary, they will also take care of the dismantling. ZTE supplies the battery, rectifier, diesel genset and power monitoring system.

Vendors also generally take care of the electricity payments (pass-through with a fee). Historically the MNOs simply paid the bills that came from PLN, the national grid company. However, the bills needed to be verified and validated, and the scrutinising work of Huawei and ZTE over the accuracy of electricity bills has generated considerable cost savings.

For micro sites, towercos tend to procure, set up and maintain everything to minimise need for site visits, which in densely populated Jakarta (and Java in general) can be an issue.

Around 10-15% of the country is off-grid and sites on remote islands are usually powered with gensets and batteries. MNOs have been trialing renewables to build green sites, reportedly with the support of government-linked initiatives and incentives.

Indonesia’s fibreisation

MNOs as well as major towercos have all been investing in fibre, including Protelindo’s acquisition of iForte back in 2015. Fibreisation has been key especially as operators transition their networks from 3G to 4G and data consumption grows exponentially.

As of H1 2017, STP reported 2,823km of fibre optics backbone in its network to support “aggressive urban 3G and 4G LTE rollout by mobile telecommunication operators.” It also noted potential new business opportunities for providing wholesale fibre connection to broadband and pay TV operators in its second quarter investor presentation. For the same period, Protelindo reported 2,386km of installed fibre, with another 1,357km under-construction.

The activity of towercos is collateral to that of pure-play fibrecos that serve the market place, such as FiberStar and Moratel.

Downward pressure on lease rates

Tower lease agreements are typically for ten years, however MNOs have started requesting new BTS orders with a 5+5 model. Most contracts are denominated in local currency. The contracts now do not offer discounts to the anchor tenant as additional tenants onboard, which used to be a trend seven to eight years back when lease pricing was higher. The contracts also typically do not include escalators on the lease rate, but rather on Inorganic growth opportunities: which towers could come to market?

Indosat Ooredoo is currently assessing options with its tower portfolio, with potential plans for a sale.

Having sold 2,500 towers to Protelindo in 2016, XL Axiata is said to have the core towers remaining on its balance sheet. No movement is expected here unless XL comes under balance sheet pressure.

Not much is expected to happen now with the Telkomsel/Mitratel towers after the 2015 discussions with Tower Bersama collapsed due to lack of approval by the government. However, this is considered the most lucrative/attractive portfolio in the market, and it could eventually be monetised. Telkomsel and Mitratel’s estimated tenancy ratio right now is 1.2-1.3, indicating plenty of headroom for growth, while the combined portfolios represent the largest and most pervasive network in the country.
Indonesia’s tower association

Unbeknownst to most, Indonesia does have a local industry body that goes by the Association of Tower Infrastructure Telecommunication Developer, or Asosiasi Pengembang Infrastruktur Menara Telekomunikasi (ASPIMTEL). Membership is restricted to only independent tower companies who currently own ~50,000 towers all over the country. Note this does not include all the towercos that exist in the country. Members include Protelindo, Tower Bersama, STP and KIN.

the maintenance portion, which is between 25-35% of the total.

Over the last eight to nine years, some towercos have seen lease rates per month drop from the highs of IDR18mn (US$1,325) per month to as low as IDR10mn (US$735) per month now.

As MNOs continue to put downward pressure on pricing, some of the larger towercos have been able to hold firm, however smaller towercos struggle. MNOs prefer to pay the same price across the board, but the scale of larger towercos allow them to hold rates steady. Estimated monthly rates charged by large towercos range between IDR13.6mn (US$1,000) and IDR16.3mn (US$1,200).

One source noted the MNOs in Indonesia use India as a benchmark, which has one of the lowest lease rates in the world at approximately US$600 per tower. On the other hand, MNOs are also sharing their own towers on a commercial basis and often charge each other more than the towerco market rates.

Consolidation among towercos in the cards

One of the big news over the summer was the refinancing of STP and KIN, who retained Morgan Stanley and HSBC respectively for the process.

Carlyle and Southern Capital who together hold ~69% stake in STP are looking to exit, while Providence Equity Partners who effectively owns almost all of KIN (through a unique structural set-up) is exiting the Asian market, having shut down its operations in Singapore and India.

Carlyle entered the Indonesian market in 2012 acquiring ~25% stake in STP for a reported US$100mn. In early 2015, there were reports STP was looking to raise up to US$400mn from a further share sale, which might be what Southern Capital paid for its shares.

Protelindo and Tower Bersama are said to have expressed interest in the STP portfolio valued at US$1bn, with the former better positioned financially to undertake the transaction; Mitratel was also mentioned as a potential buyer. Regional towercos and global pension and infrastructure funds are also part of the pool of potential buyers. At the time of writing, the first round of bids has been submitted.

Where is the growth in Indonesian towers?

There is still demand for both coverage and capacity in Indonesia.

Two or three MNOs still have coverage requirements to meet, with focus likely outside of Java. Organic growth prospects are generally positive, with Tower Bersama – Telkomsel’s preferred towerco – targeting as many as 600 new towers in the second half of the year, and a yearly target of ~1,250 organic additions.

As smartphone penetration continues to grow, so will data consumption. The big three operators Telkomsel, Indosat and XL Axiata have all experienced significant and accelerated data growth year-on-year and this trend isn’t likely to stop. This translates to tenancy ratio growth due to densification.
Given the number of smaller towercos that exist in the country, larger players always have the option to entertain inorganic growth by acquisition. However, towercos in this mature market increasingly focus more on increasing their tenancy ratio rather than their tower counts. In fact, adding a new tower is a step forward in their portfolio and one back in terms of their tenancy ratio, until additional tenants are secured.

In terms of the “value add” to an Indonesian towercos offering, the last frontier would be energy management, as prominent players are already involved in IBS, DAS and micro-poles, as well as fibre as required by MNOs.

When it comes to the energy side of things however, there are two major challenges. The first being Huawei and ZTE who already control and own a large portion of the energy ecosystem and have found ways to make the financials work, thus are not likely to relinquish it. The second is that the towercos in Indonesia typically do not have experience with energy management and would need to partner with major vendors to define a viable business model to serve the market place. And as local towercos are used to keeping things pretty simple with their steel and grass business model, the energy management business might be too much of a step outside of their comfort zone.

The discussions around small cells is much like the other markets in Asia: who will do it and how, and what business model will satisfy all the stakeholders involved? For the time being, this is a topic of interest for towercos in Indonesia, but with more questions than answers.

Without a doubt, Mitratel, Protelindo, Tower Bersama and STP will continue to remain the key towercos players in Indonesia, though new entrants such as PEKAPE through its partnership with Alfamart could scale quickly while smaller, more nimble towercos could innovate on service offerings potentially swifter than the big players.

Lessons for other towercos markets

As one of Asia’s, and the world’s, largest and most penetrated tower markets, Indonesia provides a valuable benchmark.

Indonesian towercos have leveraged a no-nonsense, relatively simple business model to scale organically and inorganically, rolling up local towercos and engaging in buy-and-leasebacks with MNOs, to the point that the largest towercos in the country are among the world’s largest and most valuable. Protelindo and Tower Bersama have market caps at IDR 43.464T (~US$3.2bn) and IDR 30.814T (~US$2.3bn) respectively, with the latter enjoying a higher earnings multiple (P/E ratio) at 32.70 to Protelindo’s 16.58.

Indonesian towercos also exemplify the diversification of infrastructure typologies beyond GBTs, pioneering the incorporation of fibre, MCPs, IBS, DAS and small cells into their portfolios.

Despite the maturity of the tower market, growth and consolidation is far from finished in Indonesia. And while the country’s largest towercos may claim a lack of interest in expanding beyond the local market – if and when they see opportunities to create a tower market as healthy as they have cultivated in Indonesia, we’re confident we’ll see them invest elsewhere in Asia. But seeking a tower market as good as Indonesia sets the bar pretty high!

If you are interested in learning more about the Indonesian tower market and exploring the investment and business opportunities, don’t miss this year’s TowerXchange Meetup Asia, to be held 12-13 December in Singapore at the Marina Bay Sands.
New operator and increased infrastructure sharing to take tenancy ratios in Myanmar over 2.0

Slow ramp up to a booming second half of year as Mytel plans network rollout

TowerXchange's first visit to Myanmar was in 2014, when the tower market was just beginning to take shape with the opening of the market to foreign operators. In March 2017, TowerXchange's Head of Asia hit the ground in Yangon and took 13 meetings over the course of the week, connecting with industry stakeholders who are preparing for the next defining period of growth in the country. From a single operator, to a three and soon to be a four operator market, Myanmar will see strong tenancy ratio growth, organic tower growth, new market entrants, as well as two or three tower transactions within the year. Read on for the comprehensive guide on everything you need to know about Myanmar towers right now.

Keywords: 4G, Acquisition, American Tower, Apollo, Asia Insights, Batteries, Best of TowerXchange, Build-to-Suit, Business Model, Capacity Enhancements, Capex, Co-locations, Construction, DG Runtime, EAGER Communications Group, Exit Strategy, IGT, Infrastructure Sharing, Installation, Investment, KBZ Towers, KDDI, KDDI Summit Global Myanmar, Lease Rates, MNOs, MNTC, MPT, MPT-KSGM, Market Overview, Myanmar, Myanmar National Tele & Communications, Myanmar National Telecom Holding Public Limited, Myanmar Posts and Telecommunications, Mytel, Network Rollout, New License, New Market Entrant, Off-Grid, Ooredoo, Opex Reduction, PAMEL, PTD, Pan Asia, Post and Telecommunications Department, Private Equity, Regulation, Rooftop, Sumitomo, Telenor, Tenancy Ratios, Towercos, Unreliable Grid, Uptime, Urban vs Rural, Viettel, Who's Who

Read this article to learn:
- Operator updates and their network strategies
- Impact of the new fourth operator on tower industry growth
- Projected tower transactions for the year in Myanmar
- New and potential entrants to the Myanmar tower market
- Tenancy ratio and lease rate estimates
- Main challenges and concerns for KDDI Summit Global Myanmar's CTO
predominantly rooftops and currently up for sale. Total investments in the country are said to be over US$1.5bn.

**Ooredoo:** Ooredoo remains the number three operator and has been relatively inactive in terms of expanding its tower network in the past six months. It hasn’t been doing many co-locations and is very much focused on cost optimisation. It spent almost double than Telenor on its operator license (blind bid) and also invested more in getting its towers built (which is not necessarily a bad thing). Compared to Telenor, Ooredoo did not build as many of its own sites, with what we understand to be around 300 rooftop structures on its balance sheets, with under 20% of it as RDUs (rapid deployment units). Ooredoo initially chose to retain ownership of power assets when having sites built by third party towercos, although they eventually adopted a full service tower+power contract structure, similar to Telenor. Rumours Ooredoo may consider exiting Myanmar have been circulating for a while now, though it remains to be seen whether this will materialise.

**Mytel:** Announced last year and formally awarded in January, the fourth and final operator license went to Myanmar National Tele & Communications (MNTC), which is a joint venture between Vietnam’s Viettel and a consortium of 11 local companies (Myanmar National Telecom Holding Public Limited). MNTC has announced it will invest US$1.3bn and focus more on rural coverage. The license is for 15 years and the MNO will operate in the 900MHz and 2.1GHz bands. MNTC will be operating under the Mytel brand and is expected to have at least 2,500 co-locations plus up to another 2,500 to 3,000 new builds to launch its network. The approach is likely to incorporate all the rollout options available – co-locations with towercos and existing MNOs, as well as BTS with towercos and building on their own. Most towercos have been in discussion with Mytel for the past few months though negotiations have yet to finalise and no contracts have been signed. The management team is in place for Mytel, with a CEO, CFO, CCO, CIO, CTO, and CERO (chief external relations officer), while there will be eight board of directors, with at least two representatives from Viettel and two representatives from the local consortium.

**Spectrum**

There have been multiple delays to the 1,800MHz spectrum auction, expected for late 2016 at one point, then March 2017. However, in late February the government published a consultation paper on a direct allocation of the highly desired frequency instead of an auction. All the operators are looking to further expand and improve their 4G coverage.
through the 1,800MHz spectrum. The Post and Telecommunications Department (PTD) is looking to offer all existing MNOs the option to acquire 2x10MHz at a pre-determined price, with a chance for additional 2x10MHz on a first come, first serve basis until all of the available spectrum (2x75MHz) are allocated. With SIM penetration flattening out, MNOs are looking to grow through data and all are expected to take part.

**Industry tenancy ratio and lease rates**

On average, most of the mature towers that are two-plus years old would have a tenancy ratio around 1.6, with some as high as the 1.8 to 1.9 range. One interesting point raised by an industry source was that the towercos who initially built for Ooredoo have thus far fared better as Telenor was fairly aggressive in adding co-locations as it built out its network while Ooredoo was slower to do so. By 2018, the Myanmar market will certainly have some portfolio tenancy ratios growing to 2.0 once Mytel goes online.

When it comes to lease rates, standard rack rates would be around US$1,400 to $1,500, but with wide variance given discounting of co-locations and/or bulk orders. Some significant discounts were mentioned leading to the notion that the industry needs to start understanding the “equivalent” lease rates, or using revenue per tower as the definitive metric.

**Expected tower transactions**

While build volumes are unlikely to reach the peak of the past two years, towercos looking to stay in Myanmar are seeking both organic and inorganic growth.

It is fairly well known within the industry that Telenor’s 1,200 site portfolio is up for grabs, with

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**Breakdown of ownership of the 13,478 towers TowerXchange estimates have been built to date in Myanmar**

- **IGT**: 2,500
- **Apollo**: 1,800
- **edotco**: 1,268
- **PAMEL**: 1,250
- **OCK**: 610
- **EFT**: 550
- **MPT**: 3,500
- **Telenor**: 1,200
- **Ooredoo**: 300
- **Mytel**: 400

*Telenor and Ooredoo have majority rooftops*

- **Independent towerco towers**:
  - IGT: 2,500
  - Apollo: 1,800
  - edotco: 1,268
  - PAMEL: 1,250
  - MPT: 3,500
  - Telenor: 1,200
  - Mytel: 400

- **MNO captive towers**:
  - Ooredoo: 1,500
  - MPT: 1,000
  - MPT: 1,000
  - MPT: 1,000
  - MPT: 1,000

Source: TowerXchange research. Tower count updated as of March 28, 2017

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**New Myanmar towercos to watch out for**

- KBZ Towers (rooftops)
- MCDC streetlight and pole winner
- EAGER Communications Group
- American Tower Corporation?
the majority being rooftops; it listed 1,050 rooftops in its December 2016 presentation to investors and analysts. At least three local towercos are said to have expressed interest and likely took part in Telenor’s “show and tell” of some sample sites to see firsthand what the structures and surrounding conditions look like. The successful bidder would have to factor in improvement capex on top of the acquisition price tag to upgrade the towers as we heard most were built for single tenancy. The locations are said to be good so for towercos with ambition, experience, and cash available, they would certainly be keen to get their hands on this portfolio. TowerXchange expects this transaction to close soon.

Discussions regarding the PAMEL sale cooled down in December, though we believe it is still in the works. TowerXchange heard suggestions of valuations between US$300mn and US$350mn. With a portfolio of 1,250, this would be the equivalent of US$240,000 to US$280,000 per tower. For comparison, edotco paid US$221mn in December 2015 for a 75% stake of the Digicel (MTC) portfolio, and roughly one year later another US$35mn for 12.5% of Yoma’s stake. Thus far, edotco has paid US$256mn for 87.5% of the 1,250 tower portfolio, placing cost per tower at US$240,941. The base price of the remaining 12.5% was said to be around US$35mn. TowerXchange is generally bullish on the transaction going through this year and paving the way for further towerco consolidation in Myanmar. There is also rumour that PAMEL is refinancing. Back in October 2014, it secured US$85mn in financing from DBS, ING, OCBC, Standard Chartered and Sumitomo Mitsui.

While some think IGT could be too big for existing players in Myanmar to acquire, it may have the scale that international towercos would like to see to enter a market. Another potential candidate for acquisition might be Apollo, with backing by US private equity investors who may consider the optimum time to be approaching to exit.

New entrants

During this trip TowerXchange learned of KBZ Towers, which through a partner is making the rooftops of the KBZ (Kanbawza) Bank branches available for the “installation and commissioning of network operator equipment.” According to the KBZ Bank website, it has more than 414 branches across the country. In Yangon alone, it has 125 branches, with another 88 in Mandalay. As the buildings would already have power and backup generators in place, plus backhaul for the bank’s financial data, KBZ is well placed for a venture of this nature.

American Tower Corporation (ATC) has also been reportedly paying visits to Myanmar, at least once a year, and more recently again. ATC so far only has stakes in India and has yet to expand its footprint in Asia. While an acquisition could be at play, for now their focus seems to be around the BTS opportunities associated with Mytel’s launch.

Another company on the radar of the industry is the company who won the bid for the 200 streetlight and pole project in Mandalay last year. From what we understand, quite a few companies participated...
in an effort to secure the exclusive rights, with the winner chosen based on its agreement to a revenue (not profit) sharing arrangement with the MCDC (Mandalay City Development Council). The percentage of revenue share was described to be very high according to our source. This portfolio would be more of a micro-play than macro, but could lay the foundation for a new towerco to build upon.

EAGER Communications Group is another firm who may be venturing into tower building. It offers fibre and billboard solutions and apparently has a concession from the YCDC (Yangon City Development Council). It has both fiber optic cable (FOC) and fibre optic duct (FOD) networks installed in Yangon and Mandalay, providing wholesale cable and bandwidth services to operator and ISPs (internet service providers). On its website, there is mention of plans to install monopoles “to provide increased coverage for the MNOs to satisfy capacity demands.”

Driver for growth

Tower building in Myanmar slowed down through Q42016 and remained sluggish through Q12017, with supposedly only MPT being somewhat active. Generally the towercos are expecting co-locations to come through from Mytel, though it appears contracts won’t be signed in the near term. MPT has also shifted gears and started to award BTS and do co-locations. Telenor of course is still on path to grow its network. What they may or may not have factored in is that Mytel is also considering BTS as part of its rollout. And anything that comes through from Ooredoo is increasingly considered ‘nice to have’ by towercos. All in all, towercos will enjoy both organic and tenancy ratio growth. How lease rates and average revenue per tower will be affected remains to be seen, as the second and third tenants will likely be negotiating hard, while some discounts may kick in for anchor tenants on some of the portfolios as new tenants onboard, depending on the structure of the Master Lease Agreement.

Operators are focused on data and for good reason. As mobile phones become more entrenched and network capacity and quality improves, consumers will end up investing with their wireless carriers to access data for various social media, entertainment, communications, and even payment portals. Fixed internet penetration is very low in Myanmar so the MNOs are in just the right place at the right time to meet the massive data demand.

With gratitude

I would like to extend a big thank you to old and new friends of TowerXchange who took time to meet with me in Yangon. Many introduced me to other members within their organisations or referred me to others at companies that were on my hit list. I am grateful for your generosity, hospitality, as well as the insights and intelligence shared.
Snapshot: KDDI Summit Global Myanmar (MPT)
CTO opens up on his challenges, concerns, and expectations

TowerXchange: Could you please introduce yourself and your company?

Masahiro Tada, CTO, KDDI Summit Global Myanmar: My name is Masahiro Tada, I joined Myanmar as Chief Technical Officer in February 2016. Previously I was working for KDDI in Japan, mainly dedicated to the general network operations for “au” network, a KDDI mobile operation in Japan.

TowerXchange: When Telenor and Ooredoo were first licensed, a lot of analysts felt MPT would be swept away by the competition, but you’ve maintained and expanded your customer base and maintained market leadership. What have been the keys to your success?

Masahiro Tada, CTO, KDDI Summit Global Myanmar: One key element is we are engaged in a joint operation with MPT, and together we bring a vast wealth of local market knowledge and over 130 years of telecom operations experience in Myanmar. To this KSJM introduced cutting-edge technology and creative commercial activities, which were previously successful in Japan. This winning formula has allowed MPT JO (joint operation) to maintain its number one position, whilst offering our 23 million subscribers excellence in terms of service and quality of network.

TowerXchange: What are some of the main challenges you face as a CTO right now? What keeps you up at night?

Masahiro Tada, CTO, KDDI Summit Global Myanmar: We are noticing a significant improvement in engineering competencies in Myanmar, as we support capacity building across our sector. However, driving and sustaining ongoing quality improvement is our most challenging KPI’s, and this challenge is never-ending.

TowerXchange: How does MPT go about making technology decisions? What are some of the key factors for consideration?

Masahiro Tada, CTO, KDDI Summit Global Myanmar: We gather market insights from all levels of our joint operation, particularly with our Regional Teams. This coupled with our network nominal planning shapes the future technology strategy for MPT JO.

TowerXchange: As the country gears up for 4G rollout and increasing data usage, what does that mean for your towers/network?

Masahiro Tada, CTO, KDDI Summit Global Myanmar: Once 4G implements, there will be a significant increase in power demand and consumption. We need to ensure we are prepared for this and have sufficient battery capacity in place to cope with the usual periods of prolonged power outages experienced in Myanmar.

TowerXchange: How would you characterise the challenges maintaining uptime, particularly for sites outside of Myanmar’s three main cities and beyond the reach of the grid?

Masahiro Tada, CTO, KDDI Summit Global Myanmar: Under the current situation, there are many off-grid areas in Myanmar, therefore diesel refueling and generator maintenance is the key challenge, and also site build and operation in the rainy season is also very important.

TowerXchange: Who is responsible for installing and maintaining energy solutions at MPT’s cell sites?

Masahiro Tada, CTO, KDDI Summit Global Myanmar: Our vendors and subcontractors are taking care of this, with the support of our O&M divisions. There a number of initiatives to reduce the energy opex on a site-by-site basis.

TowerXchange: How can MNOs tap into data and analytics to better improve O&M?

Masahiro Tada, CTO, KDDI Summit Global Myanmar: Currently we are conducting analysis on a micro (site) and macro (region and whole country) basis. Our strategy is to drive continuous improvement in quality of service for customers.

TowerXchange: Finally, please sum up how you see the future of MPT’s network evolution.

Masahiro Tada, CTO, KDDI Summit Global Myanmar: Data usage is increasing day by day, and MPT will grow to meet this demand and provide fully fledge service to all corners of Myanmar. In the future transmission redundancy and capacity expansion will be the key focus areas for MPT.
Power provisioning in Myanmar to meet SLAs with zero or unstable grid

How towercos are rising to the challenge; future opportunities for ESCOs

In 2014, two new operators entered the Myanmar market. The model for both Norway-based Telenor and Qatar-based Ooredoo was to outsource tower building to independent towercos. In phase one and two of the rollout Telenor required their towercos to acquire and operate power systems whilst Ooredoo retained ownership of their energy assets and did not include power in their SLAs. By phase three of the rollout both operators’ appointed towercos took on the tower+power model. At TowerXchange’s Meetup Asia in December 2016, towercos and industry stakeholders candidly shared their views on the current and potential future of power provisioning to Myanmar’s towers.

**Ground level realities**

Currently in the Myanmar tower market, some legacy assets are still run under a pure steel and grass model, with energy assets operated by a third-party like IPT PowerTech (edoto and PAMEL), while other towercos operate as a full-service provider (such as MIG, IGT, and Apollo).

The dimensioning of a typical Telenor and a typical Ooredoo site remain fundamentally different however, primarily due to the large, power-hungry (but ultimately efficient) equipment Ooredoo is deploying.

For the full-service provider towercos, there is typically a DG and batteries at most sites, with connection to the grid where possible. However, it is reported that a good proportion of sites in Myanmar are off-grid, and effectively all on-grid sites are unreliable with less than 16 hours of usable energy per day.

Solar panels have been described as being less efficient given the country experiences little sun for four months of the year.

Operational challenges are described as being mostly around logistics, rather than some of the other issues seen in other markets such as substantial theft. Batteries are not being stolen on a wholesale basis and diesel theft is still under control. Towercos are building in protection around

**Keywords:** Apollo Towers Myanmar, Asia Insights, Batteries, Business Model, Capacity Enhancements, Capex, DG Runtime, Dimensioning, EBITDA, edotco, ESCOs, Energy Efficiency, Energy Storage, IGT, IPT PowerTech, Infrastructure Sharing, Irrawaddy Green Towers, MIG, Myanmar, Myanmar Infrastructure Group, O&M, Off-Grid, Ooredoo, PAMEL, Pan Asia, Pass-Through, Procurement, Rectifiers, SLA, Solar, Telenor, Towercos, Unreliable Grid, Uptime

**Read this article to learn:**
- What is the typical power set up on a site in Myanmar
- Current realities in operating and providing power
- Challenges with the ESCO model from a towercos perspective
- Opportunities for power suppliers and ESCOs
- Towercos perspective on investing in power solutions
the energy assets based on learnings from other markets.

What’s important to note also is power is done on a pass-through on true consumption, as such towercos do not have a strong incentive to invest in energy efficiency, as any such capex investment would not necessarily translate to savings for a towerco’s balance sheet at the end of the day. This particular set up means towercos optimise their operations differently.

In the past few months towercos have had to double up on their batteries as some of the neighbourhoods and villages took issue with the noise of generators, which was not expected nor previously experienced in other markets. As such, there are some restrictions on running the generator from 8pm to 6am which means additional batteries need to be installed to keep the sites running over a significant period of time while the generators are off.

For those towercos who built during phase one of the roll out, the sites generally have grid connection, but again, the quality and stability are not there to sustain a high level of service and uptime without backup power systems.

**Power solutions and ESCOs**

The reality is the towercos may not necessarily want to get involved with power, but had no choice given the requirements by the operators. They are open to finding and working with a right partner that can provide power with a reasonable SLA. But the ESCO model is not without its challenges.

Towercos need an end-to-end solution that is credit worthy, which narrows the field on the number of vendors they can work with; OEMs are also not necessarily power experts.

On the other hand, towercos already have to invest in capex on power with it as an above the line depreciation item. The ESCO model brings more complications if the equipment is to be bought and a monthly fee charged, creating different implications depending whether the towerco is to be valued on multiples of EBITDA or TCF (tower cash flow).

In addition, adopting the ESCO model requires the blessing of the operators as it’s a pass-through model and they pay for the invoice. And it’s been a challenging sale as some of solutions cost 5x EPC (engineering, procurement, and construction) today, and that’s been set as the benchmark that operators are willing to pay.

Energy consumption with some towercos are skyrocketing as the mobile market has been very successful with high data usage and telecom equipment said to be at 100% capacity. This means that operators are increasingly looking to offload their network through additional sites and more co-locations. Power consumption is climbing but operators do not want to pay for power overusage, even as towercos are having to increase batteries to sustain uptime.

From the operators’ perspective, they want to ensure the right power equipment is installed, that service commitments are met, and not having to engage in time consuming bill inquiries.

Fundamentally power is less efficient to share than a tower, and right now there are different power solutions depending on the site, towerco, and operator. A towerco can configure its sites to share power, manage it through batteries, with certain limits on modularity. However, the set up could be less efficient when there’s only one tenant, but more so when there’s two. In theory a towerco could build a site for four tenants to share power from day one, but the economics of deploying so much capex up front will be challenging if there is no clear pathway to two, three, and four tenants.

Towercos seek to increase revenue and growth through co-location sales and that’s the mentality recommended to power providers – to have a mini-grid in one area connected to multiple towers. This is potentially how an ESCO model could work, similar to India where micro-grid companies are coming up fast, as well as solar. The other option is to look at the scalability of technology, whereby a towerco starts with one
tenancy, and increase the size of the battery bank or generation solution on a modular basis as necessary. There are different models that could be possible for the marketplace, subject to adaptability and cooperation to structure the model such that it works for all stakeholders involved.

**Investment decision-making**

Towercos face a tough decision when it comes to making an investment on power solutions for their sites. High profile international vendors may be able to show real data behind the performance of their generators or batteries in the field, however, the price points are not attractive. On the other hand, vendors with attractive price points do not have real data from the field. The real lifecycle of a product is dependent on how operations and maintenance are undertaken. The best piece of battery and technology could have a significantly less useful life if the O&M outsourced company uses non-original replaced parts, if filters are cleaned versus replaced with new ones, et cetera. The reality is in Myanmar there is nothing older than two years in the field and much still to be proven on what would make the most sense for a towerco.

The question remains: would the expensive generators, rectifiers, and batteries last as long as expected? And how would a towerco govern O&M in such a way that it optimises asset lifecycles?
How edotco’s acquisition of 13,000 towers from Veon will create efficiencies, and which towers could be sold next?

With two recently announced acquisitions, edotco will own 38.2% of Pakistan’s 34,300 towers. To put these deals in context, TowerXchange has updated our Pakistan tower market study to include a deep dive into the details of who is buying what and for how much, and what this means for Pakistan’s fast-growing mobile market.

Keywords: 3G, 4G, ARPU, AWAL Telecom, Acquisition, Allen & Overy, Asia, Asia Insights, Axiata, Bangladesh, BurQ, CMPak, Capacity Enhancements, DH Corp, Delta Partners, Deodar, edotco, Energy Efficiency, Herbert Smith Freehills, IBS, Infrastructure Sharing, Insights, Jazz, Lazard, Lease Rates, MNOs, Market Overview, Mobilink, Network Rollout, Off-Grid, Pakistan, Pakistan Telecommunications Authority, Qubee, RANsharing, Sales & Leaseback, Tanzanite Towers, Telenor Pakistan, Tenancy Ratios, Towercos, Towershare, Ufone, Unreliable Grid, VEON, Valuation, VimpelCom, Warid, Zong

Tower transactions restructure the market

One of the main drivers for edotco’s acquisition of Tanzanite Towers in Pakistan is now clear, with the subsequent announcement that edotco has reached agreement to acquire ~13,000 towers from VEON’s Pakistan market leading opco Jazz.

Jazz (then Mobilink) had carved out their towers to subsidiary Deodar, consolidated towers acquired from Warid, and has now reached agreement to sell Deodar to edotco. The transaction was reported reported by VEON as including “almost 13,000 towers”, and by edotco as including “over 13,000 towers.” As readers familiar with tower transactions will appreciate, the final tower count will be confirmed once due diligence is complete and the transaction closed.

edotco is acquiring a 55% controlling stake, while the Dawood Hercules Corporation (DH Corp), will acquire a 45% stake in edotco Pakistan. DH Corp, a listed investment conglomerate in Pakistan with a US$600mn market cap, brings both capital and substantial local market knowledge.

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The total proposed deal value is US$940mn, funded by US$600mn of local debt and equity splits of US$174mn from edotco and US$166mn from DH Corp.

Hussain Dawood, Chairman of Dawood Hercules Corporation said: “Our group has a history of, and passion for, bringing FDI (Foreign Direct Investment) to Pakistan through joint ventures. We work tirelessly in developing the capacity and capability of industries that are critical to addressing key societal challenges. We believe this strategic collaboration with edotco adds significant value to our commitment.”

Jean-Yves Charlier, CEO of VEON (formerly VimpelCom) told his staff “The proceeds generated from this transaction, valued at over US$900mn, will be reinvested in Pakistan, bringing further improvements to our technology and services. The transaction will help us to strengthen our position as the number one telecommunications and digital service provider in Pakistan, with over 52 million customers.” As to the specifics of how the proceeds will be reinvested, much will doubtless be used to pay down debt built up in the 2016 acquisition of Pakistan’s fourth ranked operator Warid, and the US$295mn spent on two 10MHz blocks of 1,800MHz 4G spectrum, acquired in June 2017.

Following a previous sale of towers by their opco in Italy, the agreement to sell towers to edotco represents the latest phase of VEON’s quest to become “an asset light and customer obsessed company”. Bangladesh may be the next market where VEON monetises its towers; with the regulatory regime surrounding towercos finally clarifying, VEON are likely to restart the process to sell Banglalink’s towers before the end of 2017, and may find edotco again interested in the assets.

TowerXchange sources suggest that VEON’s process to sell their Pakistani towers became a three horse race, a dynamic made interesting when the leading horse was acquired! edotco acquired Tanzanite Towers for US$88.9mn, consolidating Tanzanite’s existing 700 towers while buying out a rival who had been rumoured to have entered exclusive negotiations to acquire the Jazz towers. 70% of Tanzanite’s towers are in urban locations, and 40% are ground based towers. The tenancy ratio was 1.6, and Tanzanite reportedly had a pipeline of 200+ new build towers, derived from contracts with all four of the country’s MNOs. Prior to the acquisition of Tanzanite, edotco’s footprint in Pakistan consisted of around 20 towers, plus 13,000km of fibre, acquired when they entered the country in 2014.

Suresh Sidhu, CEO of edotco Group and member of the TowerXchange advisory board, said: “We are pleased to be able to consolidate our expansion into Pakistan with this acquisition. The acquisition of Deodar is a critical part of our growth strategy and ambition to position edotco as the leading independent telecommunications infrastructure services provider in Asia. With Dawood Hercules as our partner, we are confident in the potential of the market in Pakistan and will continue to demonstrate our long-term commitment to supporting the development and enhancement of the country’s telecommunications infrastructure.”

The deal remains subject to the customary and regulatory conditions precedent being fulfilled, and the target completion date is the end of November / beginning of December 2017.

VEON was advised by Allen & Overy and by Lazard, edotco was advised by Delta Partners and Herbert Smith Freehills.

Pakistan’s mobile market

One of Asia’s fastest growing mobile markets, The Pakistan Telecommunications Authority reports that mobile teledensity is currently 70.85% in a country with a population over 200mn. There is ample room for growth in mobile broadband penetration, currently around 24%. ARPsUs are low, reportedly around US$2, but GDP is growing, disposable income is increasing, and the macro economic indicators are good for MNO and towerco growth in Pakistan.

3G was launched as recently as the end of 2014, but adoption has been swift, aided by sub-US$30 3G handsets coming on the market. 4G launches commenced in 2015, with compatible devices increasingly available. 3G and 4G rollouts are both continuing, with the current focus being overlaying existing sites, while future densification may prompt some limited new build of infill sites.

Following the aforementioned acquisition of Warid,
VEON rebranded their Pakistan opco from Mobilink to Jazz, consolidating their market leadership – they currently have 52.3mn, or 37.4% of the country’s subscribers. In 12 years Telenor and China Mobile’s Zong have acquired 40.7mn and 28.4mn subscribers respectively, while Etisalat’s Ufone has 18.3mn subscribers.

**Rural coverage**

While Pakistan’s tower network is extensive, and population coverage in Pakistan is believed to be in excess of 90%, population per tower is ~6,000 compared to ~1,500 in Malaysia.

Pakistan has a Universal Service Fund which actively awards capital to deploy towers in remote locations.

As Pakistan’s oldest and market leading MNO, Jazz has Pakistan’s largest network, and is often the sole service provider in rural areas, implying the torch will be passed to edotco to take responsibility for much of Pakistan’s rural network management.

**Tower strategies: Jazz and edotco**

After initial reticence to share infrastructure, in the last five to six years a culture of tower sharing has blossomed in Pakistan. In particular market leader Jazz, then Mobilink, grasped the opportunity to lease out the country’s largest and most pervasive tower portfolio on a commercial basis since 2011-12, adding significant co-locations and value to the assets.
edotco is acquiring both the original Mobilink towers and 4-5,000 towers formerly owned by recent acquisition Warid, and in doing so has inherited an estimated 2-3,000 sites in overlapping locations (within 250m of each other). While many towers will be retained for densification, there are significant opportunities to create efficiencies by decommissioning adjacent sites, saving land costs, and increasing the tenancy ratio of the remaining tower.

While the initial cost per tower valuation of around US$72,300 is near the mid-point for recent Southern Asia comps, excluding zero tenant and duplicate sites the price rises closer to US$90,000 per site. edotco’s acquisitions of Tanzanite and the VEON/Jazz towers positions the business as the largest independent tower company in Pakistan, with a tenancy ratio above 1.3, and with the country’s leading MNO as anchor tenant.

With around 40,000 towers in six countries upon completion of the Pakistan deals, according to the TowerXchange League Table, the Pakistan acquisition will elevate edotco to become the world’s sixth largest towerco by tower count. TowerXchange wouldn’t be surprised to see edotco overtake Crown Castle (40,085 towers) and Towercom (formerly Reliance Infratel, 45,000 towers) within the next year.

edotco describes Pakistan as having “a mature and clear regulatory and licensing framework for towers and telecom infrastructure.” A towerco licensing regime has been in place since 2006, and the Pakistan Telecommunications Authority (PTA) has set unofficial targets to increase the infrastructure sharing ratio in the country. That said, the usual local site permitting challenges persist, with differing policies from region to region, and multiple layers of taxation.

While edotco has consolidated Pakistan’s previous number one towerco Tanzanite Towers, since 2006 several local entities have been licensed as towercos, although only AWAL Telecom appears to be actively trading as such.

**Tower strategies: Telenor Pakistan**

Telenor has leveraged infrastructure sharing to accelerate time to market since entering Pakistan 12 years ago. Telenor Pakistan is a strong promoter of all forms of network sharing; towers (sharing primarily with Jazz), fibre (sharing with Zong), and has taken a lead role in exploring active infrastructure sharing. Telenor and Zong undertook Pakistan’s first RANsharing trials across around 30 sites, while the Norwegian-owned MNO has also shared IBS, both under the MORAN model where spectrum is not shared.

While Telenor has been mentioned on the grapevine as potentially interested in the sale and leaseback of their Pakistani towers, the company has little history of tower monetisation, and no need to release capital; their partnerships with towercos are likely to remain focused on co-location and BTS. Telenor are believed to have a ~7,400 of their own towers, but may prefer to leverage co-location for future rollout: they already have over 2,000 co-locations in Pakistan.
**Tower strategies: Ufone and Zong**

Ufone has been exploring the potential sale and leaseback of their towers in Pakistan for some time. The process was stalled by the de facto merger of PTCL and Ufone, and associated management changes, but Ufone could yet contribute over 6,000 further assets to the pool of commercially shared towers.

China Mobile’s Pakistan opco, which trades under the brand name Zong, has around 9,100 sites, of which around 2,000 are co-locations.

**Tenancy ratio growth**

TowerXchange estimate the prevailing tenancy ratio (the average number of tenants across all towers in the country) to be around 1.25 in Pakistan, with a clear pathway to 1.5. Of around 10,000 co-locations in the country, most originate from barter arrangements, with some application of commercial lease rates, but often offset against one another so no cash changes hands. These agreements will continue to be converted to commercial leases as towercos continue to become more prevalent.

Tenancy ratios on commercially leased towers are reportedly rising at a respectable 0.06 per year in Pakistan, but that could accelerate with the rollout of 4G.

Non-traditional MNOs may represent potential upside on tenancy ratio growth in Pakistan,

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**Pakistan needs ~100 IBS**

A significant portion of the addressable market for in-building solutions (IBS) in Pakistan remains unserved, according MNOs at the Pakistan round table, who called for towercos to consolidate demand for IBS under a neutral host model. “There are a significant number of upcoming new mega building projects in Pakistan which need capex for active DAS and IBS. I’d like to see towercos being aggressive in this area so that MNOs don’t each have to deploy their own solutions at malls, airports and five star hotels,” said one MNO’s representative.

“The IBS market in Pakistan is highly fragmented,” responded a towerco. “There are different solutions, different models, and different systems integrators from one building to the next. It’s difficult for us to size the market: is there enough scale for a sustainable business model? It can take 18 months to negotiate one contract, but we’re interested in scale, not in deploying one IBS at a time.”

“I have half a dozen buildings on my radar in Karachi, Lahore and Islamabad, with more in the pipeline,” responded another MNO. “We wanted an opex model on a neutral host basis, but couldn’t find an interested towerco, so partnered with a vendor. IBS represented a potentially secure revenue stream with smooth cash flow and low risk.”

“There are still less than 50 IBS in Pakistan now,” said the first MNO (note that the roundtable took place in December 2016). “There could be immediate demand for seven or eight solutions, with another 50-100 in the pipeline.”

The main reason towercos cited for their lack of management bandwidth to address IBS in Pakistan was their focus on sale and leasebacks. With the acquisition of the Jazz towers now agreed, perhaps more attention can be devoted to IBS.

Meet edotco, and several other key stakeholders in Pakistan’s tower market, at the 4th Annual TowerXchange Meetup Asia, taking place on December 12 and 13

www.towerxchange.com/meetup/meetup-asia
exemplified by LTE service provider Qubee and Wi-Fi Broadband provider BurQ.

Tower lease rates in Pakistan are believed to be in the US$800-1,000 range.

**Operational challenges**

Pakistan’s MNOs cite power as the number one operational challenge in the market, followed by security and landlord issues.

While Pakistan’s electricity grid remains unstable, and outages can last eight or more hours, the situation has improved notably in recent years. Backup diesel genset (DG) runtime is being reduced at sites on the country's better grid connections, with DGs increasingly being removed from such sites.

edotco will offer a full tower+power service in Pakistan, meaning they will lease tower and ground space as well as providing DC energy.

Less than 5% of the portfolio of sites being assembled by edotco in Pakistan are off grid.

“In recent years we have invested US$30-40mn every year into power infrastructure to ensure high availability,” continued the same MNO. “It will be interesting to see if the towercos are open to making that magnitude of investment.”

The range of operational challenges in Pakistan is huge. “We understand Pakistan – we know it is not an easy country in which to operate a tower network,” said one towerco. “But there are commercial implications of this; for example the lease rate for a tower in Karachi and a tower in the FATA have to be different.”

**Conclusions**

There is a new landmark milestone in Pakistan’s fast growing mobile market. When edotco’s deal to acquire Jazz’s ~13,000 towers closes, edotco will own, and share, the largest and most pervasive tower portfolio in Pakistan, whilst at the same time Pakistan will become edotco’s largest market (in terms of tower count).

The edotco-Jazz deal is transformational; it is not just one of the largest transactions in Pakistan’s corporate history, and one of the largest deals in the history of the Asian tower industry, but it also inaugurates a new era of shared infrastructure, and a new win-win partnership between the country’s MNOs and towercos, accelerating 4G rollout, enabling enhanced QoS indoors and outdoors, and unlocking operational efficiencies.
MNO & Towerco Perspectives

In this edition of the TowerXchange Asia Dossier, readers get access to exclusive interviews TowerXchange conducted with top executives from across the Asian telecom infrastructure industry, spanning from Pakistan to China, Japan and Australia.

Interviewees from Aird Towers, Banglalink, Grameenphone, Bharti Infratel, JTOWER and edotco Pakistan among others shared their unique perspectives on the strategic, financial and operational challenges they face, as well as considerations on the evolution of the telecom infrastructure sector in light of the evolving coverage and capacity needs of mobile network operators.

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www.towerxchange.com
Aird Towers: new towerco for Australia and New Zealand has a vision for the macro and small cell network

Supplementing macro towers with small cells and RAN solutions to better meet MNO needs

Tom Andrews, Principal and Managing Director, Aird Towers

Tom Andrews, Principal and Managing Director, Aird Towers: Having a background in military and civil engineering I have been involved in the civilian wireless industry either building towers or with towercos on and off for about 30 years now. My early experience was in the UK and Europe until 1998 when I moved to Australia. Back in 2001 I set up my first Australian company which was a rooftop aggregator and leasing company followed in 2010 with a tower construction company. These companies laid the solid foundations that Aird Towers is built on.

My personal driving vision is that connectivity is now a basic human right to allow trade, healthcare and above all education, and that wireless is how most people will become connected, in short Making the World Wireless.

Aird Towers was established in 2016 with a view to its formal launch now in early 2017 and while some aspects are like a conventional towerco model, Aird Towers has a range of differences that are unique and are the logical development of a towerco. Worldwide MNOs are unhappy at the traditional rigid towerco / Master Lease Agreement (MLA) type offering especially in the face of falling ARPUs and changing technologies – and Aird Towers has a range of technical and commercial solutions that reset the towerco base model. Aird Towers does of course offer aperture space on towers but we offer a lot more with small cell and RAN solutions along

Keywords: 4G, 5G, Aird Towers, Asia, Asia Insights, Australia, Build-to-Suit, Camouflage, DAS, Decommissioning, IBS, Insights, MLA, Network Rollout, New Market Entrant, New Zealand, Oceania, Rooftop, Small Cells, Tenancy Ratios, Towercos, Urban vs Rural, Who’s Who

Read this article to learn:
- Aird Towers' vision, organic, and inorganic growth plans
- Current status of tower networks and 4G rollout in Australia and New Zealand
- Leveraging oDAS, small cells, and other RAN solutions to meet unique MNO requirements
- Is there an opportunity for a towerco to attract blackspot funding and build a sustainable rural coverage business?
with commercial aspects that our MNO customers advise are highly attractive and compelling.

The principal concept Aird Towers started with is the recognition that the MNO world is changing – with entities such as Google and Facebook actively looking for a means to offer direct connection, the emergence of IoT and then further the progression into the world of 5G mean huge changes and a global reset of both the traditional towerco and the MNO models.

**TowerXchange: What is Aird Towers’ vision for organic growth and how would you finance any inorganic growth?**

**Tom Andrews, Principal and Managing Director, Aird Towers:** A reasonable proportion of Aird Towers’ growth has been and will continue to be organic – there are many reasons for this but above all it is to ensure that our infrastructure meets with what the MNOs’ and our other customers growing needs are from both a technical and commercial stance. This is especially relevant as we move through 4G/LTE and into the very different world of 5G connectivity and we have established the means to deliver new sites effectively and efficiently. A combination of “build to suit” traditional towers, unique strategies towards small cells, and other RAN solutions is our vision now and in the future.

In terms of our business growth from existing assets, we are currently experiencing tenancy growth of about 0.32 per site per year and I am excited by that metric even though it has a lot of “low hanging fruit” boosting it.

**TowerXchange: What is the current status of mobile broadband in Australia – is the 3G rollout complete, at least in terms of “economic coverage” – and what is the status of 4G?**

**Tom Andrews, Principal and Managing Director, Aird Towers:** 3G is essentially now rolled out to all major population centres and the main efforts of the MNOs are now in LTE/4G roll-outs. Telstra has by far the most extensive coverage of both 3G and 4G outside of the cities and major towns, however Optus and Vodafone are taking steps to catch up. It is likely that some of the regional areas will go from Telstra only coverage on 3G/4G to also having 4G offerings from Optus and Vodafone by-passing 3G from these MNOs. TPG Telecom has also recently purchased spectrum and that is an interesting development though they are keeping their plans and strategy under wraps for now. It is certainly an exciting time to be involved in the mobile network infrastructure business!

There is also the fixed wireless component of the National Broadband Network – this is a 4G type solution with mobility turned off and this network covers many smaller country towns. There are growing numbers of consumers in Australia who rely on a mobile broadband as their only means of personal connectivity and this trend is set to continue.

All the MNOs with current networks have various spectrum bands and are also actively re-farming...
spectrum to fit in with their technology growth. The licencing authority, the ACMA, has recently called for bidders for more spectrum it has available in the 700MHz range so this may well change the look of the MNO landscape in Australia depending upon the auction results.

TowerXchange: What is the structure of the tower market Down Under? And how would you characterise opportunities for towercos like Aird Towers in Australia?

Tom Andrews, Principal and Managing Director, Aird Towers: The tower market in Australia currently has a surprisingly low national towers numbers to whole landmass area ratio, with existing towercos traditionally following the typical U.S. towerco business formulas of tower acquisition and strong MLA management with the MNOs. The towercos in Australia have done well – a mixture of good timing through the growth of MNO requirements (particularly from GSM through to 3G) and of prudent portfolio management.

The opportunities for Aird Towers are a blend of the traditional towerco model but above all we have set ourselves apart from the traditional U.S. based structure with MNO engagement models that are more reflective of local needs. We understand that the MNOs’ ARPUs are very challenged by regional Australia and that is why our range of unique infrastructure solutions give the MNOs real opportunities to boost their regional coverage in a highly effective way. RAN infrastructure is a very important area of our market strategy not just with traditional MNOs but encompassing IoT technologies.

TowerXchange: And how does the tower market in New Zealand compare? Where do you see the opportunities in New Zealand?

Tom Andrews, Principal and Managing Director, Aird Towers: New Zealand is a very different tower market to Australia and one we spent a lot of time analysing before we committed to it.

The opportunities for Aird Towers are a blend of the traditional towerco model but above all we have set ourselves apart from the traditional U.S. based structure with MNO engagement models that are more reflective of local needs. We understand that the MNOs’ ARPUs are very challenged by regional Australia and that is why our range of unique infrastructure solutions give the MNOs real opportunities to boost their regional coverage in a highly effective way. RAN infrastructure is a very important area of our market strategy not just with traditional MNOs but encompassing IoT technologies.

The way the MNOs have rolled out at different stages means that there are huge amounts of site duplication – seeing a hill with a tower from each MNO on it is not an uncommon sight. What this means is the traditional towerco market entry of tower purchase from a MNO would be short lived as the other MNOs have their own sites nearby. Add to that the fact that these towers were pretty much all designed to be a single operator solution and there is limited scope to increase loadings – we have done a lot of work on different solutions and know what the answers are – and without these solutions it is going to be hard to economically increase capacity or to consolidate sites. I suppose someone might run the figures on the original MNO owner being an anchor and sole tenant, but unless tenancy per site ratios get above 1.8 I think they will find it difficult, very difficult indeed.

Organic growth is the key to New Zealand – it’s a very long-term business plan and it involves a lot of preparing for 5G networks. There is a big opportunity in that area – from small cells in cities through to discreet towers in tourist areas (yes, that probably means camouflaged towers!) We are doing quite a bit in the South Island just now and it’s a remarkably rugged and beautiful part of the world with very high standards of construction capability so we are excited by this market.

TowerXchange: There have been government initiatives to enhance rural coverage in both countries in recent years – is this an opportunity for towercos, given their natural tendency to focus on urban and suburban sites with demand from multiple tenants?
Tom Andrews, Principal and Managing Director, Aird Towers: In principle, yes it is, in execution it is a bit different!

In both countries the blackspots are identified in quite different ways and the end result in each case is a list of identified blackspot areas from which either MNOs or network infrastructure providers (i.e. towercos) may choose candidates and submit business cases for funding. The funding is generally for the capital cost of the site and the site has to be capable of accommodating multi operator installations. The first round in Australia saw only Telstra and Vodafone gain sites however there was some controversy about the process and in the second round Optus gained some sites as well. I do not know if the other towercos bid or not but the problem would be a conventional towerco model of recurring rental extraction from the MNOs when they themselves would have little ARPU coming in from the site.

Aird Towers is currently looking at this for any future rounds of blackspot funding as some of our solutions may fit well into that scenario.

It is my personal view that to effectively provide a solution for these blackspot areas there needs to be more of a government input than just finance. The obvious way to provide economical coverage is through a shared RAN system and to make that more effective, the sharing of spectrum should be not just encouraged but made mandatory at these blackspot sites.

TowerXchange: What blend of site typologies do you anticipate being in your portfolio as Aird Towers scales? For example, do you interest in aggregating and leasing rooftop sites as well as ground based towers? And what opportunities do you see DAS and small cells, both outdoor and indoor?

Tom Andrews, Principal and Managing Director, Aird Towers: A range of site types will be essential to the continued growth and success of Aird Towers. From my first company, I know the rooftop aggregation market inside out, however as the MNOs need to desensitise sites, particularly in urban areas, having a whole lot of rooftops on the books may not be such a great a strategy. The indoor coverage market in Australia is pretty active with the MNOs having an in-building co-operative deployment model that is very effective and has kept neutral hosts as a rarity in that sector.

As Aird Towers grows I see the site types we will be concentrating on will be conventional lattice towers and monopoles where we can see achievement of a tenancy ratio greater than two, and then a range

Aird Towers will not be active in the indoor market just yet.

As Aird Towers grows I see the site types we will be concentrating on will be conventional lattice towers and monopoles where we can see achievement of a tenancy ratio greater than two, and then a range of small cell (including outdoor DAS) and other RAN solutions. We are also looking along transport corridors as a real growth area and have a key strategy toward highway coverage that will become more obvious as 2017 progresses.

Looking into the future of 5G, I think there we will see huge and exciting changes in the area of towercos – they will become more important in the provision of networks – and this will also mean that we will see MNOs that have retained tower assets either divest them or possibly form joint ventures with tower companies.
Broadcast Australia offers largest population and geographic coverage among independent tower providers

Clients of the 600+ tower network include Telstra, Optus, Vodafone, TPG, and other wireless providers

One of the main players within the active infrastructure sharing market of Australia is Broadcast Australia (BA), part of BAI Communications. With a diverse portfolio of structures ranging from 30m to over 230m, and as one of the most mature portfolios, it has the best regional and rural penetration among Australian tower companies. Servicing not just broadcasters, it provides infrastructure leasing and related services to the majority of the MNOs, NBN Co., as well as other telecommunications players. In this exclusive interview, TowerXchange learns about BA’s current business, operations, and future growth areas.

Keywords: 5G, Air Conditioning, Asia Insights, Asia Pacific, Australia, BAI Communications, Batteries, Broadcast Australia, Business Model, Co-locations, Construction, DAS, DDA, DG Runtime, Fencing, Health & Safety, IBS, Infrastructure Sharing, Insights, Lease Rates, Masts & Towers, NBN Co., O&M, On-grid, Operational Excellence, Optus, RF Design, Shelters, Skilled Workforces, Small Cells, Solar, TPG, Telstra, Tenancy Ratios, Towercos, Urban vs. Rural, Vertel, Vodafone, Wind

Simon McFadden, General Manager, Sales, Product and Business Development, Broadcast Australia: I am the General Manager for Sales, Product and Business Development for Broadcast Australia. Broadcast Australia has the largest population and geographic coverage of the independent tower providers in Australia. We manage TV and radio broadcast services across our nationwide tower network for the Australian Broadcasting Corporation (ABC) and Special Broadcasting Service (SBS).

We also work with all the wireless broadcasters and operators across Australia to help them reach their customers using our infrastructure. Broadcast Australia is part of BAI Communications who provide communications infrastructure solutions for customers across the globe.

In my role, I manage the Site Sharing and Commercial Broadcast businesses for Broadcast Australia.

TowerXchange: What is the role of Broadcast Australia within the country's telecom infrastructure market? Please also tell us more your site sharing division.

Simon McFadden, General Manager, Sales, Product and Business Development, Broadcast Australia: Broadcast Australia has the best regional and rural penetration among Australian tower companies.
One of the differentiating factors is our ability to provide power, buildings, and structure access. In many rural and remote areas, we are the only telecom infrastructure company providing a solution. We also run and manage networks, for example the ABC’s national radio network infrastructure and the NSW Government Radio Network for the state’s Telco Authority.

TowerXchange: Please tell us about BA’s operations and network. What type of assets do you own, where, and how much?

Simon McFadden, General Manager, Sales, Product and Business Development, Broadcast Australia: Broadcast Australia operates over 600 sites across Australia, providing 99% population coverage for our customers.

We own standard assets that you find in any telecom infrastructure company, and then have some unusual assets in our portfolio. For example, we have sites with a standard 30m structure, a building (shelter), power, and AC, which we share with mobile operators, commercial broadcasters, backhaul providers, and use for our own managed service networks. We also have sites with structures over 230m high, with multiple structures covering vast areas of land. For example, our Sydenham site in Melbourne (Vic) is over 100 hectares with five structures and has multiple customers on the site.

Finally, we own the land at 60% of our sites, which means we can on-board customers faster than the rest of the market, where sites are typically leased.

TowerXchange: What is the current coverage of the BA network (geographical footprint)? What are the plans for future investments/expansion?

Simon McFadden, General Manager, Sales, Product and Business Development, Broadcast Australia: We cover 99% of the population in Australia as a result of our mandate to ensure broadcasting coverage. This is typically covered with large structures and sites in metropolitan areas and smaller, more targeted sites for regional and rural areas. Our broadcast network does not have the same need for expansion as telco networks typically have, so it isn’t that dynamic.

We have made targeted site acquisitions in the past and will look at these opportunistically in the future. We also build new structures for customers, both telcos and other customers as required, and continue to look for opportunities where this makes sense for our customers and for us as a business.

We have an advantage in regional and remote areas where we have our own in-house end-to-end infrastructure deployment teams – from property through to engineering, RF, delivery, rigging, and installation technicians with many years of experience. These teams work together and can tackle difficult jobs which other companies may find more of a challenge.
TowerXchange: How does BA go about its network planning?

Simon McFadden, General Manager, Sales, Product and Business Development, Broadcast Australia:
Our 600+ tower network already brings coverage to 99% of the Australian population. In terms of people and processes involved in network planning, we have full end-to-end deployment capability across wireless communications and different skilled teams that specialise in each phase of the deployment process. We tend to carry out most work in-house, although occasionally we will outsource elements such as site acquisition or civil construction depending on the volume of work involved.

TowerXchange: Can you tell us a bit about your clients for site sharing?

Simon McFadden, General Manager, Sales, Product and Business Development, Broadcast Australia:
We work with everyone in Australia who needs broadcasting services or site sharing. Our core customers are Australian telcos, Telstra, Optus, Vodafone, TPG, and of course NBN Co’s fixed wireless network. We also work with a wide range of other telecommunications and wireless providers such as DDA (Digital Distribution Australia), Vertel, and many others. We work with regional commercial broadcasters too, who often share our broadcasting infrastructure.

Our services depend on our customers’ requirements, for example some may only need to be co-located on a tower, whilst other customers require us to provide a managed service for their entire network.

TowerXchange: What is the range of fees for clients to access BA sites? Or, more broadly speaking, what are lease rates like in Australia for tower leasing/sharing?

Simon McFadden, General Manager, Sales, Product and Business Development, Broadcast Australia:
Lease rates vary widely in Australia depending on our customers’ network design and needs. For example, smaller installations such as an Internet-of-Things (IoT) solution have almost no physical impact on a site and simply plug into a standard power socket. In other situations, we have been asked to provide a purpose-built structure and building.

In most cases, the lease rates reflect the cost of building infrastructure. This can be more expensive in rural areas, due to the distance from the material supply locations and the actual site. We also discuss with customers the price structure that works best for them, whether it means paying up front or annually, or again adjusting payments and terms to support the forecasted growth in their business.

TowerXchange: What is the typical setup on a BA site?

Simon McFadden, General Manager, Sales, Product and Business Development, Broadcast Australia:
We have four or five standard types of sites, ranging from 200m+ digital TV and radio broadcasting structures – one has its own cable car, the longest in the Southern Hemisphere – through to standard 30m structures, with a small compound and building. We typically offer building space, power, and AC to customers where they want it, which reduces their capital cost of installation.
TowerXchange: Would you be able to tell us what percentage of your assets are co-located?

Simon McFadden, General Manager, Sales, Product and Business Development, Broadcast Australia:
Because we have a relatively mature network, for non-broadcast customers only, we tend to see 2.5 or so tenants on the older, more active area of our network. This would be higher if we included our broadcast customers.

This ratio drops off as we look at the newer areas of the network, or very remote locations. The nature of our broadcast business means that overall, the tenancy ratio is higher than most other tower companies, because we have broadcast services on almost every site.

TowerXchange: What are some of the challenges in building a network in Australia? What about some of the operational challenges?

Simon McFadden, General Manager, Sales, Product and Business Development, Broadcast Australia:
The core challenge is the combination of climate and distance. Our sites need to be built to withstand extreme temperatures (usually hot, but occasionally cold) and can also suffer from natural disasters, such as bushfires, floods or heavy winds. As a network operator and the national emergency broadcasting partner of the ABC, these are obviously key considerations for us in managing the network.

We work proactively to make sure we stay on air. For example, we need to reduce vegetation near our sites to protect them during fires, have enough batteries on sites to ensure that we stay on air if the power grid connection is cut off until it is repaired, and have sufficient air conditioning to allow continuous operation through prolonged hot periods.

We also need to consider the flora and fauna – occasionally our field teams send back photographs of snakes on our sites. Whilst this is interesting, it is also a safety concern. Our teams follow processes to ensure they remain safe when working in remote areas where first aid may be delayed, and mobile phone coverage non-existent.

TowerXchange: What would you say is the split of on-grid vs off-grid sites?

Simon McFadden, General Manager, Sales, Product and Business Development, Broadcast Australia:
Our sites are typically connected to the grid. We have trialled renewable energy (mostly solar) in Muswellbrook (NSW) but we rely on grid power for the bulk of our infrastructure. The power load from broadcasting equipment is typically higher than telco infrastructure, so grid power is the usual solution.

Thankfully the grid’s availability, stability, and quality is good in Australia. However, in the event of power outage, generators at our larger sites will take over automatically. They can also be controlled remotely, and shared with our customers whenever they require a secure connection to a backup generator. These generators can also serve during natural disasters.
TowerXchange: How would you describe the current state of infrastructure sharing in Australia? How has this evolved over the years and where do you see it going?

Simon McFadden, General Manager, Sales, Product and Business Development, Broadcast Australia:
Tower infrastructure sharing is relatively mature in Australia, the main telcos have infrastructure sharing agreements with each other, and with the main tower infrastructure providers.

In terms of pricing models, we are seeing some newer approaches, moving away from the “menu price list” approach to an “all you can eat” type of pricing. But overall, we don’t expect the price level for a new tenant on a site to be changing much in the future. This is mostly due to the fact that customers want access to infrastructure at low cost, and without the burden associated to building their own structure.

One of the areas Australia is lagging behind compared to international markets is the lack of neutral hosts in the distributed antenna systems (DAS) and in-building systems (IBS). The telcos and infrastructure owners – such as railways and airports – would benefit from having a neutral party to build, operate, and fund changes to the infrastructure.

I think the primary reason we haven’t seen this in Australia is because the telcos tend to work very closely together, taking turns to lead the construction of a DAS or IBS and sharing the costs. This works for the incumbent telcos but not as well for new market entrants or other parties that may want to share a DAS system or deploy additional technology such as WiFi or emergency services comms.

We find that in our overseas operations in the United States and Canada, a neutral host solution works well for telcos, emergency services organisations, and of course for infrastructure owners.

The main thing to get right is the technology solution, to ensure everyone benefits from sharing the network. The Australian market suffered a bit a few years ago from DAS systems with technology that was not perceived to be ideal, but I have not seen anything like that recently. As 5G is rolled out, starting probably next year, I do think that we will have more DAS and small cells and I’m hopeful that this will present an opportunity for a neutral host to build some shared infrastructure, which we of course would like to have a role in.
Tower sharing the way forward for Bangladesh’s MNOs to drive efficiency and customer experience

Exclusive interview with Banglalink on the future of their tower assets

In a country where SIM penetration is high and 3G adoption is on the rise, yet data and voice tariffs remain amongst the lowest in the world, operators in Bangladesh are under pressure to develop sustainable business models. While the MNOs have historically built their own towers, they are becoming more cognizant that tower sharing is the way forward and towers are no longer strategic assets. The regulator is compelling commercial tower sharing and MNOs need assets everywhere to fulfill their service obligations. With an eye to the future, VimpelCom’s Banglalink talks to TowerXchange.

Keywords: 3G, 4G, Axiata, BTRC, Bangladesh, Bangladesh Telecommunication Regulatory Commission, Banglalink, Batteries, Build-to-Suit, Capex, Carve Out, Co-locations, Country Risk, DG Runtime, Decommissioning, Dimensioning, Energy Storage, Foundations, Global Telecom Holding, Greenfield, IBS, Infrastructure Sharing, Interview, LTE, Leasing & Permitting, Loading, MNOs, Market Overview, Masts & Towers, New License, O&M, On-Grid, Regulation, Rooftop, Shelters, Site Visits, Southern Asia, Tenancy Ratios, Uptime, Urban vs Rural, VimpelCom, Who’s Who, edotco

Read this article to learn:
- Coverage, 3G adoption, and tower operations in Bangladesh
- Current state of the tower regulatory framework in Bangladesh
- Bangladesh’s commercial leasing and infrastructure sharing marketplace
- Banglalink’s portfolio size, site typology, and capacity expansion plans
- Horizontal growth opportunities within the Banglalink portfolio

TowerXchange: Please introduce yourself and your role.

Peter Dindial, Programme Director, Banglalink: At the moment I am the programme director responsible for the carve out of the Banglalink infrastructure assets. My ambition is to establish the portfolio for the future. Once the tower company is formed I’ll take the lead and take on the financial accountability.

I’ve been in telecom for 30 years, been a CTO and done a lot of M&A, in particular for Telenor. I’ve been in Asia and Europe, and just come out of running the Jawwy personal mobile experience programme for STC in the Middle East. I’ve been in post since September 2016 with Banglalink.

TowerXchange: What can you tell us about Banglalink’s network infrastructure in terms of number of sites and typology (ground based towers versus rooftops)?

Peter Dindial, Programme Director, Banglalink: Currently there are 5,890 assets, excluding in-building solutions (IBS), which we may add to the process, bringing it up to about 6,000 total. Out of that, about 50% are green field sites, which predominantly service suburb and rural areas, with the other 50% as urban rooftops.

Most of the sites are about 10-12 years old as the big push on network growth occurred around 2005. Average construction age is 2009. The majority of the underlying ground leases are quite long, with three
to ten years left on most. We’re currently extending 129 leases with less than three years remaining. The landlords here are quite savvy as to the value of their assets to telecom operators, but contractually we are entitled to co-locate.

**TowerXchange:** To what extent are Banglalink’s sites shared with other MNOs and on what basis (e.g. barters versus commercial leases)?

**Peter Dindial, Programme Director, Banglalink:** Money is changing hands, as regulated under the tower sharing framework. There is no bartering; there are different commercial agreements between different partners. For Banglalink, around 20% of our towers have tenancies, and a handful have three or four tenants.

**TowerXchange:** Please put that into a broader context of the tower market in Bangladesh as a whole: roughly how many towers are there? Are the other MNOs sharing sites? We’ve estimated 24,000 sites between the three big MNOs, with just under 30,000 in total in the country.

**Peter Dindial, Programme Director, Banglalink:** Yes, TowerXchange’s numbers sound about right.

This year has been quite interesting, with conversations between MNOs on providing services to each other to fulfill network needs. The desire to build our own or build to suit doesn’t seem to be there, rather there’s a very active desire to increase sharing relationships with everyone.
The economics of the market is that the MNOs have been in business for many years and the market has matured to 82% SIM penetration. However, the market rates for voice and data are amongst the lowest in the world. Investments in 3G and LTE will be a significant drain on the MNOs’ balance sheets, as they look to reduce costs, raise capital, and have sustainable business models that continue to service the existing population. MNOs are under financial pressure to sweat their assets.

**TowerXchange: Are tower lease rates at commercial levels a towerco would charge?**

**Peter Dindial, Programme Director, Banglalink:** There seemed to be a point where pricing was being pushed down by some volume co-location deals, however that seems to be at an end and MNOs generally recognise pricing needs to stay at current, rational levels. There are still operational costs to cover and some margin needs to be retained for this activity for towercos to cover overhead and remain investible.

**TowerXchange: How would you characterise population and geographic coverage? And the progress of 3G roll out? What still needs to be built and overlaid?**

**Peter Dindial, Programme Director, Banglalink:** From my experience since I’ve been here and the conversations with other MNOs, I see a big distinction between urban and rural growth in 3G. Early estimates of 3G coverage were under-estimated, so tower sharing is imperative to enable cell splitting and to fulfill capacity requirements in urban areas. There is a lot of pressure to fulfill capacity requirements so that’s driving a lot of co-location requests in urban areas.

Broadly speaking the country is well covered. It is a dense population, with 160mn people packed into a small area. Different MNOs are stronger in some areas than others, so there are holistic synergies between, for example, Robi and Banglalink.

In terms of 3G rollout and capex of deployment, it hasn’t peaked yet. There is a lot of demand and a lot more to put out. The 4G spectrum auction is also still in the cards and the Bangladesh Telecommunication Regulatory Commission (BTRC) is in the process of determining when to hold it. The spectrum issues do need to be addressed, but LTE is coming and 3G is still growing.

The country is early in terms of 3G but mobile broadband handset penetration is increasing, with low-end 3G handsets permeating the marketplace. Sub US$50 handsets are selling fast and feature phones are virtually non-existent in the stores now. This is very good for the market as 3G-enabled handsets become the norm and pricing becomes more affordable for consumers.

**TowerXchange: Do the economics of coverage pitter out at any point? As we know, there isn’t always the business case for an MNO or towerco to undertake rural coverage. Is there anything else to fill in the gaps?**

**Peter Dindial, Programme Director, Banglalink:**

There is a social obligation fund that all MNOs contribute to, 5.5% of turnover, plus 1% into a universal service fund (USF) which has not been significantly deployed yet.

We’ve done detailed analysis on where all the sites are across the country; all the MNOs share information on the sites. So in terms of geographical coverage, there is a MNO for every part of this country. Holistically there is coverage, however, not all markets are the same for all operators. But this adds to the rationale for infrastructure sharing: the more it is encouraged and supported, the more to everyone’s interest.

**TowerXchange: We understand there is another towerco in Bangladesh, edotco, with around 8,000 sites – how is the overlap between your portfolio and their managed?**

**Peter Dindial, Programme Director, Banglalink:**

We are working on a decommissioning and consolidation plan with edotco/Robi. We’re not at a point where we have the final analysis, but we’re looking at taking out up to 20%, which is over 1,000 sites. If you look at a Google Earth map of Bangladesh’s sites, the number of cell sites per square kilometre is quite amazing. With Banglalink and edocto’s assets, there’s more than enough capacity to consolidate with minimum capex downside.

The towers on green field sites are robust and most can take another two tenants. This consolidation could be very positive, helping to drive tenancy ratios up by 0.2 to 0.3 at least.
In terms of cancelling the leases on decommissioned sites, it's quite manageable as we have non-reciprocal cancellation clauses of six months.

TowerXchange: We understand the Bangladesh Telecommunication Regulatory Commission (BTRC) has drafted a tower license framework, soliciting industry comments last year – what does the framework propose, what was the focus of your feedback?

Peter Dindial, Programme Director, Banglalink: The framework was an extension of the existing sharing framework, which set the concept of commercial trading for assets. However, there were three major sticking points which the industry gave feedback on:

1) Limiting the number of tower licenses to two in the country. This would not be acceptable as it would create a duopoly, which might not build market confidence in a tower industry.

2) Limitations on foreign ownership to sub-50%. This would restrict the participation of professional towercos who can bring value and innovation to the country.

3) Restrictions on MNOs being shareholders or part owners in any towerco.

The three issues were rejected by the industry overall as they are not conducive to growing the industry, while limiting investments and innovation.

The consultation took place last year and the
feedback seemed to be received positively by the regulator. Majority foreign ownership may not be a problem anymore; for example the BTRC has allowed Axiata’s edotco to increase their shareholding to 80%. This also illustrates that the BTRC are softening on MNOs as shareholders. Two out of the three issues have evolved positively for the benefit of the industry. However, we’re still unsure about the limit on licenses, though the BTRC seem to accept the concept put forth.

TowerXchange: At one point there was talk of some sort of state towerco?

Peter Dindial, Programme Director, Banglalink: It was an idea from 2015, but there is no mention of it in the draft regulation. We don’t think this is a current plan.

TowerXchange: Please tell us about the operational challenges running a tower network in Bangladesh. For example, how reliable is the grid, and how are sites managed and maintained? What initiatives have you undertaken to drive toward operational excellence while reducing operating costs?

Peter Dindial, Programme Director, Banglalink: The Bangladeshi grid is not that bad in comparison to some of the countries I have been in. The grid is much better, especially in urban areas. There are only about 25% of our sites where we need a DG, the rest are batteries plus grid.

Traffic is challenging in the main cities, but it’s not a big country so drive times and mean-time-to-repair (MTTR) are reduced. It doesn’t take a day-and-a-half
to service sites like some sites in Africa, for example.

The government to their credit put a lot of efforts into generating more electricity for the national grid. Power is important for the country to go forward so the grid is less of a problem, though reach might still be a challenge from some rural areas.

We have to respect this is not a country full of highways, so you spend time moving around with rural roads. Given the GDP, cost per capita, the cost of services are low, so opex costs are quite benign.

During monsoon it can mean some roads are impassable, but all necessary site autonomy is built into the networks; we don’t see a significant drop in statistics for uptime during monsoon season.

There is redundant capacity on towers. For example, I visited one 50m rural tower and the infrastructure built around it was phenomenal – towers and cabinets on 2.5m plinths to be raised out of any flood water, large landscape, easy access – my predecessors did a great job designing this network!

**TowerXchange:** Please summarise how the commercial, regulatory, and operational environment affect the tower market in Bangladesh.

**Peter Dindial, Programme Director, Banglalink:** Whatever happens as we conclude our negotiations with the BTRC, the tower regime here will be good for the tower owners, for the investors, and for Bangladesh. There is so much opportunity in this that if people are rational and look towards the better outcome, there are great business opportunities for everyone.

In the past, rumours on the future tower licensing legislation scared off a number of prospective international investors, who could bring a lot of value to help advance the marketplace here. As certainty around the tower licensing regime increases, risk reduces.

The MNOs here respect towercos and the value they bring for the customer experience. There is an established infrastructure sharing culture and the economics are being well managed with no loss leaders in any of the portfolios. So it’s a win for everyone.

Our portfolio is strong and robust with great opportunities for growth. There are horizontal moves we can make here. Not just servicing MNOs, but also Wi-Max, ISPs, and other non-traditional MNO tenants. Some of our assets are so well built they could even become localised data centres. There’s so much that could be done with the assets that hasn’t been explored yet.

The growth in this era of telecom will be around the tower business.

The ability of any MNO to unleash its towerco business would allow a welcome injection of capital which in turn will allow MNOs to better participate in a future spectrum auction, which at the end of the day, is good for the consumers as they get better service and experience, and good for the government as MNOs have more capital to bid for spectrum.
Grameenphone seeking towerco license to bring greater efficiency to industry

Bangladesh’s leading MNO prepares for regulatory, business, and market evolution

Infrastructure sharing in Bangladesh started back in the early 2000s, when the first barter arrangements took place between two MNOs CityCell and Aktel (now Robi). Commercial tower sharing then kicked in following the introduction of tower sharing guidelines by the BTRC. Grameenphone was the pioneer, establishing its wholesale business division back in 2010, followed by others in 2013 and 2015. The industry however is at an inflection, as the BTRC seeks to finalise its towerco licensing regime, with potential implications for the current model.


Read this article to learn:
- Grameenphone’s tower portfolio and wholesale business
- The evolution of infrastructure sharing in Bangladesh
- Growth drivers for telecom infrastructure in Bangladesh
- Future technologies and solutions for towercos and MNOs to adopt

Md Mainur Rahman Bhuiyan, Director and Head of Infrastructure Business, Grameenphone

TowerXchange: Please introduce yourself and your role.

Md Mainur Rahman Bhuiyan, Director and Head of Infrastructure Business, Grameenphone: My name is Md Mainur Rahman Bhuiyan and I am the Director and Head of Infrastructure Business at Grameenphone. I am responsible for developing and maintaining profitable growth of the Infrastructure sharing business in order to achieve both short- and long-term strategic objectives and sustain market leadership as a provider in site sharing.

TowerXchange: Please tell us about Grameenphone’s operations and tower portfolio.

Md Mainur Rahman Bhuiyan, Director and Head of Infrastructure Business, Grameenphone: Grameenphone Ltd. (GP) is the largest mobile telecommunications operator in Bangladesh in terms of revenue, coverage, and subscriber base of 55mn. Among Telenor Norway’s operations in 13 countries, Grameenphone is second in position in terms of revenue. The company was incorporated on 10 October, 1996 as a private limited company and later became a publicly limited company (Telenor Norway 55.80%, Grameen Telecom Bangladesh 34.20%, and the rest 10.00% are public).

In terms of our tower portfolio, we have a robust network covering 99%+ of the population, with 12,000+ 2G sites and 10,000+ 3G sites. The split for greenfield sites versus rooftop is 55% to 45%. Our coverage ranges from metro city to deep rural areas.
TowerXchange: What can you tell us about the degree of infrastructure sharing within your portfolio? Who are your clients?

Md Mainur Rahman Bhuiyan, Director and Head of Infrastructure Business, Grameenphone:
Infrastructure sharing by the MNOs can be divided into two major categories in Bangladesh. One is site sharing and the other one is transmission capacity sharing. There are currently 35,000+ towers in Bangladesh, of which 6,500+ towers have been shared among the operators to date. Grameenphone’s major customers in infrastructure sharing are MNOs (Banglalink, Robi-Airtel, and Teletalk), WiMax operators, NTTN operators, and ISPs.

TowerXchange: Can you give us a bit of background on the evolution of infrastructure sharing in Bangladesh?

Md Mainur Rahman Bhuiyan, Director and Head of Infrastructure Business, Grameenphone:
The first arrangements took place back in 2003, as barter between CityCell and Aktel (now Robi), then CityCell and Warid (later becoming Airtel and who has recently merged with Robi). Around 2008 the BTRC (Bangladesh Telecommunication Regulatory Commission) came out with the first set of guidelines for infrastructure sharing in the country, with amendments in 2011. Formal infrasharing under the BTRC guidelines was kicked off by Grameenphone in 2010, followed by edotco (subsidiary of Axiata’s Robi) in 2013, and Banglalink in 2015.

TowerXchange: What does the framework propose, and what was the focus of your feedback?

Md Mainur Rahman Bhuiyan, Director and Head of Infrastructure Business, Grameenphone:
The draft towerco guideline proposes a number of changes to the current model in practice by the industry. To highlight a few:

1) MNOs will have to roll back the current tower leasing agreements as the towercos will be rolling out following the licensing condition.

2) Towercos may source towers from the existing operators through sale/rent.

3) MNOs will not be allowed to build their own towers, and instead have to source from the towercos.

So the framework proposes that no other entity other than the licensee will be eligible to build, own, and operate towers, and the existing sharing modality will be rolled back after implementing this guideline.

In our feedback to BTRC, we proposed the co-existence of the current model so that as an MNO we are allowed to build, own, and operate towers for our own use.

In general, we believe that in order to nurture a competitive business environment within a towerco regime, licenses should not be limited to two towercos, which is what the current proposal stipulates. Secondly, MNOs should have the option to either source towers from towercos or build their own. The decision should not be imposed upon the MNOs but rather be driven by commercial negotiations.
The biggest challenge will be meeting the rollout targets of the MNOs. In the future, new sites will be rolled out more in the rural areas and operators will have different location preferences. Some of the MNO requirements for tower construction may not be profitable for a towerco as the desired number of tenants may not be available.

There are other operational challenges, including the redundancy of around 4,000 technology employees who are currently working at the different MNOs.

**TowerXchange: Looking ahead then, how will your grow the network? What will be some of the key drivers to growth? Does the country have enough coverage?**

**Md Mainur Rahman Bhuiyan, Director and Head of Infrastructure Business, Grameenphone:** Currently more than 32,000 towers are in operation in the country. Grameenphone being the largest network provider covers 99% plus population of the country. Robi, after merger with Airtel, owns the largest tower base. However, the merged entity will decommission a handful of towers in 2017.

Currently all the operators in Bangladesh are providing 3G services. Internet penetration in the country is rising at a fast pace. The regulator has also recently announced its intention to issue 4G licenses in 2017 to all existing operators. As the operators will be serving more and more data hungry customers, the need for data coverage sites, indoor solutions, and transmission backhaul will be more prominent initially mostly in the urban areas.

Some of the drivers that will push for infrastructure growth in the country:
- Highly dense population
- Intense competition in the industry
- High economic growth in the country
- Exponential data requirement by mobile users
- Accelerating penetration of smartphones
- Operational excellence in managing costs and quality
- Operators’ pressure on fixed power and fuel costs
- Customised solutions e.g. in-building and cell sites solution
- Towers overlapping
- Public and regulatory pressure to reduce energy consumption and pollution
- Infra-sharing guidelines by the BTRC

**TowerXchange: How does typical time to market for a greenfield tower build (including site acquisition, permitting and construction) compare to time-to-market for a co-location?**

**Md Mainur Rahman Bhuiyan, Director and Head of Infrastructure Business, Grameenphone:** For our own build, ideally 130 days for a ground based tower and 110 days for rooftop.

Whereas for co-location the best case of delivery is 15 days. After technical acceptance by both seeker and provider, the killer item is the NOC (no objection certificate) from HO/LO (house owner/land owner). Usually, rooftop sites will take longer.

**TowerXchange: When it comes to operational efficiency, what are some best practices you are using and what would you like to see from managed service providers and towercos?**

**Md Mainur Rahman Bhuiyan, Director and Head of Infrastructure Business, Grameenphone:** Some of the current practices in the industry right now include having fuel as a pass-through, periodic preventive maintenance at sites, and on-call support as and when required.

**Timeline of infrastructure sharing in Bangladesh**

- **2003:** Barter sharing started between CityCell & Aktel (now Robi)
- **2008:** Barter sharing between CityCell & Warid (now Airtel that merged recently with Robi)
- **2008:** Infra-sharing guideline issued by BTRC
- **2010:** Grameenphone started formal infra-sharing under BTRC guideline
- **2013:** edotco (towerco subsidiary of Robi Axiata) with NOC from BTRC started formal infra-sharing
- **2015:** Banglalink started formal infra-sharing
Moving forward, we would like to see managed service providers and towercos shifting to power and fuel as a fixed cost instead of the pass-through model. On the operational side of things, better control on site uptime and site-level performance, enhanced estate management and security, as well as monitoring of individual cell performance can help take things to the next level. More accuracy in consumables would also be nice.

TowerXchange: At this point in time, how can infrastructure providers/towercos better respond to customer needs and add value to its services?

Md Mainur Rahman Bhuiyan, Director and Head of Infrastructure Business, Grameenphone: Ultimately, the fundamental business model is focused on driving co-locations, however, we believe towercos can still focus on some of the following areas:

- Customer centricity
- Post operational support with high accuracy
- Introduce innovative power solutions with high back-up time
- Standardising tower height based pricing benchmark
- Aggressive SLA to win customers
- Reliability
- Reduce co-location timeline (feasibility analysis to site delivery)
- Minimise timeline for NOC collection from HO/LO
- Relationship building with landlords
- Active sharing

TowerXchange: What do you see as some of the upcoming technologies and products that towercos may soon adopt? Why?

Md Mainur Rahman Bhuiyan, Director and Head of Infrastructure Business, Grameenphone: Going back to some of the drivers for growth, operators and towercos alike could be looking at solutions that are smaller, faster to deploy, easier to manage, and more cost-effective. Growing data demand from consumers combined with the need to optimise business performance will likely require some changes to the existing modus operandi.

We could be seeing more:

- In-building DAS
- Low cost solutions
- Cell-on-wheels (COW)
- Monopole
- Camouflage solutions
- Tower operating centre
- Green energy solutions
- 24x7 network availability
- Significantly less time-to-market

TowerXchange: Lastly, how do you see Grameenphone evolving its business to better adapt to market realities?

Md Mainur Rahman Bhuiyan, Director and Head of Infrastructure Business, Grameenphone: Grameenphone has undertaken a strategic ambition to become a digital service provider by 2020. It aims to become the favourite partner in a customer’s digital life by digitalising the customer journey and core operations. In a bid to bring efficiency and reduce overall network operational costs in the industry, Grameenphone, the market leader in providing co-location sites, is working on setting new trends in passive infrastructure sharing by bringing flexibility in product modality and pricing. This is being done as part of the preparation to operate within a towercos regime.
A Beijing towerco’s past, present, and future: six strategies for business growth

Firsthand insights into an independent towerco doing business alongside State giant China Tower Corporation

Beijing RLZY (Rui Lan Zhuo Yue) Technology began operations as a service provider to the three MNOs in China back in the early 2000s. As the country embarked on the path to “co-build, co-share,” transferring all tower assets from China Mobile, China Unicom, and China Telecom into China Tower Corporation (CTC), the operators were stopped from building their own towers. This created the market whereby new and old companies emerged to become third-party towercos, constructing and leasing towers as part of their business. As the telecom industry evolved in China, so has RLZY’s business and ambitions.

Keywords: Asia, Batteries, Beijing Communication Industry Association, Beijing RLZY Technology, Build-to-Suit, Business Model, CACE, CTC, Capex, China, China Association of Communications Enterprises, China Financial Futures Exchange, China Mobile, China Securities Depository and Clearing Corporation Limited, China Telecom, China Tower Corporation, China Unicom, Co-locations, Construction, Dalian Commodity Exchange, Debt Finance, ESCOs, Greenfield, Infrastructure Sharing, Installation, Interview, Investment, Lease Rates, Leasing & Permitting, Masts & Towers, Ministry of Science and Technology, NEEQ, National Equities Exchange and Quotations, Network Rollout, O&M, On-Grid, Operational Excellence, posesafeIT, Pass-Through, Regulation, Rooftop, Rui Lan Zuo Yue, SLA, Shanghai Futures Exchange, Shanghai Stock Exchange, Shenzhen Stock Exchange, Stakeholder Buy-In, Sunwave Communications, Time-to-Market, Towercos, Who’s Who, Zhengzhou Commodity Exchange

Read this article to learn:
- Beijing RLZY’s business model, its footprint, and tower portfolio
- Beijing RLZY’s growth strategies
- Average tower and ground lease costs versus lease rates in China
- China’s capital market for small-to-medium enterprises

TowerXchange: Please introduce yourself – how and when did you get into the tower business?

Wendong Liu, Vice President, Beijing RLZY Technology (RLZY) and CEO, posesafeIT: My name is Wendong Liu and I am the vice president of Beijing RLZY Technology (RLZY), and CEO of posesafeIT.

After graduating from Beihang University (formerly known as the Beijing University of Aeronautics and Astronautics) in 2003, I went to work at China Unicom, where I was responsible for base station construction and maintenance. In 2012, I joined Sunwave Communications (三维通信) at its Beijing office as the deputy general manager, in charge of indoor microcellular base station construction and maintenance. I came to work at RLZY, a third-party towerco in 2016. Around that time, we also set up an R&D company in Hangzhou (posesafeIT), with an eye to solving the inefficiency that often comes with tower management, specifically with a project on intelligent towers.

TowerXchange: Please tell us about your company.

Wendong Liu, Vice President, Beijing RLZY Technology (RLZY) and CEO, posesafeIT: RLZY was established in 2006, with a focus on serving the telecom operators and industry, offering holistic solutions in three major areas: communications network planning, operations and maintenance, and engineering and construction.

The company remains at the forefront of the
information age as a top communications technology team. Through our experience and expertise, we’ve maintained consistent and positive long-term working relationships with China Mobile, China Unicom, China Telecom, and China Tower Corporation (CTC). Over the past decade, we’ve been involved with nearly 2,000 telecom base station site acquisition and construction projects, which included different types of sites and special projects.

In March 2016, the company underwent business structural change, going from Beijing RLZY Technology Limited to Beijing RLZY Technology Public Limited Company. In July of the same year, the company also became members of the China Association of Communications Enterprises (CACE, 中国通信企业协会) and Beijing Communication Industry Association (北京市通信行业协会).

On 8 September, 2016, the company became officially listed on the National Equities Exchange and Quotations (NEEQ), also known as the “New Three Board” (新三板). This is the Chinese over-the-counter (OTC) system for small-to-medium companies not listed on the Shanghai or Shenzhen Stock Exchanges. The stock code is 839188 and referred to as “瑞岚卓越.”

On 22 December, 2016, the company passed Beijing’s second round of high-tech certification, becoming a high-tech enterprise. This is part of a policy initiative through the Ministry of Science and Technology, with approval from the State Council to encourage the innovation, development, and growth of small-to-medium enterprises.

The company currently employs 27 staff.

**TowerXchange: And what assets do you have on the ground? What is your geographical footprint?**

**Wendong Liu, Vice President, Beijing RLZY Technology (RLZY) and CEO, posesafeIT:** In terms of our network footprint, to date we have built and completed 1,214 sites, of which 331 are monopoles/towers, 118 are roof tops, and 765 are streetlights. Those the three types of sites we get involved in, and they are spread across Beijing, Hefei, Shanxi, and other regions.

The locations are mainly shopping districts, transportation hubs, large residential communities, and parks and scenic areas.

**TowerXchange: Are you buying or building towers – if both, what is the mix?**

**Wendong Liu, Vice President, Beijing RLZY Technology (RLZY) and CEO, posesafeIT:** For now we are building and operating our own towers through BTS agreements with the operators. In the future, should the opportunity be appropriate, we would also consider acquisitions to grow the business. As the company listed on the NEEQ last year, it gives us a means to access capital.

**TowerXchange: Can you tell us a bit on how it works when you operate as a third-party towerco in China?**

**Wendong Liu, Vice President, Beijing RLZY Technology (RLZY) and CEO, posesafeIT:** Currently we are working with China Mobile as our main client, providing leasing services as a third-party towerco. China Mobile would provide its search rings to China Tower Corporation (CTC) for the first round of site acquisition; CTC’s success rate for the tier-one cities tends to be around 50-60% range, and up to 70-80% for tier-two cities. All remaining sites are then put out for bidding by independent towercos, who are usually successful with 90% of the sites.
The service model and payment terms differ across various regions in China, but they are increasingly becoming more standardised.

Generally lease rates for third-party towercos tend to be around 90% of CTC’s rate. Payment for each region is typically once a year, or once every two years, received post site completion. As a third-party towerco, there are usually four aspects to the project scope: site acquisition, construction, maintenance, and integrated management.

**TowerXchange: What is your business model: do you provide ‘steel and grass’ only or a full-service tower+power proposition?**

**Wendong Liu, Vice President, Beijing RLZY Technology (RLZY) and CEO, posesafeIT:** We are currently under the tower+power model, while offering tower maintenance as an additional service. The capex on the power side is recovered through the operator’s lease rate.

The operators have clear requirements when it comes to the power system, and while setting everything up can be costly, third-party towercos for the time being must build per operator specifications.

Under the current model, the operator handles and pays for the energy consumption directly.

**TowerXchange: Is the land under your towers protected or is there a risk from ground lease aggregators? In other words, who owns the land?**

**Wendong Liu, Vice President, Beijing RLZY Technology (RLZY) and CEO, posesafeIT:** Land ownership differs across areas. They could be business, industry, government, or personal. We sign long-term agreements with all land owners, subject to proof of legitimate title to the deed to avoid potential legal issues in the future. No agreements or construction will take place otherwise.

In general, the threat isn’t coming from land owners, but more from the community around the land. Upon completion of a site, there will sometimes be dispute around the issue of radiation concerns; while at the same time, we also seek testing from relevant governmental departments.

**TowerXchange: Are you engaging with the rooftop, microcell, DAS, IBS and small cell markets?**

**Wendong Liu, Vice President, Beijing RLZY Technology (RLZY) and CEO, posesafeIT:** We’ve always been involved with rooftops, and have them in Beijing, Anhui, Hebei, and other provinces and cities. But the reality is rooftops are more complicated when it comes to weight, lease negotiations, et cetera, so we construct far fewer of them compared to ground based towers.

Our next focus and expansion will be on smart towers, especially via the Internet-of-Things, and tower maintenance, with an eye to raising the industry’s overall O&M efficiency.

**TowerXchange: What is the cost of building new towers compared to the cost of leasing towers in the Chinese market?**

**Wendong Liu, Vice President, Beijing RLZY Technology (RLZY) and CEO, posesafeIT:** The cost to build a tower is around CNY¥160,000 (US$23,000). And due to geographical differences, ground lease costs range from CNY¥200,000 (US$29,000) to CNY¥500,000 (US$73,000). The terms also tend to vary, ranging from five, to 10, to 20 years.

Tower lease rates tend to average between CNY¥50,000 (US$600 pcm) and CNY¥80,000 (US$970 pcm), with 10-year terms. Occasionally it’s 5+5 years.

**TowerXchange: What is the typical time-to-market for a green field tower build?**

**Wendong Liu, Vice President, Beijing RLZY Technology (RLZY) and CEO, posesafeIT:** The standard tower construction period is typically 40 days, with 10 days for site acquisition and 30 days for actual construction.

Green field sites do require pre-consultation with the government for approval and sign-off, and must be done prior to the commencement of any site work.

**TowerXchange: How is the business financed and what does this mean about your interest/capacity to acquire or build more towers?**

**Wendong Liu, Vice President, Beijing RLZY Technology (RLZY) and CEO, posesafeIT:** Funding and financing is one of the drivers of a business in becoming operational, but also one of the biggest challenges.
We are tackling future financing from a few angles: 1) developing positive working relations with banks to access additional credit, 2) raising funds from investors through private placements, 3) tapping into the securities market via our listing on the NEEQ, and 4) other methods. The combination of the various options helps to guarantee more funding for our tower construction, business portfolio expansion, and operational prowess.

**TowerXchange: Please summarise your vision for the future of your company.**

**Wendong Liu, Vice President, Beijing RLZY Technology (RLZY) and CEO, posesafeIT:**

Globalisation. Informatisation. That while we continue to provide value as a third-party towerco in China, we can also extend our O&M experience to all tower owners worldwide through our smart/intelligent platform.

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**What is the National Equities Exchange and Quotation (NEEQ)**

The national small-to-medium-sized enterprise share transfer system (commonly known as the “New Three Board”) is approved by the State Council and set up as a national securities trading place. The company was incorporated with the State Administration for Industry and Commerce (SAIC) on 20 September, 2012, with a registered capital of CNY¥3bn.

Shareholders of the company are Shanghai Stock Exchange, Shenzhen Stock Exchange, China Securities Depository and Clearing Corporation Limited, Shanghai Futures Exchange, China Financial Futures Exchange, Zhengzhou Commodity Exchange, and Dalian Commodity Exchange.

The scope of business is to organise the public transfer of unlisted shares; to provide services to non-listed companies in the areas of financing, mergers and acquisitions, and to provide information, technology, and training services for market participants.

The NEEQ is the only over-the-counter (OTC) exchange regulated by the China Securities Regulatory Commission (CSRC). Investors need at least CNY¥5mn to participate.

Compared to an IPO on the Shanghai or Shenzhen Stock Exchanges, the NEEQ's listing process is faster, with less stringent requirements and lower costs. Valuations have also been reported to be high with a lower threshold. A little over 700 companies are currently in line for IPO approval in China. There has also been talks of a pilot programme to help qualified NEEQ-listed companies get on Shenzhen’s ChiNext board.

As of 21 February, 2017, a total of 10,675 companies are now listed on the NEEQ, according to a recent article from China Daily.
China Tower Corporation’s valuations from inception to future IPO

Industry valuation estimates range from US$33bn to US$56bn for the world’s largest towerco

China Tower Corporation (CTC), the world’s largest towerco, had stated its ambition to IPO since 2016, with TowerXchange previously reporting in early May the initial target date of late 2017 could get pushed to early 2018, and with Hong Kong seemingly confirmed as the desired bourse. Once veiled in secrecy on its financials, the investment community and industry gained greater clarity following CTC’s asset-backed note (ABN) in December 2016. On the heels of CTC’s anniversary in July and ahead of its IPO, TowerXchange has put together a comprehensive guide from the initial asset transfer that took place in October 2015 to key considerations ahead.

Keywords: 4G, Anchor Tenant, Asia Insights, Bernstein Research, CICC, CTC, Carve out, China, China International Capital Corp Ltd, China Mobile, China Reform Corporation, China Telecom, China Tower Corporation, China Unicom, Co-locations, Construction, Depreciation, Goldman Sachs, INWIT, Infrastructure Sharing, Installation, Lease Rates, Liu Aili, Nomura, Nomura, O&M, Operator-led JV, Reuters, Telxius, Tenancy Ratios, Valuation

Read this article to learn:
- How China Tower Corporation came about
- What are analysts’ valuations for China Tower Corporation
- Exclusive calculations and analysis on value per tower
- Why China Tower Corporation is seeking a HK listing
- Who are the world’s top 20 MNO-led towercos and joint venture infracos

The wheels have been in motion for CTC’s initial public offering for quite some time now, with another milestone being its three-year anniversary. It was reported by Reuters in June 2017 that CTC had picked China International Capital Corp Ltd (CICC) and Goldman Sachs to lead its IPO in Hong Kong, with final confirmation pending board approval. It also noted more banks could be added to the final IPO sponsor team.

Estimated valuations for the largest towerco in the world in the past few months range from US$33bn to US$56bn.

This is a unique market where threat from “competitors” is limited given CTC is expected to generally maintain greater than 95% market share, in spite of the presence of the 200+ independent towercos that also serve the three MNOs; political support is strong, and costs to build are favourable thanks to well-managed purchasing. There is the supposed annual escalator of ~2% on tower lease rates, with roughly the same rate as well on opex and maintenance capex to reflect inflation. Growth on the telecom infrastructure side will no doubt continue as China marches on with 4G rollouts and prepares itself for 5G, as well as provide coverage along key infrastructure developments such as highways, subways, and high speed rail.

On the flip side, CTC has one of the lowest lease rates in the world, with generous discounts as additional tenants come on board. On new towers, a 20% discount will be applied for sites shared by two lessees and a 30% discount for those shared
among three lessees, with the first sole occupier ("anchor tenant") benefitting from a further 5% discount. When it comes to site costs and electricity, a co-sharing discount of 40% will be applied for two lessees and 50% for three lessees. Again, the anchor tenant would enjoy an additional 5% discount.

Current contracts are reportedly for a five-year period, which means there is a chance the tower lease rate escalator, which had the input of the MNOs, could be renegotiated. While all the MNOs have stakes in CTC, all four organisations are effectively SOEs, so it remains unlikely lease rates would ever reach some of the figures associated with CTC’s towerco peers in other markets. China Unicom’s mixed reform ownership would (for the time being) still see majority ownership remain in the government’s hands.

**How did China Tower come about?**

What makes CTC unique also is that its formation was mandated at the highest level, to engender a culture of “co-build, co-share.” The three MNOs did not have much choice in this matter. Through sharing efficiencies and economies of scale, the towerco was to save on land resources and investments, plus optimise tower building, operations, and maintenance in the country. This would allow the acceleration of 4G rollout nationwide (and eventually 5G) through centralised planning, and potentially level the playing field between market leader China Mobile, and the other two operators China Unicom and Telecom.

**Dual and conflicting roles?**

There is no other towerco like CTC in the world, and evident not just to outsiders but also the players themselves.

In a television appearance in December 2016, Liu Aili, Chairman and General Manager of CTC was interviewed alongside senior representatives from the three MNOs and government. When the host asked the three MNO executives to describe their relationship to the towerco during the two years of CTC’s existence, this is how each answered (translation by TowerXchange):

**China Telecom (Ke Ruiwen):** We have a competitive and partnership relationship.

**China Unicom (Zhao Guanlu):** We are like brothers. During our operations in the past, us three brothers had been competing/racing, and after getting a little tired we realised something seemed to be missing. A platform was missing. The creation of the company [CTC] is the emergence of said platform. Four makes a party. There’s more stability since [CTC].

**China Mobile (Dong Xi):** I think we are like friends.

A top government official also agreed with the description of “brothers,” elaborating that CTC was born out of the three MNOs’ assets and now also serves the three of just US$22,000 per site, significantly below replacement cost. But an asset transfer between entities all fundamentally State-owned (and owned by each other) is a poor valuation benchmark. The low transfer cost reflects the depreciation of an inventory which included many 10+ years old towers, many of which were built to gain market share and with less of a view toward longevity and structural capacity, so significant improvement capex may be required. The low price point also reflects the mixed bag of assets being transferred, inclusive of everything from substantial ground
based towers, a great many monopoles, rooftops, and even small Wi-Fi offload sites.

At the time, around October 2015, China Daily had reported the transfer of CNY¥203.5bn (~US$31.5bn) worth of telecommunication tower assets, while the Wall Street Journal noted analysts valuing the venture at CNY¥214bn (~US$33.1bn). An article from the Mobile World Live cited yet another estimate at CNY¥230bn (~US$35.6bn).

More specifics emerged out of a March article this year in Chinese media Caixin, which noted actual asset transfers taking place on 14 October, 2015, whereby 1.52mn towers changed hands, for a value of CNY¥231.4bn. This would translate to ~CNY¥152,000/tower or US$23,500/tower, roughly in line with TowerXchange’s previous reporting.

As part of the carve out, China Telecom (which had the least number of towers out of the three MNOs) received only equity as part of the deal (29.9%), while China Mobile and China Unicom received both equity (40% and 30.1% respectively) and a combined CNY¥91.9bn (~US$14.2bn) in cash. The Caixin article also noted that the original agreements required CTC to pay all outstanding payments and interests to China Mobile and China Unicom by the end of 2017.

Around the same time, China Reform Corporation also injected a further CNY¥7.7bn (~US$1.2bn) in cash for a 6% stake, diluting the three MNOs shares to 38%, 28.1% and 27.9%. China Reform’s exact investment was confirmed this year by a trusted source exclusively to TowerXchange.

For most of its existence, CTC’s financials were not made public, with industry analysts piecing together information between the lines of the disclosures of the three MNOs. However, in December 2016, CTC issued its first asset-backed note (ABN) with China Merchants Bank as the lead underwriter. This lifted the veil on the towerco’s numbers, apparently just for the first half of 2016. Nonetheless, it provided more clarity for the investment community in making sense of a towerco unlike any other. The 1-year ABN at 2.86% per year allowed CTC to raise CNY¥5bn on the back of its receivables from the three operators.

### China Tower valuations 2017

Following the ABN, Bernstein Research released a report in late December 2016 suggesting a final valuation then for CTC between CNY¥215bn or US$33.3bn (which is based on discounted cash flow value) and CNY¥365bn or US$56.5bn (using a similar EV/EBITDA to Bharti Infratel). The report also highlighted a key factor that would affect CTC’s financials: “We also believe towerco is likely to change its depreciation rate from 10 years (which is what the operators historically used) to 20 years. Twenty years (or more) is in-line with normal international practice,” wrote Chris Lane, senior research analyst and head of Asia-Pacific telecommunications.

In April 2017, a Goldman Sachs report estimated CTC was worth about ~US$4bn, with a 30% discount to international peers.

Most recently in June, Reuters reported “a 10-20% stake sale could generate between US$5bn to $10bn,” effectively placing valuation at US$50bn. TowerXchange estimates tower count to be around 1.75mn at that time, implying value per tower of ~US$28,570.

### Lease rates

When CTC finalised its leasing and pricing agreement with the three MNOs in July 2016, it set the benchmark for lease rates in the country. CTC lease rates are significantly lower than

<table>
<thead>
<tr>
<th>Lease costs</th>
<th>Towers rented</th>
<th>$/towers</th>
<th>Lease pcm</th>
<th>Lease pcm**</th>
</tr>
</thead>
<tbody>
<tr>
<td>China Mobile</td>
<td>CNY¥28.1bn</td>
<td>1,110,000</td>
<td>CNY¥25,315</td>
<td>CNY¥2,110</td>
</tr>
<tr>
<td>China Unicom</td>
<td>CNY¥19.5bn</td>
<td>690,000</td>
<td>CNY¥28,260</td>
<td>CNY¥2,355</td>
</tr>
<tr>
<td>China Telecom</td>
<td>CNY¥14.0bn</td>
<td>610,000</td>
<td>CNY¥22,950</td>
<td>CNY¥1,913</td>
</tr>
</tbody>
</table>

**Based on the exchange rate of 1USD to 6.46 CNY August, 2017  
Data source: Nomura, additional analysis by TowerXchange
anywhere else in the world, with initial estimates around CNY¥26,000 per tower on an annual basis or CNY¥2,166 pcm (US$335). This figure is surprisingly low and suggests a business model calibrated in favour of creating value for the MNOs.

For year-end 2016, lease rates paid by the three MNOs ranged between CNY¥1,913 (US$296) to CNY¥2,355 (US$365), according to data by Nomura.

Like India, when additional tenants are added to Chinese towers, existing tenants’ leases are discounted.

As noted earlier in this report, there is also an escalator, “an inflation adjustment factor” which is common in tower agreement contracts.

**Tower sharing**

Prior to the establishment of CTC, tower sharing was around 20% in the country. By the end of 2016, total tower sharing reached 40%, with 70% of new towers shared, based on stats quoted by CTC chairman and general manager, Liu Aili. In some regions, tower sharing amongst the three operators were supposedly as high as 91%, and at 100% along high speed and subway lines.

Local Chinese media reported 68.1% sharing rate for all sites completed in 2016 by CTC, with a tenancy ratio of 1.39 across the portfolio by the end of the year.

In an exclusive interview with the People’s Post and Telegraph (人民邮电报) in August 2017, Liu Aili noted tower sharing has rapidly increased from 14.3% to 73% over the three years of CTC’s existence. More specifically, sharing between new builds for China Mobile, China Telecom and China Unicom have grown from 3.6% to 48.6%, 36.6% to 90.1%, and 20.9% to 92.4% respectively.

**China Tower’s IPO on the Hong Kong Stock Exchange**

While a listing on the domestic A-share market could prove more valuable in generating higher valuations and therefore raise more money, there is speculation that a HK listing is perceived to be more “prestigious and better quality.” In addition, not only is the waiting list long for China’s two main boards (Shenzhen and Shanghai), CTC also does not meet the criteria for positive net profits in the last three years, as it only broke even and became profitable in Q4 2016.

Someone recently asked whether CTC had ever considered listing on the US stock exchanges. Whilst an interesting question, the conversation from the get go was always between China and HK. A US-listing could prove more complicated than CTC may be prepared for at this stage; there are political implications to consider; plus given its structure, CTC’s financials could pale in comparison to the likes of its “peers” American Tower, SBA Communications and Crown Castle. The fact that investors within the US market may be better educated about the tower industry may actually be a deterrent as the State-towerco’s fundamental philosophy and operating principles differ from private, independent towercos.

**MNO carve out and monetisation of tower assets**

CTC is part of the growing global trend of MNO-led tower carve outs, wherein many MNOs seek to maintain majority control while monetising a minority stake. Out of the top 20, six towercos (including CTC) are partnerships between two or more MNOs. In fact, only CTC and Indus Towers in India have three MNOs each as shareholders: CTC is a joint venture between China Mobile, China Telecom, and China Unicom, while Indus was formed through a partnership between Bharti Airtel, Vodafone, and what is now Idea Cellular.

Compared to Indus Towers, CTC is different in that the three MNOs and CTC are all state-owned enterprises (SOEs) as opposed to private, independent enterprises, which further complicates the relationships between towerco and the three MNOs, who are both shareholders and clients.

TowerXchange has compiled the world’s top 20 MNO-led towercos and joint infracos by site count, including insights into their monetisation strategies, with China tower Corporation (CTC) sitting at the top of the list.

For more details, read “The rise of the operator-led towerco.”
# The world’s top 21 MNO-led towercos and joint venture infracos (by site count)

<table>
<thead>
<tr>
<th>Towerco</th>
<th>Country(s)</th>
<th>Owner(s)</th>
<th>Site count Q317</th>
<th>Monetisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>China Tower Corporation</td>
<td>China</td>
<td>China Mobile 38%, China Unicom 28.1%, China Telecom 27.9%, China Reform Corporation 6%</td>
<td>1,900,000</td>
<td>Seeking to IPO end of 2017; likely Q1 2018</td>
</tr>
<tr>
<td>Indus Towers</td>
<td>India</td>
<td>42% Bharti Infratel, 42% Vodafone India, 16% Idea Cellular</td>
<td>122,920</td>
<td>Brookfield and KKR interested in consolidating and acquiring stake in Indus+Bharti Infratel</td>
</tr>
<tr>
<td>Towercom (formerly Reliance Infratel)</td>
<td>India</td>
<td>RCOM 96%, 6 PE and hedge fund investors 4%</td>
<td>~45,000</td>
<td>Prospective sale to Brookfield fell through due to RCOM financial distress</td>
</tr>
<tr>
<td>Bharti Infratel</td>
<td>India</td>
<td>Bharti Airtel 72%, public shareholders 28%</td>
<td>39,211</td>
<td>Minority stakes are sold to Nettle, KKR and CPP. Infratel could be merged with Indus and acquired</td>
</tr>
<tr>
<td>Deutsche Funkturm</td>
<td>Germany</td>
<td>Unclear but believed to be 100% owned by Deutsche Telekom</td>
<td>31,636</td>
<td>Plans to monetise reportedly shelved after Telxius IPO cancelled</td>
</tr>
<tr>
<td>edotco</td>
<td>Bangladesh, Cambodia, Malaysia, Myanmar, Pakistan, Sri Lanka</td>
<td>Axiata, INCJ, Khazanah, KWP</td>
<td>31,600</td>
<td>Between December 2016 and April 2017 Axiata divested 37.6% stakes in edotco to Innovation Network Corp of Japan, Khazanah and Kumpulan Wang Persaraan for a total of US$700mn. Unlikely to IPO before 2018</td>
</tr>
<tr>
<td>Telxius</td>
<td>Brazil, Chile, Germany, Peru, Spain</td>
<td>Telefónica 100%</td>
<td>15,941</td>
<td>IPO cancelled in Q316</td>
</tr>
<tr>
<td>Telesites</td>
<td>Mexico, Costa Rica</td>
<td>América Móvil 58.5%, public shareholders 41.5%</td>
<td>14,962</td>
<td>Listed at the end of 2015</td>
</tr>
<tr>
<td>First Tower Company</td>
<td>Russia</td>
<td>Unclear but believed to be 100% owned by MegaFon</td>
<td>14,000</td>
<td>Carved out with a view to future sale</td>
</tr>
<tr>
<td>Mitratel</td>
<td>Indonesia</td>
<td>Unclear but believed to be 100% owned by Telkom Indonesia</td>
<td>13,113</td>
<td>Telkom agreed to transfer Mitratel to Tower Bersama in an innovative share swap agreement until the deal was cancelled in 2015</td>
</tr>
<tr>
<td>Towerco</td>
<td>Country(s)</td>
<td>Owner(s)</td>
<td>Site count Q416</td>
<td>Monetisation</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------------</td>
<td>-------------------------------------------</td>
<td>-----------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>NetWorkS!</td>
<td>Poland</td>
<td>T-Mobile 50%, Orange 50%</td>
<td>13,000</td>
<td>Speculation suggests NetWorkS! could be sold although Orange and T-Mobile retain asset ownership</td>
</tr>
<tr>
<td>DIF</td>
<td>Thailand</td>
<td>18-33% True, 67-82% Unit Holders</td>
<td>12,183</td>
<td>Listed at the end of 2013</td>
</tr>
<tr>
<td>CTIL</td>
<td>UK</td>
<td>Vodafone 50%, Telefónica 50%</td>
<td>12,000</td>
<td>Tower assets have been transferred to the CTIL balance sheet. VF and TEF may have differing appetite to monetise</td>
</tr>
<tr>
<td>MBNL</td>
<td>UK</td>
<td>EE (BT) 50%, Three 50%</td>
<td>12,000</td>
<td>EE and Three retain asset ownership, but JV includes active as well as passive infrastructure</td>
</tr>
<tr>
<td>INWIT</td>
<td>Italy</td>
<td>Telecom Italia 60%, Institutional Funds 36%, Individuals 4%</td>
<td>10,945</td>
<td>Previously explored trade sale, TIM now appear committed to retain controlling stake</td>
</tr>
<tr>
<td>National Tower Company</td>
<td>Russia</td>
<td>Unclear but believed to be 100% owned by Veon</td>
<td>10,400</td>
<td>Carved out but recent trade sale process cancelled indefinitely</td>
</tr>
<tr>
<td>Global Tower / UkrTower</td>
<td>Turkey, Ukraine, Belarus, Cyprus</td>
<td>Unclear but believed to be 100% owned by Turkcell</td>
<td>10,211</td>
<td>Cancelled IPO in 2016</td>
</tr>
<tr>
<td>Idea Cellular Infrastructure Services</td>
<td>India</td>
<td>Unclear but believed to be 100% owned by Idea Cellular</td>
<td>8,886</td>
<td>Reportedly in exclusive negotiations to sell to American Tower</td>
</tr>
<tr>
<td>MTS Towers</td>
<td>Russia</td>
<td>Unclear but believed to be 100% owned by MTS</td>
<td>5,500</td>
<td>MTS carved out around half of their towers into MTS Towers, but claims to have no plans to monetise</td>
</tr>
</tbody>
</table>
Conclusion

Back in October 2015, the range of estimated value for tower assets transferred to China Tower Corporation from the three MNOs were between CNY¥203bn to CNY¥230bn (~US$ 31.5bn to 35.6bn). Seventeen months later, more specifics of the actual transaction were reported, pegging an asset transfer of 1.52mn towers at CNY¥231.4bn (~US$ 35.8bn) and per tower value of CNY¥152,00 or roughly US $23,500.

Fast forward to the last few months, where greater clarity into the financials of CTC are available, and some of the growth achieved can be measured. Valuations for China Tower Corporation based on various industry sources are now in the range of CNY¥215bn to CNY¥365bn (US $33.3bn to US $56.5bn). For the time being, TowerXchange is inclined to use the figures from the June Reuters article, which suggests a valuation of US$50bn and our calculated estimate of US$28,570/tower.

Ignoring forex for the time being, this demonstrates an estimated value of US$23,500/tower at time of asset transfer to an increase of just US $29,000/tower over a span of 20 months. For comparison, Malaysia-based OCK Group's acquisition of the SEATH portfolio in Vietnam in December 2016 averaged US$25,355/tower, whereas edotco's recent acquisitions in Pakistan have averaged US$127,000 (Tower Share/Tanzanite) and US$72,000 (PMCL/Jazz). It's important to remind readers that cost per tower is a pretty savage metric, taking no account of lease rate or term, and to circle back to the uniqueness of the Chinese market which means that it has no direct global comp.

For the time being, while debt-laden CTC is eager to IPO soon to raise some much needed cash and ease the pressure on interest charges, the process will likely be delayed to the first quarter of 2018 at the earliest. But CTC remains diligent and charges on with its efforts to expand revenue sources and lower costs through diversification, energy management and standardisation.

Note: Unless expressly indicated, all CNY to USD figures have been converted at the rate of 1USD to 6.46CNY (August 2017).

CTC balance sheet comparison

<table>
<thead>
<tr>
<th></th>
<th>30 June, 2017</th>
<th>31 Dec, 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>流动资产 / Current assets</td>
<td>302.8275</td>
<td>395.6546</td>
</tr>
<tr>
<td>非流动资产 / Non-current assets</td>
<td>2,811.5359</td>
<td>2,721.0294</td>
</tr>
<tr>
<td>资产合计 / Total assets</td>
<td>3,114.3634</td>
<td>3,116.6840</td>
</tr>
<tr>
<td>流动负债 / Current liabilities</td>
<td>1,736.1566</td>
<td>1,715.6810</td>
</tr>
<tr>
<td>非流动负债 / Non-current liabilities</td>
<td>111.4865</td>
<td>145.4843</td>
</tr>
<tr>
<td>负债合计 / Total liabilities</td>
<td>1,847.6430</td>
<td>1,861.1654</td>
</tr>
<tr>
<td>净资产 / Net assets</td>
<td>1,266.7203</td>
<td>1,255.5187</td>
</tr>
<tr>
<td></td>
<td>Ending 30 June, 2017</td>
<td>Ending 30 June, 2016</td>
</tr>
<tr>
<td>营业收入 / Operating income</td>
<td>332.7218</td>
<td>255.4041</td>
</tr>
<tr>
<td>净利润 / Net profit</td>
<td>11.2016</td>
<td>-11.7299</td>
</tr>
</tbody>
</table>

Source: U學在線, citing CTC 1H2017 reports
Translation to Chinese by TowerXchange
China Independent Tower Alliance creates unified voice to drive industry cooperation, standardisation and influence

Private towercos looking to leverage strength in numbers to thrive alongside state-giant China Tower Corporation

China’s independent tower industry reached a major milestone this summer through the creation of the China Independent Tower Alliance (CITA). Buoyed by a key government document released in the Spring and under the leadership of the Communications Network Operation and Maintenance Committee (COMC) of the China Association of Communication Enterprises (CACE), independent towercos of all sizes have banded together to create a unified voice. TowerXchange participated in the formation of CITA and is the first in English media to report exclusively on CITA details.

Keywords: Asia, Bright Financial Leasing, CACE, CITA, COMC, China, China Association of Communication Enterprises, China Independent Tower Alliance, China Radio and Television, Communications Network Operation and Maintenance Committee, Guodong Network, Hangzhou Wanxing Technology Co., MIIT, Ministry of Industry and Information Technology, Miteno, SASAC, State-owned Assets Supervision and Administration Commission

Read this article to learn:
- CITA’s objectives and mission
- CITA’s membership makeup
- CITA’s nine main roles
- What is MIIT and SASAC’s document No. 92
- Future prospects for China’s independent tower market

About CITA

The China Independent Tower Alliance (CITA) was inaugurated on 30 June, 2017, created under the leadership and guidance of the Communications Network Operation and Maintenance Committee (COMC) and in partnership with private towercos, telecom infrastructure builders, equipment and service providers, design consulting firms, academic and research institutes, and more. Its current membership consists of more than 60+ organisations.

Membership is voluntary and requires a written application. The applying firm needs to have a “certain degree of advancement, influence, and significance” within the industry and receive the vote of two-thirds of the Alliance council for successful admission.

How CITA came together

As TowerXchange previously reported back in early December 2016, China’s independent towercos were starting to feel the squeeze as State-owned China Tower Corporation (CTC) began to make its presence felt. Market dynamics were such that the 200+ players felt they were in a grey space where their existence may not be supported nor permitted.

Enough concern was voiced that a consultation meeting was arranged between independent towercos and representatives from the Ministry of Industry and Information Technology (MIIT). The conversations and feedback from this
November meeting led to a spirit- and moral-lifting government document No. 92 clarifying and effectively legitimising the role of independent towercos.

From there, momentum gathered and the industry quickly rallied together for further discussions that led to the eventual formation of the industry body to serve the interests of the independent tower sector.

The Alliance seeks to support the development of an innovative and sustainable independent tower sector that exists to serve market needs; whereby members abide by the principles of industry development, equality, mutual benefit, risk and resource sharing, and synergy.

CITA will be driving government relations; telecom infrastructure standardisation and professionalisation; land and resource optimisation; industry networking and information exchange; and MNO communications. It endeavours to create an open, transparent and fair competitive and policy environment that allows all industry stakeholders to achieve common goals.

### CITA’s main roles

1) To be a strategic advisor and supporter to key government departments, acting as a bridge to introduce and communicate industry related policies, law and regulations and to support their execution, assessment and feedback. To voice the wishes and concerns of Alliance members to government, with the goal to seek resolutions supporting industry development.

2) To develop a regular channel of communication between MNOs, China Tower Corporation, China Radio and Television and other telecommunications enterprises; to enhance Alliance members’ understanding of the above parties to promote win-win partnerships.

3) To build a platform for daily communications between members that encourages technological and business model innovation, resource and information sharing, and a fair and competitive market.

4) To carry out research and other activities to understand industry developments and identify solutions to pressing issues and their implementation.

5) To launch industry standards in technology, leasing and service provisions; to undertake
research with the aim to develop self-regulation, professional development and industry standardisation.  

6) To organise activities and events to facilitate member training on law, taxation, technology, safety, et cetera, as well as funding and financing services.

7) To grow both the influence and membership of the Alliance through a dedicated website and various mainstream media; to initiate positive Alliance and member publicity.

8) To capture and summarise member and industry data in a timely manner, in order to maximise the localisation of the Alliance, create a top-down organisational structure, and handle tasks assigned by various levels of government and the highest order of the Alliance.

9) To regularly hold meetings with government department leaders, telecom infrastructure enterprises and Alliance members to discuss industry developments, with the goal to seek increased policy support and effectively address roadblocks and challenges to industry growth.

**CITA's first Chairman and his vision**

During the opening comments at CITA’s first event in August in Beijing, its Chairman Zhang Zhiyong (of Miteno, China’s second largest independent towerco) made some interesting points worth highlighting:

- Document No. 92 allowed independent towercos to progress from “outsiders” to real “participants” in the country’s “co-build, co-share” regime.

- Towercos are asset-heavy companies, and as result, independent towercos need to pay attention to their capital management.

- The growth of towercos naturally depends on funding and financing, and the appropriate support would allow companies to soar.

- Towercos need to increase awareness of optimal capital deployment and make it work to their advantage. For example, the Alliance could consider creating a fund together, to set up proper rules on accessing the fund, so members can support each other’s growth. Or could it be possible to partner in such a way that Alliance members could realise larger-scale financing. Or could a new model be created to allow a joint public listing.

**What’s next**

In the weeks following CITA’s first event, COMC-CACE lead for the Alliance Deng Jiatu and CITA’s Chairman Zhang Zhiyong paid visits to CTC, China Mobile, China Telecom and China Unicom, to both introduce CITA and pave the path for closer collaboration to all parties’ benefits.

Over the last few meetings, some members have expressed the need to include not only the MNOs as part of its activities and membership, but also CTC. And while the MNOs do work with the independent towercos, it remains to be seen how CTC at the highest level would view the suggestion of collaboration with other towercos.
China’s independent towerco industry is a mashup of companies with varying degrees of maturity, business savvy, scale, geographical coverage, financing and ambition. A good percentage of them are also not “pureplay” towercos; rather, they may have other primary business units in tower manufacturing, technology, or related products and services. As such, the “junior” towerco members certainly seek to benefit by listening to and tapping into the expertise of those who have come before them, while market leaders may benefit by imposing discipline and standards that ultimately serve all in the game.

While CITA’s website is still under construction, its WeChat group is alive and well, with 230+ people. Over the last few weeks, various industry articles, business opportunities and documents have been shared, with no doubt many more offline conversations. Discussions have also been initiated around intelligent locks for shelters, tower acquisition, site building best practices, policies, and regional RFPs. There is much more to come for CITA and TowerXchange is looking forward to welcoming a delegation to TowerXchange Meetup Asia 2017, as part of our continued efforts in exposing Alliance members to international best practices, new partners and investment opportunities in the region.

TowerXchange has participated in several of the formative meetings of CITA and looks forward to a long and fruitful partnership with the Alliance as we build to the launch of a TowerXchange Meetup in China.

About document No. 92

Perceived as a turning point for the independent towercos in China, the document was released by MIIT and SASAC following an industry consultation meeting. This provided a much needed boost to the towercos who were facing challenging market conditions, roadblocks to securing and executing BTS, questions on the legitimacy of their presence in the market place, as well as difficulties with contracts and account receivables.

Document No. 92 spelled out some key points, among them that independent towercos, along with CTC, were to be included and part of the system supporting the country’s “co-build, co-share” vision; that should CTC lack the capacity or be unable to deliver on tower builds as agreed, it would revert the order back to the MNOs in a timely manner; that should inappropriate and anti-competitive tactics be used and thereby create a monopolistic market place, MIIT would take action to address and set forth corrective action. The document also noted other opportunities such as DAS and street poles that towercos could explore, to provide additional services within the general “co-build, co-share” framework.
Akhil Gupta’s agenda for the tower industry in 2017

Bharti Infratel and TAIPA Chairman’s keynote address highlights three opportunities for towercos, and emphasises the importance of access to capital

Akhil Gupta, esteemed Chairman of both Bharti Infratel and of the Tower And Infrastructure Providers Association of India (TAIPA), reprised his role as keynote speaker at the 3rd Annual TowerXchange Meetup Asia, hosted in December 2016. While being Chairman of Asia’s benchmark listed towerco, Mr Gupta is also a Director of India’s leading MNO, Bharti Airtel, so his vision includes that of both infrastructure provider and tenant. Here are the highlights of Gupta’s keynote speech.

Gupta congratulated TowerXchange on hosting the premium event for the global tower industry, recognising the year on year growth of the community. More importantly, Gupta led the audience in applauding towercos, MNOs and their suppliers for the creation of the tower industry, a new infrastructure asset class with listed entities totalling a global market cap of US$125bn, of which almost US$25bn comes from Asia, with significant future IPOs in the pipeline. “The tower industry is becoming mainstream,” Gupta remarked.

Gupta described the robust, unique towerco business model in Asia and reiterated his vision for the “disarmament of the MNOs” – offering modern, reliable infrastructure under tariffs such that MNOs have no choice but to lease shared infrastructure rather than build or buy their own infrastructure.

In his 2016 keynote, Akhil Gupta chose to highlight three great opportunities for towercos and infrastructure providers for the coming year:

1. Specific prioritised adjacent growth areas
2. How to tackle energy
3. Access to capital

Specific prioritised adjacent growth areas

Driven by the data explosion, hundreds of thousands of micro sites will be needed as Asia migrates to 4G and eventually 5G.

While Gupta was pleased to see Asian towercos diversifying into the provision of these lighter sites, he noted that some MNOs are still self-deploying

Keywords: Asia, Asia Insights, Bankability, Bharti Airtel, Bharti Infratel, Business Model, C-Level Perspective, Capex, Deal Structure, Energy, Energy Efficiency, Fixed Price, IBS, IPO, Infrastructure Sharing, Insights, Investment, Lease Rates, Multi-Region, Pass-Through, Stakeholder Buy-In, TAIPA, Towercos, Wi-Fi

Read this article to learn:
- Opportunities for towercos in provision of micro sites, Wi-Fi and IBS
- A call to connect most shared towers to fibre within the next two years
- Seeking a win-win model for the provision of energy
- How to access capital: consolidate to reach scale, IPO
micro sites. Gupta re-iterated his call for towercos to step up and completely disarm the operators, offering rapid deployment at a price where it makes no sense to build their own sites. “If MNOs have built their own sites,” suggested Gupta, “we should buy them.” Gupta also called on technical teams to design micro sites with capacity for two tenants.

“Towercos must not just provision outdoor infrastructure, but must offer white label service in building solutions.”

With more than 80% of data traffic generated indoors, Gupta called on industry colleagues to commit to a vision to provide coverage in virtually every building over 10-20,000sqft. This service should be provided by towercos on a white label basis: towercos should never compete with their customers.

“I see Wi-Fi and IBS as a virtually endless opportunity, but if we yield this space, someone else will occupy it,” added Bhati Infratel’s Chairman. “This is the year we really need to step up our efforts as an industry, and make this a mainstream activity of all towercos. Towercos must become the owners of indoor Wi-Fi infrastructure.”

Alongside micro sites, Wi-Fi and IBS, the third piece adjacent growth area highlighted by Gupta was transmission.

“Most shared towers can feasibly be connected to fibre within the next two years,” said Gupta.

Initially towercos should link towers to the nearest transport network – whomever that may belong to – and to buildings in which they provision Wi-Fi. But later the focus should shift to shared microwave, inter and intra-city long distance fibre and ultimately even international long distance infrastructure.

Fibreising sites enables MNOs to take microwave dishes off towers, freeing space for an extra tenant. “I believe there is a great opportunity for us to become tower and transmission companies,” concluded Gupta.

How to tackle energy

“Provision of energy at the right cost is a mainstream responsibility for towercos in India and in other Asian countries where power is not dependable. Provision of energy is also the most complex activity we provide – yielding little or no margin under the traditional pass through model,” opined Mr Gupta.

The imperative to reduce energy opex has stimulated investment in energy efficiency solutions, resulting in the introduction of the fixed energy model. This has motivated Indian towercos to invest significant management time into negotiating energy charges.

Gupta called on stakeholders to work out a model where, after providing for depreciation of energy equipment, any profit from energy efficiency programmes should be transparent, and should shared with the customer, thus taking away much of the tension which currently characterises annual negotiations.

“We could virtually eliminate diesel... if we're able to work out a common win-win formula to share benefits between towercos and customer,” concluded Gupta.

**Access to capital**

Whilst MNOs in Asia and worldwide continue to be capital constrained, access to capital remains a key issue for towercos.

The capitally intensive nature of the micro site, Wi-Fi and IBS, and transmission opportunities, and the investment required in renewables, energy storage and grid extensions, require that stakeholders work together, and make it imperative for towercos to devise feasible tariff plans that both ensure their business case and ensure MNOs don’t find it more economic to self-deploy.

To optimise the investibility of infrastructure providers as an asset class, Gupta called for consolidation among sub-scale towercos to improve their access to capital, while the Bharti Infratel and TAIPA Chairman also called on towercos of scale to consider listing to facilitate easier access to capital.

Gupta concluded by re-emphasising the need for collaboration to unlock these opportunities and the associated capital, commending TowerXchange for providing a forum for the exchange of experience and ideas.
Towerco leveraging Alfamart store locations to provide coverage and capacity for MNOs

Partnership resolves site acquisition challenges and expedites deployment

One of the towercos TowerXchange identified in early 2017 was Indonesia-based PT. PERMATA KARYA PERDANA (PEKAPE). Through its relationship with Alfamart, one of the leading retailers in the country, PEKAPE is uniquely positioned to offer some of the best locations desired by MNOs for coverage, infill and capacity. Despite coming up against established towercos such as Tower Bersama, Protelindo and even MNO-led Mitratel (Telkomsel), PEKAPE has carved out a nice niche in the local telecommunications infrastructure sharing marketplace. During my visit to Jakarta over the summer, I caught up over dinner with its CEO and CTO. Read on to learn more.

Keywords: Alfamart, Asia, Bolt, Build-to-Suit, Business Model, Co-locations, Construction, Densification, Dimensioning, Fixed Price, Greenfield, H3I (Tri), Indonesia, Indosat Ooredoo, Infrastructure Sharing, Installation, Internux, Interview, Masts & Towers, O&M, On-Grid, Opex reduction, PEKAPE, PT, PERMATA KARYA PERDANA, Pass-Through, Rooftop, SLA, Shelters, Smartfren, Telkomsel, Urban vs Rural, Who’s Who, XL Axiata

Read this article to learn:
- Who is PEKAPE, its footprint, and business operations
- A new partnership model for telecom infrastructure in Indonesia
- PEKAPE’s business advantage in servicing MNOs
- Potential growth and expansion opportunities for PEKAPE

TowerXchange: Please introduce yourself, your role, and company.

Gilang Pramono Seto, CEO, PEKAPE: I am the CEO and co-founder of PT. PERMATA KARYA PERDANA (PEKAPE), and have been in this role for the last four years. I have more than 25 years of experience in the telecommunications industry across various functions, with various mobile network operators and vendors, including XL Axiata and Bakrie Telecom. I started my career as an engineer, then progressed through product development and management. Eventually I shifted back to focus on operations, honing my expertise in telecom network and IT.

PEKAPE was founded in 2013, beginning operations in mid-2014, with the vision to be a premier telecommunications infrastructure provider in Indonesia, contributing to the country’s goal to bring affordable communications to all citizens. Our mission is to facilitate faster and more economic roll-out of wireless operations throughout Indonesia including countryside and remote areas, as well as urban city centres.

Yusron Hakim, Chief Technical Officer, PEKAPE: I have been the CTO at PEKAPE for the last two years while also leading the day-to-day operations including business planning and development. In terms of background, I have more than 22 years of experience in the telecom industry.
TowerXchange: Can you share with us your business model?

**Gilang Pramono Seto, CEO, PEKAPE:** Our business model is mostly the rental of passive infrastructure to MNO clients, based on five to 10-year contracts, under an opex model. Having said that, we do have other models available such as revenue sharing.

TowerXchange: And how did the relationship begin with Alfamart?

**Gilang Pramono Seto, CEO, PEKAPE:** Since inception, we had the engagement of Alfamart to use both its stores and lands, which are ideal sites as they are within the network planning of the MNOs. As you can imagine, this partnership makes it much easier and faster to acquire sites.

In addition, as Alfamart continues to expand its operations and in-store service offerings, it needed to source technology solutions to support its growth. So a separate company like PEKAPE was needed to focus on that side of things.

TowerXchange: Can you tell us a bit about your clients?

**Yusron Hakim, Chief Technical Officer, PEKAPE:** We serve most MNOs in Indonesia including H3I (Tri), XL Axiata, Telkomsel, Indosat, Internux (Bolt) and Smartfren.

We provide build-to-suit (BTS) and co-locations to our clients and while we’re not working with non-traditional, non-MNO clients yet, we are working on new initiatives to breakthrough.

TowerXchange: Please tell us more about the composition of your portfolio.

**Yusron Hakim, Chief Technical Officer, PEKAPE:** We offer a mix of assets, which include microcell poles (MCP), self-supporting towers (SST) and nano-sites. There are currently more than 300 sites in our portfolio with more growth expected to meet market needs, with a current split of 80% MCPs and 20% SSTs.

We operate across Indonesia, especially in Sumatra, Java, Kalimantan, Bali and Sulawesi. We plan to expand to west and East Nusa Tenggara in near terms while eyeing opportunities in the rest of the country.

For context, Alfamart currently has more than 10,000 locations countrywide which gives PEKAPE plenty of room to grow!

TowerXchange: And what does a typical site setup look like for PEKAPE?

**Yusron Hakim, Chief Technical Officer, PEKAPE:** At PEKAPE we deploy, operate and maintain a variety of site typologies including SSTs, monopoles and pico sites.
Our sites’ dimensions vary depending on the available space and needs. A 32m high tower will require a 10x10m ground space whereas a microcell pole (MCP) we deploy at Alfamart stores will need a 1.5x4m ground space.

The sites are connected to power via PLN, the State-owned electricity company. We are responsible for backup power and typically use mobile diesel generators. Our nano-sites however, are connected to the stores due to minimal power consumption at four Amps. Power is either charged as a pass-through or at a fixed price.

In terms of transmission, MNOs use and provide either microwave or fibre optic since Alfamart stores don’t have fibre available.

**TowerXchange: How would you summarise PEKAPE’s competitive advantage?**

**Gilang Pramono Seto, CEO, PEKAPE:** As a result of our partnership with Alfamart, we are uniquely positioned to offer solutions for MNOs to increase coverage, infill and capacity, with faster deployments and competitive pricing.

**TowerXchange: And what about your plans for future business growth and expansion?**

**Gilang Pramono Seto, CEO, PEKAPE:** Our future plans include the deployment of plenty of new locations in order to support our clients’ network rollout needs across Indonesia. And we are working to provide fibre optic cable to support their transmission requirements.

Indonesia is a market that presents great expansion opportunities for tower providers since MNOs are still deploying quite heavily and need our services to either expand coverage or enhance capacity.

PEKAPE is here to serve its clients and partner with them in their growth plans!

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**About Alfamart**

Alfamart’s history started in 1989 by Djoko Susanto and family. Founded under the name of PT Sumber Alfaria Trijaya Tbk (the Company), it began the business in trading and distribution to then enter the retail sector in 1999.

In 2002 the Company started an exponential expansion thanks to the acquisition of 141 Alfa Minimart stores which also led to a rebranding and the current Alfamart name.

Alfamart is currently one of Indonesia’s leading retailers, serving more than 3mn customers daily, with approximately 10,300 stores across the country. With more than 70,000 employees, Alfamart is one of the largest employers in Indonesia.

Source: http://corporate.alfamartku.com/
JTOWER acquires largest Vietnamese in-building solution portfolio for US$10.2mn

Japanese in-building solution (IBS) firm expands outside local market backed by banks and private equity firm

JTOWER

While infrastructure sharing is not common in Japan, one firm has found a niche to serve leading MNOs NTT DOCOMO, KDDI and Softbank. Five-years old JTOWER specialises in providing in-building sharing solutions in Japan, with presence across the country in various shopping malls and commercial buildings of all sizes. With strong backing and support by financial institutions and funds, the firm made its first acquisition in the summer of 2017, expanding its network overseas to Vietnam. JTOWER is looking to apply its high-quality service and proprietary technology to advance the IBS market and telecommunications infrastructure in Vietnam.


Read this article to learn:
- Brief overview of the Japanese telecom infrastructure market
- How JTOWER financed its start-up and growth to-date
- What JTOWER likes about the Vietnamese telecom market
- Details of the acquisition from VinaCapital

TowerXchange: Please introduce yourself, your role, and company.

Atsushi Tanaka, Founder and Representative Director, JTOWER Inc.: I am the founder of JTOWER Inc.

JTOWER is the sole provider of in-building telecom infrastructure sharing solutions in Japan. Our proprietary in-building Distributed Antenna System (DAS) is used in prominent establishments across Japan, including commercial complexes and office buildings by all three major mobile network operators (NTT DOCOMO, KDDI and Softbank). Our system is MIMO-ready active DAS and covers six bands used by the Japanese MNOs.

TowerXchange: What was the vision for JTOWER? How did the company come together and how was it funded?

Atsushi Tanaka, Founder and Representative Director, JTOWER Inc.: Prior to founding JTOWER in 2012, I was CFO of eAccess and its subsidiary, EMOBILE, (acquired by Softbank in 2013, and now Y!mobile) which I founded together with Dr. Semmoto and Eric Gan.

Since eAccess was a new comer to the telecom industry in Japan, not only we had to learn and adapt to the customs and tradition of the industry very quickly, but also challenge or even break them at times. It was during that time when I started to ponder on the lack of “infrastructure sharing” concept in the Japanese telecom industry.
When I founded JTOWER in 2012, I had a vision to make infrastructure sharing the norm in the industry. Initially, my idea was to try and build a tower sharing company (thus the name “JTOWER”), but soon I discovered there was a limited demand for tower sharing in Japan, so I switched to providing indoor DAS solutions, which was basically a non-existent market at the time.

With the concept of infrastructure sharing for the telecom industry, JTOWER got funding from Innovation Network Corporation of Japan (INCJ), a JPY300bn Japanese government fund under the Ministry of Economy, Trade and Industry with a total government guarantee of JPY1,800bn.

We are proud to have now been funded by the investment funds of the Development Bank of Japan, JA Mitsui Lease Ltd. (a major Japanese financial institution held by The Norinchukin Bank and Mitsui & Co. with total assets of JPY1,300 billion), as well as all three mega-banks in Japan (Mizuho Bank, Ltd., Sumitomo Mitsui Banking Corporation and the Bank of Tokyo-Mitsubishi UFJ, Ltd.).

TowerXchange: As we know, Japan does not currently have a tower market as assets remain in the hands of operators. How does JTOWER fit into the overall telecom ecosystem in Japan?

Atsushi Tanaka, Founder and Representative Director, JTOWER Inc.: Yes, that's correct. In Japan, the operators regard towers as strategic assets and infrastructure sharing is very limited. Before JTOWER came into the market, there was no DAS sharing either, except in underground subways where a public initiative was created to bring operators together to develop and use a common DAS.

One of the reasons for the lack of infrastructure sharing by the Japanese network operators is the high quality of service provided to end users. While it’s common for DAS solution providers in Asia to procure and install off-the-shelf equipment, we have developed a proprietary system to cater to the strict standards of all three major operators in Japan. We spent the first two to three years developing the system and getting it tested and approved by the operators. For this reason, the barrier to enter the market is quite high and we are proud to say that JTOWER is the sole provider of in-building telecom infrastructure sharing solutions in Japan.

TowerXchange: Can you share some details on your operations and network?

Atsushi Tanaka, Founder and Representative Director, JTOWER Inc.: We have installed our system and hold high tenancy at a number of landmark buildings by major Japanese developers.
and shopping malls across Japan, from Tokyo to Tokushima, Hokkaido, Aichi, and more. They range from two-floor up to 53-floor buildings, with total floor space from 7,000m² to 160,000m².

**TowerXchange: What is your business model?**

**Atsushi Tanaka, Founder and Representative Director, JTOWER Inc.:** We work with developers to install our DAS inside buildings and sign a long-term contract with operators for the infrastructure sharing service. Our MIMO-ready active DAS covers six bands used by the operators.

We are also responsible for monitoring and maintenance of our equipment after installation.

Contract terms vary and depend on several factors including location and building type.

As previously mentioned, Japanese MNOs have very high standards of service, so you’ll find a DAS installed in almost every building where there is demand for coverage. For this reason, one of JTOWER’s missions is to tap into new builds.

Right now, we see lots of opportunities here in Japan! The real estate market is very dynamic and there are plenty of new large developments going on for the 2020 Tokyo Olympics.

**TowerXchange: You were previously focused just on Japan and now expanding into Vietnam with your recent acquisition of the largest IBS portfolio in the country. Congratulations! Can you tell us more about this?**

**Atsushi Tanaka, Founder and Representative Director, JTOWER Inc.:** In addition to expanding our network across Japan, we decided to broaden our perspective and extend our reach to capture the growing demand outside of Japan. The opportunity in Vietnam presented itself to us at a very good time and with this new foothold in Southeast Asia, we want to explore opportunities and expand our business aggressively in the region.

On 31 July 2017, we completed the acquisition of the largest IBS company in Vietnam, Southern Star Telecommunication Equipment Joint Stock Company (SPN) through a special purpose company (VIBS Pte Ltd.) jointly established with Japan South East Asia Growth Fund L.P. (JSEAGF) and jointly funded and managed by Development Bank of Japan Inc. (DBJ) and Risa Partners Inc. (RISA).

This portfolio includes over 120 IBS.

Established in 2007, SPN is the largest IBS operator by coverage area and the largest market share in Vietnam, supported by its positive relationships with all three major MNOs, high quality services and expansive network with real estate developers. SPN has installed its equipment and services MNOs at a variety of buildings in Vietnam, including major high-rise office buildings, airport, hotels and commercial complexes.

**TowerXchange: What do you like about the Vietnamese market? How does it compare/contrast to your home market?**

**Atsushi Tanaka, Founder and Representative Director, JTOWER Inc.:** We saw Vietnam as a great candidate for the first country outside of Japan to establish our presence in because of its relatively large population and steady economic growth over the last few years. We acquired the largest IBS company in Vietnam, but the market is highly fragmented with a number of small players who don’t have enough scale to be efficient or profitable. So, we expect a continued steady growth of the real estate market and also see the existing IBS market as largely untapped in terms of consolidation in Vietnam.

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**The carve out of SEATH portfolio**

Southeast Asia Telecommunications Holdings Pte. Ltd. (SEATH) was 100% owned by Vietnam Infrastructure Limited (VNI), an investment vehicle established to target infrastructure-related investments within Vietnam’s emerging market; it is also listed on the AIM (Alternative Investment Market) of the London Stock Exchange. VinaCapital was the private equity firm managing the portfolio.

In January 2017 VinaCapital successfully divested its shares in SEATH (1,972 towers) to Malaysia-based OCK Group for US$50mn. The IBS component however was not included at the time. As a result of this sale to JTOWER, VinaCapital has now executed its divestment strategy, with plans to wind up the fund and delisting on the AIM.
TowerXchange: What does the future hold of JTOWER in terms of growth and possible expansions in other markets?

Atsushi Tanaka, Founder and Representative Director, JTOWER Inc.: We plan to grow the company in Vietnam both organically and inorganically. Naturally, we are looking at other markets in the region to explore opportunities to further expand our business. We are very excited about our first acquisition in Vietnam, and would love to find partners in the region and beyond to accelerate our plans for business expansion.

TowerXchange: Lastly, what other opportunities within the telecom infrastructure are you exploring?

Atsushi Tanaka, Founder and Representative Director, JTOWER Inc.: We are closely watching the infrastructure sharing trends in the industry and are keen and always open to new ideas to expand our business portfolio. Just last month, we made a joint announcement with Tokyo Electric, the largest electricity provider in Japan, on the launch of a new service called “SITE LOCATOR” where we provide a tool for Japanese network operators to locate and lease space on transmission towers and building rooftops for setting up their telecom equipment.
Omnix Malaysia targets 708 towers by 2020 to become top three in the country

Independent towerco’s ability to secure difficult sites a hit with operators

David Higate, Managing Director, Omnix: I am one of four directors/shareholders in the company. We also have a private Malaysian investment company who joined us in 2016. Omnix was established in 2011 as an independent towerco to meet the operator demand for mobile coverage in urban and suburban areas of peninsula Malaysia.

Omnix was awarded a government license in 2012 to develop and license space on towers in Malaysia. This license is called the NFP license (Network Facility Provider) and is mandatory for all operators and independent towercos.

In terms of my personal background, I was in the British military for 14 years and involved in worldwide tactical communications. Subsequently I joined AT&T and Alcatel-Lucent. I came to work in Malaysia in the 90s for one of the operators, through AT&T, but I’ve always been involved in communications in one form or other for over 25 years.

Our other director/shareholder Mark Foran who has a telecoms business in Ireland and myself established a contracting company in Kuala Lumpur in 2007. In 2011 we formed Omnix Sdn Bhd with Mohd Rohaizee, a Malaysian businessman who had been working in site acquisition for ten years, and Suresh Superamanium, a Malaysian engineer and businessman.
TowerXchange: Can you please tell us about your network portfolio.

David Higate, Managing Director, Omnix: Our network now consists of 112 structures that are completed and that have operator equipment deployed. This number is increasing by three to six towers per month. These are predominantly greenfield sites and we only have a small number of rooftops. In all honesty, we do not really target rooftops. In Malaysia as in Europe, local authorities do not promote rooftops sites that disrupt the urban landscape.

All our structures are camouflaged and resemble minarets or sign boards. Our sites are minarets first, telecom towers second. All our steelwork and equipment is inside a fibreglass shroud or minaret. We are completely focused on these types of sites right now and have developed a number of designs.

In terms of location, we try to focus on areas of the country that are very hard to penetrate due to different local authorities and other permit hurdles. We have structures installed from Kedah which borders Thailand in the north, including Penang, all the way down to Johor which borders Singapore in the south.

The central area where we are in Kuala Lumpur is well covered, so now the operators are focusing on covering as much of the country as they can due to the conditions of their licenses. We're now working mainly in five different Malaysian states, and other states outside of Kuala Lumpur.

The main reason we differ from our competitors is that the operators tend to come to us with sites that are very difficult to acquire, those high demand sites they or other NFP holders simply can’t acquire. When we started off we focused on building up a land bank before we started building the structures, which we achieved through government and private site ground tenancy agreements with the Islamic Council in Malaysia.

As soon as we had a portfolio of land ready to go, we approached mobile network operators. That’s why our tower construction numbers were small for the first 18 months, but after that period of intense acquisition, we moved forward at a very fast pace.

This is quite a unique selling point for us since our customers may have had towercos trying to acquire land for them in the past, but a single site process can take up to a year. In many cases we were able to acquire sites in under one month, which is a major achievement and got us a lot of traction with the operators!

TowerXchange: Can you tell us a little about the clients you currently work with and any details you are able to share on the arrangements?

David Higate, Managing Director, Omnix: Malaysia has five main operators: Celcom, Maxis, DiGi, U Mobile, and webe, who is the newest addition and originally a WiMAX provider. We are currently working with all operators but U Mobile was our first customer.

We’re slowly building up our portfolio. U Mobile and webe are currently the most aggressive because they are relatively new. Maxis, Celcom, and DiGi have been building their networks for many years. That said, there are still a lot of infill sites required by LTE networks in the future.

Currently we have two master license agreements, and expecting a third very shortly. We have a 90-day SLA to complete sites, from acquisition to build completion, which we achieve in the majority of cases.
TowerXchange: What type of towers are you working with generally?

David Higate, Managing Director, Omnix: Since we are building mainly urban sites, we concentrate on monopoles. Our structures may be covered in fibreglass or have a signage at high level, but they are all essentially monopoles.

Our structures are no more than 30m high, which is attractive to the operators in urban areas because most of our competitors use lower monopoles (15-20m). We also tend not to do lightweight structures as we want to ensure a minimum capacity for three operators.

TowerXchange: And what is the typical set up on your site?

David Higate, Managing Director, Omnix: The footprint area is 5mx5m minimum, so quite compact. We can fit three operators as long they comply with the terms of the licence and only use the allocated space, which is only suitable for a standard outdoor cabinet.

Each site is fully fenced off and then each operator’s base transceiver station (BTS) will have a security cage installed. Security is extremely important to Omnix as many of our sites are on public land or school sites.

TowerXchange: Given that, what is the typical capex outlay required to build a greenfield GBT? And a rooftop?

David Higate, Managing Director, Omnix: For greenfield sites, it’s between US$45,000 to US$55,000 per site. We don’t have many rooftops, but they are normally around US$15,000 to US$20,000 depending on access.

Those figures are likely higher than our competitors since the fibreglass and radio-friendly materials we utilise are expensive, but we have to ensure that our structures are unobtrusive and fit as much as possible into the streetscape.

TowerXchange: How would you describe the macro environment in Malaysia for a towerco? What are some of the challenges vs opportunities?

David Higate, Managing Director, Omnix: The two big operators in Malaysia are Celcom and Maxis, all of our individual rental agreements with the operators are either 7+8 years or 10+5 years. However, it is rare for an operator to vacate the site after the initial period.

We pay a ground rent, whether to a government body or the Islamic Council on a monthly basis. We also do a lot of corporate social responsibility (CSR) activities such as providing technology to schools whereby we offer free wireless connectivity plus a fixed monthly ground rent contribution to the school. This community engagement allows us to demonstrate the benefits of connectivity and mitigate resistance to a tower being located in their area.

In terms of the ground rental agreements, we have up to 15-year land rental agreements with the Islamic Council. However with the government land, you typically won’t get longer than a three to five year agreement.

Again, the structures are fairly new, with 25-year guarantees from our manufacturers and are constructed to the highest international standard which in turn means lower preventative maintenance costs going forward.

TowerXchange: Can you tell us more about your ground rental agreements and opex arrangement?

David Higate, Managing Director, Omnix: None of our structures is actually older than three years.

Omnix specialises in identifying and securing VVIP sites which are in high demand by operators. We do this by hard work on the ground and utilising our site agreements with both private and public bodies.
with over 8,000 cell sites each. All operators are investing to improve and achieve overall geographic footprint and penetration. This gives the independent towercos a chance to grow their portfolios outside the main urban areas. In addition to this coverage rollout, they are rolling out 4G which again creates additional demand for sites. From our perspective, the biggest challenge is securing sites in high demand areas.

**TowerXchange:** And what about from a regulatory perspective? You mentioned towercos need a license to operate.

**David Higate, Managing Director, Omnix:** There are approximately 100 network facility provider (NFP) licenses issued, however, only 10% of the companies actually use them. As I mentioned previously, securing the sites is the major challenge.

MCMC (Malaysian Communications and Multimedia Commission) monitors all of the telecommunications operators and towercos in Malaysia. It took us nearly two years to be awarded an NFP license. The licence specifies how many structures you need to build in different geographic areas. MCMC has the power to withdraw the licence if site numbers are not achieved.

Each time Omnix wants to proceed with a tower, we have to go through MCMC to get an authorisation. They can occasionally visit the site to ensure compliance and perform a study on the radiation potential before you can proceed.

According to the MCMC website, as of 30 September 2016, they have 2,367 sites as part of the mobile broadband coverage expansion.

These initiatives are funded by mobile network operators and towercos who pay a percentage of profits to MCMC, which uses them to fund various coverage projects in less developed areas.

Mobile network operators are essentially subsidised to offer coverage in those areas which might not be very profitable, but are often imposed as part of their license’s terms.

**TowerXchange:** So is population coverage approaching 100% or are there more towers to be built to achieve full coverage?

**David Higate, Managing Director, Omnix:** There are 29mn people in Malaysia but each operator has varying levels of geographic coverage. The country has one of the highest rates of devices in the world at about 1.4 devices per person.

**TowerXchange:** What are the growth opportunities for Omnix and how might that be financed?

**David Higate, Managing Director, Omnix:** At the moment we are developing a business plan up to...
2020 which involves the development of a further 650 sites. Most of these sites will be on government owned property. We are confident of operator demand over the next four years particularly in the state of Johor in southern Malaysia.

This means our focus is and will be on Malaysia and there are no plans to expand the business outside the country.

To date we have secured funding from shareholders, commercial banks, and private investors. We will be seeking a strategic partnership moving forward to help us achieve our 2017-2020 targets. The expected capex over the next four years is estimated at 120-140mn ringgit (US$27-31mn) so funding is a vital component of our strategic plan.

In general Malaysia welcomes foreign investment so we would not be restricted in terms of where we can secure funding.

TowerXchange: Are you engaging with the microcell, DAS, IBS, and small cell markets?

David Higate, Managing Director, Omnix: No, not at this stage. We’ve been approached for small cell projects but there are a lot of players in this market in Malaysia and rental rates are comparatively low.

TowerXchange: Is energy equipment typically bought under traditional capex models, or are opex models being explored?

David Higate, Managing Director, Omnix: No, not at this stage. As mains power is available to all sites, alternative energy options are not being offered or explored. In some cases we provide the power to multiple operators on a site and charge accordingly as a VO (variation order).

We also provide fibre optic cable access to all the sites and it’s up to the operators if they want to use this service as a transmission solution. Typically we are paid an additional fixed monthly fee known as ROW (right-of-way) for this.

TowerXchange: Are remote monitoring and access control systems typically deployed on your sites?

David Higate, Managing Director, Omnix: The majority of our sites are within third-party secured areas such as mosques or schools. Many of these sites have 24-hour manned security. As part of our 2017-2020 strategy we will roll out an automated lock system to control operator access to Omnix sites.

TowerXchange: To sum up, what would you describe as Omnix’s unique selling proposition?

David Higate, Managing Director, Omnix: I think the work we do on the ground in terms of securing sites will pay dividends in increasing our site numbers over the next four years. We already have an extensive land bank which we are working our way through with all five operators. By the end of this year we hope to have a minimum of 220 tower with tenancy ratio of 1.5.

Malaysian government tower network part of initiative for digital economy

Universal Service Provision (USP) is an initiative by the Malaysian Communications and Multimedia Commission to achieve the following objectives:

1. Provide collective and individual access to communications in underserved areas and to underserved groups
2. Encourage the use of ICT to build a knowledge-based society
3. Contribute towards the socio-economic development of local communities
4. Bridge the digital divide

To realise these goals, several initiatives have been implemented in various stages since 2002, and to-date we are currently initiated 10 initiatives nationwide.

These are:
- 1Malaysia Internet Centre (P|1M)
- Community WiFi (WK)
- Cellular Coverage Expansion – Time 3 & Time 3 Extension
- Mobile Broadband Coverage – 3G & LTE
- Rural Broadband (RBB)
- Suburban Broadband (SUBB)
- Fiber Optic Network Expansion
- 1Malaysia People’s Cable System (SKR1M)
- Smart Device with Internet Package
- Telephony

Source: www.skmm.gov.my
Subhash Deven, Chief Operating Officer, Naza Communications: I have held various positions within the Naza Group for the last seven years. For the past five years I have been mainly focusing my efforts within the group on strategy and organisational development. As a group, we had earlier embarked on the idea of penetrating the telecommunications market. I had worked on the idea since its inception and as such I took the leadership role when Naza Communications was established.

Within Naza Communications my main focus is developing a world-class organisation with internal capabilities in our key focus areas. We are extremely driven by creating value and want to differentiate ourselves as a market leader.

We have been in the industry for under three years, specialising in providing integrated telecommunications infrastructure services to some of Malaysia's leading telco companies.

Naza Communications is licensed under Malaysia's Communications and Multimedia Act 1998.

TowerXchange: How does Naza Communications fit into the existing telecommunications ecosystem in Malaysia?

Subhash Deven, Chief Operating Officer, Naza Communications: We are growing fast to be
a leading integrated telecommunications infrastructure service provider in the country, working closely with the government and telco providers. A large number of our competitors have been in the market for around 15 years, and we are honoured to be servicing the industry alongside them. We have a lot to learn from them, however we see ourselves addressing markets needs from a different capacity.

We see our position as more of an holistic provider then a pure site-based asset provider. We have been exploring and creating a diverse range of products, from infrastructure build to RAN sharing. Naza Communications is moving away from the traditional mould of a towerco and we see ourselves reinventing the industry. The telco industry is ever-changing and with this change comes new challenges and hurdles.

We have noticed that the current market is heavily focused towards standard passive infrastructure leasing. We believe that this segment of the industry has already peaked and we expect little growth from this segment. Naza Communications is concentrating its efforts and heavily investing in what we believe will be the next generation of telecommunications network infrastructure.

We are investing heavily in RAN sharing solutions, and upgrading our capability to be able to address the market. That being said, we are also aware of the technology limitations and will need to wait for the market to be ready before we can present our solutions. We have noticed a number of players before us who failed, primarily because of an incomplete solutions offering, as well as network operators who were not ready to embark on such engagements.

We have also set our sights on providing telecommunications infrastructure to non-traditional wireless clients. We believe we are the first provider to start offering an enterprise solution. Telecommunications technology is becoming more open, and the industry will start seeing the participation of non-network operators emerging as service providers for their own individual or group needs. We are the pioneers in
this and have already secured a sizeable number of enterprise clients who want to embark on providing their own networks for internal usage.

It is an interesting time, and our stance is that conventional tower leasing is just a precursor into Naza Communications’ actual plans for the industry. We are in progress to be one of the most unconventional, disruptive providers in this segment and are excited on the possibilities which we see in our horizon.

TowerXchange: Many towercos see RAN sharing as a threat, not as an opportunity. How will Naza Communications be able to adapt the business model to create a win-win scenario?

Subhash Deven, Chief Operating Officer, Naza Communications: Inevitably RAN sharing will result in towercos loosing revenue. So will network virtualisation, reduction of equipment size and a whole host of other factors which will contribute to a decline in revenue. That being said, we plan to aggressively move into the RAN sharing space and turn this threat into an asset. We have developed an innovative business model which allows the operators to reduce their operational costs whilst not hitting our bottom line.

TowerXchange: That sounds very interesting. So what is included in your current network then?

Subhash Deven, Chief Operating Officer, Naza Communications: We own approximately 350 structures in different parts of the country which is a mix of passive and active assets for a large number of telco and non-telco clients. Out of that, we have close to 300 cell sites, which is a combination of towers and micro cell sites.

Our coverage is nationwide, with roughly 85% of the sites in urban areas.

We do have a small number of small cell sites that are rolled out through the build to suit (BTS) model. Most Malaysian operators are fairly well connected in terms of 4G and are planning for the next wave of 5G. However, this is still in trials, so there are a lot of conversations right now around the best model for deployment. Cost will always be a factor, along with speed of deployment.

So we are involved with a wide range of solutions, including marco and micro towers, IBS, DAS, and small cells. At the end of the day, we are a telecoms infrastructure provider, as such our value offering is to provide to our customers with a wide range of engineering solutions. We have the expertise to design, build and manage any form of telecommunications infrastructure. We are also at present investing heavily in developing our in-house design capability.

TowerXchange: Have you made any acquisitions to date? In other words, how has your growth come about?

Subhash Deven, Chief Operating Officer, Naza Communications: Everything has been organic to date, through the establishment of close working relationships with government agencies, regulators, and operators. We do have an aggressive expansion plan. We are actively looking to increase our footprint outside Malaysia, however we are evermindful of the challenges that regional expansion presents and our internal strategies are crafted accordingly.

TowerXchange: What do you see as some of the main challenges in building a network/tower in Malaysia?

Subhash Deven, Chief Operating Officer, Naza Communications: I believe the challenges which we face in Malaysia are probably similar or better than some of the challenges network owners face abroad. Malaysia is generally an early adopter of technology, as such our policies and frameworks are relatively up to date. We have a close working relationship with the regulators and government agencies which provides us with better visibility on where things are and what is to come.

The standard challenges are still there, in terms of deployment speed, falling prices, increasing costs and so on. I would like to believe that this is business as usual.

On a personal level, the biggest challenge I feel would be to anticipate the strategic direction the entire telecommunications industry is taking, and specifically where networks are heading with more cloud based and virtualisation. I look at that as my priority in ensuring that our direction as a company is in line with where the industry is headed, which is not always an easy task as the industry is headed in multiple directions, sometimes in opposite directions, and all at the same time!
TowerXchange: What about some of the operational challenges?

Subhash Deven, Chief Operating Officer, Naza Communications: The key challenge we face is trying to bring down our operational costs. Opex is a key driver of site costs. We are actively trying to reduce this so that we can pass some of these savings across to our customers.

When it comes to power, the electricity network is very extensive in Malaysia. As such almost all sites eventually become on-grid with a small minority being powered by alternative sources.

TowerXchange: How would you describe the typical site design and typology for rural compared with urban sites in the country?

Subhash Deven, Chief Operating Officer, Naza Communications: Urban sites in Malaysia are mainly capacity-driven as such we see a lot of smaller, more compact structures being in demand. That being said, we also see that the massive towers in rural areas are also not preferred with customers opting for more medium-sized structures.

TowerXchange: Are you involved with fibre?

Subhash Deven, Chief Operating Officer, Naza Communications: The MNOs and fixed line operators play a major role here. However, the main challenge for urban sites is getting the last mile in, whereby the right of way is always a challenge. We have customized solutions for this.

TowerXchange: How would you describe the current MNO/telecom landscape right now in Malaysia? What have been some key developments for the year and what's to come?

Subhash Deven, Chief Operating Officer, Naza Communications: The market will be exciting, it always has been, with new technologies and service offerings happening every four to five years. This will carry on for at least the foreseeable near future. In the closest horizon is the implementation of 5G which a lot of parties are currently evaluating at the trial stage.

There is also a lot of movement for the application side which we see is really driving not only usage but also a demand for good coverage.

TowerXchange: Lastly, Naza Communications signed a Memorandum of Understanding (MoU) with a group of partners for what is being referred to as the NURI Programme. Can you tell us more about that?

Subhash Deven, Chief Operating Officer, Naza Communications: The NURI Programme is a rural empowerment initiative, in line with Naza Corporation Holdings’ leadership role in accordance with the 11th Malaysia Plan for industry champions to share the responsibility in spearheading the nation’s growth and transformation.

The programme aims to cultivate one of the six strategic thrusts of *RMK11 (Rancangan Malaysia Kesebelas, Eleventh Malaysia Plan 2016-2020) which is “Accelerating Human Capital Development for an Advanced Nation.” Most importantly, we want to play a pivotal role in being the first towerco to raise Internet literacy, income and opportunities of selected rural communities by enabling them to participate in the mobile economy.

Through our various partners, Malaysian app developers Car Bengkel, Ezyhaul, Living Space, My Homestay Malaysia and the Telecommunications Engineering College (TEC), we will deliver workshops, training sessions, informal engagements, and so on.

At present around 200 villages have been identified mainly in the Northern and Eastern regions of Peninsula Malaysia and East Malaysia. The programme will be rolled out in three phases across a 36-month plan.
edotco expands footprint in Pakistan with two acquisitions totaling 13,700 towers at US$1.0289bn

Addition of Towershare and Jazz assets makes it the world’s eighth largest towerco by sites

The summer of 2017 marked a significant milestone in Pakistan’s tower market, with edotco successfully executing on the country’s first landmark sale and leaseback (SLB), acquiring Deodar, market-leading MNO Jazz’s carveout towerco. This portfolio of 13,000 towers, along with an earlier acquisition of Towershare’s 700 towers means edotco will now own ~40% of the towers in the country. As Asia’s largest (and fastest growing) multi-country tower and infrastructure company, edotco is optimistic on the growth potential of the Pakistani market and will be scaling its operations accordingly to serve its customers with end-to-end and customised offerings.


Read this article to learn:
- Why edotco re-invested in Pakistan
- What we know about the Towershare and Jazz portfolios edotco is buying
- Parallel infrastructure: decommissioning versus infill
- Power and people: operational realities in Pakistan

TowerXchange: Congratulations Suresh on your announced acquisitions of Towershare’s subsidiary Tanzanite Tower in Pakistan as well as assets from Pakistan Mobile Communications Limited (PMCL). How did edotco get started in this market and what attracted you to it?

Suresh Sidhu, CEO, edotco Group: We have been in business development activities for several years in Pakistan. We see excellent opportunities in the country for an independent towerco like us.

As a country with a relatively low mobile penetration rate at ~73% and data penetration rate ~24%, the opportunity for long-term growth in the mobile and data sphere is substantial.

Pakistan has a mature and clear regulatory and licensing framework for towers and telecom infrastructure even though the market is still at early stages of development. In addition, we see a thriving mobile market with four MNOs backed by international shareholders who have committed to investing into the country, presenting us with the opportunity to enable their growth further. The concept of infrastructure sharing is picking up in Pakistan and we believe we can play a key role in this transformation.

TowerXchange: Can you share some details on the 700 towers you are acquiring from Towershare?

Suresh Sidhu, CEO, edotco Group: The Towershare portfolio has a colocation ratio of 1.6x and consists...
of over 70% urban with 40% being ground based towers.

The portfolio was built largely from acquisitions, with the majority of towers coming from previous WiTribe assets (post acquisition, Towershare leased back these towers to WiTribe). Tanzanite has all key MNOs and WLL players as tenants on these towers, with Ufone being our largest customer after WiTribe.

TowerXchange: And similarly, what can you tell us about the PMCL portfolio, of just over 13,000 towers.

Suresh Sidhu, CEO, edotco Group: PMCL, which operates under the brand name Jazz owns a unique tower portfolio established over its 20+ years of operations in Pakistan. It is a balanced portfolio in terms of the urban-rural mix, and mainly tracks with the population concentration of Pakistan along the Indus valley with greater concentration of sites in the Central region, followed by the South and Baluchistan and KPK and North regions.

About 80% of the Jazz towers are ground-based as opposed to rooftop structures. Of these, a large majority are ready for colocation (hosting additional tenants) without any further strengthening capex required.

The current tenancy ratio of ~1.3x on this portfolio means edotco has potential to further collocate these towers with all MNO/WLL operators in Pakistan who need to achieve greater coverage/capacity targets.

All key MNOs and WLL players in the market have customer contracts with Jazz for sharing on their towers.

TowerXchange: With the Tanzanite transaction, it was 100% edotco, while the latter included a local partner Dawood Hercules Corporation Limited (DH Corp) who will own 45% equity. Can you share some of the thoughts behind these two approaches? What does DH Corp bring to the table in addition to the financials?

Suresh Sidhu, CEO, edotco Group: Having the right local partner in our markets is an important strategy that edotco is always open to. On the Deodar deal specifically, having Dawood Hercules as our local partner was a major advantage from an operational and strategic point of view. The key terms of this engagement with Dawood Hercules allow full control and consolidation of assets of interest to edotco.

To be clear, Dawood Hercules is entering as a 45% shareholder of the combined portfolio. When we did Tanzanite, we needed an entry into a reasonably-sized asset in Pakistan and in the interest of time we felt that we should acquire that asset first on our own.

Dawood Hercules is a highly reputed listed Pakistani holding company conglomerate. To date, Dawood Hercules has established successful investment collaborations with IFC, GE, Mitsubishi and the World Bank. They are financially strong and well-integrated in the country and we believe will be an excellent partner in this business venture.

TowerXchange: And to clarify, this is a sale and leaseback with PMCL? What are the proposed arrangements moving forward with PMCL/Jazz as a tenant?

Suresh Sidhu, CEO, edotco Group: Yes, this is a sale and leaseback transaction, and key terms of edotco’s long-term contract with Jazz are standard for such transactions and are benchmarked against international standards. Jazz will become edotco’s primary anchor tenant for this portfolio of assets.

TowerXchange: What does the current landscape look like in Pakistan now in terms of tower asset ownership by Ufone, Telenor, and Zong and their potential interests to divest?

Suresh Sidhu, CEO, edotco Group: In its annual report for 2014-15, the Pakistan Telecommunications Authority (PTA) reported the total tower count stood around ~40,000 for the period.

Telenor, Zong and Ufone each own and operate portfolios sized between 5,000 – 10,000 towers. Currently, Pakistan has a mobile and data penetration of around 73% and 24% respectively which provides a significant opportunity for further organic growth.

With the introduction of 4G in the market and the need to deploy efficiently in the market for the MNOs, there are many positives for towercos.
We think scale and scope of services are the key determinants of future success in this industry. The next few years will see an increased focus on optimising operational efficiencies and adapting to respond to ever-changing technology and exploding data consumption needs.

Given the need to invest in the core network, it is likely that the MNOs will look to monetise their passive infrastructure over time to remain competitive.

TowerXchange: As edotco continues its operations in Pakistan, what is some of your current thinking around network overlap and potential decommissioning? Also the contrast between parallel infrastructure in urban vs. suburban, and also the need for network extensions and rural coverage?

Suresh Sidhu, CEO, edotco Group: Currently, Pakistan has approximately 40,000 towers in operations. Many of these towers are underutilised with the vast majority of the towers having low tenancy ratios and urban overlaps as much as 50-60%. Given this situation and an increased focus by operators on the reduction in operational expense, site consolidation is a major industry discussion point. For a towerco, this can be a key driver for establishing a higher colocation ratio for Pakistan. Having said that, consolidating large portfolios (in the magnitude of thousands) is an exercise that needs careful planning and execution. Consolidation typically guarantees total operating costs to go down and the benefits to be shared among all parties involved.

As for suburban and rural coverage, we believe the network overlap is not significant enough yet to consolidate in scale.

Achieving geographical mobile coverage in rural areas has been a challenge with Pakistan being a large country. The country is now starting to push mobile coverage to underserved areas through USF grants and this again is an opportunity well-suited for a towerco, where capex outlay predicated on expected multi-tenancy fits very well with our business model.

TowerXchange: To clarify, what is the current prevailing towerco business model in Pakistan – grass and steel or tower+power or mix?

Suresh Sidhu, CEO, edotco Group: In the absence of substantial independent towercos to date, the prevalent business model for tower sharing in Pakistan has been mainly through inter-operator sharing on either commercial and/or barter agreements.

edotco has an end-to-end spectrum of service offerings in most of its markets, and we have seen different customers opting for customised asks. Our primary service offering will be the tower+power model. Through this model, our customers will be able to lease tower and ground space together with DC energy solutions.
Given the energy challenges of the country, we believe our customers are likely to adopt more complete service offerings, which will give them the most competitive total cost of ownership (TCO) rates as well as the highest up-time SLA.

**TowerXchange: Could you help shed some light on the operational realities in Pakistan?**

**Suresh Sidhu, CEO, edotco Group:** Currently, less than 5% of the edotco sites are off-grid. The quality and consistency of power in Pakistan has improved significantly in the past few years due to enhancement in power generation and investments to improve the grid. We expect further improvements in the coming years as many additional large power generation projects come online that will substantially add capacity to the grid.

Other geographical challenges like the terrain and weather have become part and parcel of operations, and while Pakistan will have its unique conditions, we have experience from other markets to draw upon. Ultimately, we believe we have the patience and resilience to overcome these obstacles.

**TowerXchange: Lastly, what will this mean in terms of your local team presence and strategy to grow manpower?**

**Suresh Sidhu, CEO, edotco Group:** Our current Pakistan operations are headquartered out of Islamabad and now post Tanzanite we have further offices in Karachi, Lahore and Peshawar bringing our full set of solutions and services closer to a wider range of customers.

Since we established in Pakistan we have been engaging mostly in business development activities with a small number of key executives based in Pakistan while leveraging on the expertise available at the Group. The completion of Tanzanite extended our resources and skill in terms of people considerably.

With the completion of Deodar, we will need to further develop our talent and believe the knowledge sharing opportunities between our new employees and our employees across the region will be a key element to developing a competent team. Human capital and talent are abundant in Pakistan and we believe the combination of the new team on the ground, experts from Jazz, the industry and our global talent available at edotco will result in a team that is able to continue providing quality services to our clients in a timely manner and meet the evolving market demands.

**edotco is the Diamond sponsor of the 4th annual TowerXchange Meetup Asia, taking place 12-13 December, 2017 in Singapore at the Marina Bay Sands. It will also be hosting an exclusive pre-conference vendor briefing, available by invite only. Contact us today to learn more or visit our website at**

www.towerxchange.com/meetup/meetup-asia/
edotco advocates a light touch regulatory regime

The regulatory conditions that promote or inhibit international investment in innovative towercos

Edotco advocates a light touch regulatory regime

The regulatory conditions that promote or inhibit international investment in innovative towercos

As a companion piece to our report on the inaugural TowerXchange and IFC Telecom Tower Regulatory conference, TowerXchange interviewed Rema Devi Nair, Regulatory Advisor to the CEO at Asia’s leading multi-country infrastructure provider, edotco. Rema Devi Nair has been active in the regulatory sphere for more than 20 years, having played a variety of roles including that of regulator, as well as headed regulatory management in a regional capacity at Axiata Group and prior to that at TM International.

Keywords: Bankability, edotco, Infrastructure Sharing, Insights, Investment, Lawyers & Advisors, Lease Rates, Leasing & Permitting, Multi-Region, Network Rollout, Regulation, Towercos

Read this article to learn:
- The regulatory policies that incentivise (and disincentivise) towerco investment
- How regulators can facilitate and accelerate rollout of telecoms infrastructure
- Why regulators should intervene in lease pricing only to prevent market failure
- The merits of a lightly regulated licensing regime
- How towercos can accelerate rural connectivity initiatives

TowerXchange: In terms of attracting international investment, innovation and expertise from towercos, what would you advocate be the guiding principles of infrastructure sharing policy and towerco licensing by regulators and other government stakeholders?

Rema Devi Nair, Regulatory Advisor to the CEO, edotco Group: Globally, the economic benefits of infrastructure sharing are well recognised by regulators and these include:

(i) optimisation of scarce resources such as land and roof space
(ii) optimisation of investment between sharing operators
(iii) ability to focus investment in technology and service innovation.

It is widely held that these benefits are best realised if infrastructure sharing policy adopts the following key principles: is actively encouraged (not mandated), is based on commercial arrangements between operators, and is offered on a non-discriminatory basis. Based on these key principles, edotco believes that all forms of infrastructure sharing should be encouraged in order to achieve greater network cost advantages.

The benefits of infrastructure sharing can be further maximised if regulators are open to the licensing of independent towercos. Towercos provide extensive benefits and indeed countries...
that have established independent tower companies generally enjoy higher levels of sharing as reflected through higher tenancy ratios. We at edotco advocate that towerco licensing should be kept simple and in keeping with global best practice, should be non-exclusive, offered nationwide, focus on passive elements and eligible to well-qualified players.

**TowerXchange: From a regulatory perspective, what attracts a company like edotco to invest in a new international tower market?**

**Rema Devi Nair, Regulatory Advisor to the CEO, edotco Group:** Business imperatives aside, new market entry is made attractive by at least three key regulatory factors: the first is the market’s commitment to broadband policy and targets, especially a bold pro-infrastructure policy position. Secondly, we seek a stable regulatory environment with a clear authorisation framework for independent towercos, and lastly a liberal FDI (Foreign Direct Investment) framework. The last point, in particular, is critical in the early stages of investment when the presence of large foreign-owned towercos bring much needed experience and economies of scale.

**TowerXchange: And on the other hand, what regulatory policies represent a significant disincentive to investment? Are there any outright deal-breakers that render a country’s tower market un-investible?**

**Rema Devi Nair, Regulatory Advisor to the CEO, edotco Group:** Typically, the following points tend to disincentivise investment:

- Lack of clarity of the regulatory framework or dated legislation that fails to accommodate innovation and new services
- BOT-type (Build Operate Transfer) arrangements that demand that assets revert to government
- Lack of a holistic, incentive-based framework for FDI
- Prohibitive regulatory fee burden including untenable taxation levels

Certainly protectionist, anti-investment approaches tend to raise red flags. We however believe in working alongside governments to adopt pro-investment regulatory regimes that benefit the nation.

**TowerXchange: How can central and local government authorities best facilitate the accelerated roll out of new telecom infrastructure, whether it be green field towers, rooftop towers, micro sites or even small cells?**

**Rema Devi Nair, Regulatory Advisor to the CEO, edotco Group:** Increasingly we note that co-investment strategies between central and local government authorities or utilities becoming essential, particularly in emerging markets facing rapid new infrastructure rollout. In this regard, we feel there are lessons to be drawn from more developed countries, where the creation of an optimal utility deployment coordination framework that meets the dual objectives of efficiency and aesthetics has occurred. Some specific examples include the multi-user infrastructure corridor approach adopted in Canada, Singapore and Australia.

Other areas for coordination include enhanced rights of way access, adoption of communications code for low impact facilities, establishment of one-stop centres and “dig once” policies.

**TowerXchange: Should regulators have any involvement in the pricing of tower builds and tower leases?**

**Rema Devi Nair, Regulatory Advisor to the CEO, edotco Group:** We support the principle that regulators should intervene only if there are competition concerns or if there is imminent market failure.

In the case of towers, regulators are more concerned about access to towers and the terms and conditions of such access. If there are no competition concerns, edotco feels that regulators should not regulate pricing, which should be left to be commercially determined between access seekers and access providers.

**TowerXchange: Should towercos be licensed?**

**Rema Devi Nair, Regulatory Advisor to the CEO, edotco Group:** Given the capital-intensive nature of the towerco business, the granting of a licence provides certainty as to the rights and obligations of potential market players, as well as future
Proofs their business. This is a critical message that governments put out to potential investors. From a regulator’s perspective, licensing sets a regulatory code that defines the terms and conditions under which players operate. It also sets the terms of market entry and behaviour, whilst ensuring that regulations are adhered to in the public interest.

Against this background, we at edotco support a lightly regulated licensing regime that meets clear policy objectives (e.g. increase infrastructure sharing), which supports the development of new services whilst not adding undue administrative load in the process. We feel that the right license model supported by strong, well-capitalised licensees builds sustainable market structures.

**TowerXchange: How can towercos help accelerate rural connectivity initiatives? And should towercos contribute to and/or be able to access universal service funds?**

**Rema Devi Nair, Regulatory Advisor to the CEO, edotco Group:** As specialist infrastructure players, towercos are well placed to help accelerate rural connectivity, being able to almost instantly provide crucial infrastructure sharing and co-location. This ability to provide access to multiple operators with speed is central to expanding rural mobile coverage, through the provision of an essential access service. Towercos also bring efficiency to rural operations by allowing operators to outsource attendant services such as maintenance, security, monitoring, surveying and land acquisition.

Accordingly, as with all licensees, towercos should be able to avail themselves of universal service funds to accelerate rural connectivity, depending on the funding mechanism adopted. Universal service approaches should be as simple as possible while providing the best incentive for towercos to expand their network and services.

**TowerXchange: How should regulators think about ‘futureproofing’ the regulation and licensing of towercos against the future evolution of the business model, and the evolution of site typologies?**

**Rema Devi Nair, Regulatory Advisor to the CEO, edotco Group:** The current towercos business model is on the verge of major changes that will witness the transformation of passive infrastructure and services to the active infra and services. Looking out over the next five years, this evolution may be represented by the emergence of alternative structures such as small cells, connectivity services (including Wi-Fi, IoT and mobile) and active O&M.

Regulators need to be aware of this evolution playing out, or risk regulations becoming redundant against technological and business realities. Future proofing regulations may demand:

(i) flexibility to extend offered facilities and services e.g. transmission capacity and / or dark fiber
(ii) enhancing infrastructure sharing through an open access model
(iii) permitting active sharing involving technically more complex sharing of radio access networks and antennas by operators
Exhibition preview

TowerXchange is not just about towercos and tower strategists. One of our top priorities is to provide a platform for proven passive infrastructure equipment and solutions providers to introduce themselves and their activities. From static asset manufacturers to RMS and turnkey solutions providers to hybrid energy solutions, these companies play a critical role in ensuring the operational efficiency and profitability of towercos and MNOs, and the safety of their employees.

In this section we gather interviews with the top service, solution and equipment manufacturers who will gather at the fourth TowerXchange Asia Meetup in Singapore this coming December.

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ABLOY: Helping MNOs and towercos to achieve operational excellence
Site security solutions for greater flexibility, transparency and efficiency

Securing telecoms sites has never been more important as they are increasingly considered a part of critical national infrastructure. Sabotage, internal theft, vandalism and changing shape of the infrastructure are challenges telecom tower owners face in today’s world. These challenges and their impact can be overcome by intelligent security solutions from ABLOY, one of the leading manufacturers of locks, locking systems and architectural hardware in the world.

Keywords: Abloy, Access Control, China, Fencing, India, Interview, MNOs, Operational Excellence, Opex Reduction, Outdoor Equipment, Regulation, Shelters, Singapore, Site Visits, Southeast Asia, Towerco, Urban vs Rural

Read this article to learn:
- ABLOY’s footprint and client base
- Market dynamics in Asia’s telecom industry
- Top security issues faced by MNOs and towercos
- Cutting-edge solutions for MNO and towerco operational excellence

TowerXchange: Please introduce your company, your footprint and how you fit into the telecoms infrastructure ecosystem in Asia.

Pauli Jormanainen, Regional Director, ABLOY: With 110 years of history, ABLOY is one of the leading manufacturers of complete high security solutions. ABLOY door and asset locking solutions are used extensively within high risk, high value markets as well as by infrastructure, government, and defence end users who demand the ultimate in high security.

ABLOY has a proven history of telecommunication business for decades. Along with the new technology in telecom business, ABLOY has introduced new methods and systems to create value and fast pay-back time to telecom customers. We provide a complete solution including hardware, project management, and managed services from installation to managing access rights.

ABLOY is active in all major Asian markets thanks to our own sales and support units in Singapore, India and China. Other countries have a wide network of well-trained distributors to look after the specific requirements of each customer.

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 the world across a variety of industries.

ABLOY has major MNO customers using its CLIQ technology in over a dozen countries and an installed base of more than 90,000 locking points utilising the CLIQ 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. We understand that all have their own unique security requirements and a demand for long serviceable life.

Our ABLOY CLIQ CONNECT is a revolutionary product and has been recognized worldwide with prizes such as the Golden Award in the Access Control category at the Merlion Awards in the Safety & Security Asia 2015 Exhibition and the Gold Medal in MTP Securex 2016 in Poznan, Poland.

**TowerXchange: As a global company, you serve clients worldwide. How would you characterise the Asian market compared to some of the others you are active in?**

Pauli Jormanainen, Regional Director, ABLOY: We have a deep understanding of the telecom industry and its dynamics in Asian region, thanks to our 30 years’ experience in Asia. Operations in the telecommunication infrastructure are very much similar everywhere, naturally with its own flavors in each market/country.

In Asia manpower is still quite affordable and operators and towercos handle many of the processes which are outsourced to different partners in many other regions. Fast growth of telecommunication infrastructure, strong competition between the operators, mergers, new technologies and changing requirements are putting telcos to quite demanding position also in Asia.

In many countries in Asia also, MNOs own their towers and are not sharing them with others. This is one of the reasons tower counts are high and new towers continue to be built as MNOs extend their coverage. On the other hand, in the countries where towercos exist, you see a mixture of state-backed entities with strong positioning in the market alongside independents. So there are varied and interesting market dynamics in the region.

**TowerXchange: What are some of the top security challenges faced by MNOs and towercos in Asia? And how can you help?**

Pauli Jormanainen, Regional Director, ABLOY: According to our customers, the main security challenges for them are the unauthorized access to sites, high running costs, theft (be it materials or information and perpetrated by external or internal parties) and vandalism.

Lost keys are rarely reported and the percentage of returned keys is often smaller than unreturned. Also, with current mechanical locking systems, the patent can be already expired and the number of keys out in the field is unknown. MNOs and towercos are thus experiencing sizable costs when rekeying or replacing locks and losses with stolen equipment and wiring.

Carriers also need to be prepared for possible outages, which in turn can damage their reputation and bring substantial financial consequences.

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 unauthorized 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: What would you say has driven the shift from “padlock and key” to more sophisticated security solutions such as what ABLOY offers?**

Pauli Jormanainen, Regional Director, ABLOY: Actually padlocks and keys are still needed, but not only the traditional mechanical padlocks and keys but more intelligent mechatronic ones with double security features. Intelligent security solution is needed to allow flexible granting of access rights and give reliable, online information who, when, and how long has had an access to the sites. With electronic locking systems security is not compromised in case of say lost keys.

Operational excellence drives many companies today and telecom companies are no exception. Incident management must be handled promptly and preventive maintenance in an efficient manner. No one wants field engineers to drive hundreds of kilometers just to get a key and notice at the site that it is a wrong key! Investment in mechatronic system brings greater efficiency and productivity of personnel, reduce aborted visits, and improve management of contractors on site.
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. The pressing need for secure networks and high service levels is a central challenge that is already been addressed in security standards and protocols.

In the future we expect to see various governing bodies start to enforce certain level of security standards to ensure satisfactory protection of the operators’ assets and at the same time service availability.

ABLOY can offer a system where every key holder has only a single identifiable key. In the system there are flexible ways to grant (and also take out) access rights, monitor, and measure key users online as well as offline. The ABLOY system offers towerco's with great possibilities to plan, control, and measure workforce even at remote areas.

Access rights can be given for as short as five minutes! The rights can be given only when needed and even by using a smartphone. Audit trails can be carried out both from keys and locks, and from keys even in real time. Instead of manual keeping of records, key holder and audit trail information can be pulled from the administration system any time to fulfil regulatory audit requirements.

TowerXchange: When it comes to urban versus rural sites in Asia, what are some of the considerations in maximising site security? Can you share some success stories with us?

Pauli Jormanainen, Regional Director, ABLOY: The nature of the requirements for security tends to differ between cities and remote areas. Within cities, problems depend on the level of security of specific neighbourhoods.

According to our customers, urban sites are many times more vulnerable if they aren't properly protected. Naturally in cities the sites can be reached easier and faster, whereas in remote areas the response time can take longer. On the other hand, rural areas communities tend to value the sites and the connectivity they ensure, which can mitigate some of the risks.

But both in city and rural sites we need to implement solutions that are at the same time strong enough to resist any attempt of non-authorized access and flexible enough for efficient remote planning, granting, and controlling of authorized access. In both cases, not only access to site needs to be protected, but also the equipment, batteries and any other subcomponent as they are in high demand on the black market.

TowerXchange: What is the typical capital outlay per site to install your solution? And how does this translate to efficiencies and savings?

Pauli Jormanainen, Regional Director, ABLOY: Every case is unique and the complete solution price tag depends on many different components. The product / lock has naturally one price, but it also depends on the level of security, model, size and features.

Mechanical solution is the most cost effective, offering high physical and key security, but less flexibility to control access rights and monitor the system.

The full solution can include site surveys before building up the proposal, system planning, integration, installation, and service. Based on the wide experience of complete solution users, normal return of investment for the customer is less than 24 months.

TowerXchange: Lastly, what is the ABLOY advantage? How does your solution differentiate from your competitors?

Pauli Jormanainen, Regional Director, ABLOY: We have decades of experience working with telcos and have always been developing suitable solutions for them. This often means customized solutions both in hardware and software, and that is one of our strengths.

We can combine both economical mechanical systems with the more advanced electronic systems to cover all of our customers’ security needs. We can integrate our software into the customers’ existing RMS, access control, HR, or job management systems which will offer flexible use of all systems.

ABLOY has a proven track record of producing strong locking products against physical attacks, products that work superbly under any environmental conditions and exceed many quality and performance standards. We have a global approach and references, but also permanent local expertise in consultancy, planning and implementation, and service functions. We have been around for almost 110 years and have very high commitments for the next 100 years.
Enhanced security and operational efficiencies through improved access control

An interview with leading access control provider - Acsys

Poor access control can not only lead to security concerns but it can also have a significant impact on a company's operational efficiency and bottom line. In this interview, we speak to leading access control system provider, Acsys, to understand how the telecom tower industry has been affected by poorly managed access control and discuss the advantages that mechatronic locks can bring to the sector.

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

Olivier Meganck, VP Sales, Africa, 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.

TowerXchange: In relation to controlling access and NOCs, what are some of the operational challenges faced?
Olivier Meganck, VP Sales, Africa, 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 know when the vendor has arrived, what he has done, whether the problem is fixed and when he has left the site. NOC operations need to rely solely on the vendors assertions.

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

Olivier Meganck, VP Sales, Africa, 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.

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

Olivier Meganck, VP Sales, Africa, 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?

Olivier Meganck, VP Sales, Africa, 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?

Olivier Meganck, VP Sales, Africa, 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?

Olivier Meganck, VP Sales, Africa, 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?

Olivier Meganck, VP Sales, Africa, 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.

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

Olivier Meganck, VP Sales, Africa, 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.
Improving cell site energy economics with mini-grids
How Ascot Industrial and their partners are working with African MNOs

Connecting telecom power systems to mini-grids offers an additional layer of infrastructure sharing which can help improve the economics of a cell site. To date, the rollout of such projects in rural Africa has been limited but Ascot Industrial and their partners plan to change this. TowerXchange speak to Ascot Industrial's Rocco Incardona to learn more about the mini-grid projects they have been working on.

Keywords: Africa, Ascot, Ascot Industrial, Batteries, Community Power, Dimensioning, Energy, ESCOs, Infrastructure Sharing, Managed Services, Microgeneration, Off-Grid, Opex Sharing, Renewables, Solar, Urban vs Rural, Who's Who

TowerXchange: We understand Ascot to be involved in a telecom mini-grid project in Africa, please can you share some of the details of this project?

Rocco Incardona, Area Manager, Africa, Ascot Industrial: Ascot have joined forces with an operator and a local managed service company in the market to build a project which suppliers power not only to the tower but also to the local community surrounding the tower. In this instance, the operator has purchased the power equipment and mini-grid infrastructure, Ascot has supplied, delivered and installed the power equipment and our local partner is building the mini-grid and will maintain the power equipment. It is an interesting project as it is win-win for all parties.

TowerXchange: Can you explain how engagement with the community was managed, what their power requirements are and how billing will be managed?

Rocco Incardona, Area Manager, Africa, Ascot Industrial: The first step in engaging with the community was to conduct a series of interviews to understand the daily energy needs of the inhabitants, both in terms of volume of power required and also in terms of time of usage. The community surrounding this particular tower has around 300 inhabitants which showed a particularly high interest in bringing power to the village and that, coupled with the fact that the village had comparably good transport infrastructure in place to reach it, made it a leading candidate for such a microgrid system.
In terms of the power requirements, the system has been sized to provide basic lighting and ventilation (typically three bulbs and two fan vents per hut) as well as to enable inhabitants to power their TV, radio and mobile phones in their homes. In addition to this, electricity is also used to run a fridge in which to store medicines for the entire community as well as power a laptop and a sound system for the village. Should power requirements increase we can increase generation capacity through the addition of further PV panels or increasing the diesel generator runtime.

When it comes to managing the billing and payment, this is the most difficult task. In order to make the operation as simple as possible we have put in place prepaid kWh meters with which to manage the process.

**TowerXchange:** How should the provision of power to the local community improve the economics of the cell site?

**Rocco Incardona, Area Manager, Africa, Ascot Industrial:** With energy now being supplied to the local community new businesses have started to spring up. Villagers have opened small shops through which to sell cell phones and scratch cards and small industrial activities such as welding and grain mills have been developed. As inhabitants now have the ability to charge their mobile phones we have also seen revenues from mobile phone usage shoot up. As a result of all this, the operator has experienced a huge increase in cell site revenue.

**TowerXchange:** Do you see this model as being readily replicable across other sites?

**Rocco Incardona, Area Manager, Africa, Ascot Industrial:** This model can easily be replicated in all sites which are surrounding by rural villages. We forecast that we will roll this model out across approximately 150 sites in the next two years.

**TowerXchange:** What are some of the biggest challenges in these kind of projects?

**Rocco Incardona, Area Manager, Africa, Ascot Industrial:** In addition to managing the payment process the other biggest challenge is in sizing the system correctly. When conducting interviews in the early stages the community may promise to consume a certain quantity of energy, but after building the system only a small proportion of the energy being generated is consumed. The biggest risk you run is in oversizing the system.

**TowerXchange:** How are Ascot positioned to deal with some of the challenges in putting in place such systems?

**Rocco Incardona, Area Manager, Africa, Ascot Industrial:** The benefit of Ascot’s solution is its scalability; we can start with a 50kW system and build this up to 1MW as the amount of power being consumed by the local community grows. This allows us to overcome the problem of oversizing the initial system; rollout of power generation equipment can be based upon actual power consumption requirements.

**TowerXchange:** What kind of maintenance and security is required for the system?

**Rocco Incardona, Area Manager, Africa, Ascot Industrial:** Periodic routine cleaning of the PV panels along with battery and diesel generator maintenance is required to ensure that the system is running optimally. When it comes to security concerns, we haven’t needed to install any particular anti-theft systems as the local community itself acts as the guardian of the equipment, a real benefit to the project.
Ausonia: how to reduce the total cost of ownership via full-service energy offering

Italian firm discusses solutions for off-grid and remote sites in Asia and beyond

With 85 years of experience in the power business and thousands of installations across the globe, Italian company Ausonia offers a wide portfolio of energy solutions to help Asian MNOs and towercos reduce fuel consumption and maintenance costs. To cater to the evolving demands of the industry, Ausonia has also created its own energy service company (ESCO) known as MediPower, to provide energy-as-a-service, based on the opex model. With both capex and opex solutions available and against the backdrop of various regional market drivers, Ausonia looks to continuously adapt its offerings to best serve its customers.

Keywords: Asia, Ausonia, Bangladesh, Batteries, Capex, China, DG Runtime, ESCO, Energy, Energy Efficiency, Hybrid Power, Infrastructure Sharing, Interview, Japan, Job Ticketing, Korea, Loading, Malaysia, Managed Services, MediPower, Meetup Preview, Multi-country Partner, Myanmar, NOC, O&M, Off-grid, Opex Reduction, Outdoor Equipment, Pakistan, Philippines, ROI, Rectifiers, Site Surveys, Site Visits, TIM, Unreliable grid, Uptime, Vietnam, Vodafone, Who’s Who, Wind

Read this article to learn:
- Ausonia’s history, experience and footprint in Asia
- Beyond energy products, the creation of Ausonia’s ESCO
- How to improve energy efficiency in off-grid and remote sites
- Clever solutions to reduce total cost of ownership (TCO)

TowerXchange: Could you please introduce yourself, your role and background?

Giuseppe Taranto, International Sales - Telecom Business Leader, Ausonia: I have over 12 years of experience in the power business, including business development and sales in different geographical areas (EMEA, Americas, Asia and Oceania). I joined Ausonia in 2012, when the CEO, Massimo Ombra, asked me to help him launch the new Hybrid and High Efficiency DC gensets portfolio recently designed by the company to meet the needs of the telecom industry in lowering opex and TCO.

Over the years, we have worked with tens of MNOs and towercos across the globe and came to understand their specific power needs to identify the right energy solutions for their sites. As a result of our efforts and partnerships with our clients, we have one of the most acclaimed portfolios of AC and DC gensets solutions in the telecom industry, with thousands of installations in different countries and strong references, even among the ESCO community.

TowerXchange: For those that might not be familiar with Ausonia, please tell us about the company and the customers you work with.

Giuseppe Taranto, International Sales - Telecom Business Leader, Ausonia: If you ask any power specialist working in our home market (Italy), they will certainly know Ausonia. In fact, we were the first company in Italy to manufacture generating
sets and we are constantly expanding our footprint in the local market. On top of this, the know-how and experience we have accumulated over many years of business helped the company achieve a high level of specialisation and quality, such that our products today are widely requested by different industries and customers.

We are very active in sectors where power is a critical issue. Our gensets are used to power drilling stations for the oil and gas industry from Central Asia to Saharan Africa; to ensure backup power to hospitals, airports and industrial sites from South East Asia to Latin America. We even serve NATO with gensets for their military applications.

In the telecom industry, Ausonia has a long history of success, with thousands of generators installed worldwide. We receive positive feedback year-on-year since 2003 by our controlled ESCO known as MediPower, which uses Ausonia gensets to perform their services under the Power Lease Agreements signed with all the MNOs operating on the Italian territory (Vodafone, TIM, Wind and 3).

The capability to develop, design, manufacture and offer energy solutions to our customers, starting from a basic capex offer to a pure opex business model represents a unique value proposition in the telecom market. This gives new potential customers a strong sense of confidence, as they see us not only as a manufacturer of power solutions, but also as the first user of our products.

TowerXchange: Specifically, what is your footprint in Asia and what are some key issues and challenges your clients face in this region?

Giuseppe Taranto, International Sales - Telecom Business Leader, Ausonia: Ausonia started looking at Asia in the nineties, when the company was strengthening its focus on the export markets. We approached various customers in the region, from Bangladesh to the Philippines, from Pakistan to Myanmar and Malaysia, and we realised their power requirements were very specific and could not be standardised.

Since then, we have delivered generators to companies in Vietnam, China, Korea, Japan, Philippines and many other countries. Today we are in discussions with major regional players in the telecom industry for the supply of generators to power their off-grid and poor-grid sites.

At this time, the main concern is around the opex of their traditional power solutions and everyone is trying to understand what would be the best energy solution to be deployed on each site, with the ability to achieve the lowest capex and the highest opex reduction. Within this context, Ausonia is an ideal energy partner as we have the skills and expertise to design customised and efficient energy solutions in line with their technical and financial needs, supporting them also with local maintenance teams and warranty.

In Asia different scenarios are possible. We see opportunities in supplying our energy solutions directly to the MNOs or to local and regional towercos. But there is also increasing attention and study towards the power lease offers (energy-as-a-service), in which Ausonia Group can play a direct role by offering its local presence in the market, as well as partnering with local managed service providers (MSPs) who want to add something more to their current service offerings.

In Asia different scenarios are possible. We see opportunities in supplying our energy solutions directly to the MNOs or to local and regional towercos. But there is also increasing attention and study towards the power lease offers (energy-as-a-service), in which Ausonia Group can play a direct role by offering its local presence in the market, as well as partnering with local managed service providers (MSPs) who want to add something more to their current service offerings.
Additionally, our energy solutions can be equipped with anti-theft devices which help our customers in reducing the risks connected to robbery of fuel, batteries and other components of the power systems, thereby further increasing their savings on the capex replacements and making our proposals more attractive.

**TowerXchange:** Would you be able to share one or two examples of how you’ve helped clients address their energy/uptime requirements?

**Giuseppe Taranto, International Sales - Telecom Business Leader, Ausonia:** In several countries we experienced situations where many customers tend to “oversize” their power systems compared to the real power consumption of their equipment on site. We conducted several site surveys with our technicians and found that in some cases the customer could get to the target of improving efficiency and reducing opex by simply replacing the existing genset with a new one of smaller capacity or by installing a variable speed DC genset.

In other cases, we helped the customer to hybridise the site by adding rectifiers and batteries or by totally replacing the existing set up with a brand new hybrid power system, integrating a variable speed DC genset with deep-cycle batteries in an all-in-one product.

We also helped customers in solving critical problems with the very high costs related to refueling and maintenance of off-grid and remote sites. In those cases, customers used to go to the sites once a month, with employees or contractors literally carrying heavy fuel canisters on their shoulders while climbing hills and mountains, or accessing sites only after having paid mandatory fees to local gangs. On these types of sites we have deployed our Dual Variable Speed DC Generators system, which has been able to reduce fuel consumption up to 63%, reducing the number of site visits by 88% and dropping down the TCO by 51%, with a payback period of only 11 months, guaranteeing a power availability rate close to 99.99%.

**TowerXchange:** What do you think is the Ausonia advantage?

**Giuseppe Taranto, International Sales - Telecom Business Leader, Ausonia:** There are multiple advantages in selecting Ausonia as an energy partner. On top of what I said earlier about our history and know how, our products offer several configurations of energy solutions which, thanks to a significant reduction in the fuel consumption and to different capacities of integrated fuel tanks, can extend the refueling intervals up to three to four months.

Moreover, our high efficiency solutions can be configured to require preventive maintenance after
as many as 2,000 running hours, equivalent to more than 80 days, allowing customers to schedule only four or five site maintenance/refueling visits per year, with great savings in yearly opex.

Additionally, our power units can be controlled and managed remotely through a dedicated web-based system, which can be integrated to the network operation centre (NOC) of the customer for managing alarms tracking, ticketing and escalation.

Last but not least, thanks to the scalability of our modular solutions, we can deliver systems to power multi-tenant sites, in which a new operator can be added and billed singularly for its energy consumption.

Considering all this, if our customers compare our DC gensets solutions with the traditional solutions installed around the globe, they realise that the payback period is often less than one year and the product lifetime typically goes over five years, making it an excellent investment, even looking at short-term business plans.

**TowerXchange: Lastly, what is the vision for the company, and for Ausonia’s presence in the Asian region moving forward?**

**Giuseppe Taranto, International Sales - Telecom Business Leader, Ausonia:** Being a proactive and flexible company, we see great opportunities of growth in Asia, especially in countries where telecom players need to urgently go through a renovation of their power assets, or where the network expansion is mandatory to comply with local strategies or simply to follow the indications given by the local regulators.

In Asia different scenarios are possible. We see opportunities in supplying our energy solutions directly to the MNOs or to local and regional towercos. But there is also increasing attention and study towards the power lease offers (energy-as-a-service), in which Ausonia Group can play a direct role by offering its local presence in the market, as well as partnering with local managed service providers (MSPs) who want to add something more to their current service offerings.

The market in Asia is changing fast and new scenarios and players are emerging, and this naturally lends to new energy requirements which Ausonia is ready to follow closely, by adapting our energy solutions portfolio to new power demands, more specific technical requirements and efficient technologies.
With asset registers incomplete or out of date in many parts of the world, tower owners are getting a shock when it comes to the capacity of their structures, the safety of the sites and, most shockingly, the legitimacy of the hardware hanging from their towers. Spencer Crawford-White from Delmec talks us through some of the major challenges tower owners face in managing their assets and how a tower portfolio can be brought back into line.

Keywords: Interview, Monitoring & Management, East Africa, Southern Africa, West Africa, Europe, Delmec, O&M, Construction, Installation, Investment, Capex, Due Diligence, Opex Reduction, Co-locations, Infrastructure Sharing, Capacity Enhancements, Health & Safety, Bankability, Site Level Profitability, Operational Excellence, Off-Grid, Unreliable Grid, ROI, Site Visits, Site Surveys, Asset Register, Masts & Towers

Read this article to learn:
- The most common hurdles faced by tower owners in terms of updating and maintaining an asset register
- How to bring an asset register back up to 100% accuracy
- How and when tower portfolios should be audited
- The benefits of certification to investment, expenditure and business development
efficiency in what we offer - we're not the cheapest but we could be if we combine all of our offerings together for our clients. What we offer is the means to get the job done right first time, and we can also reduce timescales allowing sites to introduce other solutions quicker, which can have an enormous cost impact.

Spencer Crawford-White, CTO, Delmec Engineering:

Every single company we’ve spoken to has terrible trouble with their assets. The might have an idea of what they have from a purchase ledger, but they don’t know what they have in each location from a safety or structural capacity perspective.

Spencer Crawford-White, CTO, Delmec Engineering:

The African market needs to build more structures but overall the global market will move towards the independent towerco business model, meaning you’ll have infrastructure owners and MNOs totally separated. The headache of leases and planning isn’t interesting to an MNO and towercos can do it on a bigger and more specialised scale. People have been buying networks for 20 years now, but I think towercos are now doing it on a greater scale than before. It’s a good time for them as acquisitions are cheaper at the moment due to the downturn in the global economy. It means costs have gone down but on the other hand insurance premiums have gone up because people aren’t spending the same on safety and structures as they ought to.

Maintaining sites generally is a big issue globally both in terms of the structure and recording what’s on it. Most site providers we do physical reviews for are surprised by the equipment on their towers. There are huge implications for lost revenue and also significant safety concerns if you don’t have a handle on what’s hanging on your towers. Unregistered equipment hanging on towers is a huge loss in terms of selling space and generating cash. It's mostly down to poor record keeping but there’s also the odd opportunist – smaller radio broadcasters or broadband microwave solution companies who might have reached a private arrangement with the land owner where the site is located. They sometimes steal power too, which of course is the biggest cost to infrastructure managers in Africa due to the lack of reliable grid provision.

Spencer Crawford-White, CTO, Delmec Engineering:

They do not adhere to maintenance and routine recording. Not just Africa. Globally. Every single company we’ve spoken to has terrible trouble with their assets. The might have an idea of what they have from a purchase ledger, but they don’t know what they have in each location from a safety or structural capacity perspective. The more we’ve gone to Africa and started helping, the more interest we’ve had from their European counterparts, which leads us to believe that even assets there don’t have as good a set of records as possible.

TowerXchange: Where does Delmec see the biggest growth in the tower industry taking place over the next few years?

Spencer Crawford-White, CTO, Delmec Engineering:

TowerXchange: Given Delmec’s track record in auditing asset registers, what would you say is the most common problem which towercos and MNOs face in creating and maintaining accurate asset registers?

TowerXchange: How would you go about rectifying problems with an asset register?
Spencer Crawford-White, CTO, Delmec Engineering:
The main reason we’re employed is because at the starting point, towercos don’t even know what they’ve got. They’ll do an audit on 10% of the proposed buy before an acquisition and ask questions like can you get there? Is there a tower? Has it got a fence and does it look okay? No other information comes back, not even photos in most cases. When we go out we’ve often got nothing beyond co-ordinates and a theoretical size of structure. They might have pictures of 10% of the towers if we’re lucky. So although they have almost nothing initially, we help them pull that to 100% for every site, we help them assess every tower.

How do we rectify problems? We train local people, show them how to do it efficiently, do structural analysis and give them a RAG report (Red Amber Green). In Europe we give a 40 page technical report, in Africa we give four pages because that’s the level of detail each market needs. Our database maps that with pie charts in the same colour so we keep track of it all.

Part of our solution is to arrive at a certificate of conformity when we know 100% that the site is okay. We will give clients a report detailing what and how to improve, then we will sign off on a local contractor for them, then certify the structure on a scale from ‘gold’ to ‘white’. For gold certification we go and inspect the site ourselves, silver is checked by one of our approved contractors, bronze is certified by the client’s contractor and for white certification the client details what they have done and we take their word for it. Unsurprisingly everyone wants gold level certification once they have committed the time and funds to the upgrades. They can take the certificates to the bank for investment for the future as our certificates are well known in the market.

TowerXchange: So tell us about the full benefits of certification?

Spencer Crawford-White, CTO, Delmec Engineering:
A reduction in insurance premiums, ability to increase borrowings, getting a higher (and more reliable) calibre of customer. MTN, Tigo or Vodafone want to protect their assets and they’re looking for something of this standard, which is important to ensure their SLAs are met. It’s also very useful for further investigation – we receive a 40% return rate of business, so having that data in our system means it can be very quick for us to help customers know how they can maximise their assets.

TowerXchange: Who should use an asset register auditing service and why is it important? When is it most effective to review an asset register?

Spencer Crawford-White, CTO, Delmec Engineering:
The site owner is the responsible person whether they are independent owners, towercos or mobile network operators. They are responsible for recording and auditing their assets, most importantly for safety – keeping an accurate accident register is vital. Commercially, of course, it’s also critical.

When should they be reviewed? If you look at the standards it ranges across the type and location of a structure. Yearly inspection should really be the norm, but certain clients could see that every couple of years is enough. Some might leave it five years but in our experience it’s a lot cheaper and more effective to keep on top of problems as they arise than to wait for something serious and risk having to make major repairs or even replace infrastructure.
Eltek on the adoptability of green solutions in Asia
Expectations and reality of doing business in frontier markets

Eltek is a world leader in high-efficiency power electronics and energy conversion, providing a range of power solutions to secure continuous, safe and efficient operation of the telecom network, from the central office to remote cell sites. Eltek has deep commitment and experience in the telecom tower market in Asia, Africa and LATAM, and have been at the forefront of the debate about who should ultimately provide energy to cell sites: MNOs, towercos, or a new breed of ‘powercos.’

TowerXchange caught up with David Leal to find out Eltek’s stance in the Asian market.

**Keywords:** Asia, Axiata, Bangladesh, Batteries, Business Model, DG Runtime, ESCOs, Eltek Energy, Fuel, Hybrid Power, Meetup Preview, Myanmar, O&M, Opex Reduction, Procurement, Project Finance, RMS, Renewables, Security, Singtel, Site Visits, Skilled Workforces, Telenor, Who’s Who

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**Read this article to learn:**
- Eltek’s range of solutions for clients such as Singtel, Axiata group and Telenor
- Eltek’s proposition for grid-challenged countries including Myanmar
- Industry business model considerations: capex versus opex
- Benefits to towercos and MNOs through Eltek’s offerings

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**TowerXchange: Please tell us about Eltek’s footprint in Asia. Who are your clients and which products are they seeking to buy?**

**David Leal, Regional President - APAC, Eltek:** Eltek has been the number one power vendor for all major MNOs in the Asian region for over 20 years. We pride ourselves in supporting our customers through close local interaction with our vast array of in-country offices together with reliable solutions using state-of-the-art technology.

Eltek works closely with all key MNOs in the region including Singtel, Axiata group and Telenor group companies, providing competitive DC power solutions ranging from access solutions to base station power, mobile switching centres and data centres.

Additionally, Eltek has been the undisputed leader in green solutions for a long time in this region, if not globally. The key to success in this area is working with the customers to provide cost-effective solutions adapted to the required environment, whether that be off-grid sites or for sites connected to unreliable grids.

**TowerXchange: Talk to us about some of the more challenging grid markets where you operate such as Myanmar and Bangladesh.**

**David Leal, Regional President - APAC, Eltek:** Yes, these areas present great opportunities for everyone but also huge challenges. These countries not only have grid reliability issues, but other issues...
such as relatively poor infrastructure, vandalism and political instability.

We work closely with our customers through our local and regional personnel to provide alternative power solutions to sites which have grid issues, to ensure their uptime requirements are met at the lowest possible cost. In this process, we also thoroughly test and evaluate third-party products incorporated into our solutions to ensure our integrated solution is able to solve the customer’s problems. Our goal is to ensure that once rolled out, our solutions work seamlessly in our customers’ network.

TowerXchange: The previous discussions around Myanmar was that off-grid sites would rely on DG or on a combination of DG and batteries. It looks like the local industry is now exploring green power. What has been your experience?

David Leal, Regional President - APAC, Eltek: The initial rollouts were all in cities where the grid is available and all the vendors were rushing against tight rollout deadlines in order to meet the MNOs' launch dates.

In spite of the fact that we are receiving more and more RFPs for green solutions, the actual deployment remains slow and we put this down to the fact that everyone is still learning and coping with the challenges of doing business in this vast and developing country.

We do believe green deployment will be a long-term reality in Myanmar, though it does require good maintenance support. Eltek will continue in its efforts to expand its service offerings and add innovative progressive system solutions to meet the needs of our local customers.

TowerXchange: Which model is going to be prevalent in Myanmar and beyond in Asia? Upfront-capex or pure-opex? And what about ESCOs?

David Leal, Regional President - APAC, Eltek: We really think that the model battle will continue on for some time and is often dominated by where the financing is coming from and whether the new pop-up companies will be able to survive in the long term.

We believe that high quality reliable products are vital no matter which model is chosen, as the environment we are operating in Myanmar can be challenging. At the same time, maintenance planning and support are also critical to ensure the assets are well-managed in the field, to ensure our customers have the maximum possible uptime for years to come.

From our side no matter which model is chosen, Eltek will always be there with smart solutions to support our customers’ goals.

TowerXchange: Lastly, how does Eltek position itself to be a provider of choice in the market place? How can you help your clients in the long run?

David Leal, Regional President - APAC, Eltek: As a pioneer with more than 40 years of experience, it has always been our passion and motivation to innovate and lead the way in power conversion.

In addition to our wide range of product portfolio, we are able to offer our customers competitive and attractive long-term project financing for the supply of our products, as well as solutions and services through our cooperation with the Norwegian Export Credit Agency, GEIK and Export Credit Norway.

We have products and solutions that provide towercos and their customers opportunities to generate new revenue streams. Our commitment is to help our customers optimise and safeguard operation of their business-critical equipment, reduce carbon footprint, while at the same time reduce total cost of ownership of power supply equipment and related services.
Enatel’s SYNERGi solution achieves 90% less genset runtime
Opex and efficiency boosted with Enatel Energy’s power solutions

Enatel Energy offers an expansive portfolio of fully customizable DC power systems and industrial battery chargers, designed to meet every power conversion requirement. Solutions offer flexibility and scalability by way of rack-mount, hot-pluggable combinations of modular AC-DC rectifiers, DC-AC inverters and DC-DC converters with advanced monitoring and control.

In this interview, Murray Wyma, CTO DC Systems, Enatel Energy, talks about the work that the business has done recently in Mexico, explains why MNOs are likely to see energy costs go down in the future, and gives an insight into what makes Enatel Energy’s products so unique.

**Keywords:** 3G, Africa, Americas, Asia, Australia, Batteries, Central America, Chile, Colombia, Enatel Energy, Energy, Haiti, Hybrid Power, Interview, Kenya, Madagascar, Mexico, Myanmar, New Zealand, Nigeria, North America, Off-Grid, Opex, Pacific Islands, Renewables, Solar, South Africa, South America, South Asia, Southeast Asia, Tanzania, Unreliable Grid

Read this article to learn:
- How Enatel Energy went about upgrading the Sinuoso site in Mexico
- About Enatel Energy’s installed global base at cell sites
- Why energy costs are coming down for MNOs
- How Enatel Energy provisions high 9s reliability in its products
- How to handle power requirements on a site with multiple tenants

TowerXchange: Please give us a brief overview of your company for our readers that aren’t familiar with you.

Murray Wyma, CTO DC Systems, Enatel Energy: Enatel Energy is a division of Enatel, which was founded 14 years ago by the same personnel that created Swichtec Power Systems, a company successful in designing and manufacturing switch-mode power solutions, primarily for the telecommunications industry. Based on over 30 years’ of experience, our core business is the design and manufacture of power conversion products for the telecommunications, IT, utility, materials handling and renewable energies sectors. Headquartered in Christchurch, more than 90% of everything we design and manufacture is exported internationally to over 70 countries throughout the world.

Competing with the best in the world, our products include a range of high-efficiency rectifier and converter modules, hybrid power systems, and rack and compact power solutions, supported by embedded and GUI-based software, along with a range of ancillary products. We also participate in the renewable energies sector with a range of high-efficiency solar inverters and modular, high-efficiency battery chargers for the material handling equipment industry.

At Enatel, our core focus of research and development is utilizing creative, cutting-edge technology so we can offer our customer’s better products, performance efficiency and value.
for money. This approach ensures that we stay committed to the continual development and enhancement of our suite of AC and DC power systems, intelligent modular rectifiers, DC-DC converters, control and monitoring options as well as motive power and solar energy solutions.

TowerXchange: Could you share some details of one of your more challenging projects since we last spoke?

Murray Wyma, CTO DC Systems, Enatel Energy:
The Sinuoso site, located in North-West Mexico, on the edge of the Sonora desert, is challenged by its environment and is a fully off-grid site with 2G (including air-conditioning) and 3G cellular loads in self-contained cabinets.

A hybrid system had previously been deployed with a mix of DC rectifiers, solar converters and AC inverters, from a range of suppliers, with a third party PLC controller for supposed hybrid functionality. This was a good example of an attempt to pull together a hybrid system, including solar from a disparate array of different manufacturers’ equipment that never worked as intended. The decision was made to upgrade the site with our SYNERGi solution with five 2kW solar converters, nine 2kW rectifiers (phase-balanced) and six 1.2kW inverters, to provide the necessary efficiencies and cost savings.

The SYNERGi hybrid power system cycles the batteries, saving diesel and maintenance expenses by operating the existing generator in its optimum efficiency power range for longer periods. The ‘solar optimization’ feature also ensures that the genset does not run if solar power is available. SYNERGi incorporates its own self-learning algorithm to track sunrise through the seasons, to give well-defined stop conditions to the generator to ensure it does not run unnecessarily during the ‘solar day’. It does not require connection to external date or time references, and does not require links to weather forecasting web pages. It operates autonomously.

The battery is usually the crucial element in a hybrid system, but in this instance a reconditioned set of 1500Ahr AGM batteries was supplied to analyse cyclic performance over time before deciding on the best battery fit – a lithium battery solution is currently being considered.

Over the month of August 2016, SYNERGi delivered some remarkable results. In fact, we’ve reduced the genset runtime hours by 90%, the usage of diesel and the CO2 emissions by 87% and the maintenance costs by 83%. This means annual CO2 savings of 56,052kg and monthly savings in excess of US$3,400.

ROIs and paybacks are site dependant, but in most cases full payback on these sites can easily be achieved in less than twelve to eighteen months.

TowerXchange: What is your installed base at cell sites worldwide, and what is the approximate energy mix within that installed base?

Murray Wyma, CTO DC Systems, Enatel Energy:
Enatel Energy systems have been installed within
hundreds and thousands of cell sites globally, with numerous hybrid systems deployed through a network of integrators. These systems are located in Kenya, Madagascar, Chile, Tanzania, Colombia, South Africa, Myanmar, Nigeria, Mexico, Haiti, Australia, Pacific Islands and New Zealand.

All conceivable climates and conditions are encountered in such diverse geographic locations, everything from integrated generator solutions and outdoor cabinets to walk-in shelters and buildings. We see energy mixes from the normal single cell/single tenant sites with average loads of approximately 1kW through to large sites (as in the Sinuoso example) and multi-tenant sites of 4 or 5kW.

Lately, we are seeing requirements for off-grid solutions approaching 9kW load. In sites this size, the use of cyclic batteries becomes uneconomic, often forcing the owner to once again consider 24/7 operation of the generators unless large renewable energy sources are available. This could be a controversial statement, but as long as a genset is operating at maximum efficiency, then no amount of cyclic charge/discharge would deliver comparable fuel use in terms of overall litres per kWhr of energy.

The other factor in the equation is the ease of deployment and monitoring of the power solution. This is where Enatel Energy differentiates itself by offering scalable solutions that monitor and report full energy logging of all system parameters (loads, battery, charge/discharge, genset kWhrs, solar kWhrs et cetera., hourly, daily, and monthly).

We are seeing a big increase in solar power supplementation for remote sites and our easily integrated converters offer clever functionality such as solar optimization (minimizing genset run-time) as mentioned in the Sinuoso example.

For us, it is all about making life easier for the energy solution owner, and of course, providing secure power with high 9s uptime to meet the most demanding SLAs.

TowerXchange: Should cell site energy solutions be owned and operated by MNOs, towercos or ESCOs?

Murray Wyma, CTO DC Systems, Enatel Energy:
As an embedded power system provider, we are agnostic with respect to the energy solutions owner. As time progresses, we are obviously seeing more of a shift from MNOs towards towercos and ESCOs. This enables more efficient use of tower space, and energy as now many sites are multi-tenant. Ultimately, this must lead to lower costs for the MNOs and consumers. However, for MNOs who already own the tower infrastructure, retaining ownership of the tower can ensure fixed levels of tower (and power) servicing cost, rather than be exposed to the risk of rent increases. We are also focussed on next generation power architectures for initiatives that migrate a towerco into a powerco, allowing monetization of those traditionally distributed stranded assets. This applies similarly for an MNO looking to diversify – as some are.

We include patented features such as dynamic generator anti-stall in our products to ensure higher uptime. As a result we can raise alarms if the generator goes into a ‘low power’ state, possibly due to poor fuel quality, blocked air filter et cetera.

The other benefit of detecting the generator’s peak power capability is that we can then programme the genset to operate at its peak efficiency during the battery recharge.

Enatel Energy offers optimal dynamic phase-balancing where we can adjust rectifier output to ensure the phases on the generator are balanced (within the scope of the applied load/battery recharge).

The intention of the SYNERGi hybrid solution is to ensure that the generator will run efficiently.

TowerXchange: SLAs often demand 99.5% or higher uptime – tell us about the reliability and autonomy of your solution.

Murray Wyma, CTO DC Systems, Enatel Energy:
Our designers come from a long history of DC power in the telco space (since the mid 1980s). The telco uptimes typically required are greater than 99.9999%. The best way to describe how we provide high 9s reliability is through the quality of design in our products, redundancy and plurality of supply. The other factor is fail-safe operation. No matter the state of any controller/monitor, the core power system operates autonomously. This is a cornerstone of telco DC power system design.

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The intention of the SYNERGi hybrid solution is to ensure that the generator will run efficiently.
A further line of defence to prevent the site collapsing is the ability to control load shedding. SYNERGi has the ability for the operator to shed their loads and maintain critical site and transmission capability. These features are unique to Enatel Energy and demonstrate Opex savings through optimized functional capabilities which maximize uptime and avoid unnecessary truck rolls.

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

**Murray Wyma, CTO DC Systems, Enatel Energy:** Allowing space for extra power modules and battery connections can be easily catered for at the time of design for minimal cost. When a site is first deployed, the system frame can be supplied with a minimal number of power modules. This can be done through modular configurations that support the use of wind turbines and expansion shelves.

We are also currently addressing multi-tenant metering of up to six or more.

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

**Murray Wyma, CTO DC Systems, Enatel Energy:** Certain levels of M2M technology are already built into Enatel Energy systems. We have built in full SNMP functionality through to SNMP V3. This includes a full suite of traps, gets and sets. This enables easy integration of third party SNMP managers. This is advantageous due to their well-proven legacy and in many cases SNMP managers are already in use by our clients and end-users. Further to this, we have built in UDP communications for use with our craft tool which enables set-up, log access and bootloading facilities across a narrow bandwidth (sometimes 2G) sites. Designing ‘narrow band capable’ remote communications is essential to the developing nations market.

It is vitally important to be able to maintain the communications channel to the device from the equipment manufacturer remote control facility. Monitoring solutions, where third party site control systems have been added to our monitoring, limited access to our equipment, blocking visibility, and the ability to change key system parameters.

**TowerXchange: Please sum up how you would differentiate your solution from your competitors’?**

**Murray Wyma, CTO DC Systems, Enatel Energy:** Enatel Energy presents the most complete, comprehensive telco hybrid system on the market with the SYNERGi system. With SYNERGi, users can automatically generate maximum power tracking and anti-stall. They can automatically set their generator loads to a predefined optimum level and carry out dynamic phase balancing. Our solution also allows users to control two generators simultaneously and alternate their cycles to synchronise their services.

Users can also seamlessly include green energy sources through solar and wind converters and take advantage of true plug-and-play power modules (rectifiers, solar and wind converters) with self-setting addresses. The system also provides full kWhr logging of all energy sources (grid, gensets, solar and wind) on an hourly, daily and monthly basis. Just as importantly, the solution can be accessed remotely through via HTTP, SNMP (v2C and V3) and UDP scripting.

SYNERGi features a one-step front-panel control that provides a battery initialization (commissioning) charge to enable installation technicians to set the system and walk away without the need to return to site. Generator start-up has adjustable settings that can be based on time of day (up to two periods per day), battery voltage, battery Ahrs (battery capacity) and periodic genset tests (independent of other settings). The start and stop functions can be enabled simultaneously to provide maximum security.

If a battery is stolen, disconnected, lost, or found to be ineffective, the system will detect the problem and notify the user. Battery history can also be logged to enable battery warranty claims if necessary. As previously mentioned, the system can be optimized for solar use to ensure that the generator does not run unnecessarily by predicting the ‘solar day’ and limiting the use of the system to ensure maximum possible solar harvest.
Back up Asian towers: EnerSys®’ sophisticated battery solutions

Supporting the rapidly evolving tower industry with bespoke backup solutions

With operating costs becoming a key issue for tower owners, choosing the right backup power solution is an increasingly important task. With variables in location, climate, budget, maintenance and deployment, choosing the right battery and cooling options to keep the total cost of ownership (TCO) to a minimum can be tricky. EnerSys® talk us through their experiences in the Asian market and how they work with customers to choose the most efficient solutions to meet their requirements.

Keywords: 5G, Asia, Batteries, DG, DG Runtime, EnerSys®, Energy, Energy Efficiency, Fuel Cell, Hybrid Power, Interview, Meetup Preview, Off-Grid, On-grid, Operational Excellence, Opex Reduction, Renewables, SLA, Solar, Unreliable Grid, Uptime, Who’s Who, Wind

TowerXchange: Please introduce EnerSys®, your footprint and your offering to the Asian market.

Dave Cowgill - Senior Director Marketing, Engineering & Quality, Asia, EnerSys®: We are the global leader in stored energy solutions for industrial applications. We manufacture and distribute reserve power and motive power batteries, battery chargers, power equipment, battery accessories and outdoor equipment enclosure solutions to customers worldwide.

EnerSys® offers an extensive portfolio of premium flooded and sealed batteries to serve the telecom industry. This portfolio of batteries offers design features such as exceptional performance, long life, compact footprint, high energy density, and ease of installation. Our batteries are ideally suited for a wide range of wireline and wireless telecom applications, including central office and outside plant. We also offer outdoor equipment enclosure solutions.

In Asia, EnerSys® has a comprehensive infrastructure with a company presence in seven countries and 18 local offices for sales, applications and logistic support.

TowerXchange: How does your experience in Asia differ from the other markets you operate in?

Dave Cowgill - Senior Director Marketing, Engineering & Quality, Asia, EnerSys®: The European and North American markets are very

Read this article to learn:
- EnerSys®’ offerings for global and Asian tower owners
- How the Asian backup power market differs from the rest of the world
- Backup power considerations for on-grid, unreliable grid and off-grid
- Case study demonstrating TCO savings up to 55%
established and have relatively reliable power. In Asia, of course it is very different and we see a wide variation in the operating conditions and power reliability across the region. This in turn means we have to develop customised solutions that are uniquely suited to the conditions and requirements of particular customers and geographies.

**TowerXchange: What are the considerations that tower owners need to keep in mind when choosing a backup solution in on-grid, unreliable grid or off-grid environments?**

Dave Cowgill - Senior Director Marketing, Engineering & Quality, Asia, EnerSys®: Each of the scenarios listed presents their own unique challenges to the backup power system as well as opportunities for cost savings and minimising TCO.

For on-grid systems, the main consideration is typically how to maximise battery life whilst also minimising the power usage on the tower. For this we would typically propose reducing or completing disabling the cooling system and using a backup battery specifically designed for operations at high temperatures. The new EnerSys® SBS XL is ideally suited for this and using our TPPL technology has a life expectancy of ten years at a temperature of 35°C.

On the other hand, off-grid systems have been successfully powered for some time now by a hybrid mix of batteries, diesel generators and increasingly some kind of renewable energy source (solar, wind et cetera). This kind of system brings unique challenges to the battery system and our research has shown that the lowest operating costs can only be achieved by using the full capacity of the batteries on a daily basis to minimise diesel genset runtime. This means the batteries need to have the capability to cycle deeply and recharged quickly – something that our tried and tested SBS EON range has been specifically designed for.

Finally, in unreliable grid environments towers are typically supported by a combination of batteries and diesel gensets. The random reliability of the main system means batteries have little time to recharge from the power grid and that generators need to run every day to either support the tower once the batteries are discharged and/or recharge the batteries themselves.

The key challenge here is therefore how to minimise the runtime of the diesel gensets that are one of the biggest contributors to the tower operating costs – typically far more than the cost of batteries. For this kind of application our new SBS XC range is ideal as it combines an outstanding fast charge capability with the ability to achieve an exceptional number of cycles; the modelling work we have done shows it can give tower owners TCO savings in the range of 30 to 50%.

The most effective TCO savings will depend very much on the site operating conditions and power reliability. However, choosing a battery that is designed for the site conditions can definitely deliver TCO savings to tower owners. The highest savings typically come from reducing the cooling

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load on the tower or from reducing or even eliminating the runtime on costly diesel generators – and the key enabler to this can be choosing the optimum battery solution.

**TowerXchange: Can you share a case study illustrating how you helped your clients achieve desired outcomes?**

Dave Cowgill - Senior Director Marketing, Engineering & Quality, Asia, EnerSys®: Our most recent work has been looking at potential TCO savings for a tower owner in an extremely unreliable grid environment. In this instance, each tower is usually equipped with at least 600Ah of battery back-up, but even that is not enough to cover for the many power outages in an average 24-hour period.

Typically, the batteries are completely discharged within eight to ten hours a day, meaning the diesel generator needs to be run for the remaining 14 to 16 hours of every day. This is obviously bad from an environmental perspective, noisy for the community nearby and of course it involves significant costs related to the fuel, maintenance and service of the genset.

After assessing the application, we realised that the perfect solution would be a battery that has both an outstanding fast charge capability and excellent cycling. We already knew that our TPPL technology had the potential for industry leading charge acceptance, so we decided to optimise its design even further.

Our target was to design a product able to maximise its recharge while the power is on, enabling the battery to be ready for the next outage. If enough recharge current is available, it’s even possible to design a system that relies totally on battery backup on a standard day. The result of this work is our brand new SBS XC range that we have just launched.

Based on the load details that were provided to us by the tower owner, we estimate that TCO savings of up to 55% can be achieved compared to traditional lead acid batteries.

**TowerXchange: Looking forward, what do you think will be the power priorities for Asian tower owners as 5G and network densification requirements increase?**

Dave Cowgill - Senior Director Marketing, Engineering & Quality, Asia, EnerSys®: The 5G standards are still not agreed, but the evolving infrastructure needs seem to be trending towards a larger number of smaller, but more dense tower sites. We expect this to drive demand for new, innovative power solutions.

**TowerXchange: Can you give us some insight into EnerSys®’s vision for the future and how you will fit into this evolving market?**

Dave Cowgill - Senior Director Marketing, Engineering & Quality, Asia, EnerSys®: We believe experience in providing power backup in mobile communications is very important. The mobile network has a critical dependence on available power and backup regardless of the reliability of the local grid. EnerSys® is a powerful solution provider and a trusted partner in backup power solutions. Hence we are in a unique position to use our experience and unique technology solutions to help and continually support tower companies to backup their mission critical equipment in the most cost-effective way.
Still keeping your hybrid power systems indoors? It’s time for a change

Flexenclosure offers high-standard, purpose-built solution for outdoor telecom sites

Mobile telecommunications network equipment is expected to work without issue 24/7. There is no compromise on this, which is why transmission equipment, BTS systems, RF equipment, et cetera, are designed, tested and built for operation in the most demanding of environmental conditions. This is especially important in the developing world where the weather – particularly heat and humidity – can be extremely hazardous for highly sensitive electrical equipment. Why is it then that power systems for telecom sites are not similarly ruggedised and need to be housed in a shelter or cabinet of some kind?

Keywords: Asia, Energy, Energy Efficiency, Flexenclosure, Hybrid Power, Meetup Preview, Opex Reduction, Outdoor Equipment, Renewables, Shelter, Unreliable grid, Who’s Who

Read this article to learn:
- Why indoor equipment in a box is less effective
- New designs to reduce theft at cell sites
- Advantage to outdoorisation of hybrid power systems
- Innovative solution to reduce TCO, maintenance and improve performance

TowerXchange: Please tell us about your role within Flexenclosure and background.

Srikanth Murugan, Global Director Sales Engineering, Flexenclosure: For the last three years I have led the sales engineering function at Flexenclosure, where I am responsible for designing bespoke solutions for data centres. I have spent nearly two decades working in the telecommunications industry around the world, with extensive experience in pre-sales and project management, balancing business insight with technical expertise.

TowerXchange: You’ve been questioning and exploring why power systems need to be “contained” – what have you concluded?

Srikanth Murugan, Global Director Sales Engineering, Flexenclosure: Based on extensive experience from our hybrid power projects in Africa and Asia, we observed that the current crop of hybrid power systems in the market simply hadn’t lived up to their promises. And the honest answer to this is that none of the power system vendors wanted to rethink the way their solutions were designed and built. It was easier to simply take components that were originally designed for indoor use, put them into a box and hope that the system would cope reasonably well in these extreme conditions.

TowerXchange: And this doesn’t make sense?
Srikanth Murugan, Global Director Sales Engineering, Flexenclosure: There are a number of significant problems with the traditional approach. The first being failure at high ambient temperatures. Rectifiers and power systems are designed to work ideally at temperatures around 20°C to 35°C. However, when the ambient temperature crosses the 45 or 50 degree mark, they start failing as they are not built for these conditions and would need special cooling solutions to keep them running. Operators need power solutions that can safely be put outdoors even at temperatures up to 55°C (130°F).

The next is that the component design is unfit for the purpose. The first thing you always see on the face of a rectifier is the fan, which is intended to pull in cool air and release hot air. A component like this clearly cannot be exposed to an outdoor environment as it will start sucking in dust, moisture and humidity if not fitted with an enclosure and a filtering system, and it will soon fail. For a reliable outdoor solution, the rectifier needs to be designed for the purpose, using convection cooling rather than fans.

TowerXchange: Besides heat and humidity, what might be some of the other weather effects a hybrid power system will face if installed outside?

Srikanth Murugan, Global Director Sales Engineering, Flexenclosure: Heavy rain can also be an issue, so protection would be needed. To provide reliable power to mission critical mobile networks, hybrid power systems need a minimum ingress protection rating of IP54 so they can withstand water splashing against them from any direction without any adverse effect on their functions. Essentially the power solution needs to be a completely sealed and tamper-proof unit to withstand heavy rains.

TowerXchange: However, when it comes to rural or remote sites, there are typically concerns around theft, and perhaps a valid reason to keep equipment indoor?

Srikanth Murugan, Global Director Sales Engineering, Flexenclosure: Yes, one of the main reasons power solutions are still built as indoor systems is to protect them against theft. This is because power components are typically built in modules which can easily be pulled out of the larger overall system and sold. So to avoid the risk of theft, hybrid power system design needs to be changed not to include any removable power modules and to incorporate chipsets that are critical to the system, but of no value if stolen.

TowerXchange: What might be an advantage to the outdoorisation of hybrid power systems?

Srikanth Murugan, Global Director Sales Engineering, Flexenclosure: It should allow for...
reduced lifespan of moving parts. Hybrid power systems often have moving parts like fans or mechanical automatic transfer switches. Anything that moves will ultimately wear out and will need to be periodically maintained or replaced, thus incurring both cost and potentially expensive service disruption. So for a system to be built specifically for an outdoor environment, the design should ideally remove all moving parts and use only semiconductors.

TowerXchange: Lastly, how did this all this “thinking outside of the box” lead to innovative new offerings for telecom clients?

Srikanth Murugan, Global Director Sales Engineering, Flexenclosure: It's clear that putting indoor power components into a box and expecting sustained performance in extreme outdoor environments is not the best approach for long-term success. So manufacturers of hybrid power systems need to think out of the box both figuratively and literally to be able to offer the market systems that are purpose-built for outdoor telecom sites and to outdoor telecom standards.

With this in mind, Flexenclosure’s eSite x10 was designed and built from the ground up to address all of the issues above and it has revolutionised the industry. It is an IP65 sealed, tamper-proof unit with no moving parts and passive convection cooling for outdoor temperatures up to 55°C. Soft switching between grid and gensets has replaced mechanical ATS’ and protects the unit from damaging input power. And specially designed power components provide additional electrical protection. This increased sophistication also allows greater amounts of power to be harvested from an unreliable grid.

The truth is there was never any logical sense in building indoor hybrid power systems for extreme outdoor use, and now there is no longer any reason to deploy them. The benefits of modern hybrid power systems include simplified maintenance, longer life span, lower total cost of ownership, reduced risk of theft, simplified logistics, and improved reliability and performance.
Lithium ion batteries could eliminate the need for diesel generators

Perspectives on a new generation of energy storage solutions

GS Yuasa is a leading manufacturer and distributor of energy storage solutions which has been serving various industries for decades prior to its final merger back in 2004. The company has been supplying mobile network operators with its solutions and is now actively doing business with independent towercos and ESCOs.

In this exclusive interview, GS Yuasa’s General Manager, Mr Soichi Hanano, shares his views and insights on the dynamics of the energy business and how the company can support green targets as well as cost reduction initiatives.

Keywords: GS Yuasa, Southeast Asia, Japan, Southern Asia, East Asia, China, India, Bangladesh, Pakistan, Australia, Thailand, Hong Kong, Asia Pacific, Interview, Batteries, Opex Reduction, Energy Storage, Lithium, Off-Grid, Unreliable Grid, ESCOs

TowerXchange: Tell us about GS Yuasa and its footprint in Asia.

Soichi Hanano, General Manager, Industrial Battery Department, Marketing Division, International Business Unit, GS Yuasa: GS Yuasa is a Japanese company formed in 2004 by the merger of two large, 100-year old battery manufacturers; Japan Storage Battery Co., Ltd., known as GS, and Yuasa Corporation. At US$3.5 billion in sales, GS Yuasa is currently one of the world’s largest battery manufacturers.

GS Yuasa manufactures a full line of technologies including lithium ion, lead acid, nickel metal hydride, and nickel cadmium for the automotive, industrial, telecommunications and specialty battery markets. With thirty-six affiliates in sixteen countries, GS Yuasa has a worldwide presence operating under the GS Yuasa, GS, and Yuasa brands.

GS Yuasa’s major achievement in terms of supplying long life VRLA and lithium ion batteries in the Asian telecommunication market come from our relationships with major MNOs in China, India, Bangladesh, Pakistan, Australia, Thailand, Hong Kong and Japan, where we have been supplying lead acid batteries for several decades and where lithium ion is rapidly gaining acceptance.

TowerXchange: Who are your key clients and which products are they showing their interests the most?

Read this article to learn:
- GS Yuasa’s footprint, client base and evolution
- Why lithium ion batteries are the right choice for off-grid sites
- How the right battery can support green initiatives
- The evolution of the industry business model and the arrival of towercos and ESCOs

www.towerxchange.com/meetups/meetup-asia   |   TowerXchange Asia Dossier 2017   | 217
Soichi Hanano, General Manager, Industrial Battery Department, Marketing Division, International Business Unit, GS Yuasa: Our key clients in the telecommunications sector are mobile network operators who own telecom towers to whom we have been supplying batteries for many years. However towercos and ESCOs, who have started managing passive equipment including batteries, are becoming a very relevant part of our business. We are aware that the independent towerco model is widely accepted in developing countries, where the need for cell site densification and extension is urgent and capex intensive.

In terms of customers’ requirements, we experience a variety of scenarios. Although our principle service is to supply batteries for site backup, the choice of product depends on a combination of factors, including peripheral devices, renewable generation, remote monitoring, electricity condition and grid stability.

GS Yuasa is a well established battery manufacturer with exceptional experience of supporting new applications. It is our strength to have a wide line-up of products such as long life VRLA, advanced VRLA with superior cyclic life performance and lithium ion batteries. Our new lithium ion products have cutting edge performance, which allows us to offer new approaches to energy storage that were not previously feasible.

The lithium ion battery has especially superior characteristics for cyclic life performance, quick charging and deep discharging and is attracting a huge amount of interest from MNOs as well as towercos, who use lithium ion batteries as a core power component for the telecom base stations in areas with poor electricity networks.

TowerXchange: What is the percentage of your business coming from MNOs versus towercos? And how big of a change the entrance of towercos represented for your business?

Soichi Hanano, General Manager, Industrial Battery Department, Marketing Division, International Business Unit, GS Yuasa: I’d say to date 60% of our business comes from MNOs and 40% from towercos. However, the percentage of business coming from towercos has been increasing and we presume the trend will continue in the future, as the business model for managing telecom towers continues to change.

Today towercos are focusing intensely on reducing opex as this is the primary way for them to increase profitability. GS Yuasa has had to provide much support to towercos in their pursuit of efficient operation as we have considerable project management experience in terms of recognising and analysing telecom base station load patterns by data logging and proposing the most suitable power system, depending on the site condition. We then follow up with a field trial and, eventually, with the commercial implementation. Our approach is particularly useful for MNOs and towercos who have experienced site instability due to poor power quality.
GS Yuasa is working not only as a battery manufacturer and supplier but also proposing green power solutions that can contribute to reducing opex as well as CO2 in the long term.

**TowerXchange: How does GS Yuasa address the environmental issues in markets where green initiatives are flourishing?**

Soichi Hanano, General Manager, Industrial Battery Department, Marketing Division, International Business Unit, GS Yuasa: Our batteries are usually deployed as components of larger systems. Their use in the power delivery system of a telecom base station is a typical example. We believe that the environmental impact of our products should be evaluated as part of the whole assessment of a particular application, rather than a narrow definition of battery production and disposal impacts.

In off-grid and unreliable grid scenarios, the choice of battery can strongly influence the selection of the primary energy source. Our lithium ion technology is allowing our clients to avoid utilising any fossil fuel based solution thanks to its high charge acceptance and long cycle life at elevated temperatures. In some sites we are able to avoid the deployment of diesel generators altogether by harnessing intermittent grid supplies or renewable power sources more effectively.

Having an overall cost benefit, in addition to environmental advantages, generally helps promoting green initiatives. Luckily this isn’t hard when diesel generators are involved!

Local operating conditions can have an enormous impact in the choice of the appropriate green storage solution. The lead acid battery is often perceived as an environmental hazard because of its heavy metal content. In reality, lead is exceptionally recyclable, therefore we can easily demonstrate its advantages as long as a safe recycling infrastructure is locally accessible.

Our company is unique in our range of traditional and new battery technologies, which allows us to provide an unbiased view of the most appropriate green solution to a particular application.

**TowerXchange: What performance and ROI can be achieved with lithium-ion batteries at unreliable or off-grid sites? How do life-cycles compare with lead acid batteries?**

Soichi Hanano, General Manager, Industrial Battery Department, Marketing Division, International Business Unit, GS Yuasa: Utilising lithium-ion batteries in unreliable or off-grid sites can deliver great opex savings and overall financial benefits. In fact, full charge can be obtained in less than two hours, which means that even in the case of frequent power outages, the need for diesel fuel purchases and delivery costs can be greatly reduced or eliminated altogether. For some sites we have shown that DG capex can also be avoided which allows companies to achieve the payback point within one or two years.

The lifecycle of lithium-ion batteries is five to ten times greater than currently utilised lead acid technology and their performance is not degraded, even if they never experience a full charge.

In any case, these characteristics greatly improve the flexibility of operation and reduce maintenance requirements of our products. Soon after the payback period, our clients start realising the advantageous opex savings which last for many years until replacements are required.

Finally, the electronic state of health monitoring system is an integral component of our products. It allows remote monitoring to be applied throughout the life of a telecom base station to provide long term operating efficiencies. In particular it means that there is no need for local input from skilled technicians to maintain the operation of the battery. The optimum performance and replacement strategy can be applied to every site across a whole network.
gsmtowers transition from tower manufacturer to full turnkey solution provider

GSMTOWERS evolves designs and business model to meet client requirements in Myanmar

Back in February 2014, we spoke to Christian Strømme, Managing Director, GSMTOWERS, about his company's activities in Myanmar. We thought that we would get back in touch with him to review progress. Since our last interview, GSMTOWERS has rolled out almost 400 towers across Myanmar and is now offering a full turnkey solution to the local tower company Irrawaddy Green Towers (IGT). But the company also has ambitious plans for the future which include renovating and upgrading MPT’s legacy infrastructure.

Keywords: Asia, Capacity Enhancements, Construction, Customs, Greenfield, GSM Telecom Products, GSMTOWERS, How to Guide, IGT, Infrastructure Sharing, KSGM, Logistics, Masts & Towers, MPT, Myanmar, Network, Rollout, New license, Ooredoo, Passive Equipment, Southeast Asia, Spare Parts, Steelwork, Telenor Myanmar, Warehousing, Who’s Who

TowerXchange: We last spoke with you about your work in Myanmar in early 2014. Could you give us an update on how your projects have proceeded?

Christian Strømme, Managing Director, GSMTOWERS: We’ve been working with the local tower company Irrawaddy Green Towers (IGT) right from the beginning. In fact, our partnership dates back to the time when they received their very first tower order and they had to go through the whole state approval process. In 2014, we rolled out 300 towers across Myanmar, and did 121 structural surveys and analyses for KSGM and this year we expect to add an additional 100 towers and will do tower strengthening on another 65 sites.

Our partnership with IGT has evolved over time. There was a development six months ago that provides a good illustration of how things have changed. Up to 2014, we were working in a supply only role. Now we offer a turnkey solution that involves everything from site acquisition through construction to RFI.

TowerXchange: How have the telecoms and import regulations changed?

Christian Strømme, Managing Director, GSMTOWERS: There have been a lot of changes in terms of import regulations. When we started operating in Myanmar, the new telecoms laws were shrouded in mystery – no one knew exactly what was happening. Getting an import license was an issue so we had to find alternative routes to market. Now the import system is well established and all MNOs
have import licenses. As a result, everything is now imported by the MNOs or towercos directly.

When we first started out we had to send product descriptions with each shipment. But now we just have to include a packing list and bill of lading. There’s much less hassle, which is a big plus. Last year we had to get towers approved by Yangon City Development Committee (YCDC) and the regional state governments, which was at the time a big issue, as it was a first time for them as well. Now all is much easier as the processes are known, and well tried. However, I should mention that buildings and local permits are still issued separately. So when we buy land we have to get approval from municipalities and villages.

We also find it is harder to buy land on behalf of Ooredoo Myanmar than Telenor. Sometimes, local monastic institutions raise objections to Ooredoo plans, which can cause problems. But we’re still making progress.

_TowerXchange: Conditions on the ground including weather and infrastructure have been a problem from the start in Myanmar. Have there been any changes or improvements?_

_Christian Strømme, Managing Director, GSMTOWERS:_ We’re now moving deeper into rural areas so transport infrastructure has become an issue. We’ve had to contend with a tough rainy season which is only coming to an end now. The rain removed a lot of the existing infrastructure as it does every year so we are having to contend with considerable environmental challenges. On the positive side, it is now possible for us to move more around and get to sites by car.

There are cases when we have to improvise to get items on site. For example, we recently had to build an elevated track over a wetland to move a diesel generator. To accomplish this, we asked a sub-contractor to build a track along the wetland. We then built a simple train track and used an old train wagon to move it. Because the terrain was so difficult we also had to build a small bridge to move the item along the track.

That gives you an idea of some of the problems that we encounter out in the field. That’s why it’s vital to have a good local logistical partner in Myanmar.

Talking about infrastructure generally, it’s clear that there have been some improvements over the past two years. You can see lots of road building activity in and around Yangon. There are more small vehicles on the road and the government seems to be putting a concerted effort into building slide bridges. In the rural areas, villages are insisting that their roads be rebuilt as part of a site acquisition agreement. We often find that when we buy land for a customer, the local chief will insist on road repairs as part of the deal.

The overall pace of the rollout hasn’t slowed, although admittedly there have been some quiet periods between the three phases. Last year, for example, there was a dip in activity around Christmas when the Optima project (Editor: Optima was the proposed shared rollout between Telenor and Ooredoo) fell through. But after that plans went back into high gear.

_TowerXchange: How have your operations in Myanmar changed? What have been the main lessons learned so far?_

_Christian Strømme, Managing Director, GSMTOWERS:_ We have made some changes to the way in which we supply towers. We now have heavier pieces that come in fewer parts. At the start of the year we decided to adapt our original design – we went from having more lightweight pieces in a four legged model to a three legged tubular model, to reduce the number of pieces in the tower. This was due to feedback from our clients, that they kept losing pieces. A total of ten tonnes of steel went missing. We came to the conclusion that our design had too many small parts in it which meant that parts could go missing or be stolen. As a result, we’ve adapted our original design (easier to hand carry)
to one that it is more easily manageable. We've also cut down on any redundancies to ensure that there are no lost pieces. On the whole, we're happy with the decision. Although we have fewer options for upgrades later, and it is more difficult to hand carry, we've been able to reduce our risk exposure. We can also rollout parts much faster.

Since making the decision to change the design of our product we've also acquired our own warehouse. It's allowed us to better monitor and store stock. It's also helped us to realise our goal of becoming more of a full service, turnkey provider. Nowadays, we look after the stock to ensure that there isn't any mismanagement.

TowerXchange: What does the future hold for GSMTOWERS in Myanmar?

Christian Strømme, Managing Director, GSMTOWERS: We got our first contract as a turnkey service provider in August 2015. Since then we’ve completed our site acquisition and are finalising the first towers on air.

In addition, we’re also involved in providing upgrades to the legacy infrastructure in Myanmar owned by MPT. As part of this project, we’re working with KSGM to repair these towers and make them shareable. Typically, they tend to be old structures that pre-date the recent rollout.

We started servicing these structures last year and will begin repairing them this year. It’s all part of our soft move into full turnkey status.

See you at our future events!

Meetup Asia 2017
12-13 December, Singapore

Meetup Europe 2018
17-18 April, London

Meetup Americas 2018
20-21 June, Boca Raton

Meetup Africa & ME 2018
9-10 October, Johannesburg

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The next generation of network and site level energy intelligence

Huawei drives energy efficiency and eases the transition to hybrid systems

Since entering the market 7 years ago, Huawei Telecom Energy has become the number one supplier in the telecom energy industry. Investing over 10% of revenues into R&D, the company is focused on ensuring their products are at the cutting edge of technology, of the highest quality and future proofed to be ready for changing requirements in the telecoms sector. TowerXchange speak to Wang Zhiwu, General Manager of Huawei Telecom Energy to learn more.


Read this article to learn:
- Attitudes towards renewables deployment globally
- How Huawei’s product line is equipped to ease the transition to renewables when MNOs and towercos decide to make the switch
- Strategies to tackle the high cost of energy associated with cooling
- How intelligence is being developed at both the network and site level to improve energy efficiency
- What differentiates Huawei from its competitors

TowerXchange: Please can you introduce Huawei and their energy division.

Wang Zhiwu, General Manager, Huawei Telecom Energy: Huawei is the largest telecommunications company in the world with revenues of over US$60bn last year. The network energy business is one of 7 Huawei product lines, which is divided up into four units; telecom network energy, data centre energy, solar power stations and secondary power supply.

For the network energy division we have nine energy centres; seven in China, one in Japan and one in Germany. We employ over 2,000 energy engineers and 10% of our revenue we invest in R&D.

Our energy division entered the telecommunications field back in 2009 and since then we have become the number one supplier in the telecom energy industry in terms of market share (as highlighted in an independent study conducted by Frost & Sullivan). We work in over 170 countries and so have an extensive footprint.

TowerXchange: As such a global organisation, how have Huawei observed the switch to renewable energy to power cell sites amongst the world’s MNOs and towercos? What rate do you see this trend progressing at?

Wang Zhiwu, General Manager, Huawei Telecom Energy: In my opinion, renewable energy in the MNO and towerco space is at a very early stage, only...
an estimated 2% of sites have renewable energy as a source of generation. This means that most sites in poor grid areas are reliant on diesel generators at present and there is a huge opportunity for renewable energy as the costs come down. In some countries, the cost of renewable energy generation is approaching grid parity and so the business case is becoming more compelling.

In addition, renewables offer a good backup option even for grid connected sites, offering that level of security in the event of grid failure. There are cases even in the UK where MNOs are looking at renewable energy on their cell sites.

A further driver in the move towards renewable energy is in the reduction of carbon emissions. In China and other developing countries where the economy is growing rapidly, pollution is becoming a major concern and so governments are investing heavily in renewable energy. In China, China Tower Company has a portfolio of over one million sites and have plans to deploy solar on a large scale in line with objectives from the government.

**TowerXchange: How does Huawei’s solution support the use of renewable energy at cell sites?**

**Wang Zhiwu, General Manager, Huawei Telecom Energy:** The deployment of renewable energy on cell sites has stalled because of the costs but this will change. All of our energy solutions have the ability to support all energy inputs, be it solar, wind, grid or any other source of generation. The system is ready to accept whichever generation technology and so when the time is right for a company to make the switch to renewables, the integration will be as seamless as possible.

Secondly there is a high degree of flexibility in our systems. Due to space constraints for example, not all cell sites have a big enough footprint to handle the size of the solar system that is required to power the site. Our power systems have the ability to support different power generation capacities and so are suitable for all scenarios.

Thirdly, we have intelligence built into our network management systems and controllers which automatically can select the best power setting. For example, with hybrid sites, when the sun is shining the controller will prioritise power generation from the solar panels as this is the cheapest form of energy, when power is being generated from solar, the system will switch to grid (when available) as the next cheapest power generation source before relying on the diesel generator. The ability to move between different sources of generation automatically in order to ensure the lowest cost of electricity is one of the key features of Huawei’s system.

**TowerXchange:** Typically what proportion of costs/ energy usage is attributed to air conditioning and what strategies are being deployed globally to bring this down?

**Wang Zhiwu, General Manager, Huawei Telecom Energy:** In the past five years I have travelled very widely and seen lots of different scenarios. In Saudi Arabia, for example, temperatures can rise to over 50°C in the daytime, in this instance we found in our test lab that up to 40% of power usage will be due to air conditioning to bring this temperature down.
Companies need to rethink their cooling strategies in order to control costs and we see three key ways they can tackle this.

Firstly, MNOs and towercos need to assess and reduce the susceptibility of equipment to high temperatures. A lot of equipment can operate at temperatures up to 60°C, yet MNOs are still cooling it to 25°C; equipment that can withstand the higher temperatures should be kept in separate compartments to that which needs to be cooled and this will reduce the cooling requirements.

It is usually only the battery that exhibits strong sensitivity to high temperatures and as such, we have been working for the past three years on how to increase the performance of batteries at these extremes. In 2014 we launched a new high temperature battery that can operate at temperatures up to 45°C. This means that the aircon system in the aforementioned case where temperatures reach 60°C, will only need to bring the temperature down by 15°C rather than 35°C and this can equate to energy savings on a cell site of up to 30%.

A second area that tower owners should consider is cooling on demand. Whilst aircon may be essential in the height of summer, in winter or cooler evenings, a simple fan will provide the cooling required. Switching from aircon to a hybrid system will enable a reduction in power consumption used by cooling by as much as 20-35%. Huawei’s controller has the ability to intelligently switch between the two cooling systems automatically, dependent on the temperature inside and outside the cabinet.

**TowerXchange: How is energy being more effectively controlled and managed at cell sites, what intelligent solutions do you see being built into systems and how has this evolved?**

**Wang Zhiwu, General Manager, Huawei Telecom Energy:** When we talk about intelligent solutions there are two levels; network level intelligence and site level intelligence.

At the network level I believe that in the future, all sites will be fully integrated into an energy network management system which enables tower owners to look at the bigger picture in terms of energy usage on their networks. This is particularly important for towercos who have much higher power usage due to the presence of multiple tenants on their sites. With a single tenant a site may use 5kW but as you add further tenants this could go up to 15kW. With an energy management system, towercos can spot weakness of their energy system, looking at which province or which district within a province has the highest power consumption. Having this information, helps inform towerco decision making when it comes to investments and energy efficiency improvements.

When it comes to site level intelligence, the usage of hybrid generation systems is at a very early stage but intelligence built into the system that enables switching between each generation source automatically will bring considerable savings to tower owners. Huawei’s control system enables this automatic switching, ensuring that the cheapest source of energy is used be it solar, grid or diesel.

**TowerXchange: What makes Huawei stand out from its competitors in the field?**

**Wang Zhiwu, General Manager, Huawei Telecom Energy:** There are three key areas where we feel Huawei stands out from its competitors. Firstly, in the past seven years, over 10% of Huawei network energy product line revenue has been invested into energy R&D. This is a much larger investment than any of our competitors and it ensures that our technologies are always at the cutting edge of research, bringing innovative solutions to improve network efficiency.

The second area is in regards to quality. Huawei have very strict processes in place to guarantee that our products are manufactured to the highest standard. We have adopted systematic managed processes, like the Integrated Product Development (IPD) process learned from IBM, which helps control our production processes and ensure that we are always reaching the highest quality levels.

Finally, Huawei bring an understanding about the telecoms sector that other energy equipment providers simply do not have. The tower industry has changed as towers have moved into the hands of independent towercos and with this new energy requirements have been created. Huawei’s understanding of the telecoms sector allows us to tailor our solutions to ensure that we stay aligned with the future shape of the industry.
Making tower automation consumable: Journey from data to decisions

Infozech’s iTower suite tackles the huge volume of variable data being generated by diverse RMS systems

Whilst remote monitoring and site management systems have the capacity to generate a wealth of data, turning this into actionable intelligence remains key. TowerXchange speak to Infozech to understand how the company is helping tower owners move from data to decisions.

Keywords: Africa, Asset Register, Energy, Infozech, KPIs, Logistics, Monitoring & Management, O&M, Operational Excellence, QoS, RMS, Site Level Profitability, Site Management System, Site Visits, SLA, Who’s Who

Ankur Lal, Founder & CEO, Infozech

Ankur Lal, Founder & CEO, Infozech: When we talk about data collection, two key aspects are (i) collation from multiple points of origin and (ii) the sanctity of the received data. The biggest challenge is to have a federated view of data and to manage the “single source of truth”. Another issue of increasing concern is missing and incorrect data.

Infozech’s systems address these challenges by providing a strong fundamental structure for data management. Our systems provide the necessary platform to collate data from multiple interconnected or remote sources and act as the data management warehouse that becomes the foundation for single source of the various data elements in the network. We understand that data organisation alone does not serve the purpose and to have a single reliable data source it is imperative to have data sanctity checks that our systems provides.

To maintain a single version of sanitised data, Infozech utilises reconciliation of data at various levels:

Data Validation: Infozech’s platform has been designed in a way that it automatically eliminates the repetitive inflow of same data, selecting the same value and capturing it. The captured data is verified against permissible ranges and likely values.
based on business logics. Every raw data packet and its value is validated against its defined type and threshold value to filter out the garbage values, what we term as noise associated with the data. The data discrepancies are highlighted and filled in using Smoothening Algorithm and Fill-In feature that Infozech has developed.

**Reconciliation**: multiple channels of data coming up from machine sensors and the manual data feed from mobile applications are all reconciled and a clean version is achieved. This enables the user to interact with the single version of data, post all the vendor negotiations. Data for grid energy usage is also reconciled with the power bill and a final version is maintained in the system. This verified data now serves the purpose of providing insights on how to plan and make relevant decisions.

**TowerXchange: What steps have Infozech made to increase automation in remote monitoring and maintenance and what noticeable impact has this had on optimising costs?**

**Ankur Lal, Founder & CEO, Infozech**: Towercos and operators have invested a lot in intelligent RMS and monitoring systems but either the RMS is not sending data packets then site visibility becomes difficult. Our monitoring platform gives a 360 degree view of all the sites which are Online or Offline. It has helped our customers to identify sites with recurring problems and after correction of those problems, almost 95% of the sites are brought to online. This has increased the visibility of sites to the people operating at the NOC.

**Data Management**: Infozech’s system is hardware agnostic and collects real time data from diverse RMS. This data can have noise which translates into wrongful actions. Infozech has developed a proprietary algorithm which filters the noise and helps in deriving meaningful insights from the data. The meaningful data is action oriented and infers real insights for critical issues. Thus correct actions can be taken on critical issues at the right time which helps towercos reduce site downtime.

Towercos face the biggest challenges in maintaining the site that provides high quality services to maintain site uptime at a cost that doesn’t erode profitability. That is why many towercos are turning to Infozech for help in transforming their field force for maintenance activities at the site.

Infozech’s maintenance module enables last mile usage with access to data (Energy, Trouble Ticketing (TT), Preventive Maintenance) from different devices like mobile, tablet and web. We have enabled our customers to follow a mobile first approach to capture data from the field in real time. Our algorithms deliver logic for predictive maintenance based on the energy consumption pattern of the site. This ensures that the equipment is serviced well on time before any failure happens. This reduces maintenance cost and decreased truck roll.

**TowerXchange: How does Infozech help partners track and manage energy more efficiently?**

**Ankur Lal, Founder & CEO, Infozech**: With large number of towers across different geographies, consolidating data for tracking and managing energy consumption has become a nightmare for passive infrastructure providers. With variable power supply at these sites it is more difficult to track energy usage. Energy usage data is collected manually and tabulated in Excel sheets and then sent to senior managers for decision making. This process involves a long cycle and often data is changed before any actions can be taken. It is difficult to validate the energy consumption data which leads to reconciliation issues between the customers and the fuel suppliers. This time consuming process leads to long billing cycles.

In order to help partners track and manage energy efficiently, Infozech has developed an innovative mobile solution for last mile usage by the technicians and fillers. All energy parameters like DG, Grid and battery are captured from the mobile. We have multiple checkpoints in the system to deal with inconsistent and wrong data. The quality of data ensures that meaningful insights can be drawn from the data. Our platform captures energy data sent from the RMS. We also have a portal to upload
fuel filling data, therefore we have three data source (Mobile, Sensor & Portal) for comparison. This provides the energy managers with more information and they can approve or reject a particular set of data based on the trend.

Infozech’s intelligent iETS (Energy Tracking System) platform predicts fuel filling of sites based on the consumption pattern and a notification is sent to the concerned filler before the site runs out of fuel. This helps energy managers in better planning for fuel usage, purchase and procurement from the supplier. iETS provides important report which helps track budget for energy management.

**TowerXchange: Ensuring that billing is carried out seamlessly is critical to a towerco’s business model, how does Infozech help their partners in automating this and what has been the response from clients?**

Ankur Lal, Founder & CEO, Infozech: Tower billing is becoming more and more complex by each passing year due to a significant increase in number of parameters involved in the billing. Furthermore, the lack of reliable data for the final settlement with operators leads to many disputes each month. Most of the billing activities are happening manually on Excel spreadsheets which are prone to human error easily. This not only affects the billing calculations, but also affects revenue realisation for the tower company.

Infozech offers an effective and efficient end-to-end billing solution – iBill, which addresses these challenges and improves operational efficiencies in the billing process. A flexible rule based billing logic layer is available for the user where he himself can set up MSAs and billing rules based on different sets of billing parameters. This can be done as and when required, thus ensuring a faster turnaround. This configuration is required only once, which makes the month-on-month billing process person independent and reduces the dependency on SME.

Billing data is available in a single repository and a controlled access is available to different users. Any exceptions in this data are highlighted, and corrective actions can be defined. Bills are generated automatically from this sanitised data, which ensures accuracy of the generated bills. Moreover, bill approval workflow available in iBill helps in identifying any revenue leakage. An automated process for bill generation ensures quick bill generation, which further ensures timely payments from operators.

In addition, historical information along with audit history is maintained for any data-set changes, which provides easy and quick access for reference and verification. This results in transparency, leading to minimal billing disputes, and timely resolution of disputes with customers.

One of the customers using iBill has told us that the extensiveness provided by iBill in terms of configuring MSAs, and configurability of building new business rules on the fly has provided flexibility to their sales team to go into market with new plans and pitch the business models to the operators which are more suitable to them. He also mentioned that automation has significantly improved the accuracy and overall efficiency in the billing process, and helped us to recognise around 1% additional revenue, which was earlier not recognised due to inefficiencies.

**TowerXchange: In addition to supporting billing, how do Infozech support towercos in asset reconciliation in order to take better control of their revenue management?**

Ankur Lal, Founder & CEO, Infozech: Telecom operators have thousands of tower sites spread across different geographies. Each of these sites has its own passive infrastructure setup and operational cost in terms of rent, location, power consumption, fuel used, equipment installed et cetera. Reconciliation processes are required at different stages (Asset Management, Operator Billing, and Vendor Payment) of the telecom tower industry. Each business function (O&M, Finance, and Opex Controller) performs several steps of reconciliation to reach the desired outcome.

Accuracy of asset information related to a site is most important for financial and compliance management as it forms the basis of revenue through operator billing. Hence, asset reconciliation enabling tracking of the discrepancies between the physical inventory of what actually exists and the database accounting system of what should exist, becomes an important part of asset management.

Infozech built a reconciliation solution to support
towercos in asset reconciliation. This helps them take better control of their revenue management:

Analyse: understand asset information requirements and management needs. Various sources of information are analysed and process and frequency of data management is analysed which forms basis of reconciliation system setup. Data Preparation: Data collection engine is setup to collect data from different sources over different interfaces and varied formats. Validation rules are defined for each different source to identify data discrepancies, check and ensure completeness of data.

Automate: iRecon tool is setup to consume data from different sources and define process workflow to reconcile data from these sources based on business rules. iRecon publishes information gaps and mismatches and enables informed decisions to take corrective actions.

Outcome: Get an accurate picture of what assets exist, where they are and their present condition. iRecon provides the versioning of asset data which enables tracking of asset throughout its lifecycle.

Key benefits of Infozech’s rule based automated reconciliation engine are:
1. It enables fact based decision making on capex and opex planning for assets.
2. Automated process data reconciliation and management eliminates people led process redundancy.
3. Platform is flexible to cater for today’s needs as well as adapt to future needs.
TowerXchange: Can you tell us some of IPT Powertech’s major achievements for the benefit of readers not familiar with your company?

Khaled Habbal, VP & COO, IPT Powertech: IPT Powertech has been a first mover in the industry at multiple times throughout its 24-year-long history. Back in the 1990s, we started out as a provider of starter and specialty batteries. We were the first to introduce and stock sealed and specially application batteries. When the telecom sector picked up in 1995-1996, we immediately noticed the great value we can add, so we started offering battery systems to telcos. A few years later, we expanded into selling power systems, and we were also the first to foresee the need to integrate power into outdoor cabinets, so we made a strategic decision to manufacture our own cabinets independently, and hence became a full-fledged energy system integrator. We were also the first to launch the hybrid battery concept, we became one of the few companies in the region, if not the only one, to combine product R&D to our assembly facilities in Romania and Lebanon.

In parallel, we had launched our telecom services division, which consists of three main pillars: 1) site construction service, that is, building telecom sites and laying optical fibers; 2) telecom installation and network services; and 3) field managed services and maintenance.

Our ability to combine our power expertise, telecom services, and managed services at the same time became our differentiation factor, and this
propelled our recent success in introducing and implementing the Guaranteed Savings and T-ESCO models.

Our journey has been a rapid evolution to becoming one of the regional players in our field with reach to more than 50 countries coupled with a geographic presence in 11 countries in Africa, South East Asia and the Middle East.

The past year has been an exceptional one. We ventured into two large projects for a major towerco in Nigeria, supplying energy efficient power solutions including a long-term management, maintenance, and guaranteed opex optimisation contract.

We also signed a long-term contract with one of the major operators in Myanmar, providing managed services through a combination of a guaranteed savings model and T-ESCO models for their entire network.

All these achievements would not have been possible without the dedication of our 2,500+ experts who live our slogan “Redefining Power Solutions, Reinventing Telecom Infrastructure.” They relentlessly serve the top clients in the region and deliver projects to more than 60 operators in more than 50 countries.

**TowerXchange: How have you adapted the Telecom Energy Services Company (T-ESCO) business model to better serve MNO and towerco needs?**

**Khaled Habbal, VP & COO, IPT Powertech:** We have been serving the largest MNOs across many continents for more than 20 years by providing a wide range of products and services from comprehensive and tailor-made power solutions through to passive and active infrastructure. Throughout the expansion of our business and diversification of our activities, our broad array of offerings has seen a considerable evolution across the whole telecom and power value chain of MNOs and towercos. As for telecom power, we adapted our business model to fulfill the needs of our customers by providing an holistic solution of energy efficient products and managed services as a Telecom Energy Services Company (T-ESCO).

Our own energy services offerings are categorised in two main streams, one called The Guaranteed Savings Model and the other T-ESCO model and both serve MNOs and towercos in a way to reflect the appetite for capex spending or capex leasing. Both models ensure the deliverables of power availability and reliability to the network respecting all Service Level Agreements (SLAs) related are met.

We have seen in some instances in Africa, MNOs that are not planning to divest their towers however are looking to divest their power equipment. In those instances, with the pressure coming from the global profitability of the MNOs, we are providing the T-ESCO model whereby all investment to modernise power solutions and making them efficient and deliver the required availability are provided by IPT Powertech Group. Naturally, servicing a long-term contract for the same is a key factor for its success. On the other hand, we have noticed that towercos have access to investment resources and strategic directions whereby they invest themselves through innovative and energy efficient power solutions; however, they need the deliverables to be met and the promise of those solutions to be achieved which is reflected in our guaranteed savings model.

**TowerXchange: What is your approach to eliminate the ‘blame game’ where energy equipment manufacturers and O&M service provider blame each other for any performance failures?**

**Khaled Habbal, VP & COO, IPT Powertech:** It has always been a dilemma between the energy equipment manufacturer and O&M service provider where one side blames the other side either on the actual specs of a product and its deliverables or on the service level and the maintenance operations.

Our approach is simple: combine energy equipment provider, system integration, and O&M service contracting services to create a single point of accountability. By being the energy system integrator and the contractor at the same time, we are able to manage key points in the value chain, thus leaving no room for performance failure—or for the ‘blame game.’ In fact, we believe that our group is one the few solution providers globally offering and merging hybrid and renewable energy solutions with telecom infrastructure services and offering field managed services and maintenance all at the same time.
Managed services contractors buying energy solutions and managing them will only be able to cover themselves during the warranty period. Their real challenge starts after the warranty period expires.

The combination of expertise all under one roof makes IPT Powertech Group one of the few global parties able to eliminate the blame game and provide top-notch services to towercos, MNOs and ultimately power availability for the telecom networks.

**TowerXchange: We understand IPT Powertech operate power systems at over 3,200 Ooredoo Myanmar towers - can you give us a sense of the operating conditions and challenges in Myanmar?**

**Khaled Habbal, VP & COO, IPT Powertech:** IPT Powertech Group is enrolled in an end-to-end managed service contract with Ooredoo Myanmar including rollout services, operation and maintenance, grid connection, generator fueling, power management and power colocation which is extremely challenging from a geographical, political, operational and financial perspective.

From an operational and organisational perspective, the situation is very challenging as we are covering the totality of the country with its area of 677,000 sq km ranging between mountains, forests and tough terrains through to rivers, lakes and oceans. Out of the total universe of Ooredoo’s 4,500 sites, Linfra Myanmar is currently managing 3,200 sites which are divided between edotco’s 1,250 sites, PAMEL’s 1,250 sites and 700 Ooredoo self-built sites which are spread-out all over Myanmar across the 15 regions. Approximately 65% of the sites are off-grid while the remaining are grid connected. The grid availability and reliability is not consistent which means lots of outages, both planned and unplanned. The off-grid sites by themselves bring tremendous challenges from regular fueling to preventive maintenance ensuring mean time to repair (MTTR) is in line with our committed SLAs.

With a five month season of ravaging monsoon and rampant floods, operating conditions become extremely stringent, whereby we take necessary measures to overcome such constraints by deploying additional resources and enhanced logistics to maintain the quality and best performance of our services. We also face access, security and political issues in some regions which are handled by our CSR team who is strongly engaged with local communities and groups to come up with proper resolutions. Availability of stable power remains a major challenge to our operations and service level agreements.

**TowerXchange: How do you see the future of cell site energy in Myanmar, given that edotco has committed to provide full power as a service, and that the towerco which owns the other substantial portion of Ooredoo’s towers, PAMEL, is for sale? Other Myanmar towercos provide energy equipment with energy costs passed through to the tenant - how can we correct the disincentive to invest in energy efficiency this results in?**

**Khaled Habbal, VP & COO, IPT Powertech:** The tower landscape in Myanmar is divided between seven tower companies surpassing the 10,000 towers mark during 2017. Major players are edotco, Pan Asia (or PAMEL), Irrawaddy Green Towers (IGT), Apollo Towers, OCK, EFT and MIG. Under our managed services contract with Ooredoo, we are fully responsible in managing the energy consumption on sites comprising of supplying and delivering generator fuel and managing the electricity supplied by the national grid of Myanmar. The energy pass-through model does not have a disincentive outcome for us to invest in energy efficiency for two main motives:

- Our objective is to optimise the operational expenditures (opex) of our customers notably on the energy consumption.
- Our guaranteed savings model starts with the design, engineering, manufacturing and supply of power-efficient solutions to ensure lowest capex, opex and TCO to our customers. Moreover, we are committed to our environmental values in protecting the environment and reducing carbon footprint by continuously optimising the use of generators, and by reducing engine run-hours while minimising noise pollution to local communities.

**TowerXchange: Let's talk about Nigeria. How have IPT Powertech come to be so trusted by Nigeria's leading towerco, IHS?**

**Khaled Habbal, VP & COO, IPT Powertech:** We started working with IHS in 2003. At that time, IHS
was a site construction contractor. Over the years, we developed a strong relationship with IHS by repeatedly reengineering our proposed solutions to fit with their growing site requirements. It wasn’t long before IHS became the largest tower company in Africa. Our stellar achievement was the deployment of hybrid concepts on their sites, which was recognised when IPT Powertech was selected as the preferred power solution vendor of several towercos in multiple countries.

Now, we are engaged with IHS in Nigeria on the largest project of Guaranteed Savings across the African continent. We are proud to be one of the largest suppliers of power efficient solutions and one of the main contractors ensuring the Guaranteed Savings Model.

The Guaranteed Savings Model is a risk-free approach for securing full economisation and savings for the operators and towercos. The model works by reducing the capex and opex to reach the optimal Total Cost of Ownership (TCO), while maximising the lifetime of the equipment.

TowerXchange: We understand IPT Powertech manages the energy equipment at a large number of Nigerian cell sites for IHS. How does the contract structure and operating conditions in Nigeria compare to those in Myanmar?

**Khaled Habbal, VP & COO, IPT Powertech:** As I mentioned, IPT Powertech Group is engaged in Nigeria with the largest towercos on the major project of Guaranteed Savings across the African continent, supplying energy efficient power solutions—including management and long-term maintenance — and opex optimisation under a long-term contract.

As for Myanmar, we established our business there a little less than two years ago, by offering the Guaranteed Savings Model and T-ESCO Model. Myanmar has interesting potential for the future, and our growth there is stimulated by the need of this region for energy-efficient products and infrastructure services adapted to the local market’s requirements. Based on our agreement, all future expansion of the network comes as a kWh model which is effectively our T-ESCO model.

According to this model, energy is sold as a service. We guarantee that no capex, nor capex replacement investment, is required from the operator. The operator will only be charged based on a consumption scale of our own solutions. We will be responsible for all the investment in capex, opex, replacement of spare parts over time, and system management.

**TowerXchange:** Who defines your energy equipment selection policy? Is it driven by your clients, Ooredoo and IHS, or does IPT Powertech decide what equipment to buy and install?

**Khaled Habbal, VP & COO, IPT Powertech:** Our selection of energy equipment is a two-phase process that run simultaneously: on one hand, our team undertakes extensive and thorough site surveys to gather useful information that will help us determine the appropriate type of energy equipment; in parallel, we conduct several meetings with the client to clearly understand their needs, then we croscheck their requirements with the survey results to decide on the best course of action. The findings of the field study and the customer’s main demands are communicated back and forth with our IPT design team, who are always on standby mode to create customised solutions that fully compliment the client’s requirements.

Our positioning in the market as the complete solutions provider has provided us with the expertise to propose the right solution that the client is looking for, and we move forward with development, manufacturing the equipment, integrating it within the system, and maintaining our own solution for optimal performance. In short, we provide customers with a complete and hassle-free service, so that they can focus their attention on their core business.

A key element behind the successful relationship with our clients is our common focus on the Total Cost of Ownership “TCO”, and in particular that we work with IHS and Ooredoo on long-term contracts.

TowerXchange: Providing energy as a service in Myanmar and Nigeria is a costly undertaking. How is your business financed? Would you welcome third party investment to finance further deals of this nature?

**Khaled Habbal, VP & COO, IPT Powertech:** One of IPT Powertech’s strengths is that it is self-funded, and this has given us an inherent autonomy when it comes to decision-making. Naturally, we take well-calculated risks, which is why we were able to grow...
exponentially over the past years without needing external funding. Being highly capitalised with good financial backing from commercial banks allowed us to internally invest in and finance the Guaranteed Savings and T-ESCO models. The introduction of the Guaranteed Savings and T-ESCO models has been extremely successful and has gained the attention of new clients.

In order to accommodate this exponential growth and finance further opportunities, we have recently started looking for external funding though third-party investment or other type of financial means.

**TowerXchange:** There is often a tradeoff between capitally intensive hybrid and renewable energy equipment with lower operating costs and longer lifecycles, compared to other proven DGs and battery combinations that might have less longevity but which might be more familiar to field engineers - what is your energy equipment investment philosophy?

**Khaled Habbal, VP & COO, IPT Powertech:** Switching from the conventional solution to hybrid solutions has been an on-going dilemma in the last couple of decades for MNOs and tower companies.

Hybrid solutions were born from the need to reduce opex, which basically consists of maintenance expenses, fuel expenses and energy bills. When any of these expenditures increase — consequently increasing the opex — clients start searching for alternative power solutions. Therefore, we tailor our power solutions based on the country conditions and specificities such as solar and wind applicability, geographic and land conditions, accessibility to sites and the spread of sites and operation method.

When fuel prices skyrocketed in 2007-2014, the majority of the MNOs easily made the decision to switch to hybrid solutions and put an end to this dilemma. Nevertheless, it is not easy to identify the starting point of this switch since the investments and networks are huge. So the focus was on reducing the cost of diesel, which reached unprecedented levels and put a huge stress on MNOs on many levels: operation, logistics, vandalism, cost, and so on. Accordingly, we have designed solutions that reduce diesel consumption drastically. That was an appealing strategy since it eliminated the client’s fuel stress while achieving a short payback time, given the high fuel price back then.

IPT Powertech always emphasised to the clients the required resources to run the solution and provided all the training needed accordingly.

Each country and operation has its own specificities and accordingly, their own suitable solutions. Therefore, and after the fuel price went back to lower levels, MNOs and tower companies started to focus more on optimising the maintenance expenditures to control opex. More attention was given to technologies used inside the solutions and its compatibility to the operation and country. Available technologies in the market were not an issue by themselves since they are mature enough and tested, but the technical capabilities of the technical teams and the available business model had a more direct effect on the operation of the solution.

To conclude, each time and period has its own energy equipment investment philosophy. With the price of oil today and the need to reduce opex, we are developing solutions that answer our clients’ need.

We can assure that operational excellence is a strategy that proved successful across all times and this can only be driven by operational leadership and by continuously investing in our people.

**TowerXchange:** Finally, what lessons have you learned that might be transferrable in other countries where MNOs or towercos are considering partnering with ESCOs?

**Khaled Habbal, VP & COO, IPT Powertech:** Based on our experience, we believe that the long-term partnership between towercos, MNOs and powercos is essential and driven to deliver the lowest TCO.

Our group is proud to be among the few global players that have presence in multiple geographies in different continents along with power system integration expertise putting us in a unique position to be able to offer this end-to-end solution eliminating the otherwise unavoidable blame game which is seen almost everywhere.

Therefore, the single point of responsibility is key to the success of outsourcing power to become a service.
KIRLOSKAR OIL ENGINES LIMITED: A leading global presence

An interview with Joint Managing Director, RR Deshpande

Having supplied to many of the leading towercos and operators in India, Africa and the Middle East; Kirloskar is a recognised name in the provision of green diesel generating sets to the telecoms sector. With a new product set to be launched and ongoing R&D to enhance generator lifespan, TowerXchange speak to Kirloskar’s joint managing director, RR Deshpande to find out more.

Keywords: Africa & ME, DG Runtime, Energy, Energy Efficiency, Hybrid Power, India, KOEL, Kirloskar, KIRLOSKAR OIL ENGINES LIMITED, Opex Reduction, Who’s Who

TowerXchange: Please can you introduce Kirloskar Oil Engines and its products to TowerXchange readers.

RR Deshpande, Joint Managing Director, KIRLOSKAR OIL ENGINES LIMITED: The Kirloskar Legacy stands for a tradition of excellence for more than a century now. A personification of leading values and visionary goals, the name ‘Kirloskar’ is engraved on numerous nation-building milestones. Today, the Kirloskar Group stands as an enormous industrial conglomerate.

Incorporated in 1946, KOEL is the flagship company of the Kirloskar group. We have four state-of-the-art manufacturing units in India that offer world-class service. The company has a sizable presence in international markets, with offices in Dubai, South Africa, and Kenya, and representatives in Indonesia and Nigeria. KOEL also has a strong distribution network throughout the Middle East and Africa.

Today KOEL is an acknowledged leader in the manufacturing of diesel engines, agricultural pumpsets, power tillers and generating sets.

Kirloskar Green Diesel Generating Sets – have a range from 5 kVA to 625 kVA. We will soon be launching 750 kVA to our global markets. Our products are most preferred in the telecom sector – having an installation base of 75,000 in this segment in India.

TowerXchange: What companies has Kirloskar Oil Engines worked with and what is the company’s footprint?

RR Deshpande, Joint Managing Director, KIRLOSKAR OIL ENGINES LIMITED: Having supplied to many of the leading towercos and operators in India, Africa and the Middle East; Kirloskar is a recognised name in the provision of green diesel generating sets to the telecoms sector. With a new product set to be launched and ongoing R&D to enhance generator lifespan, TowerXchange speak to Kirloskar’s joint managing director, RR Deshpande to find out more.

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Kirloskar Green Generating Sets have a lifespan of more than 10,000 hours, and in-house R&D teams are continuously developing components and processes to ensure that the life and reliability of the product is improving.

Emphasis on regular maintenance and service practices provided by Kirloskar, and using genuine Kirloskar spares can surely prolong the lifespan of Generating sets.

TowerXchange: Generator lifespan and reliability is something that is frequently spoken about by towerco's and operators - what kind of lifespan is reasonable and what can be done prolong it?

RR Deshpande, Joint Managing Director, KIRLOSKAR OIL ENGINES LIMITED: Kirloskar Green Generating Sets have a lifespan of more than 10,000 hours, and in-house R&D teams are continuously developing components and processes to ensure that the life and reliability of the product is improving.

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TowerXchange: How does Kirloskar Oil Engines see the move to generator-hybrid systems shifting across the telecoms sector and what impact does this have on the company’s strategy?

RR Deshpande, Joint Managing Director, KIRLOSKAR OIL ENGINES LIMITED: Kirloskar is aware of the dynamics of the telecom market, and is fully equipped to provide hybrid solutions as per market demands, availability of alternate fuel/hybrid power remains a concern. Kirloskar is already has the technology and is working on providing a cost effective and viable solution.

TowerXchange: With generators often spoken about as a commodity item, how does Kirloskar Oil Engines differentiate itself from its peers?

RR Deshpande, Joint Managing Director, KIRLOSKAR OIL ENGINES LIMITED: Kirloskar has a strong service network, and we have “service as a differentiator”. This puts us way ahead of other generating set manufacturers.

Kirloskar Generating Sets have lower operating costs, and robust performance at right cost makes us the most value added player in the Generating Set market.
IPS unleashes the Off-Grid Beast!

EXERON runs virtually maintenance free, and can reduce opex by 96%!

International Power Supply (IPS) has developed a robust, military-grade off-grid power solution, which has now been refined for virtually maintenance free operation in telecom applications. IPS’s modular solution is readily upgradeable for the era of infrastructure sharing, and has the advantage of all the components having been developed and sourced from the same manufacturer. TowerXchange spoke to CEO Alexander Rangelov to learn more...

Keywords: Air Conditioning, Batteries, DG Runtime, Energy, Energy Efficiency, Hybrid Power, IPS, Infrastructure Sharing, International Power Supply, Lithium, Logistics, Microgeneration, Off-Grid, On-Grid, Opex Reduction, RMS, ROI, Rectifiers, SLA, Shelters, Site Visits, Spare Parts, Who’s Who

Read this article to learn:
- How IPS developed and attracted investment into EXERON – The Off-Grid Beast
- Reducing telecom opex by 96% with a 16 month ROI on a 1.5 kW load site
- How dynamic control of battery charging can extend battery life by 30%
- How IPS simplify delivery, installation and maintenance
- The importance of all the power systems, enclosures and A/C equipment coming from the same manufacturer

TowerXchange: Please introduce International Power Supply to our readers – where do you fit in the telecoms infrastructure ecosystem?

Alexander Rangelov, CEO, IPS: IPS is a 26 year experienced high tech company specialised in the R&D and manufacturing of power electronics and energy conversion technologies for the areas of telecommunications, off-grid electricity, defense and railways. We are deeply specialised in the design and development of complete telecom indoor and outdoor power solutions for both grid connected and off-grid applications. Our portfolio includes all kinds of power components and solutions needed for telecom infrastructure, all of which are developed, designed and manufactured by us in Sofia, Bulgaria (EU).

TowerXchange: What has attracted PTIG, PostScriptum Ventures and BlackPeak Capital to invest in IPS and how are you going to deploy the capital?

Alexander Rangelov, CEO, IPS: Our investors have been attracted from our unique and innovative product: EXERON – The Off-Grid Beast. It was invented by IPS initially for military applications (powering communication infrastructure and desert camps) for providing reliable power in remote and hardly accessible areas with harsh ambient conditions. In the last seven years we developed the system to become a solution addressing the global electricity and environmental problem. The fast market penetration and
international recognition we have achieved, the IPS team’s passion and our enormous R&D ability made our investors keen on supporting our global expansion. The capital is invested in R&D, business and market development, new logistic hubs and offices around the world as well as manufacturing facilities.

IPS has partners, distributors and operating systems in 51 countries. Offices, logistics hubs and service points are distributed worldwide at strategic locations.

TowerXchange: How are your solutions proven in terms of their ability to reduce opex in distributed telecom networks?

Alexander Rangelov, CEO, IPS: Regarding opex reduction, it is very important to find the optimum correlation between the opex reduction level and the return of investment (RoI) period. With one of our projects with a large telco group we achieved 96% telecom opex reduction and a 16 month return of investment period for a diesel generator powered off-grid site with 1.5 kW constant telecom load. This result is thanks to the highest integration level of the EXERON system components and the innovative process and battery management. IPS developed unique software for dynamic control of the battery charging process, leading to extending the battery life by approximately 30%.

TowerXchange: What is the “sweet spot” in terms of the kW load on the site which EXERON is able to support?

Alexander Rangelov, CEO, IPS: We are not limited to any output power. The whole EXERON system structure is based on power modules of 2 kW or 4 kW. So the minimum power step is practically 2 kW. The unique IPS communication protocol can address up to 16,300 modules simultaneously. So, this means 16,300 modules x 2 kW or 4 kW.

A large number of modules are used in our mini grid applications, but for telecom applications typical numbers would be 2 kW, 4 kW, 6 kW, or up to 36 kW in some special cases.

TowerXchange: Tell us about IPS’s Exeron system and how it meets the needs of towercos who need to increase the power capacity at cell sites as additional tenants are added?

Alexander Rangelov, CEO, IPS: The modular system structure offers great scalability and flexibility. There is only one unit (MCU – Main Control Unit) that monitors and controls all system modules (rectifiers, solar charge controllers, inverters, DC-DC converters). All of them are hot pluggable. The power capacity extension for any power system component is easily done by simply adding new plug&play power modules. The advantage of having only one MCU for the whole system, and sourcing all modules from only one manufacturer, is great efficiency, redundancy and self-control. It is the base for the intelligent mini-grid systems. It is unique because the same EXERON technology with the same control unit that is used for telco towers can be deployed as a mini-grid electricity solution for villages controlling and monitoring over 16,300
power modules corresponding to 65 MW of power. That is why we call it EXERON – The Off-Grid Beast!

TowerXchange: Tower companies’ Service Level Agreements (SLAs) often demand 99.5-99.9% uptime – tell us about the reliability and autonomy of your solution.

Alexander Rangelov, CEO, IPS: IPS is developing and manufacturing all products under the NATO military standard for quality AQAP 2110, so every single component meets higher requirements than usual. As mentioned before the EXERON system has been developed initially for military applications in remote areas. A big advantage is that it can operate in very harsh ambient conditions with temperatures between -40°C and +80°C, heights above 4000m above sea level, high humidity and salinity, acid environments et cetera. These features are not always the case for civil applications but have high importance for the telco companies in some areas of Africa, Asia and South America.

TowerXchange: How do you ensure ease of delivery, installation and maintenance of your solutions at remote cell sites?

Alexander Rangelov, CEO, IPS: The ease of delivery is guaranteed with the new manufacturing facilities that we have built and the logistics hubs in Africa, Asia, Australia and America. The ease of installation is guaranteed in a few simple steps, since everything is included and pre-installed in the system. The EXERON runs basically maintenance free, however if some of the modules need to be exchanged – it takes not more than ten seconds, because every single system module is hot pluggable (rectifiers, solar charge controllers, inverters, DC-DC converters, the MCU – Main Control Unit, surge protection devices et cetera). Another big advantage is that an outage in one of the modules or more of them cannot lead to a full system stop. Even in case of main control unit failure, the system will continue its operation unchanged.

Following the military standards for quality during the development phases and manufacturing, a high system availability and robustness is guaranteed. It is a clear advantage and of crucial importance for remote, hardly accessible and long-distance site locations, which leads directly to reduced opex costs.

TowerXchange: Should remote monitoring capabilities be built in to energy systems or should third party RMS be used to monitor performance?

Alexander Rangelov, CEO, IPS: Yes, the remote monitoring is built in to the EXERON. It offers three options for remote monitoring and signaling: there are potential free contacts for signaling (event relays), there is an SNMP monitoring, and the third one is the integrated web server in the MCU. It is accessible through HTTP. You can monitor, but also control the functions and parameters of the system. The MCU can also monitor and transfer the signals from different sensors that can be connected to the EXERON – smoke, fire, humidity, temperature, et cetera: up to 16 sensors.
better performance, faster RoI, robustness, advanced features and functionality, a global all-in-one scalable solution, leading to outstanding opex savings

TowerXchange: Do you see IPS being a pure solution provider, or do you have any appetite to explore energy services company (ESCO) business models?

Alexander Rangelov, CEO, IPS: IPS is a R&D and manufacturing company, so in this aspect we are a pure solution provider. In 2016 together with our investors we started offering also the ESCO business model, but mainly for residential applications.

TowerXchange: How would you differentiate IPS and EXERON from competitive modular hybrid energy solutions?

Alexander Rangelov, CEO, IPS: In just a few words: better performance, faster RoI, robustness, advanced features and functionality, a global all-in-one scalable solution, leading to outstanding opex savings.

EXERON is a multi-talented beast! It can be used for grid connected sites in the way of a customised outdoor cabinet with a purely modular rectifier. At the same time EXERON can be deployed to control and optimise hybrid diesel genset-battery sites, but also PV-diesel-battery sites. The good thing is that it can start as grid connected or hybrid configuration and then at anytime new power modules can be added – solar charge controllers and/or inverters. All within the same architecture. And under the same MCU control unit.

To mention it again, our clear advantage over other solutions is the fact that we develop and manufacture all the system modules. At the end they talk to each other in the system via a unique communication protocol, developed by IPS and delivering optimal performance and efficiency. In addition, we have the ability to scale our power modules. There are a lot good solutions and products on the market, but they have limitations. Still in 2014 in Germany, EXERON won the world innovation ees Award for innovative off-grid power systems with energy storage. We are continuously developing the system and believe that this is the only way to break limits and create innovative functionalities and features.

IPS designs and manufactures not only the power systems, but also the proper environment - enclosures and outdoor cabinets with many options, heat exchange options, but also with our own developed air conditioning module. We have even built a redundant air conditioner for cooling and heating. It’s virtually maintenance free! Sounds good?!

TowerXchange: What’s next for IPS and EXERON?

Alexander Rangelov, CEO, IPS: We are ready to open a new chapter in IPS’s successful history in the next couple of months, which will be a huge technological jump. In the beginning of 2017 we are planning to release a new storage technology integrated in the EXERON which will offer the long life and multicycle ability of Lithium-based batteries, but at the price levels of Lead-based batteries. Keep an eye on IPS and EXERON-The Off-Grid Beast!
Orissa Wicomm: telecom infrastructure project implement experts

How this I&C firm deployed RMS and access control solutions at 5,200 Asian cell sites in 14 months

Nallen Singhe, CEO, Orissa Wicomm: I’ve been in the telecommunications industry since 1993, originally with operator Maxis, then with energy equipment provider Eltek. In between I was also COO at a broadband operator in the Philippines. I started Orissa Wicomm in 2011 initially with a focus on renewable and industrial power, but we were drawn back into telecommunications, for whom we provide lightning protection, DC power, cooling, RMS, batteries, fuel cells, solar, COWs et cetera – we’re focused on the infrastructure side of the business.

Orissa Wicomm represents several leading suppliers in the region, including Hitachi, Ellego, Ballard, Envicool, Invendis, Acsys, Ying Li and Narada.

Nallen Singhe, CEO, Orissa Wicomm: We were trying to sell batteries and power systems to edotco, but were asked to participate in an RFP to integrate two key technologies with their ECHO monitoring centre in Kuala Lumpur: remote monitoring and access control systems for edotco – we learn more about that project, their aspirations as a licensed network facilities provider in Malaysia, and their experiences in The Philippines in this exclusive interview with CEO Nallen Singhe.


Read this article to learn:
- The critical success factors behind the installation of RMS and access control systems at 5,200 cell sites in 14 months
- How Orissa Wicomm secured an NFP license with intent to build their own towers
- The structure of the tower market in Malaysia
- How tower networks are being modernised in The Philippines
of which Invendis were the stand-out choice; the sensors were easy to connect to each other, and calibration was easy. Invendis were selected as the RMS supplier, and they introduced Acsys for access control.

We did a 15 site proof of concept in each country before the main rollout. This enabled us to train the engineering, operations and management teams, and to quality check the fuel, battery and temperature monitoring sensors.

The first PO was for 3,000 sites, and I remember Invendis initially thought we could rollout maybe 500 per year – we deployed at a spectacular rate, installing solutions at 5,200 sites in 14 months across Bangladesh, Malaysia and Sri Lanka! Invendis now has capacity to supply 3-4,000 new sites per quarter in this region.

TowerXchange: What were the critical success factors behind the implementation of RMS and access control systems for edotco?

Nallen Singhe, CEO, Orissa Wicomm: edotco were very open about the process and the budget; they gave us plenty of leeway and treated us like part of the company not just as a supplier.

Another critical success factor was our experience on the ground in the region. We didn’t reinvent the wheel, we used existing networks and local partners in Bangladesh, Sri Lanka and Malaysia who know how to deploy, and who know the stakeholders at the MNOs. They also knew the local “lords” who can restrict access if you don’t manage the relationships carefully.

TowerXchange: A common challenge when rolling out RMS and access control solutions, which are in part designed to combat fuel and equipment theft, is that much of that theft originates within the supply chain, which can result in would-be thieves trying to discredit or vandalise the systems – what has been your experience with these issues?

Nallen Singhe, CEO, Orissa Wicomm: We anticipated more problems with this than we actually encountered. Because our proofs of concept had demonstrated to edotco management that the solution worked, their eyes were open if people claimed the system didn’t work because they didn’t want fuel consumption to be watched. We also laid many cables underground in steel pipes, and as a result have had no cable cuts to date.

Fuel theft has been dramatically reduced, and there have been fewer battery thefts in the last year. Thanks to the Acsys mechatronic lock system, an internal thief would have to use their own key to enter the site and steal fuel or equipment and we’d know it was them.

TowerXchange: What’s next for your RMS and access control project?

Nallen Singhe, CEO, Orissa Wicomm: The total contract was for 12,000 sites in four countries; next year we’re hoping to rollout in Cambodia, plus more sites in Sri Lanka and Bangladesh. Now we have developed and proven our expertise in deploying RMS, we’re promoting the
solution to other operators in Malaysia and The Philippines.

**TowerXchange:** We understand Orissa Wicomm is interested in building and leasing your own towers – what can you tell us about that?

**Nallen Singhe, CEO, Orissa Wicomm:** A couple of months ago we were awarded a Network Facilities Provider (NFP) license in Malaysia.

We needed to demonstrate to the Multimedia and Telecom Ministry how we were going to add value to Malaysia’s telecom infrastructure – in particular we needed to have a unique land bank of prospective sites to offer. There are Hindus, Christians and Muslims in Malaysia, and each has a substantial number of places of worship. We were able to sign up a deal with an authority which controls 2,700 Hindu temple compounds, many with a lot of land in strategic places. The deal has a revenue sharing component that facilitates investment in community activities.

We want to compliment, not compete with, our friends at edotco. So we are working closely with edotco to map this land bank against their sites, and work together to offer them to operators. We will retain a proportion of the sites ourselves as we had to make a commitment to the Ministry to build a certain number of towers per year. We hope to have our first towers up by Q1 2017.

Whether or not the telcos ask for them, I will put in Invendis and Acsys solutions onto my towers at my own cost – I want intelligent towers, enabling us to show operators it’s easy to monitor their towers, and I don’t want my field engineers to drive hundreds of kilometers just to get a key!

Orissa Wicomm also wants to be the go-to-guys to provide green power because we understand the unique requirements of these sites. If you need to build a site off grid we can design and build sites with the latest fuel cells, solar hybrid and/or lithium ion batteries, all at competitive prices because we deal directly with manufacturers – in some cases because we represent them directly.

**TowerXchange:** What have been your impressions of the towerco segment in Malaysia?

**Nallen Singhe, CEO, Orissa Wicomm:** There are around 150 NFP license holders and 20 are active. While all the NFP licenses are nationwide, most are held by State backed towercos who remain focused on a single State. The State backed towercos have a close relationship with the stakeholders who control site permitting and approvals, giving them near-monopoly status within some States. However some (not all!) of them don’t have the funds and can be slow to rollout. The MNOs sometimes get impatient to rollout, and are reluctant to meet high rental costs – lease rates are fairly uniform in Malaysia.

In addition to the State backed towercos there are a handful of independent towercos, the most active today of which are edotco, OCK and Premium Radius... And soon Orissa Wicomm!

**TowerXchange:** I understand you personally have considerable experience in The Philippines, and that Orissa Wicomm has an office in the country. What can you tell us about the tower network in The Philippines?

**Nallen Singhe, CEO, Orissa Wicomm:** Globe has around 7,300 towers in The Philippines and Smart around 9,000.

There are currently no towercos in The Philippines. We had enquired whether either company might be interested to share their towers, but at the moment there seems to be no real push to form a towerco or to sell to the towercos. Both MNOs are serving over 50mn subscribers, and have healthy balance sheets and thus no financial impetus to sell their towers. However, they are still extending coverage, building new towers yearly, and we’re helping with a major network modernisation programme, for example installing a lot of lithium ion batteries and LPS at key sites.

However the operational cost of running a tower network in The Philippines is phenomenal. Sometimes we have to catch a plane, then a boat then take a donkey up a mountain to install lightning protection systems or lithium batteries at a remote tower! We think remote monitoring and access control systems could be valuable tools in such an environment.
Methanol fuel cells making inroads into the telecoms sector
An interview with SerEnergy, the world’s largest methanol fuel cell manufacturer

SerEnergy is the largest methanol fuel cell manufacturer in the world, supplying solutions for ships, vehicles and stationary power generation across the globe. TowerXchange speak to the company’s Head of Stationary Power, John Lindegaard Kjær to understand where fuel cells can bring real benefits to grid connected, poor-grid and off-grid telecom sites.


Read this article to learn:
- Who SerEnergy are, which sectors they serve and what their fuel production capacity is
- Use cases of fuel cells and how they compare to other sources of power generation
- Serenergy’s fuel cell efficiencies and space requirements for indoor and outdoor scenarios
- How easy fuel cells are to install and maintain
- The CO₂-emission reduction potential of fuel cells
- What differentiates SerEnergy from other fuel cell suppliers

TowerXchange: Please can you introduce SerEnergy.

John Lindegaard Kjær, Head of Stationary Power, SerEnergy: SerEnergy is a world leading developer and manufacturer of reformed methanol fuel cell solutions applicable for ships, vehicles and stationary power generation, for example for telecom sites, running either as backup, supplementary or primary power source. Systems are largely deployed within all areas around the world.

SerEnergy’s products are based on High Temperature PEM fuel cell technology providing the customers with high-quality solutions with attractive economic returns and features. The products reflect on the company’s rich experience within system design, offering cost-efficient and highly reliable systems.

With a green mindset SerEnergy aims to contribute to the world’s transition from fossil fuels to renewable energy at the same time as overcoming some of the known obstacles within the renewable sector such as flexibility and availability.

With headquarters in Aalborg Denmark, SerEnergy is the largest methanol fuel cell manufacturer worldwide with a production capacity up to 25MW (5000 units) per year. On top of a premium product, SerEnergy is continuously investing heavily in creating a service organisation that can support our customers within all areas worldwide.
TowerXchange: Fuel cells are not something that have been spoken about as extensively in TowerXchange discussions, can you explain what grid situations they are most suited to and how extensively they have been deployed?

John Lindegaard Kjær, Head of Stationary Power, SerEnergy: There are various types of methanol fuel cell systems, but in general they can be used for backup power, supplementary power or primary power.

Backup power
A lot of customers around the world rely on being able to run communication systems at all times. This also puts more stress on the reliability of the systems and on grid availability. This means that even if you are based in areas where loss of grid (down time) only happens every second year or less you still need a backup system that is always able to provide power so that your systems keep running. If you need longer than 6-8 hours of backup time, batteries typically become too heavy, space demanding and expensive. Traditional diesel generators offer long backup time, but for systems that are not running very often they still need to be maintained and you need to make several startups per year to make sure they can run in a backup situation. Our fuel cells offer great advantages in those cases since they are able to be used for both short and long backup time. At the same time, they are more or less self-maintaining and even if they are not in use the systems are able to be kept in optimal conditions through self-test programs and automatic startup cycles.

Supplementary power
In many situations and in many regions in the world you need a supplementary power system which is able to take over when the primary power source is not running. The system could run several hours per day or per week. This could be for regions with unreliable grid but it could also be part of a green installation with solar panels, wind turbines or other energy sources where the fuel cells can ensure that the system is running 24/7. In many parts of the world, especially Asia and Africa the grid is highly unreliable and in order to keep telecom sites up and running you need either an alternative to grid power or a system that can run several hours a day or per week due to outages. Methanol fuel cells offer an ideal solution to conventional power sources like diesel generators due to low fuel cost and less maintenance.

Primary power
Methanol fuel cell systems are a great alternative to traditional diesel generators when it comes to providing power on off-grid sites. Typically, there are large investments involved in connecting especially remote sites to the grid, so together with the low operation cost and the relative little investment the fuel cell system can offer large cost benefits for the customers. Compared to diesel generators both maintenance and fuel cost are in most cases much lower when operating a methanol fuel cell system.

TowerXchange: What advantages do fuel cells offer above other sources of generation?

John Lindegaard Kjær, Head of Stationary Power, SerEnergy: The fuel cell technology has a number of advantages compared to batteries and diesel generators especially making them suitable in many situations both for backup, supplementary and primary power. First of all, the fuel cell system is a technology that offers a up to 70% reduction of CO2-emissions. Besides that, the fuel cell technology offers several clear advantages compared to diesel generators. Especially in densely populated areas where the surroundings are quite sensitive to noise, vibrations and harmful emissions. Diesel generators will give you all three at the same time, while the fuel cell system can offer you low noise,
no vibrations and no harmful emissions due to the nature of the technology. This allow customers to setup the base-stations where the coverage is best and it also makes it easier to get the required approvals from the owner of the property as well as the authorities.

Fuel cell solutions offers a very compact design per kW. It can be installed in either an outdoor cabinet next to the actual telecom equipment or it can be integrated into an existing indoor solution. In an outdoor solution, the footprint for up to 15 kW is typically not bigger than 1x1 metre including cabinet, modules and tank while in an indoor installation offers an even smaller footprint integrated into e.g. a 19” rack system. Not only is it convenient on existing sites but it also saves money on rental cost and installation.

Our fuel cell system is fully monitorable, not only when it comes to power output but you are also able to monitor the state of the inside of the system e.g. fuel cell stack, reformer etc. At the same time the system is running fully automatically and will be more or less self-maintaining and conditioning. The monitoring system also allows you to monitor fuel levels, state of the grid and alarms making it possible for the customers to respond faster to alarms, service requests etc.

The efficiency of the fuel cell system is another area where it outperforms existing technologies. The fuel cell system is dimensioned according to the exact needs of the customers and it runs at a very high efficiency no matter if it is delivering 30% of its capacity or 100%. The electrical efficiency rate is typically between 40-50%.

Methanol fuel cell offers a cheap fuel source. Methanol fuel cells runs on a blend of water and methanol which is easily accessible in most parts of the world and at low rates. At the same time the use of methanol offers a CO2-neutral alternative to traditional fuels, depending on the source of the methanol.

_TowerXchange: How robust is the system and how simple is it to install and maintain?_

**John Lindegaard Kjær, Head of Stationary Power, SerEnergy:** Fuel cells offers a robust design which is used for both stationary as well as mobility applications like cars and buses, meaning that the technology is equipped for the most extreme conditions. The installation of the fuel cell system is quite easy and in most cases, offers more flexible and faster installation options than traditional power sources – like the options for integration into existing enclosure solutions. The fuel cell system is a compact and lightweight design which is a big advantage for base stations with limited space and also for installations in city areas on rooftop sites, in buildings et cetera.

_TowerXchange: What kind of opex reductions can fuel cells provide and how does TCO compare to other sources?_

**John Lindegaard Kjær, Head of Stationary Power, SerEnergy:** Our methanol fuel cell systems offer low maintenance because they are self-conditioning and maintaining and the systems can be monitored remotely resulting in large savings in terms of service cost, unplanned site visits et cetera. As mentioned previously methanol is a cheap fuel source and in most cases and in most parts of the world methanol is cheaper compared to traditional fuel sources.

_TowerXchange: How do SerEnergy differentiate themselves from other fuel cell providers in the market?_

**John Lindegaard Kjær, Head of Stationary Power, SerEnergy:** SerEnergy was established back in 2006 and has since then worked intensively with the implementation of the technology into e-mobility, marine as well as stationary application like telecommunication. That also means that the SerEnergy fuel cell systems have been tested and deployed in many markets and with many customers giving a proof of concept which not many competing companies can match. SerEnergy is committed to serving our customers commercially and technically meaning that we support our customers remotely and locally in a way that not many of our competitors are able to offer. With SerEnergy being owned by Fischer Group, we also offer a solid financial base.
Accruent’s SaaS site management solution delivers for towercos

Siterra helps optimise key tower management tasks, and the service is constantly evolving to meet client needs

Accruent’s Siterra provides a platform much like a dedicated ERP for towercos and MNOs – they are experts in helping clients clean up and organise their data, making the solution ideal as companies scale their operations across multiple regions and countries. In the latest of a series of interviews exploring the capabilities of Siterra, TowerXchange focuses on the merits of using a native SaaS platform, and on data accuracy and standardisation, critical to accelerating time to market for tenants, and critical to driving tenancy ratio and valuation growth for the towerco or MNO.

**Keywords:** Accruent, Americas, Asia, Asset Lifecycle Platform, Asset Register, Capacity Enhancements, Central America, Europe, 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, South America, Transfer Assets, Who’s Who

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**TowerXchange:** Please introduce your company – where do you fit in the telecoms infrastructure ecosystem?

**Bill Glass, General Manager of Telecom, Accruent:**
We have developed an enterprise-class Software as a Service (SaaS) product for tower companies which encompasses the full site life cycle from site construction to co-location and the decommissioning of towers. Our software facilitates efficient operations and drives strong revenue growth for tower operators and managed service providers.

Think of us as an Enterprise Resource Planning (ERP) provider for tower companies and MNOs. We have the capacity to manage the entire ecosystem that surrounds tower infrastructure.

Co-location is one area we have a special focus on; most tower companies want to increase their co-tenancy ratio. What makes our company unique is that it has the capacity to manage the entire process from marketing through to fulfilment and operational management.

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

**Bill Glass, General Manager of Telecom, Accruent:**
Our solution has strong credibility in the market. Thirteen of the top 121 tower companies listed by TowerXchange are already current Accruent
customers. At present, we operate in twelve countries across five continents and have a particularly strong focus for 2016 on Europe and Central and Latin America. We are constantly adding new portfolios for our current customers and carrying out implementations in multiple countries.

At first, many of our clients purchase our solution to use it in a particular territory. However, once they have the solution installed, they realise that they can achieve operational efficiencies by rolling it out across all of their countries and portfolios, and we can support them in this endeavour. If a company wants to roll out our solution to multiple countries, we can help them standardise processes by rolling it out across all of their countries and portfolios, and we can support them in this endeavour. If a company wants to roll out our solution to multiple countries, we can help them standardise processes including reporting, colocation, license management, project management, vendor management, and inspection management.

One of the selling points of our solution is that it cleans up and standardises data. It puts data into a much more efficient site-centric format, which makes it easier for MNOs and tower companies to buy, integrate and market their assets. What's more, by handling data in a digestible manner, tower companies and MNOs can make towers available on the market faster and more cost efficiently, thereby increasing tenancy ratios.

TowerXchange: How does your solution help manage different stakeholders within the tower supply chain from tenants to subcontractors?

Bill Glass, General Manager of Telecom, Accruent:
The solution can help tower companies handle leads and administration models. In addition, the asset register and customer portal integration that sits at the heart of Siterra’s colocation solution can be used to provide up-to-date information on colocation. For example, a tower company may wish to inform an MNO of open towers that are available for rent. They will be able to do this through our portal.

Our solution can also be used to support contract and service provider management. In fact, Siterra uses a permissions-based model. If an operator or tower company wants to give a contractor or service provider access to the system it can do so very easily. The contractor or service provider can then carry out a task and post a photo to provide proof that the project has been completed. Siterra offers sophisticated tools for project managers to efficiently review work submitted for accuracy and quality. What's more, the system has built in security features so that each contractor's access and visibility is limited to only the assets, tasks, and sites that are necessary for their work.

TowerXchange: How can your SaaS platform be configured to adapt to different towercoms’ unique business processes and workflows?

Bill Glass, General Manager of Telecom, Accruent:
We are constantly developing and upgrading our platform to suit the needs of tower companies. As things currently stand, Siterra provides for more than 90% of tower companies’ needs straight out of the box. The remaining 10% can be easily configured on the platform so customers can adapt it to meet their specific requirements. We come to the engagement with our customer with best practices available to immediately drive efficiency based on our knowledge of the industry.

We’ve also developed many feature requests in partnership with our clients. A client will typically come to us with a request for a particular feature. Once we have developed that feature we will incorporate it into later versions of our platform so that other customers can take advantage of it.

Thanks to our focus on long term partnerships and successful product co-development, we've been able to create a stable platform for tower portfolios. However, we notice that many companies in the market continue to invest in custom software. We feel that this is a failed strategy because, over the long term, companies end up wasting IT resources and limiting the potential to make long term efficiency gains.
TowerXchange: How can a robust approach to asset registers and asset lifecycle management improve the valuation of tower assets?

Bill Glass, General Manager of Telecom, Accruent:
The main benefit comes in being able to understand the condition of the assets and the inventory associated to those assets. Being able to keep track of inventory is a benefit, particularly for large, international tower companies. Smaller companies, on the other hand, are looking to maximise their tower valuation for strategic buyers. That’s exactly where the site-centric focus of our software comes into play.

Our platform can provide complete access to maintenance records, site information and pictures of site equipment. This makes it extremely useful for strategic buyers and companies that are seeking to sell their assets.

For example, it isn’t really feasible for a strategic buyer to use manpower to inspect four thousand towers when purchasing a portfolio. By using Siterra, buyers and sellers can perform clean searches without digging through files and records to get access to the right information. We find that most buyers and sellers prefer to use Siterra to carry out the portfolio valuation process – at the end of the day our system reduces acquisition risk for acquirers and improves return on investment for sellers.

TowerXchange: Please sum up how you would differentiate your solution from your competitors?

Bill Glass, General Manager of Telecom, Accruent:
Our annual product investment is larger than most of our competitors’ revenues – that in itself differentiates us from our competitors.

On top of this, Siterra is a SaaS platform, so we have benefited from the shift towards cloud applications. Unlike many other solutions on the market, our SaaS application was not built from scratch based on an on-premises application – all of our incremental investments have been to enhance its functionality. Total costs for the customer can escalate quickly if a solution needs to be re-built over time or requires extensive support. That’s why it makes much more sense to purchase a proven SaaS solution like Siterra.

With some solutions on the market, users tend to become beholden to professional service teams after deployment. That’s not the case with Siterra. Once a customer has bought the solution and implemented it, they’re up and running. They don’t need to constantly check in with our professional services department.

There’s also a huge amount of functionality built into Siterra that allows customer system administrators to modify workflows, create new reports and manipulate site data on a large scale within the administration console. Users don’t need to receive any code or help from Accruent to make these changes.

In summary, our market share, our investment, and our product functionality significantly outweigh our competitors’ products, and over the last fifteen years, we have successfully brought the best of the best when it comes to industry best practices and knowledge.
Tarantula provides the go-to product for all things infrastructure
COO explains how Tarantula integrates all aspects of site management into one enterprise product

Thanks to its highly flexible workflow platform and portfolio management system, Tarantula supports around 350,000 towers worldwide with a value of approximately US$25bn and tracks over 6mn assets. In this interview, Maurice Barnes, Tarantula’s COO shares details about the company’s latest projects and the successful utilisation of the Red Cube and Orange Cube solutions in the Asian telecom tower market.

Keywords: Asia, Asset Register, Health & Safety, India, Interview, KPIs, Meetup Preview, Myanmar, O&M, Operational Excellence, QoS, ROI, Revenue assurance, Security, Site Management System, South Asia, Southeast Asia, Tarantula, Valuation, Volaris, Who’s Who

TowerXchange: Please introduce yourself and your background.

Maurice Barnes, COO, Tarantula: I have over ten years of experience in telecommunications infrastructure management. I was previously involved in international business development with Telstra Corporation and worked as Director of Business Technology Services with Crown Castle Australia. More recently, I spent five years working in the APAC region in enterprise software sales before joining Tarantula in early 2015 as Director, Customer Solutions prior to assuming my current role as COO in late 2016.

TowerXchange: Tell us about the Volaris acquisition of Tarantula.

Maurice Barnes, COO, Tarantula: In January 2017, we announced that we had been acquired by the Volaris Group, a company with deep experience in growing vertically focused software companies such as Tarantula. Volaris Group is a wholly owned division of Constellation Software Inc. (“Constellation”), which is listed on the Toronto Stock Exchange (TSX:CSU) with a market capitalisation in excess of US$12bn.

Volaris has a philosophy of never selling businesses that they buy. This provides us clear-cut stability and allows us to focus on our long-term goals. With the support of Volaris Group, we can continue to grow our business to better serve our customers worldwide.

Read this article to learn:
- Tarantula’s recent activities in Asia and highlights for the year
- How Tarantula has innovated to meet evolving client needs
- How Tarantula can help effectively manage multiple stakeholders
- Benefits of systems and data integration for tower portfolio management
TowerXchange: Could you give us an update on some of your recent activities in the Asian market? What have been the highlights of the past year?

Maurice Barnes, COO, Tarantula: Last year has been very exciting for Tarantula and gave us a chance to apply our long standing experience to different customer problems. Our customers faced various changes in their business and these needed to be factored into their tools. We came up with a number of practical solutions by leveraging the experience of our team with telecom companies and towercos. We distilled their expertise into our products and delivered value-add solutions to solve our customers’ business challenges.

We are in the process of helping one of our biggest towerco customers to deploy the O&M module to track their maintenance activities across multiple geographies. Usage of our mobility tool to track remote field activities as well as capture accurate site data will provide enormous value to the towerco in reducing operational costs. Additionally, we have been continually providing support to fine-tune the billing module to ensure that our application generates accurate and consistent financial data that can be used to secure revenue.

We also helped one of our major customers in India to integrate their application with Oracle and streamline BOQ management for additional efficiency. Keeping track of materials and services required for large-scale rollout is a time and labour-intensive process. When this information is retained by multiple stakeholders across multiple disparate applications, discrepancies can arise, leading to bottlenecks in project progress. Providing an interface between our application and Oracle will ensure that the application data flows seamlessly across the IT landscape and reduces data discrepancies. The interface also provides a mechanism to easily transfer key milestone dates to the Oracle system and ensure that the supply chain and procurement of parts is efficiently managed.

TowerXchange: We know that your products are continually evolving to meet the needs of the market; how has it changed since we last spoke?

Maurice Barnes, COO, Tarantula: Asia is a very diverse region and the evolution of the industry varies from country to country. The region offers everything from mature tower markets in India to new and growing markets like Myanmar which is just a few years old now.

There are big differences in operational and commercial environments across Asia and Tarantula has the capability to address various requirements across a broad spectrum. We leverage our telecoms experience to learn from our clients and adapt our solutions to work around their roadmap to best support them.

We are constantly adding new innovations to our product capabilities, be it to cater to the dynamic industry changes, to create value for various types of markets and stakeholders, or to address specific problems. We have been focusing on adding two new modules for transmission management and improved asset planning this past year.

As bandwidth is expanding, transmission is becoming an even more important feature for our customers who need to match the demand. The transmission module is being developed specifically for telcos enabling them to plan, source, and provision their transmission equipment and links as part of their network deployment. They will be able to track and manage the entire link lifecycle as well track costs through a workflow-based framework.

Additionally, the asset dictionary feature is being designed to extend our asset management capabilities and reduce asset duplication. The feature will minimise repeated manual inputs in creation of assets and their attributes. Users will need to register their asset in a centralised asset catalog and then be able to reuse the same asset information in site and project management.

Both these features will evolve further as we take on board feedback and inputs from our customers through our customer engagement process. Our customers can see that we absorb the feedback from our discussions with them, and insights into how their businesses run, and these are integrated directly as features in our products.
TowerXchange: How does your product help manage different stakeholders within the tower supply chain, from tenants to subcontractors?

Maurice Barnes, COO, Tarantula: There are a lot of different stakeholders involved in tower site management and many users that require site access. There can be many different protocols for this in different jurisdictions; for instance, in some cases health and safety documents must be received to permit site access. Contractors need to be given time slots to access the site to avoid overlap and crowding. All of this needs to be managed efficiently.

Our products can create different user groups to issue approvals in line with different processes, and provide electronic approval of requests to protect the integrity of the assets. This enables towercos to manage multiple tenants, allows them to know who is involved in what, and provides a project contact list with all stakeholders recorded. Sometimes our clients find stakeholders that they weren’t aware of and unauthorised equipment that has been installed. The product enables them to do a match-back with the asset register and identify any unauthorised equipment so they can decide the necessary action such as increasing the lease rate or moving the equipment elsewhere.

Red Cube also enables work orders such as site inspections, diesel checks, or asset counts to be allocated on the mobility app; this promotes proactive management of subcontractor work and allows our clients to know that the work orders actually happened. The platform tracks milestones so that all stakeholders know what they need to do, what’s next, and whether any changes are required.

TowerXchange: How can your solutions be configured to adapt to different towercos’ unique business processes and workflows?

Maurice Barnes, COO, Tarantula: Red Cube has over thirty real-world processes included out of the box; a start-up towerco could take this and use it right away. Having these processes makes a good baseline to configure for different clients. They could split one process into two steps, creating a legal and financial component for example. They can configure processes into layers, change what different roles in the company do, split one task into two, or combine three into one depending on their requirements. They can slim each process down or make them more complex, and then break them down again if necessary; since the core processes are available out of the box, it’s easy to change them.

The biggest complexity in tower portfolio management usually involves the different legal and commercial regulations in each country. Again, our experience in different markets has enabled us to create solutions that minimise problems...
Our products integrate with the multiple systems that towercos use, including trouble ticketing, ERPs, remote monitoring systems, and document management tools; this full data integration across all these systems enables towercos to maintain a single source of truth for end-users and this is integrated with all the other elements such as billing, capacity on site, discounts for existing tenants, tax, etcetera. Any of these features can be dragged and dropped in or removed as necessary to create the necessary overview of the project. Our products integrate with the multiple systems that towercos use, including trouble ticketing, ERPs, remote monitoring systems, and document management tools; this full data integration across all these systems enables towercos to maintain a single source of truth.

Maurice Barnes, COO, Tarantula: Accurate asset management has a huge impact on valuation of tower portfolios. The more you can demonstrate that you are implementing contracts, collecting your receivables, and ensuring there is integrity in what’s sitting on the sites, the better valuation you’re going to get. The key parameters are tracking, managing assets on site, creating a matrix, knowing what’s there and being able to create a direct link between these and the MLA and billing system. Being able to integrate all of the necessary elements of site management and link them together can provide a clearer picture of recurring cash flow: this asset belongs to that company, this is their lease, we bill them this, and this is their interplay with the site.

Moreover, the asset dictionary feature will reduce data duplication and offer more accuracy in the capture of tower assets.

TowerXchange: What are your plans for growth and expansion, and what is your future vision for the company?

Maurice Barnes, COO, Tarantula: Our focus is solely on improving how our customers manage and operate their shared infrastructure business. We’ve developed Red Cube, the go-to product for managing shared telecoms infrastructure. We’re the market leaders in the towerco space and our aim is to get into the telco space as well and provide coverage of both sides of the infrastructure sharing model, including towercos and telcos. To achieve this, we have rolled out Orange Cube, which is a product tailored to the needs of mobile network operators. We’re driving project management and asset reporting to include commercial management functionality for MNOs to help them improve ROI. We have implemented partner and relationship management so that we empower our customers, and in turn, their customers to succeed.

There is a lot of growth ahead on both sides of the infrastructure sharing model with the advent of 4G and later 5G. More sites will be required with more capacity, more small cell coverage and all operators and infrastructure providers need to start thinking about the new demands of this changing marketplace.
Total Telecom Energy Solution

Oil & Gas major uniquely combines diesel and solar into compelling Energy Solution for emerging market cell sites

Total are uniquely positioned to provide all four of the critical components of the ESCO proposition. They have obvious capacity and accountability for diesel logistics from a footprint of 15,000 refueling sites worldwide. And they have a global field workforce and a robust balance sheet. In addition, through SunPower, one of the world’s top three leaders in the solar industry, they have renewable energy solutions proven at off-grid telecom sites.


Ingrid Jaumain, Head of Energy Solutions, Total Marketing and Services

Ingrid Jaumain, Head of Energy Solutions, Total Marketing and Services: While Total needs no introduction, please could you introduce Total’s Energy Solutions department and your relationship with SunPower – where do you fit in the telecoms infrastructure ecosystem?

In terms of where Total fits in the telecoms infrastructure ecosystem, of course we play a critical role in fuel supply, supplying tens of thousands of cell sites with diesel either directly or distributed from our 15,000 gas stations. Our assets also include SunPower, a leading solar company which has installed over 3,000 pure solar and solar hybrid telecom sites. This gives Total a unique synthesis; we can leverage a huge client portfolio and operational footprint in challenging countries across Africa, the Middle East, Asia-Pacific, the Americas and the Caribbean – countries where MNOs and towercos have to tackle the challenge of generating energy far beyond the reach of the electricity grid.

SunPower was one of only the actors worldwide able to provide robust solar power solutions; when they started in the 1980’s it was a small market. SunPower develops the key components of their solution in-house, including data loggers and remote monitoring, and provides a full O&M service for several clients. Total’s Marketing & Services, one
of the three branches of the Total Group, has a view to providing a complete set of multi-energy services to a customer base with diverse energy needs, from MW power plants, commercial buildings and homes to remote, distributed sites.

Total has thousands of people in the field, which is critical to field operations in telecom. Given our responsibility both for fuel supply and service, customers can trust that our fuel deliveries are up to international standards both in terms of services and product quality. As an upstream and downstream major in African countries, for example, we can’t afford not to provide high quality service – we have to be reliable to keep the trust of our customers and stakeholders. Our customers are able to leverage Total’s commitment to high standards, and our commitment to better energy – our value proposition is all about reducing energy risk and optimising fuel operations, batteries and renewables from grid connected to unreliable and off grid environments.

The unique, global footprint of Total and SunPower, spanning deep knowledge of diesel and renewables, enables us to build a sustainable relationship with our clients, helping them to save money by showing them how to hybridise a site, and showing them which sites to hybridise.

Total has extensive experience of operating such multi-product projects for the mining industry, which faces similar challenges of providing capital intensive equipment with different sources of energy in remote areas. We are able to leverage multiple energy sources, from diesel and lubricants to solar.

**TowerXchange: How proven are your solutions in the field?**

**Ingrid Jaumain, Head of Energy Solutions, Total Marketing and Services:** Total and SunPower are...
already managing over 3,000 cell sites, including thousands of sites for a really big MNO in Africa for whom we also do O&M and fuel supply. For some clients and some sites we supply just diesel, sometimes it’s just solar.

My role is a new position within a new entity created to provide optimised energy solutions for our B2B customers. The Telecom sector is a priority for us and we aim at providing the industry with a consolidated, worldwide energy operator offer, ultimately delivered through an opex / ESCO business model based on the aforementioned value proposition of optimising the full energy path. In the most integrated models, the idea is to offer ten to fifteen year operating contracts with zero capex across Africa, the Middle East, Americas and APAC. We have all the bricks we need to put this all together.

**TowerXchange: How can MNOs and towercos be certain that the optimal power source is running at any given time? How can you ensure that field technicians don’t manually over-ride power source selection without good reason?**

**Ingrid Jaumain, Head of Energy Solutions, Total Marketing and Services:** I have two answers to this question, the first of which is from a site design perspective. It is critical to carefully design the energy system to achieve the correct balance of solar, energy storage and diesel on hybrid sites. Well designed hybrid sites rarely encounter problems with the selection of the optimal power source. The second part of the solution is monitoring. Our data logger has been developed in-house, based on our extensive experience in managing the DG, solar and battery banks remotely. Data is pushed to our platform managed in France, which co-ordinates alerts and field operations.

The combination of robust remote monitoring with local knowledge and the right local partners are key – you’ve got to know how they will react in the field. That’s why we also have dedicated, robust and cost-effective energy GPRS monitoring, developed based on the O&M knowledge and experience in the group. Given the challenging conditions in field operations, our principle is to keep systems and processes simple and easy to operate in the field.

**TowerXchange: What is the addressable market for 100% solar and solar hybrid cell sites in terms of load and grid conditions? At what load does diesel simply make more sense?**

**Ingrid Jaumain, Head of Energy Solutions, Total Marketing and Services:** It’s difficult to give one simple answer, because it always depends on the quality of power available, drive time to the site and a number of different variables. However, we’ve seen some vendors install solar on big sites where the contribution will be very low. Based on the real data we’ve gathered from over 3,000 solar and hybrid cell sites, we seldom see return on capital invested at sites with greater than a 3kW load, particularly on sites that are a short distance from a fuel depot.

Small, remote cell sites are sometimes very difficult to supply with diesel at reasonable logistical costs. There is a business case for 100% solar (always with batteries) at small sites up to 1kW.

Most cell sites average loads of 1-3kW where hybrid solutions, with a balance of anywhere between 20-80% solar versus diesel, often deliver RoI. What gives us our credibility is Total’s commitment to lower energy opex no matter what energy source is used.

**TowerXchange: What is the difference between the cheapest solar panels on the market and...**
“carrier grade” solutions in terms of energy density and longevity?

**Ingrid Jaumain, Head of Energy Solutions, Total Marketing and Services:** Quality of product is key. The reputation of solar has been harmed by certain actors who damaged the market with unreliable solar panels and who didn’t optimise site design – they put poor quality solar products on large sites where renewables don’t make economic sense.

Total chose SunPower because of the quality of the technology. SunPower panels can provide 38% more energy from the equivalent surface areas compared to traditional solar modules. Given the space constraints on MNO and, particularly, towerco sites, this can be critical.

Total qualifies our products and equipment by simply listening to our clients’ needs, designing a relevant solution, and bringing that to market through local channels, giving the customer someone to talk to in case of problems in the field. We already tackle complex and remote sites supply as we are for instance present in this market in mining, and have the intention to increase our market footprint in the telecom segment.

Governments are rightly prioritising QoS, so the stakeholders want to fall back to the strength and credibility of a partner like Total, a global company with a strong commitment to Corporate Social Responsibility. We are strongly differentiated from smaller ESCOs offering energy services, but who don’t offer the same access to the same economies.
of scale. As a worldwide big company, we are also building more complete partnerships with our clients, leveraging for instance on our existing Corporate Social Responsibilities programs, mainly dedicated to access to energy.

Solar generation and electricity provision in general is highly dependent on the levelised cost of electricity. SunPower’s technology is reliable, efficient and highly differentiated, enabling us to offer hybrid and renewable energy at a very competitive cost per kWh. This gives us an advantage within the ESCO / capex free model, where finance is critical. We’re able to offer reliable technology guaranteed for 25 years, with a lower degradation of product.

TowerXchange: Have you experienced any instances of solar panel theft? How can this risk be mitigated?

Ingrid Jaumain, Head of Energy Solutions, Total Marketing and Services: Like every other supplier, we have experienced some solar panel theft, in response to which we have developed a concrete based racking system that is really safe. Monitoring fuel is also key and our datalogger includes a sensor for the diesel tank.

TowerXchange: Quoting one of the towerco CEOs on TowerXchange’s advisory board “The problem is that there is a finite amount of GLA (Gross Leasable Area) at a site. A solar array already needs ~35sqm to supply a single tenant, add a second tenant and the space savings are minimal – you still need ~66sqm, 97sqm for a third.” How can solar power be made scalable and space-efficient so that towercos can add multiple tenants? And how can you blend in a community power proposition with its own unpredictability of peak load?

Ingrid Jaumain, Head of Energy Solutions, Total Marketing and Services: I’d like to answer this question from both a technical and business model perspective.

From a technical perspective, we have developed and standardised a modular approach in addition to the SunPower technology advantage: for a 9 kWp installed capacity you need ~50 sqm versus more than 65 sqm with competitor products. For a given load you have a given combination of diesel, solar, batteries and monitoring – it’s easy to add more power to create the scalability required for co-location and growing community power requirements. We’ll always optimise site design and prioritise the telecom load, with backup power solutions with capacity to take on peak load – our hybrid solutions are often so optimised for solar and batteries that a little extra DG runtime whilst the site’s energy load is growing toward a modular upgrade can actually increase the lifetime of the genset.

From a business model perspective, we previously ran a programme called SunCash, a pay-as-you-go system similar to using phone cards with credit used to regulate energy demand at mini-grid sites so we can anticipate the maximum load we provide per day in kWh.

While community power is critical to sustainability, the priority will be given to telecom infrastructure – that’s the business imperative and SLAs need to be respected within those relationships.

In summary, modular technology, flexible business models, the right energy mix and energy optimisation are all important to scalability.

TowerXchange: What has changed which makes it time to stop talking about ESCOs and start deploying ESCOs?

Ingrid Jaumain, Head of Energy Solutions, Total Marketing and Services: From my perspective, over the last 12-24 months emerging market telecoms
have matured toward a preference to partner with specialists in dedicated fields. As towercos are present in more markets, and as stakeholders want to reconsider their capital investments and lighten their balance sheets, the time is right to start deploying ESCOs.

Now, according to what the client wants we also develop intermediary models, that’s the strength of Total Marketing & Services, being the operational arm of the Group; we are flexible, we permanently listen to the market and always adapt to our client needs.

Hybrid and renewable energy technology and solutions in general are more mature. For example, now everyone has an RMS, and data management is becoming more powerful. The tricky part of the ESCO proposition had been monitoring O&M to guarantee service, but we have both the field operations and technical skills to do this.

Having a trusted ESCO partner helps prospective towercos get a contract in greenfield markets.

I took Total’s proposition to the TowerXchange Meetup Asia 2014 and spoke to several stakeholders in energy services in India, for example, where the energy services market remains fragmented with no actor with both the required financial and operational capabilities to scale the model. Taking a global picture; many oil majors have largely exited from any direct presence in African marketing activities whilst operating through distributors - we’ve been able to purchase some of their assets.

With 30-40% of opex coming from energy, you need to trust your ESCO partner, having direct affiliates with operations in the field is a competitive advantage.

**TowerXchange: Towercos, who already own one in four of the world’s cell sites, are astute buyers – whilst some simply demand energy at a kWh price ESCOs find difficult to deliver, others don’t want to sign long term fixed price energy services agreements, they want to share in the energy efficiencies as technology improves. How do you think the ESCO business model will evolve to attract towercos to engage?**

**Ingrid Jaumain, Head of Energy Solutions, Total Marketing and Services:** Because of its size, Total’s worldwide financial capacity and credibility, Total has some interesting assets for this market segment.

In off-grid and unreliable grid markets, our long term contracts are based on formulas that provide flexibility as even we never know what the oil price will be tomorrow. We will often put in place the capability within a contract to revisit terms every two to three years – we want to stay committed business partners – we will find a way to structure a win-win agreement using innovative legal, business model and contract engineering.

Of course any capex-free solution requires a minimum level of commitment, but I think there is a space for a kWh offer, and if clients want an optimised financial solution, combining a leasing component or similar, that is also fine with us.

Total is a big company but we’re also pragmatic. We understand that ESCO agreements typically start with a pilot phase with a few sites to start with, which represents an opportunity to reassure everyone and an opportunity to demonstrate our value proposition.

**TowerXchange: Finally, please sum up what differentiates Total from other companies aspiring to achieve scale in energy services for emerging market telecoms.**

**Ingrid Jaumain, Head of Energy Solutions, Total Marketing and Services:** We have local operations – thousands of people in the field in different countries in Africa, the Middle East, APAC, the Americas and the Caribbean.

We have a track record; we’re already a supplier of diesel to thousands of sites for fuel and solar equipment, which means we have knowledge and proven technology in-house which we can leverage to build a worldwide telecom energy operator proposition.

Total’s unique positioning is our commitment to better energy – we are the only worldwide multi-energy provider spanning solar, diesel and lubricants, owning directly the technology and products. “Think global, act local” could be a good summary: on an everyday basis we are people “rooted in the field”, putting operations at the core of all our business models and we are also committed to better energy, preparing the future!
The Sale & Purchase Agreements & Master Lease 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 Agreements (MLAs) that define the main terms in any tower transaction. Jeff Eldredge and Rob Dixon, Partners at Vinson & Elkins, have advised on over ten sale and leaseback transactions in the last couple of years in countries such as the DRC, Ghana, Nigeria, South Africa and Tanzania. Rob and Jeff kindly agreed to meet with TowerXchange and to provide us with an overview of tower sharing SPAs and MLAs.

Keywords: SLA, MLA, Transfer of Assets, Regulations, Novation of Leases, Due Diligence, Anchor Tenant Privileges, Service Level Agreements, Infrastructure Sharing, Vinson & Elkins

Read this article to learn:
- How a minimum number of towers must be included for a deal to be viable
- The conditions precedent that need to be fulfilled before assets are transferred
- What happens to towers that aren’t transferred in the first close
- How the MLA defines the rights of the Anchor Tenant
- 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: 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).

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: One key point in the process is
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 sample of sites before signing the SPA so it will have 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.

**TowerXchange: So tell us about the critical consideration when drafting Master Lease Agreements.**

**Jeff Eldredge:** 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 (perhaps 10-20 years) 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 – that’s how they build value. Thus, there’s a natural tension that needs to be resolved to everyone’s satisfaction.

"The MLA is where the real value is for the tower company and where most of the real complexity lies in a deal"

**TowerXchange: What happens to any towers for which the CPs cannot be satisfied?**

**Rob Dixon:** 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 sample of sites before signing the SPA so it will have 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.

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**Rob Dixon:** The treatment of ‘stub sites’ depends on the deal. The operator is unlikely to have

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.

The MLA is an umbrella agreement which defines the operator’s rights as anchor tenant in terms of leasing space and capacity (windload) 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. The service levels for different classes of towers is 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.

**Rob Dixon:** There are of course other agreements which are important in most towers deals – for example the Build to Suit Agreement – but perhaps that’s for another time!
Zhu Hai Coslight Battery brings large scale lithium ion manufacturing to the telecoms sector

An interview with General Manager, Yanming Xu

As one of the top five polymer lithium ion battery manufacturers globally, ZhuaHai Coslight Battery boasts an impressive production capacity as it continues to drive up the energy density of its products. TowerXchange speak to Coslight’s General Manager Yanming Xu, to understand the scale of their operations and how they see lithium ion establishing its place in the market.

**Keywords:** Africa, Asia, Batteries, Coslight, Energy, Energy Storage, Lithium, Who’s Who, Zhu Hai Coslight Battery Co. Ltd

**Read this article to learn:**
- The scale of the company’s production capacity
- The energy density of current cells and the roadmap to enhancing this
- What is driving lithium ion adoption
- How the company views Li-Ion and VRLA battery banks

TowerXchange: Please introduce Zhu Hai Coslight Battery Co. Ltd to TowerXchange readers.

**Yanming Xu, General Manager, Zhu Hai Coslight Battery Co. Ltd:** As a subsidiary of Coslight Group, Zhuhai Coslight Battery Co., Ltd. is a Sino-foreign joint venture specialising in the research, production and sales of lithium batteries with polymer lithium-ion battery as its main product. Our factory covers an area of over 160,000² with over 5000 staff.

Worldwide we are one of the top five polymer cell manufacturers with a total capacity of over 4 billion Wh/year. The total capacity of cells we can produce is over 22M pcs/month and our total revenue (polymer) was US$384 million. Our operational manufacturing plant as well as our manufacturing facility currently in planning are both fully automated.

Zhuhai Coslight’s mainstream MP NCM EV cell can achieve over 3000 cycles with ~200Wh/kg gravimetric energy density, further increased to 255 Wh/kg by the end of 2017 through new chemistry that was introduced. Our long term R&D strategy is steadily pushing forward and targets 300Wh/kg energy density by 2020.

TowerXchange: Which companies does Coslight work with in the African and Middle Eastern region and how extensively have your solutions been deployed?
Yanming Xu, General Manager, Zhu Hai Coslight Battery Co. Ltd: We are just starting to enter the African and Middle Eastern market and believe that we will become a key partner, bringing extensive expertise in the battery field.

TowerXchange: Which companies does Coslight work with in the Asian region and how extensively have your solutions been deployed?

Yanming Xu, General Manager, Zhu Hai Coslight Battery Co. Ltd: Coslight has worked with a telecom customer to establish the Green Shuttle program, a Li-ion battery based backup power system; sites are scattered mostly across India, with solar panel combination to recharge the system while the grid is off.

TowerXchange: How have you seen the appetite for lithium ion batteries changing and how is their business case becoming more compelling?

Yanming Xu, General Manager, Zhu Hai Coslight Battery Co. Ltd: An increasing concern about the the environment along with the need for a reliable power supply in developing countries, or countries which have been through conflict is driving lithium ion uptake. The clean and safe energy solution will triumph eventually, and we will enter the era of widespread pouch type Li-ion battery deployment.

TowerXchange: Do you see scenarios for mixed battery banks incorporating lithium ion and VRLA batteries?

Yanming Xu, General Manager, Zhu Hai Coslight Battery Co. Ltd: Not really; combining the two may help reduce the relatively high cost difference but lead acid still has a high requirement on BMS and maintenance. Lead acid, unlike lithium ion, is not a robust and reliable solution.

TowerXchange: Can you explain some of the R&D that is being undertaken at Coslight at present and how this will improve your offering to the telecom sector?

Yanming Xu, General Manager, Zhu Hai Coslight Battery Co. Ltd: Coslight is the top brand in the Pouch type Li-ion cell industry, and work with so many big names in the consumer sector. We shall use this experience in a UPS application as well.

TowerXchange: Finally, what differentiates Zhu Hai Coslight Battery Co. Ltd from its peers?

Yanming Xu, General Manager, Zhu Hai Coslight Battery Co. Ltd: We tailor the market not tail the market.
See you at our future events!

Meetup Asia 2017
12-13 December, Singapore

Meetup Europe 2018
17-18 April, London

Meetup Americas 2018
20-21 June, Florida

Meetup Africa & ME 2018
9-10 October, Johannesburg