Countries covered: Afghanistan, Australia, Bangladesh, Cambodia, China, India, Indonesia, Malaysia, Myanmar, Pakistan, Sri Lanka, Thailand, Vietnam

Companies covered: edotco, Bharti Infratel, Indus Towers, American Tower, Viom Networks, Towershare, Miteno, Q Towers, Apollo, IGT, MIG, Protelindo, Tower Bersama, STP
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Empowering tomorrow’s connected world

Connectivity is at the core of everything we do. Providing first-of-its-kind regional accessibility, our telecoms infrastructure reach enables us to touch communities and expand communication businesses across Southeast Asia.

Enabling connectivity for the future
With special thanks to the TowerXchange “Inner Circle”

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Director - TMT  
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About TowerXchange

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.

The TowerXchange Journal is free to qualifying recipients. We also provide webinars and regular meetups. TowerXchange monetizes this community through hosting annual Meetups and the sale of advertising, without compromising editorial integrity.

TowerXchange was founded by Kieron Osmotherly, a TMT community host and events organizer with 16 years’ experience, and is governed with the support and advice of the TowerXchange “Inner Circle” – an informal network of advisors.

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TowerXchange’s analysis of the independent tower market in Asia

Selected Asian tower market size comparisons, Q4 2015

- **China**: 1,180,000 towers
- **India**: 450,000 towers
- **Indonesia**: 69,458 towers
- **Vietnam**: 55,000 towers
- **Pakistan**: 28,000 towers
- **Malaysia**: 20,000 towers
- **Thailand**: 47,483 towers
- **Cambodia**: 9,000 towers
- **Sri Lanka**: 7,000 towers
- **Bangladesh**: 27,000 towers
- **Myanmar**: 7,410 towers

Source: TowerXchange

**Afghanistan**: TowerXchange understands that Etisalat and MTN attempted to create a joint venture carve out towerco, under the management of IHS, but that IHS investors balked at the deal based on it being too far beyond their SSA-centric remit. FTS towers operates a tower portfolio in the country for Afghan Wireless.

**Australia**: TowerXchange understands there are around 9,000 telecom towers in Australia, 74% of which remain operator-captive. The Macquarie-led consortium that acquired Crown Castle Australia and it’s 1,772 towers is finalising the restructuring and integration of the business. This was the first major tower transaction to take place in Australia for some time, but TowerXchange is actively tracking more than one towerco with an appetite to enter this market. Broadcast Australia also operates a portfolio of 620 towers, some of which are leased out to MNOs. There are a number of smaller towercos in Australia which could become acquisition targets in a rollup play.

**Bangladesh**: edotco operates a network of 6,000 towers transferred from Axiata’s Bangladeshi opco Robi. The edotco portfolio is maturing fast with 11 different customers including six MNOs. #2 operator Bangalink’s ~6,000 towers are believed to be coming to market as part of VimpelCom’s passive infrastructure monetisation process.

There are around 27,000 towers in Bangladesh, with around 1,000 new towers going up each year.

While local regulator the BTRC encourages infrastructure sharing, a proposed change of law that would prohibit licensed MNOs from operating tower sharing companies would restrict options for Axiata-owned edotco and Airtel-owned Bharti Infratel, which may also be interested in entering Bangladesh. However the proposed merger of Axiata’s Robi, third ranked MNO in the country, and #4 Airtel Bangladesh which owns ~3,800 towers throws into question whether one or two towercos is required.

**Cambodia**: With a crowded operator market of five operators serving a population of 15.5mn, and a regulator that supports infrastructure sharing, there seems to be potential for the 9,000 site tower market in Cambodia to grow. Some challenges still remain including 20% of sites being off-grid and mines in the more remote areas. edotco operates a portfolio of 1,700 towers in Cambodia. Local tower builder Camtower Link also operates a small independent portfolio.

**China**: The injection of ~1.1mn legacy China Mobile, China Unicom and China Telecom towers into China Tower Company (CTC) has now been agreed and is expected to be finalised by 31 October 2015. The deal will have value the company at 214 billion yuan, or about US$34bn. Under the deal, the
# Tower deals in Asia 2008-2015 (excluding carve-outs)

<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>2015</td>
<td>India</td>
<td>Viom Networks</td>
<td>American Tower</td>
<td>42,200</td>
<td>$1,180,000,000*</td>
<td>$76,540</td>
<td>Controlling interest acquisition</td>
</tr>
<tr>
<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>Controlling interest 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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</tr>
<tr>
<td>2014</td>
<td>Malaysia</td>
<td>KJS</td>
<td>YTL Power Int'l</td>
<td>309</td>
<td>$15,000,000</td>
<td>$48,544</td>
<td>Company acquisition</td>
</tr>
<tr>
<td>2014</td>
<td>Indonesia</td>
<td>XL Axiata</td>
<td>STP</td>
<td>3500</td>
<td>$460,000,000</td>
<td>$131,429</td>
<td>SLB</td>
</tr>
<tr>
<td>2013</td>
<td>Indonesia</td>
<td>Hutchison</td>
<td>STP</td>
<td>300</td>
<td>$68,000,000</td>
<td>$226,667</td>
<td>SLB</td>
</tr>
<tr>
<td>2012</td>
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<td>Protelindo</td>
<td>503</td>
<td></td>
<td></td>
<td>SLB</td>
</tr>
<tr>
<td>2012</td>
<td>Indonesia</td>
<td>PT Central Investindo</td>
<td>Protelindo</td>
<td>152</td>
<td></td>
<td></td>
<td>SLB</td>
</tr>
<tr>
<td>2012</td>
<td>Indonesia</td>
<td>Indosat</td>
<td>Tower Bersama</td>
<td>2500</td>
<td>$519,000,000</td>
<td>$207,600</td>
<td>SLB</td>
</tr>
<tr>
<td>2011</td>
<td>Indonesia</td>
<td>Infratel</td>
<td>Tower Bersama</td>
<td>595</td>
<td></td>
<td></td>
<td>SLB</td>
</tr>
<tr>
<td>2010</td>
<td>India</td>
<td>Essar Telecom Infrastructure</td>
<td>American Tower</td>
<td>4450</td>
<td>$432,000,000</td>
<td>$97,079</td>
<td>SLB</td>
</tr>
<tr>
<td>2010</td>
<td>Indonesia</td>
<td>Hutchison</td>
<td>Protelindo</td>
<td>1482</td>
<td>$165,900,000</td>
<td>$111,943</td>
<td>SLB</td>
</tr>
<tr>
<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>
<td>SLB</td>
</tr>
<tr>
<td>2009</td>
<td>India</td>
<td>Viom Networks</td>
<td>QTL</td>
<td>18000</td>
<td>$2,407,000,000</td>
<td>$133,722</td>
<td>Company acquisition</td>
</tr>
<tr>
<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>
</tr>
<tr>
<td>2009</td>
<td>Indonesia</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>
</tr>
<tr>
<td>2008</td>
<td>Indonesia</td>
<td>Bakrie</td>
<td>STP</td>
<td>543</td>
<td>$34,000,000</td>
<td>$62,615</td>
<td>SLB</td>
</tr>
<tr>
<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 99,914 $8,007,900,000 $102,460

American Tower has announced but not yet closed a deal to acquire a 51% stake in Viom Networks, also taking on some debt in a deal which creates an enterprise valuation of US$3.23bn thus a per tower valuation of $76,540.
carriers will pay a leasing fee for use of the towers. Local commentators expect the process to continue into 2016. All of China’s SOE towers will be transferred to CTC, through which 120,000 new BTS are supposedly already being conducted - although reports suggest a number of those builds are being subcontracted to a rapidly growing independent towerco segment in China, which already numbers ~20,000 towers.

**India:** 70% of India’s 400,000 towers are owned and operated by towercos, making the Indian tower market second only to the U.S. in terms of longevity and second only to China in terms of scale. The market was adversely affected by the restructuring of MNO licenses in 2012, but has fully recovered and been boosted by ongoing waves of spectrum auctions. Tower transaction deal flow continues to pick up as companies look around at their options for acquisitions and divestments, and deals totalling up to 200,000 towers at a value of approximately US$10.2bn may be in the works.

American Tower has announced its purchase of a 51% stake in Viom Networks after protracted negotiations; American Tower will pay US$1.18bn in cash in addition to taking on some debt. Viom Networks owns 42,200 towers with a tenancy ratio of 2.4, and the deal will value the company at around US$3.23bn. The Tata Group will retain a minority share, and the SREI Group will exit completely. American Tower was also rumored to be in the final stages of negotiating the acquisition of Reliance Infratel (~52,000 towers, tenancy ratio 1.6) and it remains to be seen whether American

---

### Estimated tower count for Bangladesh

<table>
<thead>
<tr>
<th>Company</th>
<th>Tower Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grameenphone</td>
<td>7,800</td>
</tr>
<tr>
<td>Banglalink</td>
<td>6,000</td>
</tr>
<tr>
<td>edotco</td>
<td>5,300</td>
</tr>
<tr>
<td>Airtel</td>
<td>3,800</td>
</tr>
<tr>
<td>Teletalk, CityCell and non-traditional MNOS</td>
<td></td>
</tr>
</tbody>
</table>

![Estimated tower count for Bangladesh](chart.jpg)

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### Estimated breakdown of towers owned by Indian towercos

<table>
<thead>
<tr>
<th>Towerco</th>
<th>Tower Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indus Towers</td>
<td>116,454</td>
</tr>
<tr>
<td>Bharti Infratel</td>
<td>37,486</td>
</tr>
<tr>
<td>Reliance Infratel</td>
<td>52,000</td>
</tr>
<tr>
<td>Viom Networks</td>
<td>42,200*</td>
</tr>
<tr>
<td>GTL Infrastructure</td>
<td>29,432</td>
</tr>
<tr>
<td>American Tower</td>
<td>13,883</td>
</tr>
<tr>
<td>Tower Vision</td>
<td>8,400</td>
</tr>
<tr>
<td>Ascend</td>
<td>4,500</td>
</tr>
</tbody>
</table>

Source: TowerXchange research, quarterly filings, site lists

*American Tower has announced but not yet closed a deal to acquire a majority stake in Viom Networks
Tower would acquire both companies. Alongside American Tower, other bidders for Reliance Infratel’s assets are reportedly investment firms Farallon Capital, Carlyle, and Tillman Capital.

Bharti Infratel’s share price has fallen from it’s mid-year high, but the company still has plans for expansion, and is looking at the potential acquisition of 11,000-12,000 towers from Vodafone, and 8,600 towers from Idea Cellular.

BSNL has received “in-principle” approval to carve out its estimated 65,000 towers into a separate towerco which could be valued up to US$3bn. A government working group has been formed to develop a capital and organisational structure for the new entity.

GTL Infrastructure, with just under 30,000 towers, Tower Vision with 8,400 and Ascend Telecom with ~4,500 complete the Indian towerco market. Ascend are in the process of raising US$100mn through IPO.

**Indonesia:** Indonesia remains one of the most mature tower markets in the world, with solid tenancy ratios and strong market caps boasted by three major towercos; Protelindo (12,156 towers), Tower Bersama (11,154) and STP (6,790). IBS Tower, KIN and Retower all also have some scale in Indonesia.

Disappointingly, Tower Bersama’s innovative share-swap acquisition of Mitratel now stands cancelled, owners Telkom having terminated the deal at the

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**Indian tenancy ratios approaching and exceeding 2.0**

<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>Retower Asia</td>
<td></td>
</tr>
<tr>
<td>Tower Vision</td>
<td></td>
</tr>
<tr>
<td>Ascend</td>
<td></td>
</tr>
</tbody>
</table>

Source: Quarterly and Annual Reports, TowerXchange research
behest of the commissioner. The future of Mitratel and their 5,500 towers remains uncertain. Telkom still has a further 17,615 towers on their balance sheet, of which 13,000 could potentially be sold at an unspecified point in the future. Both Indosat and XL Axiata may have an appetite to divest their remaining towers, totalling ~5,800 and ~6,500 respectively, although none of these opportunities are expected to close in 2015.

Protelindo and Tower Bersama are holding firm against downward pressure on lease rates, which are believed to average around US$1,150 in Indonesia. However, 2015 may prove to be a slight down year in terms of BTS volume.

Meanwhile, the new battle ground for competition between Indonesia’s towercos seems to be microcells and fibre, as illustrated by Protelindo’s acquisition of iForte.

**Malaysia:** edotco has carved out 3,500 towers from Celcom in Malaysia where their first 20 site BTS hotel township is about to be launched. A further 3,200 towers are owned and operated by a diverse group of State-backed independent towercos. Malaysian commentators felt that the recent sale of one of the State-backed towercos, KJS, is an isolated incident, and that a substantial rollup of Malaysia’s smaller towercos is unlikely, given the alignment of political and personal interests it would require across the country.

**Myanmar:** The Myanmar tower count reached 7,470 by Q3 2015, approaching the half way point in...
the 17,300 tower rollout which is the total the GSMA forecast the country would require to meet Telenor and Ooredoo’s license obligations.

Phase three has seen a re-alignment of towerco-MNO partnerships, with IGT now building for Ooredoo - they have lit 1,500 of 2,900 contracted towers, making IGT Myanmar’s leading towerco. Apollo will be number two, with around 1,100 of 1,827 contracted towers for Telenor built to date. In October 2015, Axiata’s towerco edotco announced the acquisition of Myanmar Tower Company (MTC) from Digicel for US$221mn. MTC had built 1,250 phase one and two towers in prime urban locations for anchor tenant Ooredoo. While Ooredoo retained ownership of the power assets, edotco have an appetite to bring their full energy service proposition to Myanmar. Eco-Friendly Towers, a subsidiary of Young Investment Group, has a contract to build 700 towers in phase three for Telenor.

Myanmar Infrastructure Group (MIG) is a joint venture between majority shareholder Singapore Myanmar Investco (SMI) and Golden Infrastructure Group (GIG), a venture involving Dan Ryan of Square1 Infrastructure. MIG had proved themselves building rooftops and poles in 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 have secured a contract to build 503 towers in phase three of Ooredoo’s rollout. MIG has access to the capital markets via SMI’s Singapore stock exchange listing. MIG provides a full service tower+power proposition.

All the towercos in phase three of the Myanmar tower rollout are required to provide full service tower+power, a departure from phases one and two in which Ooredoo retained ownership of power assets. Ooredoo’s phase one and two towers, built by the aforementioned PAMEL and MTC, may be excellent targets for ESCOs.

A culture of infrastructure has yet to fully take root in Myanmar - Telenor and Oordeoo built a lot of parallel infrastructure in the country’s three biggest cities, but demand for infill sites to improve capacity and QoS, plus the economics of rural coverage, may see tenancy ratios climb above the current 1.1-1.2 toward and beyond 1.3 by the year end on Myanmar’s healthiest tower portfolios. Whilst tenancy ratio growth has been slower than anticipated, pressure is growing on lease rates and capex per site in Myanmar. The situation could be eased if and when Myanmar’s fourth operator is finally licensed; the government reported 17 local companies were interested in joining a consortium, to which international partners will subsequently be added.

Pakistan: We estimate there are ~28,000 towers
in Pakistan. Deal flow in Pakistan is increasing rapidly; MNO Warid (which was rumored to be selling ~4,500 towers to Towershare) will reportedly merge with Mobilink, owned by VimpelCom and the Abu Dhabi Group, by the end of the year. VimpelCom has also received first indicative offers for the sale of its tower portfolios in Pakistan, but this tower sale will be delayed by the forthcoming acquisition of Warid Telecom.

We have been unable to confirm speculation that #2 MNO Telenor may bring their Pakistani towers to market too, while reports suggest Etisalat’s towers may come to market too. There is some growth potential in a Pakistani tower market with 3G only launched in late 2014, with 138mn subscribers and five competitive MNOs, but there may also be some need for decommissioning of parallel infrastructure. The political context and operational challenges of Pakistan seem likely to preclude the participation of U.S. listed and U.S. funded towercos in Pakistani tower divestiture processes, which would seem to narrow the field to Asian and Middle Eastern based towercos and investors; recently licensed edotco, which operates a 13,000km fibre network in Pakistan, and Towershare remain favorites to acquire Pakistani towers.

**Sri Lanka:** Dialog has transferred 2,150 towers to edotco, and Bharti Infratel are again believed to be interested in entering the market. High levels of bi-lateral sharing means tenancy ratios are closer to two than one. 4G driving need for cell site densification. There are around 7,000 towers in Sri Lanka.

Deal activity in the Sri Lankan tower market may be picking up with Bharti Airtel reportedly looking into selling its 2,500 towers. Bharti Airtel has not confirmed the deal, but it would be in line with their strategy of eliminating less profitable operations.

**Thailand:** Thailand has a tower market unlike any other in the world! Joint venture towercos are being established as vehicles for the resolution of long standing BTO (Build-Transfer-Operate) disputes. 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 1,800 MHz bands, is reportedly in the final stages of forming a 49-51% JV towerco with majority stakeholder DTAC, into which 11,000 disputed towers would be injected.

TowerXchange reckon there are 47,483 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 important question is: are Thailand’s telecom towers investible? The steady leaseup of DIF’s towers is a good sign, but the emergence of the tower sharing model has slowed with the proposed infrastructure sharing deal between TOT and AIS being scrapped in early October after months of negotiation. With 4G auctions imminent, we are cautiously optimistic about the investibility of Thai towers, as long as investors have the stomach for politics and don’t mind a 49% FDI limit.

**Vietnam:** Towers are being built and co-locations added more quickly in the 55,000 Vietnamese tower market than in Myanmar! But it’s a complicated ecosystem. A fragmented group of around 30 local towercos own ~10,000 towers. Alcazar Capital’s Golden Towers has embarked on a rollup play. Meanwhile the restructuring of Vietnam’s Ministry owned #2 and #3 ranked MNOs MobiFone and VNPT could unlock a decent sized sale and leaseback opportunity in the mid-term - at the very least, VNPT will be even more incentivised to co-locate as they had historically relied on MobiFone’s network. Even market leaders Viettel appear to have warmed to the idea of co-location. 4G spectrum in the 2.3 and 2.6 GHz bands, together with refarmed 900MHz spectrum, is expected to be auctioned in 2016

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Meet 250 leaders of the Asian tower industry at the TowerXchange Meetup Asia, taking place on November 24 and 25 at the Marina Bay Sands in Singapore. www.towerxchange.com/meetups/asia.

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**Legend**

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

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Note: Russia is covered under Europe; we estimate it to have a 5% towercos penetration and we expect it to be a growth market.
### Day One | Tuesday 24 November

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>Registration and coffee</td>
</tr>
<tr>
<td>9:00</td>
<td>TowerXchange market analysis and forecasts for the growth of the Asian tower industry</td>
</tr>
<tr>
<td>9:30</td>
<td>Keynote Address - Suressh Sidhu, CEO, edotco</td>
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<tr>
<td>9:50</td>
<td>Keynote panel: CXOs of Asia’s leading tower cos</td>
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<tr>
<td></td>
<td>Moderator: Lim Chuan Wei, Partner, Analysys Mason</td>
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<td></td>
<td>Bimal Dayal, COO, Indus Towers</td>
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<tr>
<td></td>
<td>James Young, Advisor &amp; SVP Sales, Marketing &amp; Leasing, Protelindo</td>
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<td>Shannon Grewer, General Counsel, Towershare</td>
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<td></td>
<td>Umang Das, Chief Mentor, Viom Networks</td>
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<td></td>
<td>Arun Kapur, Chairman, Irrawaddy Green Towers</td>
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<td></td>
<td>Thivanka Rangala, CFO, edotco</td>
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<td></td>
<td>Tilak Raj Dua, Director General, TAIPA</td>
</tr>
<tr>
<td></td>
<td>Nobel Tanihaha, CEO, STP</td>
</tr>
<tr>
<td>10:50</td>
<td>Morning coffee and networking</td>
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<tr>
<td>11:20</td>
<td>Introducing the leading energy equipment and service providers in Asia</td>
</tr>
<tr>
<td>11:40</td>
<td>Roundtable breakouts</td>
</tr>
<tr>
<td>1:00</td>
<td>Networking lunch</td>
</tr>
<tr>
<td>2:00</td>
<td>Keynote Address - Akhil Gupta, Chairman, Bharti Infratel</td>
</tr>
</tbody>
</table>

### 2:30 Roundtable breakouts

### 3:50 Afternoon coffee and networking

### 4:20 Keynote panel: Tower investments in the Asian market

- **Moderator:** Brandon Amber, Managing Director, Palladium Partners
- Gulfruz Qayyum, MD, Head of Telecoms MEA, Citi
- Eric Crabtree, Principal Investment Officer, IFC
- Kingston Pang, SVP Asia, Macquarie Group
- Pankaj Suri, Equity Research - Asian Telecom and Media, Nomura
- Pankaj Agarwal, Director, Capitel Partners

### 5:20 Close of day one followed by drinks reception and optional dinner

### Day Two | Wednesday 25 November

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>9:10</td>
<td>Keynote Address: Amit Sharma, Senior Vice President, American Tower Corporation</td>
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<tr>
<td>9:30</td>
<td>Keynote panel: Best practices for MNO tower portfolio optimisation</td>
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<td></td>
<td>Moderator: Enda Hardiman, Managing Partner, Hardiman Telecom</td>
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<td></td>
<td>Tomy Sudiwoyono, Tower Planning &amp; Engineering Manager, Indosat</td>
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<td>Mohammad Rizvi, Manager of Network Planning and System Engineering, Teletalk</td>
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<tr>
<td>10:40</td>
<td>Introducing Asia’s leading turnkey infrastructure solution providers</td>
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<td>11:00</td>
<td>Morning coffee and networking</td>
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<td>11:20</td>
<td>Roundtable breakouts</td>
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<tr>
<td>12:40</td>
<td>Operational best practices for tower portfolio management</td>
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<tr>
<td>1:00</td>
<td>Networking lunch</td>
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<tr>
<td>2:00</td>
<td>Roundtable breakouts</td>
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<tr>
<td>3:20</td>
<td>Introducing the leading RMS, access control and Site Intelligence Platforms</td>
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<tr>
<td>3:40</td>
<td>Afternoon coffee and networking</td>
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<tr>
<td>4:00</td>
<td>Panel discussion - Identifying new growth opportunities in the Asian tower market</td>
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<tr>
<td></td>
<td>Moderator: Kingston Pang, SVP Asia, Macquarie Group</td>
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<td>Pak Mohamad Iwan, COO, Komet Infra Nusantara</td>
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<td></td>
<td>Patrick Tangney, Partner, Alcazar Capital/Golden Towers</td>
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<td></td>
<td>Ted Zhong, CEO, Q Towers International</td>
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<td></td>
<td>Mark Bedingham, Managing Director, Myanmar Infrastructure Group and President and CEO,</td>
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<td>Singapore Myanmar Investco</td>
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<td></td>
<td>Tushar Kapadia, Vice President, Strategic Initiatives, GTL Infrastructure</td>
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<td></td>
<td>Dr. Mahadi Murshidi, CEO, Common Tower</td>
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<td></td>
<td>Philippe Luxcay, CEO, Apollo Towers Myanmar</td>
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<tr>
<td></td>
<td>Zhiyong Zhang, President and Chairman, Miteno</td>
</tr>
<tr>
<td>5:00</td>
<td>Close of conference</td>
</tr>
</tbody>
</table>
First round table breakouts, 11:40-1:00 day one, Tuesday November 24

1. Country focus: India - tower valuations and deal flow - Pankaj Suri, Nomura
2. Country focus: Myanmar - power - Paul Carpenter, Hardiman Telecoms
3. Best practices for maturing towercos - Sameer Sinha, Indus Towers
4. Country focus: China - Min Zhang, Miteno
5. Tower market investibility - Brandon Amber, Palladium Partners
6. Beyond GBTs: opportunities in microcells, small cells and DAS - Senior executive, Huawei
7. The benefits of tower sharing: optimisation and economies of scale - Ankur Lal, Infozech Software
8. How infrastructure sharing should be promoted and how towercos should be licensed - Rema Nair, edotco
9. The business case for carve outs, network sharing, and JVs - David Goldstein, edotco
10. Developing new opex and capex models - Udhay Mathialagan, Tarantula
11. Translating infrastructure data into intelligence - Senior executive, Accruent
12. Selecting the right services and business model for each international market - Carlos Katsuya, Head of TMT Asia, IFC

Second round table breakouts, 2:30-3:50 day one, Tuesday November 24

13. Country focus: Indonesia - James Young, Advisor & SVP Sales, Marketing & Leasing, Protelindo
14. Country focus: Thailand - Dominic Arena, AEC Advisory
15. Country focus: Vietnam - Patrick Tangney, Golden Towers
16. How to prepare people, processes and assets for transfer to a towercos - Thivanka Rangala, edotco
17. How to fund a ‘building’ towercos - Dikun Goh, Deutsche Bank
18. The impact of tower transactions on MNO balance sheets - Pankaj Suri, Nomura
19. Managing towercos relationships post-separation – the tenant’s perspective
20. How to measure and improve Tower Cash Flow - Paul Carpenter, Hardiman Telecoms
21. How to minimise the total cost of evaluating and strengthening towers - Ir Nalini Subramaniam, edotco
22. How towercos and their subcontractors can ensure adherence with challenging SLAs
23. How to reduce energy opex - David Leal, Eltek

Third round table breakouts, 11:20-12:40 day two, Wednesday 25 November

25. Country focus: Pakistan - Arif Hussain, edotco
26. Country focus: Bangladesh - Enda Hardiman, Hardiman Telecoms
27. Country focus: Myanmar - building and colocating - Arun Kapur, Chairman, Irrawaddy Green Towers
28. MNO consolidation: implications for the tower industry - Gulfrad Qayyum, Citi
29. Commercial and technical due diligence on tower transactions - Lim Chuan Wei, Analysys Mason
30. The impact of new spectrum on network topographies and demand for BTS and colocation - Pankaj Agrawal, Capitel Partners

Fourth round table breakouts, 2:00-3:20 day two, Wednesday 25 November

31. The evolution of towercos service provision; will there be an end to end model?
32. The legal issues in the relationship between towercos and landlord - Francois Feuillat, Vinson & Elkins
33. Fixed price, distributed renewable power: can towercos deliver? - Tushar Kapadia, GTL Infrastructure
34. How to combat fuel theft and energy waste at your site
35. Network planning in the era of infrastructure sharing
36. Community power project management: licensing, implementation, O&M
37. Country focus: Sri Lanka - Mohan Villavarayan, edotco
38. Country focus: Australia - Kingston Pang, SVP Asia, Macquarie Group
39. How tower transactions and towercos create capital value - Dikun Goh, Deutsche Bank
40. The contractual terms that create (and destroy) value
41. How to audit your asset register
42. Tower power system design: standardisation versus customisation
43. A unified approach to the management of remote towers
44. Master lease agreements - providing operational flexibility and maximum performance
45. How to manage a broad diversity of managed services, O&M and EPC partners - Paul Carpenter, Hardiman Telecoms
46. When will hybrid power reach the ‘tipping point’ where the opex savings justify the capex?
## Latest attendee list for TowerXchange Meetup Asia 2015

### Mobile Network Operators

- Airtel Bangladesh Limited, General Counsel
- Bharti Airtel, Deputy Group Chief Executive Officer and Managing Director
- Axia, Director
- Etisalat, Director Procurement / Infrastructure
- Indosat, Division Head Tower Planning & Engineering
- PT Bakrie Telecom.Tbk, Director & COO
- Teletalk, Manager of Network Planning and System Engineering

### Towercos

- American Tower Corp, Executive Vice President and President, Asia
- Apollo Towers Myanmar, CEO
- Beijing Miteno Communication Technology Company Limited, Chairman & President
- Common Tower, Chief Executive Officer
- edotco Bangladesh, Director, Operations
- edotco Cambodia, Country Managing Director
- edotco Cambodia, Head of Business Development
- edotco Group Sdn Bhd, Chief Executive Officer
- edotco Group Sdn Bhd, Chief Financial Officer
- edotco Group Sdn Bhd, Chief, Sales & Corporate Affairs Officer
- edotco Group Sdn Bhd, Director, Strategy & Commercial
- edotco Group Sdn Bhd, Director Engineering
- edotco Group Sdn Bhd, Director, Business Development
- edotco Group Sdn Bhd, Regulatory Advisor to CEO
- edotco Group Sdn Bhd, Specialist, Marketing Communication

### Mobile Network Operators

- edotco Group Sdn Bhd, Head of Regional Operations Centre
- edotco Group Sdn Bhd, Head of Strategic Decision Support & Contract Management
- edotco Group Sdn Bhd, Financial Controller
- edotco Group Sdn Bhd, Specialist Marketing
- edotco Group Sdn Bhd, Head of Strategy & Analytics
- edotco Malaysia, Country Managing Director
- edotco Malaysia, Director of Sales and Marketing
- edotco Pakistan, Country Managing Director
- edotco Sri Lanka, Country Managing Director
- edotco Sri Lanka, Head of Energy
- GTL Infrastructure, VICE PRESIDENT -STRATEGIC INITIATIVES

### Towercos

- Indus Towers, Chief Operating Officer
- Indus Towers, Chief Supply Chain Management Officer
- Indus Towers, Chief Sales and Marketing Officer
- Irrawaddy Green Towers, CEO
- Irrawaddy Green Towers, Vice-Chairman
- Komet Infra Nusantara, Chief Operating Officer
- Link Development, Chief Executive Officer
- Miteno Communication Technology Co. Ltd., Senior Representative TBC
- Miteno Communication Technology Co. Ltd., Senior Representative TBC
- Miteno Communication Technology Co. Ltd., Senior Representative TBC
- Myanmar Infrastructure Group (MIG), President and Chief Executive Officer
- Protelindo, Advisor and SVP Sales, Marketing and Leasing
- Q Towers, CEO
- Russian Towers, President
- Sacofa Sdn Bhd, Chief Executive Officer
- Sacofa Sdn Bhd, Senior Manager of Accounts Management
- Sanyuan Tec, COO
- Sanyuan Tec, Chief Executive Officer
- SBA Communications, VP, Business Development
- Senno Telcom Co., Ltd, Chief Executive Officer
- Senno Telcom Co., Ltd, Chief Operations Officer
- STP, President Director
- Towershare, General Counsel
- Towershare, Shareholder
- Towershare, Board of Directors
- Towershare, Director of Operations
- Towershare, Chief Executive Officer
- Towershare, Senior Representative TBC
- Viom Networks, Chief Mentor

### Access Control

- Abloy International, Business Development Manager
- ACSYS, Founder & COO
- ACSYS, VP Sales, Asia

### Advisory firm: investment strategy legal

- AEC Advisory, Chairman and Managing Director
- Analysys Mason, Partner
- Capitel Partners, Director
- Citigroup, MD, Head of Telecoms MEA
- Deutsche Bank, Associate Director
- Hardiman Telecommunications, Managing Consultant
Hardiman Telecommunications, Managing Partner
KPR Consult A/S, Chariman
KPR Consult A/S, Chief Technology Officer
Macquarie Group, SVP - Asia
Macquarie Group, Managing Director
Nomura, Equity research - Asian Telecom and Media
Palladium Partners, Managing Director
Teleconsult Group, Chief Executive Officer and Chairman
Vinson & Elkins, Senior Representative TBC
Vinson & Elkins, Senior Representative TBC
Vinson & Elkins, Senior Representative TBC
Vinson & Elkins, Senior Representative TBC
Vinson & Elkins, Senior Representative TBC

Association

TAIPA, Director General

Energy Equipment

Alsanj, General Manager
Ballard, Sales Director, Asia Pacific
Cummins Power Generation, Senior Representative TBC
Cummins Power Generation, Senior Representative TBC
Eltek Power Pte Ltd, Regional President -- APAC
Evangelus, Senior Representative TBC
Enatel Energy, Senior Representative TBC
EnerSys, Regional Director - Reserve Power
FG Wilson, Sales Manager North & SE Asia
Flexenclosure, Senior Representative TBC
Flexenclosure, Senior Representative TBC
GS Yuasa, Senior Representative TBC
GS Yuasa, Senior Representative TBC
H2 Inc., Chief Executive Officer
Heliocentris, VP Sales and Marketing

Heliocentris, GM APAC
IPT PowerTech Group, VP & COO
IPT PowerTech Group, GM - Telecom Division
LFPO Technology Sdn Bhd, Managing Director
LFPO Technology Sdn Bhd, Business Development Director
Lineage Power, Senior Representative TBC
Mahindra & Mahindra Limited, Senior Vice President-Mahindra Powerol Business
Mahindra & Mahindra Limited, President & Chief Executive- Truck & Power Train Division
Mecc Alte, Senior Representative TBC
NorthStar, Senior Representative TBC
NorthStar, Senior Representative TBC
Redflow, Global Sales Director
TOTAL, Senior Representative TBC
Zamil Infra, Senior Representative TBC

Investor

Alcazar Capital, Partner
Goldman Sachs, Managing Director
IFC, Head, Asia, TMT
IFC, Chief Investment Officer
Khazanah, Director
Khazanah, Associate
Khazanah, Associate

Managed Service Provider

Elektroskandia, Managing Director
Elektroskandia China, Communication Manager
EVOLOGY, General Manager
ieng Group, Co-Chief Executive Officer
ieng Myanmar, Country Head
LeBLANC Communications, Program Manager - Infrastructure

R.S. INFRA PROJECTS. Pvt. Ltd, Director
R.S. INFRA PROJECTS. Pvt. Ltd, Director
Sagemcom, Senior Representative TBC
Sagemcom, Senior Representative TBC

Site Management Platforms

Accruent, Senior Representative TBC
Cisco, Consulting Systems Engineer
Tarantula, Senior Representative TBC
Tarantula, Senior Representative TBC

RMS

AIO Systems, Senior Representative TBC
Infozech, Senior Representative TBC
Invendis, Senior Representative TBC
Invendis, Senior Representative TBC
Qowisio, Sales Director
Telemisis, Senior Representative TBC
Telemisis, Senior Representative TBC

Static Assets

EkiStruct, Chief Executive Officer
Ganges Internationale (P) Ltd., Vice President - Operations
International Telco Poles Pty Ltd, Managing Director
Nanhua, Vice Director of Sales
Shanghai Ambor Industries Ltd, President

Tier 1 OEM

Huawei, Senior Representative TBC
Huawei, Senior Representative TBC
Huawei, Senior Representative TBC
TowerXchange Meetups bring together 250+ business leaders representing the entire telecoms infrastructure ecosystem.

TowerXchange engages with MNOs who retain their passive infrastructure, and with 143 independent towercos and network sharing joint venture which between them have acquired or built over 1,876,000 towers worldwide. TowerXchange also maintains relationships with over 500 investment and advisory firms who facilitate tower transactions.

TowerXchange explores the implications of tower transactions for the supply chain: from tower designers and manufacturers to tower construction and O&M firms. The TowerXchange community engages with every major telecom energy equipment and service provider worldwide, including an emerging class of credible ESCOs. We track over 30 different RMS and ILM solution providers, as well as leaders in access control and H&S solutions for cell sites. And we connect the passive infrastructure ecosystem with innovations in microcells, small cells and DAS as well as fibre, microwave and satellite backhaul.

The TowerXchange community is brought together by the renowned TowerXchange Journal, circulated to 11,800 tower industry leaders worldwide. The tower industry’s leaders gather annually at TowerXchange Meetups – we look forward to meeting you there!
What is a Meetup?

Proven over five past events attended by over 1,000 decision makers, TowerXchange Meetups are unique executive retreats for the most influential men and women in telecoms infrastructure. Held annually in Africa, Asia, CALA and Europe, we use small group round table breakouts to give participants unique access to the key stakeholders in the telecom tower industry in each country.

80-90% of the leading towercos and MNOs attend

At other telecom events, a maximum of around 10-15% of the CXOs who lead tower strategy for MNOs and towercos are in attendance. At TowerXchange we regularly attract multiple senior representatives from 80-90% of the towercos active in any region, as well as the majority of MNOs. And thanks to our unique structured networking round tables, everyone has access to these decision makers.

Laser beam focus on towers

Another problem with other telecom events is that passive infrastructure is typically hidden away as an under-appreciated small part of a broader show. The huge audience of middle management, device and VAS influencers at other events dilutes access to the few tower decision makers present. In comparison, TowerXchange has been described as a “networking club for tower geeks” – everyone you meet at TowerXchange is focused on towers, and everyone you meet is a decision maker.

Accelerate vendor selection

If you want to buy telecom tower structures and accessories, energy equipment, energy services, RMS, ILM, access control, H&S equipment, or if you want to contract with tower construction and O&M firms, then

Curated expo of proven suppliers

Every TowerXchange expo has sold out
the private expo at the TowerXchange Meetup provides a ‘who’s who’ of proven passive infrastructure equipment and service providers.

Identify opportunities for your business today...

TowerXchange introduces each Meetup with our proprietary research, defining the size of the tower market in each country, identifying who owns the towers today and predicting the future tower transaction pipeline. We also track network rollouts, extensions and densification, and examine ownership of energy assets and the prospects for energy service providers.

...And opportunities for your business tomorrow

We use MNO and towerco CXO panel sessions to understand the future of the tower industry. What has been the progress of tower transactions and of portfolio integration? What future acquisitions are planned? How is capex being deployed? What are the priorities of efficiency programmes? Are opex-sharing models being explored? Are microcells, small cells and DAS being rolled out?

Unique structured networking

TowerXchange’s renowned round table breakouts are led by an expert moderator, but everyone’s opinions and questions are welcomed. Each round table focuses on a specific country, financial or operational issue. You can attend three or four round tables at each Meetup. Register now to secure your choice of round table and tailor your agenda to meet your networking objectives!
edotco Group is an integrated telecommunications infrastructure services company providing end-to-end solutions that includes towers, energy, transmission, operations and maintenance in the region of Southeast Asia.

Today, edotco Group has a large network sites its circle of operations in Malaysia, Sri Lanka, Bangladesh, Pakistan and Cambodia. This represents the company’s commitment to expand possibilities with cost-efficient telecommunications infrastructure that is built around growing competitiveness and connectivity for businesses.

Guided by practical optimism to make a difference in the business we are in, edotco is determined to drive its aspiration – “Enabling Connectivity” by transforming businesses in a way that make a positive impact on the society we live in. Focused on providing innovative and environmentally conscious energy solutions, edotco continues to deliver world class products and services in line with its vision to make a difference today for tomorrow by enabling and empowering communications in a responsible manner in the region.

www.edotcogroup.com
Our sponsors

GOLD SPONSOR:

Huawei

Huawei is a leading global ICT solutions provider. Through our dedication to customer-centric innovation and strong partnerships, we have established end-to-end capabilities and strengths across the carrier networks, enterprise, consumer, and cloud computing fields. We are committed to creating maximum value for telecom carriers, enterprises and consumers by providing competitive ICT solutions and services. Our products and solutions have been deployed in over 170 countries and regions, serving more than one third of the world’s population.

Huawei’s vision is to enrich life through communication. By leveraging our experience and expertise in the ICT sector, we help bridge the digital divide by providing opportunities to enjoy broadband services, regardless of geographic location. Contributing to the sustainable development of society, the economy, and the environment, Huawei creates green solutions that enable customers to reduce power consumption, carbon emissions, and resource costs.

www.huawei.com

SILVER SPONSOR:

Eltek

Eltek was established in Norway in 1971 as a specialist telecom power systems supplier. Since then, we have grown organically and through mergers and acquisitions to become a leading international supplier of power solutions within several industry sectors, including telecom, rail and infrastructure, power generation and distribution, maritime and offshore and data centers. Eltek reported revenue of NOK 3.85 billion in 2014, is headquartered in Drammen, Norway and became part of Delta Group in 2015, a leading power and thermal management solutions provider.

Eltek’s hybrid solutions are based on the HE technology for optimal utilization of all energy resources. By combining solar or wind energy input with smart generator control and optimally dimensioned batteries, the scene is set for dramatic OPEX reductions and a positive environmental impact. Return on investment is typically only 2-3 years.

Eltek is the only power specialist with true global coverage, with approximately 2,500 employees, offices in almost 40 countries, business in more than 100, which gives us a unique capability to serve global customers. Eltek Power Pte Ltd was set up in Singapore in 1997, since then it has been the Asia Pacific Regional Office and continues today to provide key support for the region. Visit our website to see live HE saving!

www.eltek.com/energy_saved_he.epl

SILVER SPONSOR:

Acsys

Acsys is the global leader in cell site access control solutions. Our patented, military-grade technology is utilised by leading tower companies, telecom operators, and vendors throughout the globe to better manage their O&M and eliminate unauthorised access.

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
specialized site management toolset, 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.

Red Cube Enterprise is Tarantula’s flagship product for smart and efficient telecom site management, with modular design and configurable workflows. The platform is the worldwide industry standard for co-location and tower lifecycle management. The tool also offers additional capabilities such as location management, asset and lease management, operations and maintenance, invoice management, mobile field-force solutions, and comprehensive dashboard reporting.

www.tarantula.net

Cummins Power Generation

Cummins Power Generation, a subsidiary of Cummins Inc. (NYSE: CMI), is a global leader dedicated to increasing the availability and reliability of electric power around the world. A trusted name for its market leading diesel generators, Cummins is also a global provider of state-of-the-art hybrid power solution to telecom cell sites. Our wide range of products for the telecommunications industry serves global telecom operators with access to energy efficient and reliable power solutions.

www.cummins.com
Cummins employs approximately 46,000 people worldwide and serves customers in approximately 190 countries and territories through a network of more than 600 company-owned and independent distributor locations and approximately 6,500 dealer locations. Cummins revenues were $19.2 billion in 2014, 11 percent higher than 2013.

www.cumminspower.com

Miteno Communication Technology Co. Ltd.

Miteno (300038 SZ), is a leading non-state-owned independent owner, operator and developer of wireless communication towers, and a tower designer and manufacturer. In addition to leasing tower spaces, Miteno provides customized DAS, smart cities solutions and smart power poles which consolidates illumination, base station, Wi-Fi, monitoring, advertising, environmental surveillance and charging pile services. Headquartered in Beijing, China, founded in 2004, Miteno has business operation across China. In 2015, Miteno made strategic move to expand its tower leasing business into global market.

www.miteno.com

Telemisis

Telemisis SitePro® enables operators of telecommunications sites to take control of operating expense and improve reliability, by providing improved visibility into the current and future performance and status of their estate of assets. Our team of industry veterans have over 100 years experience designing and globally deploying full site management solutions; including power optimisation, fuel management, electricity metering, environmental management and machine/equipment control in harsh and demanding locations.

Telemisis design and manufacture SiteNode®; the industry's smallest, most flexible and cost-effective remote telemetry node. SiteNode units provide interfacing and data collection capabilities from a wide range of standard devices and sensors that may already be deployed or will be added during a deployment.

www.telemisis.com/products

Exhibitor:

Flexenclosure

Flexenclosure is a designer and manufacturer of intelligent power management systems and prefabricated data centre buildings for the ICT industry. The company provides systems that are fully integrated, modular, factory tested for reliability, adaptable to local conditions and quick to install.

eSite is a hybrid power system for off-grid and bad-grid cell sites that cuts diesel costs by up to 90%. eSite is an integrated single cabinet system for maximum reliability and speed of installation. eManager, an all-in-one toolbox for remote management, site power optimisation and KPI reporting, is an integral part of eSite.

www.flexenclosure.com

Infozech

Infozech is a leading provider of technology-led and data analytical solutions to Telecom – infrastructure, operators and communication service providers. Infozech has been delivering cost optimization and revenue management solutions, over the past 10 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 operating costs through tracking real time tower operations, prediction and analytics.

Its iETS product manages energy costs worth about 837.5 million US$ across 150,000 towers in India. iETS was adjudged the most innovative product at The Economic Times Telecom Award 2014.

www.infozech.com
Our exhibitors

GS Yuasa

With 36 affiliates in 16 countries, GS Yuasa has a worldwide presence operating under the GS Yuasa, GS, and Yuasa brands.

www.gs-yuasa.com (GS YUASA)

Abloy South East Asia

Abloy South East Asia 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.

www.abloy.sg

Nanhua

For more than 24 years, Shanghai NANHUA Electronics has been focused on the designing, manufacturing and models propose alternative operational structures that will guarantee ROI. We address multi-tenant infrastructure complexities, reduce OPEX, assure access to BI services, and deliver effective Asset/Inventory control.

AIO specializes in Hybrid/Energy Resource Management, targeting specific Battery/Generator/Fuel challenges with our newly developed Compact GenFuel solutions and more. With our enhanced Site Hardware and Management Services, such as Site Installation Simulations, System Integrations, Technician Applications & Support, companies can rest assured to address all their RMS needs from A-Z.

www.aiosystems.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$3.2B 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 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.

Exhibitor:

Heliocentris

Heliocentris is a German technology company that provides Managed Power Solutions and Services for commercial stationary applications for global Telecommunication Operators and Tower Companies. Services reach from energy optimization and solution engineering to implementation of customized turnkey power solutions and smart operations. The flagship product the “Energy Manager” enables smart connectivity between different components in hybrid energy supply clusters, such as batteries, solar panels, conventional diesel generators or fuel cells, thereby substantially decreasing the ecological footprint at much lower operating cost. The company is headquartered in Berlin with branch offices in Munich, Dubai, Vancouver and representations in Johannesburg and Yangon.

www.heliocentris.com

Exhibitor:

AIO Systems

AIO Systems is a next generation solution provider of management control systems for remote site networks tailored for telecom, power, oil & gas and water utilities. Our customized solutions are designed to control, predict, track and remediate critical network site operations in a timely and pro-efficient manner. AIO’s numerous business

www.towerxchange.com/meetups/meetup-asia
marketing of industrial application products. NANHUA has begun the promotion and application of Aviation obstruction light system for telecom towers in the year 2007. NANHUA has full experience in manufacturing of the complete line of cost-effective obstruction lighting and control solutions for the telecom towers, chimneys, high buildings, port machinery and any other high structures that could threaten the aircrafts. NANHUA products have been proven to be professionally designed and highly reliable.

NANHUA Electronics is located in Shanghai, China, with a factory of 6000 square meters, 310 staffs till June of 2014, including 37 members in R&D center and ISO 9001 quality authentication certification.

www.nanhua.com
Exhibitor:

ieng Group

i engineering Group provides end-to-end engineering infrastructure solutions to the telecommunications and power industries across Africa, the Middle East and Southeast Asia. We were established in 2007 and are now operating in thirteen countries: Algeria, Burkina Faso, Cameroon, Congo, DR Congo, Ethiopia, Ghana, Lebanon, Myanmar, Rwanda, South Sudan, Uganda and Zambia. We plan, procure, build, optimise and maintain telecom infrastructure; we now have more than 3,000 sites under management.

www.ieng-group.com

Our exhibitors

EnerSys

EnerSys® is the global leader in stored energy solutions for industrial applications. We complement our extensive line of motive power, reserve power and specialty products with a full range of integrated services and systems. With sales and service locations throughout the world. Headquartered in the United States, with regional headquarters in Europe and Asia, EnerSys employs over nine thousand people and operates 32 manufacturing and assembly facilities world-wide. This vast infrastructure and over 100 years of battery experience positions EnerSys at the forefront of both manufacturing capabilities and new product development.

www.enersys.com
Exhibitor:

Mecc Alte

Mecc Alte is proud to be the world’s largest independent producer of synchronous alternators. A specialised manufacturer of rotating machines, within the electromechanical sector. Quite simple we manufacture the widest range of low voltage alternators. We are a totally independent company focused on one product sector, making us specialists within our field. We operate in many diverse applications working closely within the independent power generation market offering a versatile range from 1-3000kVA. We are pleased to support TowerXchange where we will be introducing the new innovative Mercurio Telecom system, a cost effective simple DC power solution for remote telecom stations.

www.meccalte.com
Exhibitor:

Sagemcom

Sagemcom is a French high-technology group with an international dimension, and a major “smart city” player proposing smart meter, smart grid, smart site, smart infra and smart services offer. Sagemcom concentrates expertise in telecom and energy solutions enabling the supply of customized connected systems to utilities, telecom operators and services operators worldwide.

We offer highly efficient and innovative solutions for Energy & Site monitoring, green energy production and optimization, radio site construction, optical fiber rollout, telecom equipment and associated services.

As a founder member of the LoRa alliance, Sagemcom also proposes a solution that enables the connection with both deep indoor sensors and unpowered objects. This IoT solution is built on LoRa network, accordingly to the LoRaWAN specification.

Sagemcom employs 4,200 people on five continents, with a revenue of around 1.3 billion euros.

www.sagemcom.com
Exhibitor:

Lineage Power Pvt Ltd

Lineage Power Systems, a subsidiary of PACE Group, is a global leader in providing innovative Energy Management products & solutions for telecom sector. We pride being the
Our exhibitors

Redflow

Redflow is a global market leader in flow battery technology, providing high energy density energy storage solutions with a small footprint. To meet energy challenges Redflow have developed a range of zinc-bromide flow batteries. These batteries provide effective and sustainable energy storage solutions for numerous applications including telecommunications, renewables integration, on- and off-grid remote power and smart-grids.

At the core of the Redflow global network is their research and development centre in Brisbane, Australia. This global presence also incorporates a gigawatt manufacturing facility in North America and offices in the USA and Europe.

http://www.redflow.com

Exhibitor:

Zamil Infra

Zamil Infra is one of the leading EPC players in the Telecom Infrastructure & Power projects which offers Total Solution Provider, Full turnkey services, Managed Services, and Energy & Power solutions to telecom operators and service provider companies. Zamil Infra has successfully executed telecom passive infrastructure works at 10,000 plus sites in Middle East, Africa and Asia. With global factories in Bahrain, UAE, Egypt, Vietnam, India and China, we specialize in design and fabrication of varied kind of telecom towers. Our leading clientele includes major telecom players like TeliaSonera, Globe telecom, Etisalat, MTN, Vodafone, Bharti Airtel, Aircel and Network Equipment Providers such as ZTE, Ericsson, Huawei.

http://www.zamilinfra.com

Exhibitor:

NorthStar

NorthStar is an industry leader in designing and manufacturing high performance lead-acid batteries and high efficiency telecom cabinets. The company has state-of-the-art facilities in the USA and Sweden, and their products are used in more than 120 countries worldwide. NorthStar premium thin plate AGM batteries deliver long life at elevated temperatures, with faster recharge and superior PSOC cyclic performance. NSB Blue Batteries are today reducing 85% of diesel generator run time in offgrid telecom applications. The newly launched NorthStar Academy program will help customers to prolong their battery life and save energy in their telecom network.

www.northstarbattery.com

Exhibitor:

ELEKTROSKANDIA CHINA is a division of Sonepar Group based in France. We started operation in Shanghai in 1999, now is the leading professional in the market of Telecom Network Installation Materials and Sustainable Energy Business, and serving our customers globally through our vertical network of sister companies throughout the Sonepar Group of companies.

CUE DEE is today a leading global supplier of Antenna mounts, Brackets, Towers and Masts in both the Telecom and Wind energy sectors. We believe that for you as a customer our unique high quality product line coupled with our technical knowledge ensures a successful cooperation.

SONEPAR in association with CUE DEE at TowerXchange, together we can make it possible.

http://www.elektroskandia.com.cn

Exhibitor:
Our exhibitors

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.enatel.net

TOTAL

Total is a global integrated energy producer and provider, a leading international oil and gas company, and the world’s second-ranked solar energy operator with SunPower. Our 100,000 employees are committed to better energy that is safer, cleaner, more efficient, more innovative and accessible to as many people as possible. As a responsible corporate citizen, we focus on ensuring that our operations in more than 130 countries worldwide consistently deliver economic, social and environmental benefits.

www.total.com

Cisco

With the rise of Internet of Things, people and things are being connected at scales that were once not possible. Large scale management of unmanned remote sites is now a reality with the possibilities provided by Connected Assets, giving operators the visibility and controls to all aspects of remote site management such as environmental, operational health and surveillance and security. It can connect to everything onsite from generators and batteries over fuel tanks to the HVAC or doors, helping to detect critical events like theft or malfunction of equipment. Business intelligence can be automated with rule based policies for each site to harvest operational and productivity efficiency.


Qowisio

Qowisio develops and manufactures the most innovative Remote Monitoring Solution (RMS) on the market. Its solution is fully wireless, easy to install and designed to work in the hardest environment. We are one of the first player of the new IOT market. Our strategy is dedicated to the telecom market with a strong footprint in Europe, Middle East and Africa.

Our solution includes a wide range of features: Power monitoring, Environmental alarms monitoring, Security control, Hybrid management, Green power monitoring, Multi-tenants monitoring, RFID inventories... And there is even more coming up...

www.qowisio.com

Towershare

Towershare is a leading independent owner and operator of wireless communications infrastructure, focusing primarily in the Middle East, South Asian and North African markets. Headquartered in the UAE, Towershare’s management team comprises telecom veterans who, between them, have built and managed over 30,000 towers in MENA and Asia. TS has an operational footprint in Pakistan where it owns and operates ~150 towers and has signed agreements to acquire more than 5,000 towers from multiple operators in the country. Furthermore, TS is in discussions in more than four different markets for sale and leaseback and build-to-suit opportunities around the region.

http://towershare.com/

Do you provide equipment and services to the Asia tower industry?

Demonstrate your solutions to the leaders of Asia’s towercos and their counterparts heading tower strategy by exhibiting at the TowerXchange Meetup Asia. Contact Annabelle Mayhew at +44 7423 512588 or at amayhew@towerxchange.com
Towerco perspectives

The Asian tower market is one of the world’s most dynamic, and our mission at TowerXchange is to provide up-to-the-minute coverage and insight into new developments. To do this we regularly speak with the leading towerco decision-makers in all of the key Asian markets to keep a finger on the pulse and provide the clearest picture of this rapidly changing industry to our readers.

In the following pages you’ll find some of the most memorable interviews from the past year, providing a high-level overview of all of the latest major trends. We at TowerXchange would like to thank our interviewees for sharing their visions for the Asian tower market, and giving us a glimpse of the future shape of the industry.

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www.towerxchange.com
edotco extends footprint into Myanmar with acquisition of majority stake in MTC

Exclusive interview with edotco CEO Suresh Sidhu

On 2 October 2015 edotco announced that it had reached agreement to acquire a 75% controlling stake in Digicel Myanmar Tower Company (MTC), subject to the approval of regulators and MTC’s minority shareholder YSH Finance. The transaction values MTC at an enterprise value of US$221mn. When closed, the deal will bring edotco’s tower count over 15,000 and extend their footprint to include Malaysia, Bangladesh, Cambodia, Sri Lanka, Pakistan and now Myanmar.

Keywords: Acquisition, Asia, Asia Insights, Business Case, Digicel MTC, edotco, Infrastructure Sharing, Lease Rates, Market Forecasts, Myanmar, New Market Entrant, News, Power As A Service, RMS, Strategic Acquisition, Towercos, Valuation

Read this article to learn:
- What attracted edotco to invest in Myanmar
- MTC’s highly sought after urban locations
- edotco’s views on provision of energy and remote monitoring solutions
- TowerXchange’s commentary on the benchmark this transaction establishes for the value of a Myanmar tower

TowerXchange: Congratulations on the announcement of edotco’s maiden transaction beyond the Axiata group! What has attracted edotco to invest in Myanmar?

Suresh Sidhu, CEO, edotco: Mobile penetration in Myanmar remains among the lowest in Southeast Asia; according to the Myanmar Ministry of Communication and Information Technology, mobile penetration stood at just over 50% in June 2015.

The outlook is positive as Myanmar’s three main telecommunications operators have already committed to cover circa 85% of the population by 2020. New Crossroads Asia (NCRA), the research branch of the Union of Myanmar, estimates that Myanmar will achieve 100% mobile penetration by 2021.

edotco expects to invest further into Myanmar as it plans to bring its full service offerings into the country. Through its proposed investment in Myanmar Tower Company (MTC), edotco will offer Myanmar its knowledge capital, especially in the realm of tower and infrastructure sharing, which we believe will greatly benefit its partners and customers.

TowerXchange: Can you share some insights into the characteristics of the portfolio you are acquiring from Digicel MTC?

Suresh Sidhu, CEO, edotco: MTC currently owns and leases out 1,250 towers (largely a ground-based portfolio) which support multiple customers and are located primarily in highly sought after urban

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locations. MTC currently provides services to all three of Myanmar’s mobile operators: Ooredoo Myanmar, Telenor Myanmar and MPT.

**TowerXchange: Will edotco provide just steel+grass, or tower+power in Myanmar at these newly acquired sites and/or at any new builds?**

**Suresh Sidhu, CEO, edotco:** In Myanmar, towerCos have different operating models with some providing both tower and energy as part of their solution, and others just providing the tower (where mobile network operators take care of their own energy needs).

The market is trending towards including energy as part of a towerCo offering, primarily due to limited grid availability and reliability. To help operators run more efficient networks, edotco has regional competence to bring its best-in-class energy solutions (linked with our state-of-the-art real time remote monitoring service, echo) to Myanmar.

Within our existing operating markets, edotco provides end-to-end solutions in the tower services sector including co-locations, build-to-suit, energy, transmission and fibre as well as operations and maintenance; edotco is therefore well positioned to extend such capabilities in Myanmar as well. However, a final decision will be made after the transaction has closed and we have formally acquired the company.

**TowerXchange:** We understand around 7,410 towers have been erected to date in Myanmar, with a further 3,390 contracted in phase three of the rollout - how soon do edotco hope to start building additional towers in Myanmar?

**Suresh Sidhu, CEO, edotco:** edotco believes Myanmar has a strong growth potential in terms of new coverage and capacity, largely driven by increasing mobile penetration, operator license obligations, potential new entrants and new spectrum licensing. This will drive the need for new towers across all mobile operator networks; however, edotco expects infrastructure sharing will also become more prevalent. GSMA-IFC estimates there will be around 17,300 towers by 2017 in Myanmar, which is approximately 10,000 more towers than are currently in existence.

Developing the infrastructure Myanmar requires to meet demand will take investment by all key tower industry players, including edotco. We are well positioned with sufficient financial strength and firm backing from Axiata and we look forward to expanding our network and implementing our regional expertise in Myanmar for the benefit of all. Assuming the transaction closes as expected, we will hope to begin building new towers sometime in 2016.
edotco 360: Bangladesh - improving telecoms infrastructure from the ground up

edotco BD delivers “service and operations excellence” to promote infrastructure sharing

As the first towerco on the ground in Bangladesh, edotco is rapidly consolidating its position and contributing to the culture of infrastructure sharing in this rapidly growing telecom market. We spoke with the Managing Director of edotco BD, Darryll Sinnappa, who has over 18 years of diversified professional experience, primarily focused in the telecommunications and IT industries. Prior to joining edotco, Darryll was with Axiata Group Berhad in Malaysia as the Commercial Head in the Network Transformation SBU. In this role he was involved in driving some of the largest Cost Driving transformation initiatives, notably in Carrier Collaboration engagements, Right Cost Network (RCN) and Least Cost Network (LCN) initiatives, across the Axiata Group.

Keywords: 3G, 4G, Asia, Axiata Group, edotco, Bangladesh, BTRC, BTS, Market Overview, Power, Regulation, Robi, Qubee, Sale And Leaseback, Teletalk, Tower Count, Towershare, VimpelCom, Asia Insights, Off-grid, Unreliable Grid, Batteries, Solar

Read this article to learn:
- edotco’s partnerships in the Bangladesh operator market
- The progress of infrastructure sharing in Bangladesh
- Estimates of new tower rollouts over the next three to five years
- Grid challenges and the development of alternative energy
- The evolving licensing framework for towercos in Bangladesh

TowerXchange: Could you tell us about edotco’s recent launch in Bangladesh and your partnerships with Robi, Qubee and Teletalk?

Darryll Sinnappa, Managing Director, edotco Bangladesh: The launch of edotco BD has successfully engaged all telco operators under the infrastructure sharing agreement. The growing partnership with our customers, in line with BTRC’s vision of advocating infra-sharing, is vital in the evolving telecommunication industry.

We currently possess a customer base of both MNO’s and non MNO’s. With successful fulfillment of customer needs, edotco BD is among the top preferred infrastructure providers in Bangladesh. edotco BD is the first to launch a state-of-the-art remote monitoring centre for passive infrastructure equipment enabling observation of management of energy, fuel, battery life and other passive components. The “exceeding” result of the latest Customer Satisfaction Survey conducted by Spire Research and Consulting, indicates that edotco BD is successfully meeting almost all requirements of customers, and is ready to lead the industry.

Partnerships:
- edotco and ROBI: edotco is providing end to end passive infrastructure for ROBI as well as managed services and nationwide field operations.
- edotco and QUBEE: An infrastructure sharing agreement exists between both parties with a number of sites shared with edotco BD. Qubee also recently initiated an expansion of their Wi-Fi hotspot strategy, using edotco sites as PoP (Point of
Presence).
edotco and Teletalk: With Teletalk continuously expanding their 3G network coverage, we have a tower sharing arrangement using edotco BDs towers.

Notably all these partnerships have played an instrumental part in enhancing infrastructure sharing. It has enabled collaboration and has paved the way for new niche specialised internet service providers and broadband providers to reach out to the masses in Bangladesh, bridging the digital divide, paving the way for a ‘Digital Bangladesh’.

TowerXchange: How is the development of the Bangladeshi tower market progressing? How complete is the coverage? What are the operational implications for edotco given that I understand that you manage the full field first level operational maintenance and energy for your Bangladeshi tenants?

Darryll Sinnappa, Managing Director, edotco Bangladesh: In Bangladesh, all mobile operators combined have over 25,000 towers; every operator under the BTRC infrastructure sharing guidelines are sharing their current passive infrastructure with each other, that includes non-telecom equipment such as towers, buildings, batteries, electricity, and cooling systems to ensure larger network coverage with cost efficiency. edotco is strongly pursuing the BTRCs agenda of sharing infrastructure and have strengthened the sharing model since inception. Operators are driving to enhance 3G coverage across the board and mobile coverage is primarily addressing infill capacity as well as rural coverage.

With this management responsibility comes the responsibility of ensuring the best quality of service and best network availability to our key customers. It also means that we need to be very “service and operations excellence” oriented as a company. We have seeded into our company DNA the culture of customer first, efficiency at all levels, and quality in all our operational work efforts. Operational functions and network availability becomes a clear focussed function and improvements in efficiency become ingrained into every team member, and improvements in processes ingrained into the company accordingly. We have started introducing new tools, deepened our analytics efforts and introduced more advanced monitoring systems to harness as many efficiencies as possible whilst also moving towards more automation to improve speed of service delivery.

TowerXchange: We understand there are a total of around 27,000 towers in Bangladesh – are we right, and how many new towers would you estimate are being built each year?

Darryll Sinnappa, Managing Director, edotco Bangladesh: From our internal analysis, those figures look about right, as far as new tower builds are concerned, it depends very much on the three to five year plan for each mobile operator as well as any new government policies that may arise. Based on coverage, technology and mobile trends, we believe possibly another 5,000 additional sites may likely be developed. They would be in the form of infill sites to address the growth of data utilisation as well as coverage sites to address the growth of users.

TowerXchange: How could the 1,800 and 2,100 MHz spectrum auction, which at last report was due this month, affect the Bangladeshi tower market?

Darryll Sinnappa, Managing Director, edotco Bangladesh: As key inputs into the businesses of our clients the mobile network operators (MNOs), developments in spectrum allocation and management is an area that we watch closely. From the perspective of the tower business, new spectrum would translate into new opportunities for not just new build but also increased possibilities for co-locations and infrastructure sharing. The latter two possibilities are especially important as tenancy growth is a key strategy for edotco BD.

TowerXchange: One of TowerXchange’s energy storage vendor clients described the Bangladeshi grid as “one of the most unreliable in the world” particularly during the monsoon season. What has been your experience of the Bangladeshi grid and what steps have you taken to maximise uptime at your sites?

Darryll Sinnappa, Managing Director, edotco Bangladesh: Power supply in Bangladesh is not always available due to load shedding issues and also due to the exponential growth in demand seen from recent infrastructure and development in
Bangladesh and thus ample planned measures are taken in order to facilitate for it.

Battery is an immediate secondary source after grid failure. We as edotco are looking into the latest technologies for battery back-ups including lithium ion batteries which provide faster recharging times and much longer-lasting charge, resulting in substantial efficiencies. All BTS/RBS sites have such solutions and the capacity depends upon the network plan. For business critical sites (Core, Hub, HVC, Remote), diesel-powered generators are used as a redundant power source with an orderly fuel arrangement in place. In addition, solar panels are another energy/power source that is deployed at sites with the most vulnerable grids.

Our greatest challenge is faced during the monsoon periods when the storms knock out transmission lines. The repairs for this takes significant time and this is when our resources are stretched to ensure that we keep as many sites powered up by an efficient localised mobile/portable generators logistics programme. Our strength of vastly experienced field operations and management teams across the nation certainly helps us to overcome the challenges of this season in the best way possible.

TowerXchange: Can you tell us about edotco’s deployment of solar hybrid sites in Bangladesh?

Darryll Sinnappa, Managing Director, edotco Bangladesh: Bangladesh is a developing nation trying to overcome challenges for the demand and uninterrupted supply of electricity across the whole country.

There are still rural areas with no commercial electricity supply, for recognition known as NCP (non-commercial power) zones. In an effort to bring about advancement to such areas and taking all the related factors into consideration, edotco is pioneering the use of renewable energy sources for its infrastructure with the deployment of solar technology across a large number of sites throughout Bangladesh especially in NCP zones and areas with the most vulnerable grids. This innovation is being used alongside the generators that are currently powering the towers. In the absence of power supply, solar panels are able to harness the sun’s energy and convert it to run mobile telecom transmission services, which is of optimum benefit in NCP zones. Therefore, with the addition of solar technology, a notable amount of carbon emission is reduced, both at sites with and without commercial power. The carbon footprint is also reduced significantly. On average, solar hybridisation reduces energy costs by 30% per site.

Conservation of the environment is one of the leading thoughts at edotco Bangladesh, driving the effort to increase the number of network transmission towers using solar energy, going green with high tech environmental solutions toward greener pastures for the nation.

TowerXchange: Like most metropolitan centres, we understand Dhaka has a lot of rooftops rather than ground-based towers. What steps have you had to take to ensure the structural integrity of the buildings your sites are located on top of?

Darryll Sinnappa, Managing Director, edotco Bangladesh: Most of the sites in Dhaka City are pole
sites, which do not have an impact to structural integrity as they are light and strong. Moreover, in Dhaka City, it is mandatory for landowners to have a safety check done with due approval by the Capital Development Authority of the Government of Bangladesh, known as RAJUK, in order to build a house or building, which satisfies our minimum structural safety requirement for pole sites.

On the other hand, for tower sites (on roof tops) anywhere else in the country, we do a structural analysis of the building to figure the feasibility of a particular tower, via third party consultants. After analysis, if the building is deemed as feasible for a tower site, only then does the acquisition team move forward to make an agreement with the house owner.

**TowerXchange: What is the current regulatory framework around infrastructure sharing? Can you share any insights into the regulation of towercos’ equity ownership? Do you expect any regulatory changes in the near to mid-term to support telecoms development?**

**Darryll Sinnappa, Managing Director, edotco Bangladesh:** BTRC, the Bangladesh regulatory authority, has had the foresight to advocate a strong policy position on infrastructure sharing as far back as 2008 through its Infrastructure Sharing Guidelines (ISG), which have since been amended in 2011. The guideline establishes key principles such as non-discriminatory access to towers, commercially negotiated terms, as well as clearly establishes the role of access seeker and provider.

The ISG also details the basis on which any request for access can be rejected, typically on grounds of insufficient capacity. We feel that with some minor amendments to accommodate independent tower companies, the ISG can continue to provide impetus for further infra-sharing in Bangladesh.

Presently, separate regulation of tower companies is not yet in existence in Bangladesh. As such, equity ownership issues in relation to tower companies are not as yet relevant.

Notwithstanding reviews of the National Telecom Policy and the legislative and regulatory changes that might emanate from that process, Bangladesh is well poised to make crucial decisions in the area of infrastructure rollout and sharing, through the licensing of independent tower companies. edotco Bangladesh is a firm advocate of the licensing approach to standalone tower companies, given the mutual benefit of regulatory oversight for the regulator and security of tenure for the operator. We feel this will spearhead a new era of growth and operational excellence hitherto unseen, with new levels of specialisation and innovation in towers.

**TowerXchange: What do you think are the top three changes required to aid the development of the Bangladeshi tower market?**

**Darryll Sinnappa, Managing Director, edotco Bangladesh:** Bangladesh is a rapidly urbanising nation with cities like Dhaka and town centres facing major trials in advancement with lack of space and stable power deficiencies. Keeping the nation’s challenges in mind; innovative technology and solutions for tower management in terms of space, structural design, energy efficiency, advanced batteries, et cetera, are primary to bring about development in the tower market.

In terms of cost efficiency and the environment, cordial industry collaboration is another leading factor to aid development, which edotco BD is actively committed to.

Furthermore, while issuing the towerco license, only the serious players who are well-capitalised and experienced should be prioritised, for the sake of stability in the tower market.
edotco 360: Cambodia - increasing competition and opportunity

The independent towerco model is starting to be embraced in Cambodia as regulators begin to promote new developments

With 3G coverage increasing and demand for 4G services starting to appear, Cambodia’s telecoms industry is increasingly starting to adopt the independent towerco model. The development of Cambodia’s telecommunications infrastructure is under way, but the government is doing its part to support growth through new regulations. The stage is set for sustained telecoms and tower market growth in Cambodia.

Keywords: 3G, 4G, ARPU, Asia, Axiata, BTS, Cambodia, Camtower Link, DAS, edotco, Energy, Hybrid Power, IBS, Investments, Market Overview, Managed Services, Regulation, VAS, Insights, Asia Insights, Who’s Who, Towercos, RMS, Market Overview, Off Grid

Read this article to learn:
- The size of the Cambodian mobile and tower markets
- The potential for tower sharing and new tower builds
- The quality of grid access in the Cambodian market
- The deployment of IBS and DAS in Cambodia
- New regulatory developments and their impact on the tower market

Phillip Wong, Country Managing Director, edotco Cambodia: I served as CFO at Hello Axiata Company Limited from 2009 – 2012, and then CFO at Smart Axiata Co. Ltd from 2013. Before joining Axiata, I was Vice President and General Manager of Alcatel-Lucent for South East Asia where I oversaw business operations. Prior to that I was CFO of Alcatel for Singapore and the South East Asia Region. I have worked extensively in the Asia Pacific region, across six countries and have significant experience in the integration and merging of new businesses and overseeing organisational change.

TowerXchange: How is the development of the Cambodian tower market progressing? How complete is coverage, how mature is the 3G overlay?

Phillip Wong, Country Managing Director, edotco Cambodia: The MNOs in Cambodia (Metfone, Smart, Cellcard) have a total of 21.39 million subscribers, 97.7% of which are prepaid subscribers; the overall ARPU in Cambodia is US$2.5. 3G services now cover 50% of the country, and interest in 4G services is increasing with various operators beginning to deploy 4G infrastructure. There has been a recent shift in the market with the entrance of three Chinese operators. There is currently a total of 9,000 towers in Cambodia, with an expected growth rate of 3% in 2016. edotco is the market leader with a portfolio of 1,700 towers; our main competitor is Camtower Link, the second licensed tower sharing...
company in this market.

TowerXchange: How quickly are new towers going up in Cambodia? Is it a good market for tower manufacturers and construction subcontractors?

Phillip Wong, Country Managing Director, edotco Cambodia: The top three operators already cover over 90% of the populated areas. As a result tower growth is expected to be limited, unless they move aggressively on 4G/LTE. However, the new entrants providing mobile services will still require towers. It remains to be seen whether they will opt for tower sharing or building new towers. The potential for growth in the tower market is significant if they choose to go with new tower rollouts.

TowerXchange: We understand that the grid is one of the biggest challenges in the Cambodian market. Are a significant proportion of sites off grid or on unreliable grid connections?

Phillip Wong, Country Managing Director, edotco Cambodia: Energy remains a big challenge in the Cambodian market however it has improved recently and now only an estimated 20 to 25% of all sites are off-grid.

TowerXchange: What energy equipment is typically installed on sites? Are backup DGs or battery banks widely used? Is power a pass through?

Phillip Wong, Country Managing Director, edotco Cambodia: There are two main types of site: grid and off-grid. On grid sites the operator applies for a grid connection from EDC (Electricité du Cambodge) the government provider, and private grid providers. All sites use batteries for backup but DGs are used for off-grid sites and important sites such as MSC/BSC sites and hub sites. The power in the Cambodian tower market is a pass through.

TowerXchange: Is there much opportunity for small cells, DAS and IBS in this market?

Phillip Wong, Country Managing Director, edotco Cambodia: Yes, some operators are investing in IBS and small cells, however the cost of IBS is quite high so the number of deployments are still relatively low. Operators are focussing their investments in IBS at strategic areas e.g. airports, shopping malls, five star hotels and high-rise condominiums.

TowerXchange: What is the current regulatory framework around infrastructure sharing? Can you share any insights into regulation of towercos’ equity ownership?

Phillip Wong, Country Managing Director, edotco Cambodia: The regulatory framework acknowledges the benefits of infrastructure sharing between operators, including reduced duplication of investment, ability to build coverage more quickly, lower operating costs, and more efficient use of resources. The Cambodian regulator also supports 100% foreign ownership to encourage investment in the country’s telecommunications infrastructure.

TowerXchange: Do you expect any regulatory changes in the near to midterm to further support telecoms development?

Phillip Wong, Country Managing Director, edotco Cambodia: Currently a new telecommunications law is being drafted and it is expected to come into force in the first half of 2016. Some of the proposed provisions undermine regulatory certainty and investment potential; they will also require universal service responsibility which will increase costs. The government should encourage infrastructure sharing on commercial terms with operators, and they should be free to enter into sharing agreements. The regulator should also look into mandating infrastructure sharing in cases where operators have not shared their towers.

TowerXchange: What do you think are the top four changes required to aid the development of...
the Cambodian tower market?

Phillip Wong, Country Managing Director, edotco Cambodia: Mandating infrastructure sharing would be a good starting point. Beyond that, new structure types such as pylon trees, and camouflaged structures should be introduced into the market. Towercos should also start to provide managed services for operators including the operation and maintenance of both passive and active infrastructure and equipment; this could enable considerable savings and overall increased efficiency. Finally the number of In-building solutions (IBS) and DAS should be increased to improve the quality of services in larger populations centres, especially the capital, Phnom Penh.

TowerXchange: How do you think the Cambodian tower market will change over the next 3-5 years?

Phillip Wong, Country Managing Director, edotco Cambodia: I expect there will be some consolidation between the operators, and a few of them will not survive. This will definitely have an impact on the towerco market. I believe that more operators will adopt the tower sharing model and this will result in increased tenancy ratios, which will benefit everyone. It's also possible that tower rental pricing may be impacted due to increasing competition in the tower market. As the tower model is embraced in Cambodia the need for new tower builds should start to decrease year by year. I also predict that towercos will increasingly provide value added services such as managed services and monitoring systems to optimise operations.

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edotco 360: Pakistan - Poised on the brink of a tower revolution

With regulatory support, MNO cooperation and potential tower deals on the horizon, all of the pieces are in place

Arif Hussain, Country Managing Director of edotco Pakistan has had a diverse and successful 20+ year track record in telecoms working with operators such as AT&T, Multi-Links and Multinet, and on the vendor side with Alcatel-Lucent in multiple global markets including the US, Europe, Africa and now Asia. Prior to assuming leadership of edotco Pakistan, Arif was the COO of Multinet, a subsidiary operating unit in the Axiata Group.

Keywords: 3G, 4G, Asia, Axiata Group, edotco, BTS, ITU, Market Overview, Multinet, Mobilink, Pakistan, PTA, Power, Regulation, Sale And Leaseback, Telenor, Tower Count, Towershare, VimpelCom, Warid, Insights, Asia Insights, Off-grid, Unreliable Grid, Batteries, Solar

Read this article to learn:
- edotco develops efficient sites ready for occupancy with fibre available from day one
- Pakistan’s regulatory and MNO landscape
- Tower counts and teledensity in Pakistan
- The extent and quality of grid access
- How this market will change in the next three to five years

TowerXchange: When we last spoke to Group CEO Suresh Sidhu, edotco was managing 13,000km of fibre in Pakistan while awaiting receipt of a license to trade as a towerco, in anticipation of building ~200 towers for the local operators – what is the current state and focus of your Pakistani operation?

Arif Hussain, Country Managing Director, edotco Pakistan: In Pakistan, our operations are more focused on building edotco’s brand attributes with our target MNO partners, leveraging on the strength that our regional 14,000 operational tower presence gives us.

We have a very experientially capable core team in place to establish our on-ground operational competency, while working closely with our MNO partners to expound edotco’s capability in delivering customised tower space hosting solutions. I am pleased with the progress we have made so far in terms of regulatory requirements and we are very encouraged by the prospect of soon securing our first build-to-suit deal. We are expecting licensing soon and currently are in an advanced stage of discussions with relevant MNOs on towers.

TowerXchange: What makes the Pakistani tower market unique compared to other markets?

Arif Hussain, Country Managing Director, edotco Pakistan: Spurred on by the forward looking deregulation policy of 2004, Pakistan has established a vibrant telecommunications market...
as a whole where the clear success story is Mobile telephony, having grown from less than 10mn subscribers in 2005 to well over 100mn in the space of a mere decade.

Five well established mobile operators are present in an energetic and competitive market exceeding 70% penetration according to the regulator (PTA). The MNO space is exclusively the domain of international operators (Mobilink/VimpelCom, Telenor, Ufone/Etisalat, Zong/China Mobile and Wateen/Dhabi Group) which can be a very positive market dynamic for end users in terms of the latest services innovation (e.g. mobile banking).

With 3G and 4G licensing completed in 2014, we expect exponential growth prospects in consumer demand for mobile data which in turn will translate to an operator imperative to build denser network coverage, driving substantial demand for new tower sites in the coming years. These market dynamics continue to be overseen and helped ahead by one of the most forward-looking regulatory environments in the region.

We see the number of sites in Pakistan more than doubling from present levels in the next five to eight years, driven primarily by demands of 3G and 4G network coverage.

TowerXchange: We estimate there are ~28,000 towers on the ground in Pakistan – are we right, and how complete is the coverage, and what is the status of the 3G overlay?

Arif Hussain, Country Managing Director, edotco Pakistan: According to available market data and our internal estimates, there are around 28,000 unique mobile tower structures across Pakistan which, when including the impact of reciprocal operator sharing, equates to around 35,000 – 38,000 operational sites, primarily owned and operated by MNOs.

3G was first launched in Pakistan in the latter part of 2014 and coverage is now reported to exceed 50-60% in top population density markets while new cities are being announced daily. Zong (China Mobile) and Wateen (Dhabi Group) have also launched 4G LTE services with rapidly expanding coverage being reported. As MNOs reach for greater coverage with better network stability of their 3G/4G networks and consumers begin to demand increasingly faster mobile data speeds, we see a major competitive edge for edotco to play out with our leading edge energy efficient site designs augmented by our available nationwide fibre footprint. Globally, we have seen heavy data traffic sites must be on fibre to give users the real 3G experience and we expect a similar trend to play out in Pakistan in the coming months and years. edotco fully intends to leverage this advantage in our customer propositions where we are offering efficient sites ready for occupancy with fibre available from day one.

Teledensity in Pakistan, as of April 2015, which includes Fixed Line, WLL and Mobile currently stands at 73% and the country’s geographical coverage is greater than 92%. In terms of mobile penetration, the figure is now at 70.04 mobile connections per 100 people.

TowerXchange: What kind of volume of new tower build do you anticipate in the market?

Arif Hussain, Country Managing Director, edotco Pakistan: In customised market studies we have
conducted and through our own internal modelling, we see the number of sites in Pakistan more than doubling from present levels in the next five to eight years, driven primarily by demands of 3G and 4G network coverage. While there remains some opportunity to augment coverage through sharing of available sites owned by other MNOs, independent towercos are much more active in developing MNO clients and offer an attractive alternative by means of a customised build-to-suit offer. Therefore we see substantial opportunities for new site builds in the next few years.

TowerXchange: What is the regulator doing to support the tower industry and the development of telecoms?

Arif Hussain, Country Managing Director, edotco Pakistan: The Pakistan Telecommunications Authority (PTA) is a globally recognised regulator by the industry. Most recently the PTA was honoured by being elected as a member of the ITU Council for a third four-year term. While the relationship between the licensees and the regulator have seen some ups and downs, overall the local industry perception of the regulator is progressive and positive with ample opportunity for constructive dialogue to hear differing perspectives.

Infrastructure sharing was considered and drafted into the present regulations several years back with two types of tower licenses available (a broad Infrastructure license or a simple tower license) designed for the licensee to provide telecommunications infrastructure to the industry on a shared basis. An update to the overall telecommunications policy is expected in the near future where we fully expect the regulator to further support the idea of infrastructure sharing which will ultimately benefit the consumer (faster rollout of services), the country (reduction in unsightly structures) and the operators (more economical rollouts).

TowerXchange: What are the main obstacles facing the growth of the tower industry in Pakistan?

Arif Hussain, Country Managing Director, edotco Pakistan: While the tower operating company model has been studied in depth and there have even been attempted implementations in the last few years, no substantial foothold has been established in Pakistan in this regard. A number of factors contribute to this condition but I think the lack of an independent towerco with experience and means has been the primary detractor.

Of course Pakistan has had its share of significant challenges over the years, primarily around security and power shortages, which definitely play into investor/new entrant confidence and desire to pursue the available market opportunity. However, the Pakistan telecom market is worth taking a closer look; in spite of all the perceived negativity it successfully raised nearly US$1.2bn in 3G and 4G licensing fees for the government in 2014. All our discussions with prospective MNO partners convince us the towerco model is extremely well understood within the Pakistani telecoms industry; the winning combination of commercial terms and a long term contract are close to being established as a benchmark.

TowerXchange: What are your thoughts on the recent sale of 4,500 Warid towers to Towershare?

Arif Hussain, Country Managing Director, edotco Pakistan: For the towerco model to be fully and successfully realised in Pakistan there will have to be portfolio sale and leaseback deals to help the market players achieve the necessary scale and size of operations. There are well-established global industry benchmarks that clearly show that successful towercos require significant size and scale, which then is the platform for creating greater efficiencies and higher co-location ratios to deliver target returns for investors. While this can be achieved in Pakistan through organic build-to-suit driven growth, I believe to truly achieve the desired returns at a meaningful scale against a given risk profile and within an investment window of five to eight years, the industry will be compelled to seek the acquisition of a significant portfolio of towers from an MNO by towercos. I think such deals will be an integral part of helping to establish and grow the tower and telecommunications infrastructure industry in Pakistan.

However, for a first-of-its-kind deal, the 400-pound gorilla in the room must be adequately addressed to ensure the seller and the buyer both get what they want. The operator must feel they are getting the kind of value that can meaningfully impact their business plans/balance sheet, while the acquiring
Sale and leaseback of entire operator portfolios will be key for the establishment and growth of the towerco model in Pakistan.

towerco must ensure the valuation of the towers to be acquired is clearly supported by the revenue potential to be generated over the life of their investment.

TowerXchange: There has been talk of both Telenor and VimpelCom selling their Pakistani towers; what impact would this have on the market?

Arif Hussain, Country Managing Director, edotco Pakistan: Again, sale and leaseback of entire operator portfolios will be key for the establishment and growth of the towerco model in Pakistan. Any such deals will strengthen the MNOs ability to compete and position the acquiring towerco to build adequately sized, scaled and efficient operations. In addition such deals will also be beneficial in optimising the tower portfolios by presenting greater opportunities to eliminate parallel capacity inefficiencies.

TowerXchange: How would you characterise the extent and quality of grid power in Pakistan? For example, are a significant proportion of sites off grid or on unreliable grid connections?

Arif Hussain, Country Managing Director, edotco Pakistan: Like a majority of developing countries, Pakistan has its grid power challenges as a result of which most sites were built with at least one on-site generator. To counter this challenge we are building sites with the average design considerations to take into account a minimum of eight hours of grid unavailability up to the extreme of an off-grid site in the most remote areas.

Our site designs are taking full advantage of the regional experience we have as edotco in developing intellectual property through investment in R&D to build more energy efficient sites leveraging technologies such as deep cycle batteries and solar energy.

TowerXchange: How do you think the Pakistani tower market will change over the next three to five years?

Arif Hussain, Country Managing Director, edotco Pakistan: I believe from the current virtual ‘start-up' that the Pakistan tower market will be much better established with defined players and market leaders in the next three to five years. Furthermore, while there remain some gaps in commercial understanding and what are initial trust issues between towercos and MNOs, I believe the market will be much better organised in the next few years.

With edotco Pakistan successfully integrating optimised energy and a fibre backhaul solution in their portfolio, I fully expect MNOs to exclusively rely on us as their towerco partner of choice to deliver on all their telecom infrastructure expansion needs.
Towershare on the challenges and opportunities in Pakistan

Towershare is using its experience and local know-how to shape the future of telecom networks in this unique market

The telecom and tower markets in Pakistan are still somewhat of a mystery to outsiders. We spoke with Farid Madhani, Manager Strategy and Planning at Towershare, to shed some light on the unique conditions on the ground, how this market is progressing and how his team are using their extensive experience to contribute to its development. Farid’s background is in finance and investments; before joining Towershare, he worked with Dawood Hercules Group, an agro-energy conglomerate, where he specialised in new investments.

Keywords: 3G, 4G, Asia, China Mobile, Energy, Etisalat, Market Overview, Mobilink, Decommissioning, Pakistan, PTA, Regulation, Telenor, Towershare, Vimpelcom, IBS, Insights, Asia Insights, Country Risk, Infrastructure Sharing, Build-to-Suit, Off-Grid, Unreliable Grid, Hybrid Power, IBS, RMS, Towershare

Read this article to learn:

- The current operational challenges on the ground in Pakistan
- The number of towers and overall coverage
- The potential for IBS in Pakistan
- Regulatory initiatives in Pakistan
- Current grid conditions and what to expect over the next two to three years

Farid Madhani, Manager, Strategy and Planning, Towershare: Please give us a brief overview of the telecom and tower markets in Pakistan.

Farid Madhani, Manager, Strategy and Planning, Towershare: Pakistan is a unique market from a number of perspectives. In terms of demographics, it is the world’s sixth largest population. At the same time the population is very young and hungry for data services which is driving growth. It has a very competitive MNO market with five operators, all owned by international groups including VimpelCom, Telenor, the Abu Dhabi Group, China Mobile and Etisalat. With all of this scale the pricing is very low; ARPU’s are sitting at US$2 and they have been declining for the past five to seven years. All of these factors make Pakistan a textbook case for tower sharing as operators are struggling to remain profitable.

The operators in Pakistan are already open to sharing and are actively sharing infrastructure; approximately 30% of the towers on the ground are currently being shared. There is also a lot of parallel capacity and in some areas it’s not unusual to see four or five towers grouped together. Whatever the number of towers is, it’s not representative of what should have been built for optimal coverage. Currently the majority of towers are held by the MNOs and broadband providers, and Towershare is the only towerco with a footprint.

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TowerXchange: Can you give us an idea of the number of towers on the ground and the overall coverage?
Farid Madhani, Manager, Strategy and Planning, Towershare: It’s difficult to pinpoint the exact number but we estimate it to be between 34,000 and 38,000, including small cells and rooftops. In terms of geographic and population coverage, more than 90% of the geography has 2G, and more than 95% of the population. 3G and increasingly 4G are being rolled out especially in the major cities; this has been progressing well and demand is continuing to grow.

There are some areas yet to be covered in Pakistan, particularly in the Federally Administered Tribal Areas (FATAs) which are still proving challenging. There are some towers that were already on the ground; Mobilink owns some that were built in the early part of this century. Towershare is currently the only company building in this last frontier using our combined experience in Pakistan and working closely with the tribal lords. Our local team has built more than 10,000 towers in Pakistan with Towershare and in previous roles; almost all of Telenor's phase one towers were previously managed by experts who now work with us.

TowerXchange: As demand increases in Pakistan do you expect to see new tower rollouts in the short term?

Farid Madhani, Manager, Strategy and Planning, Towershare: We predict that 1,000 to 2,000 new towers towers will be built per year in Pakistan over the next couple of years, and all of these will be built by towercos. The MNOs are squeezed for investment capital and have turned their focus completely towards achieving profitability.

Towershare goes where our clients need us, and our strategy is to solve their problems as they arise. We predict that there is likely to be demand for increased coverage and capacity in urban areas, including in-building sites. To date all in-building sites have been deployed by MNOs but this is likely to change.

TowerXchange: What is the regulator doing to support the tower industry and the development of telecoms in Pakistan?

Farid Madhani, Manager, Strategy and Planning, Towershare: The regulator in Pakistan is very supportive and has actively encouraged MNOs to share infrastructure. The Pakistan Telecommunication Authority (PTA) released an MOU that set an unofficial target to increase the sharing ratio in Pakistan. This has been progressing steadily and the MNOs and towercos are working closely with the PTA. It’s a non-binding agreement but it does indicate the regulator’s commitment.

Another obstacle in Pakistan is the operational expertise required in this market. The conditions on the ground are unique and very different from other emerging markets, and therefore can be very challenging. The operational realities in Pakistan vary from place to place, from Karachi to Lahore to Mardan. Each city and region has its own regulations with regards to right of way; in some areas there are housing societies with strict controls on the height of towers and how close they can be built to homes. But in other areas you can see really tall towers right in the middle of houses. Refuelling,
providing electricity, security, insurance, testing, overhauling and maintenance all come with their own challenges unique to this market and they all require feet on the ground and a team with experience operating here.

Taxation is another obstacle in this market; there can be some complications due to complex federal and regional policies that can lead to tower deals becoming unprofitable with either the towerco or MNO being caught out. There have been efforts to find an optimal structure but this is challenging due to the different Federal and regional layers of sales tax, capital gains tax, and withholding tax. That being said this is business as usual for us and our team has experience managing it.

TowerXchange: How would you characterise the extent and quality of grid power in Pakistan? For example, are a significant proportion of sites off grid or on unreliable grid connections?

Farid Madhani, Manager, Strategy and Planning, Towershare: This is part of the reason towers and tower sharing have become so important in Pakistan. The power situation has been challenging for the past four to five years; the average national outage is eight hours per day. This is higher in rural areas, and it increases everywhere in the Summer months. Sometimes even when there is grid access there are issues with quality and consistency. A site can be connected to the grid, but it may still need to use gensets for up to four hours per day during grid supply.

However, there has been a lot of investment in the grid recently and there are a number of power plants to come online over the next few years, including coal, solar and hydro.

For our part, Towershare is looking to improve this situation by using our expertise to develop energy solutions designed for each unique situation. We’re also implementing new RMS equipment and our own NOC to improve reporting and customer experience. The NOC is up and running now at our HQ in Islamabad with some basic features, but it will be fully operational in a few months.

TowerXchange: How do you think the Pakistani tower market will change over the next three to five years?

Farid Madhani, Manager, Strategy and Planning, Towershare: We predict that there will be at least one pan-Pakistan towerco that will emerge. There will also be consolidation in the market, resulting in some of the overlap issues being addressed. The number of tenancies will definitely increase, and the overall number of towers will actually decrease so that you won’t see five towers grouped together within 20-50 metres anymore.

The power situation has been challenging for the past four to five years; the average outage is eight hours per day. This is higher in rural areas, and it increases everywhere in the summer months.

TowerXchange: There has been talk of both Telenor and VimpelCom selling their Pakistani towers; what will be the impact on the market?

Farid Madhani, Manager, Strategy and Planning, Towershare: This will be very good for the market and has the potential to create a pan-Pakistan tower company. Telenor and Mobilink have the most towers in the country and any change in ownership of portfolios of this size will represent a big opportunity, will result in a lot of consolidation, and will also create a big barrier to entry for any other companies interested in this market.
Man on a mission: Akhil Gupta
on the disarmament of operators

TowerXchange’s exclusive interview with the visionary behind Bharti Infratel, and his quest to persuade MNOs worldwide to share towers through independent towercos

Akhil Gupta is truly one of the founding fathers of the tower industry as we know it today. He was responsible for the separation of Bharti Airtel’s passive infrastructure and subsequent founding of Bharti Infratel, one of the world’s largest and most respected towercos. He is also a co-founder of Indus Towers, a joint venture between Bharti Airtel, Vodafone and Idea Cellular, which has become the largest tower company in the world. Akhil is Vice Chairman of Bharti Group and Chairman of Bharti Infratel. He is also Chairman of TAIPA (India’s Tower and Infrastructure Providers Association) and President of TSSC (Telecom Sector Skill Council of India).

Keywords: India, Bharti Airtel, Bharti Infratel, Deal Structure, Acquisition, Investment, Opex reduction, Infrastructure sharing, Operational excellence, Operator-led JV, Infrastructure funds, Carve Out, Regulation, Indus Towers

Read this article to learn:
- The driving principles behind the creation of Bharti Infratel
- A view of potential consolidation in the Indian towercos market
- The progress of Bharti Infratel’s Green Towers P7 Programme
- How many new tenancies will be needed for 3G and 4G, and do towercos have the capital to deploy hundreds of thousands of additional sites?
- Why Bharti sold rather than retained their African towers
- Akhil Gupta’s vision for the extension of the towercos model

TowerXchange: Can you provide a brief introduction to Bharti Infratel and give our readers an idea of your history and footprint?

Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd: Bharti Infratel has about 35,000 towers in 11 of the 22 telecoms circles in India, plus a 42% share in Indus Towers, which operates in 16 circles, giving us a total of 85,000 towers. One of the world’s largest towercos, Bharti Infratel is a listed entity with a US$12bn market cap today. We maintain complete neutrality and are non-discriminatory vis-à-vis all Indian MNOs; all tariffs are transparent and are the same for all clients.

TowerXchange: Thinking back on the founding of Bharti Infratel, what motivated the carve-out of tower assets?

Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd: Many people think it was just to raise funds but this isn’t the case; I know because I was part of the top team that developed the strategy behind this move!

We realised that operators were fundamentally ill-suited to manage passive infrastructure efficiently. They are by very nature marketeers and thus best suited to do marketing, sales, brand-building and advertising. Managing passive infrastructure is a low technology engineering job; refilling diesel on-site is critical but can seem mundane; it was often not appropriately prioritised and operators were never able to optimise opex and maintain the
best uptime. At Airtel, we had earlier outsourced IT and network management on the principle that our partners had better domain knowledge, better economies of scale and could attract better human capital vis-à-vis the activity in question. We felt we must do the same for passive infrastructure (i.e. towers) since we as an operator did not have the requisite skill set and mindset for the same. The other reason of course was that we felt that this infrastructure would need to be shared extensively amongst operators to reduce cost, especially in low tariff countries like India, which was possible only with independent towercos. However, we realised that there were no companies with those skill sets and so we decided to create a company and outsource tower maintenance to it. This is how Bharti Infratel was formed. The basic principles for the towerco were to share towers on a non-discriminatory basis amongst all operators and to have a business model that would create a win-win scenario between MNOs and towercos. Accordingly, we designed a Master Service Agreement (MSA) whereby with the addition of a second or third tenant, it would result in a lower charge for everyone. Towercos make a lot more money with a second tenant, but the anchor tenant also gets approximately 20% relief on their lease rate and energy charge. This made it a true win-win situation for both and resulted in a unique situation where a company makes more money when its existing customers start paying less than before.

The principle of sharing benefits between MNOs as more tenants come on board is fundamental to this industry, and it also ensures operators will never find it worthwhile to build their own towers.

We’re on a mission of operator disarmament – to disarm their manpower and make it economically unfeasible for them to build their own towers. I’m pleased to say that today virtually no operator in India builds its own towers.

TowerXchange: Reflecting back on the restructuring of MNO licenses in 2012, how did that change the way the tower business was run in India?

Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd: Since the tower business has evolved on this basis of a strong, deep-rooted win-win business model, licensing and regulatory changes have made little difference.

TowerXchange: It seems like the Indian tower market has restructured to the extent that M&A deal flow is recommencing - do you expect to see consolidation among the Indian towercos in the coming year?

Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd: Personally, I feel there are not too many towercos in India: Infratel, Indus, Viom and Reliance Infratel have sizeable portfolios. ATC has a little over 12,000 towers, and there are a few other small tower companies. Over 85% of the total towercos-owned towers are with top three towercos.

Consolidation in the tower industry is not an important change. Having too many operators in a market causes havoc, but in the tower business it doesn’t. If I don't have a tower at a location and say Viom does, they can offer a second or third tenant rate much cheaper than what I could offer with a new tower; this fosters the automatic co-existence of towercos. Demand is high and there are long-term contracts with our clients with pricing protection.
As a result, no towerco can offer much lower rentals for incremental business, with the result that towercos do not typically witness price wars.

**TowerXchange: What are the prevailing lease rates in India?**

**Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd:** Prevailing lease rates are around 32,000 rupees per calendar month (approximately US$500) for a single tenant on a ground based tower, on top of which each state has a different energy charge depending on grid availability. This is discounted to 28,000 rupees with a second tenant and 24-25,000 with a third tenant. The rates for rooftop sites are lower but with the same construct.

**TowerXchange: Are there any differences in network coverage and density between the different Circles, or is it a fairly mature network across India?**

**Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd:** The whole country is pretty well-served now; Airtel for instance covers about 83% of the geography and towers are deeply distributed across every state. There is more density in some Circles than others, but there are no vast areas without towers. However, many more towers will be needed for the continuing increase in data demand.

**TowerXchange: What do you think of the rumored towerco launch by BSNL?**

**Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd:** This would be a welcome step and it has been in the works for some time now. The sooner they can launch a towerco and make all of those towers available to operators, the sooner we can stop building parallel infrastructure. We as towercos are not in this business to put a tower in a place where we might have a single tenant for five years; the return on capital invested and return on equity wouldn’t make sense. We do not want to put up single tenant towers unless we absolutely have to. As such, I’m happy if BSNL has towers that they make available to Bharti Airtel and other operators.

**TAIPA has offered to co-operate with BSNL and help them bring their 35,000 to 45,000 towers to market sooner rather than later.**

**TowerXchange: Tell us about Bharti Infratel’s Green Towers P7 programme, the role RESCOs are playing and could play in the future?**

**Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd:** One of the major costs to operators is energy. From our point of view this isn’t a part of the business we have to make a lot of money from; we’d love to work with partners to provide the lowest cost energy by putting capex into renewable energy.

Indian grid power is not always the best, which means our networks have a historical dependence on diesel generators. We are driven by environmental issues and cost reduction to speed up the P7 initiatives and reduce energy costs below that of diesel generator-powered units.

Ultimately a towerco is designed to run passive infrastructure; we are not a power company and have no aspiration to be a power company. If Renewal Energy Service Companies (RESCOs) can provide an electricity connection 24 hours a day 365 days a year at a reasonable price or if our clients can put in their own connections and have their own meters, that’s the ideal scenario. Until then, power is an integral part of what we do, and we’ll do what we can to make energy more efficient, and to achieve uptime SLAs with our customers.

The RESCOs in India are currently very small; a lot of companies are thinking about it and trying to raise the required capital. In the meantime our aim is to make as many towers diesel-free as we can. Currently, 23-24% of our towers are diesel-free. We manage sites with 16+ hours of grid with large battery banks; we make extensive use of efficient lithium-ion batteries that charge very quickly and have deep discharge. We also use solar energy where we can and where the conditions are suitable.

**TowerXchange: How achievable are the Indian government’s green energy targets for 2015 and 2020?**

**Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd:** Green energy targets are under discussion, but our stance has been that it’s the government’s job to provide electricity.
Do towercos have capital to invest in networks to keep up with data demand? It would depend on each company. At Bharti Infratel and Indus Towers we have no limitations on capex – Infratel has over US$1bn in cash, and no debt; we have a huge capacity to build whatever is needed.

It’s unreasonable to force the telecom industry to build out renewable generation capacity beyond the reach of the grid when the telecom industry consumes a small proportion of India’s diesel. We’re happy to install renewables on a voluntary basis, but if the government is not mandating electric cars for the automotive industry why should they mandate solar energy for cell sites? The best way to reduce carbon footprints is to provide reliable grid power and that is the responsibility of the ministry of power. It is important to note that as per an independent study by Nielsen, the telecom industry in India only accounts for less than 2% of total diesel consumed in India.

TowerXchange: Some analysts have suggested that India will need twice as many towers for the 4G era, increasing from 400,000 today to 800,000. Do you agree with such a forecast?

Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd: Indian MNOs have overall invested close to US$50bn in spectrum auctions to date. Most of this spectrum will be used for data networks. As more investment goes into 3G and 4G using a lot of higher frequency bands, there will be demand for cell site densification.

I’m less concerned about the increasing number of towers, but more interested in the increasing number of tenancies. There are about 600,000 tenancies in India today, and we definitely expect that to double with the continuing 3G and new 4G rollout. In our view it is not a race to build more towers, but a race to increase the number of tenancies.

TowerXchange: How will this infrastructure growth be financed? What role will the towercos continue to play?

Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd: The operators have put a lot of money into spectrum and active infrastructure and they do not build towers. Towercos must invest in passive infrastructure going forward.

We must make sure that when the operator’s question is build versus buy that they always buy. Towercos do a better job achieving economic and capital efficiency.

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and we feel these would have strong potential.

**TowerXchange: Does Bharti Infratel have any plans for international growth or will you remain focused on the domestic market?**

Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd: We have looked at Bangladesh, but there are some important regulatory issues which need to be sorted out first. There are three main issues; the taxation of tower asset transfers; the current policy whereby the operator must retain at least 51% of the towerco (experiences in other markets have proved that it should be other way round: towercos must own at least 51% and operators a maximum of 49% to make it non-discriminatory and not under control of the operator); in addition to this VAT has to be charged, but there is no pass through. We're seeking to meet the regulator to discuss these issues.

**TowerXchange: Could you reflect on the ongoing process to divest Airtel's African towers - what was the thinking behind selling those assets as opposed to rolling them into your own towerco as you have done in India?**

Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd: We seriously looked at taking over Bharti Airtel's African towers, but we realised that Africa is not a mature enough market to accept a towerco whose group company runs operations in the same country, unlike India where it is accepted that operator-owned towercos are non-discriminatory independent towercos.

As a result the decision was made to outsource this to other towercos already operating in SSA. Deals have been agreed in all of Bharti Airtel's largest African markets, but it's possible that due to regulatory regimes the towers in two or three countries won't be sold. That won't be a problem for us.

**TowerXchange: What were your experiences running the African tower sale process in-house?**

Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd: I felt if the principles and objectives of the tower sale were clear, and the process was simple and clear, we could run it in-house. The moment the second tenant came I wanted a big relief on our rental and energy costs; once that principle was established, the process became relatively simple.

We've been running a towerco for seven years, so we definitely had the experience to do this in-house! The transaction was not motivated by raising a few billion US$; it was more important to relieve the ongoing burden of passive infrastructure capex and transfer that infrastructure into specialised hands.

**TowerXchange: Please conclude by sharing your vision for how infrastructure sharing can create value for telecoms worldwide.**

Akhil Gupta, Vice Chairman, Bharti Group & Chairman, Bharti Infratel Ltd: First of all, I think TowerXchange are doing a fantastic job in bringing the efficiencies created by towercos to the forefront of everyone's agenda. This is one area where telecoms can adopt a similar strategy in both the emerging and developed world, and it is a primary need around the globe.

I'm a supporter and proponent of the tower industry and business model. It has now been proven that since the model is based on sweating out existing assets, there is progressively higher growth between number of towers, tenancies, revenues, EBITDA, EBIT and PBT for a tower company. The other striking feature of the towerco model is our long term contracts and consequent predictable revenue stream and strong free cash flows.

Our vision for the next three to five years is to get all the passive infrastructure out of the hands of the MNOs. Infrastructure needs to be shared – gone are the days when owning towers conferred a competitive advantage. Nobody has ever been able to stop a competitor putting up a tower next door, but the efficiencies that can be achieved by sharing towers are undeniably compelling.

I do believe that outsourcing passive infrastructure to towercos creates significant value for telecom companies. While huge capex on towers by an operator is always a drag on its valuation, a towerco gets a multiple of the same as value due to better capital productivity.

Akhil Gupta is the latest member of the TowerXchange “Inner Circle” Informal Advisory board.
Miteno: A market leader in the Chinese tower industry

Miteno shares some insight into their plans for the Chinese tower market, and international expansion

With the formation of the record-breaking China Tower Company fast approaching, international investors are watching closely to identify new opportunities for investment. As huge as China Tower Company may be, there are still independent tower portfolios in China, comprising an estimated 15-20,000 towers. We spoke with Zhiyong Zhang, Chairman and President of one of the leading independent towercos Miteno to learn about the independent tower market in China and its ecosystem.


Read this article to learn:
- Miteno’s background, development and business model
- The scale and structure of the Chinese tower ecosystem
- Grid access and hybrid energy in the Chinese market
- The impact of the creation of China Tower Company
- Miteno’s long-term growth strategy

TowerXchange: Could you introduce your company and give us an idea of your position in the tower ecosystem?

Zhiyong Zhang, Chairman & President, Miteno: Miteno was founded in 2004 and formally came into operation in 2006 as a designer and manufacturer of communication towers. We gradually branched out into the operation and maintenance of communication infrastructure. Before the establishment of China Tower Co., Ltd., Miteno was a leading vendor for China Mobile’s national central purchasing, the country’s largest telecom carrier. It can be said that Miteno is a market leader in China in the design and manufacture field of communication towers.

TowerXchange: Could you give us some insight into your business model evolution?

Zhiyong Zhang, Chairman & President, Miteno: Miteno was listed on the domestic GEM as an ‘A Stock’ only four years after we came into operation, a testament to the company’s advanced business model. Though in theory Miteno is in a traditional manufacturing industry, we designed an innovative model for communication tower provisioning, which integrates all resources of this traditional manufacturing industry on one operational platform. Under this model, we highlight our brand value by enhancing our technological edge to focus on design. Under strict management, we outsourced most of our manufacturing, which would otherwise require heavy asset management.
Our business focus has gradually shifted to communication tower operation, i.e. leasing communication infrastructure to telecom carriers. Miteno owns a network monitoring platform for tower operation, which not only tracks the status of the tower in real-time, but also gathers other data through extra interfaces, such as video monitoring and environment monitoring. When our towers reach a certain number, this platform will yield a huge network value.

TowerXchange: Can you provide some specific detail on the scale and structure of the ecosystem of privately owned towers in China and how that segment of the market will be affected by the creation of China Tower Company?

Zhiyong Zhang, Chairman & President, Miteno: Currently the number of privately-owned towers in China is around 20,000. Half of them belong to big players like Miteno, the rest of them are scattered and operated by hundreds of private companies throughout China. These independent companies will benefit from the creation of China Tower, because leasing towers from a third party is feasible for wireless carriers. For Miteno, we are participating as a tower consolidator, trying to lease self-owned towers to more tenants. Our strengths lie in tower design, manufacture and installation.

TowerXchange: The tower industry varies considerably from country to country; can you give us an idea of how tower sharing and tower leasing work in the Chinese market?

Zhiyong Zhang, Chairman & President, Miteno: A few years ago, the vast majority of communication towers in China were constructed by state-owned telecom carriers. These assets were later divested to the newly founded China Tower Company, allowing the carriers to co-construct and share the communication infrastructure through administrative means. Private owners across the county also have a small number of communication assets, offering equipment lease services to telecom carriers.

TowerXchange: What is the cost of building new towers compared to the cost of leasing towers in the Chinese market?

Zhiyong Zhang, Chairman & President, Miteno: The situation varies in different areas, and relevant statistics are not forthcoming as lease services have just begun.

TowerXchange: What is the extent, quality and availability of the electricity grid in the Chinese market? Can you give an idea of what percentage of towers are off-grid? Who owns the power equipment when a site has multiple tenants?

Zhiyong Zhang, Chairman & President, Miteno: It can be said that 99.9% of the communication towers in China rely on fiber-optic communication and on State Grid Corporation of China for power supply. Power supply is never a problem.

TowerXchange: The GSMA has stated that there are 35,000 instances of hybrid and renewable power being used in China. Are these solutions used for off grid towers? Do Miteno’s towers use hybrid and renewable energy solutions?

Zhiyong Zhang, Chairman & President, Miteno: Hybrid and renewable energy are used in China only as backup power supply. Government owned mobile carriers have strict design requirements on towers; very few off grid towers exist. We are
introducing new backup power solutions with better cost performance.

**TowerXchange**: The transfer of over one million towers to China Tower Company is unprecedented in the global market. What impact do you think this will have on the Chinese tower market?

**Zhiyong Zhang, Chairman & President, Miteno**: There are three major positive impacts. First, it changes the KPI assessment mechanism of telecom carriers so that they can fully focus on their core business. Second, it shifts infrastructure investment from capital expenditure to operating expenditure in recognition of the third party leasing model. Third, such recognition provides broad space for the development of private capital, thus creating a completely new industry chain in China.

**TowerXchange**: What is Miteno’s long-term strategy, both in the domestic market and internationally? Do you have plans for international growth?

**Zhiyong Zhang, Chairman & President, Miteno**: As a listed company committed to meeting the needs of capital market, we have made “going global” one of our strategies. Miteno’s strengths lie in the tower design, manufacture, installation, operation and maintenance of the communication tower, as well as in financing capacity. We will also receive the support of national policies in exploring the international market.

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**See you at our future events!**

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www.towerxchange.com
Beijing Miteno Communication Technology Co., Ltd

Beijing Miteno Communication Technology Co., Ltd (300038 SZ), founded in September 2004, is a leading non-state-owned independent owner, operator and developer of wireless communication towers, and a tower designer and manufacturer. In addition to leasing tower spaces, Miteno is a provider of customized DAS, smart cities, Wi-Fi solutions. Headquartered in Beijing, China, Miteno has business operation across China. In 2015, Miteno made strategic move to expand its tower leasing business into global market.

**Highlights:**
- As a tower operator, Miteno’s tower portfolio includes 2000+ owned towers;
- As a tower designer and manufacturer, Miteno has provided over 25,000 communication towers and auxiliary products to major wireless carriers of China;
- DAS solution: POL and dual-channel DAS system;
- Data Center: Integrated with the TIG-300, a self-developed intelligent tower monitoring system;
- Integrated Tower Base Station solution for limited ground space.
An insider’s view: how the tower market works in China

The first independent towerco in China, Q Towers, seeks to create transparency and increase the invisibility of Chinese towers

China is about to make international headlines in the telecom press when a million towers, rooftops and DAS are transferred from China Mobile, China Unicom and China Telecom to the recently created China Tower Company (CTC), representing the clearest indication to date that China has embraced infrastructure sharing. What readers may be less aware of is the fact that there are around 15,000 independently owned towers in China. With abundant organic growth opportunities, the Chinese independent tower sector could represent an interesting opportunity for international investors, if those investors can comfort themselves that the market offers sufficient transparency.

TowerXchange and Q Towers’ CEO Ted Zhong are on a mission to create that transparency!


Read this article to learn:
- What is the size of the Chinese tower market and how many towers are independently owned?
- The implications of the creation of CTC for China’s independent towercos
- ‘Permitting’, land ownership and protection of the area around towers in China
- The need for a benchmark of the value of Chinese towers as ‘pledge-able assets’
- The current limitations of the Chinese capital markets as sources of finance for Chinese towers, and the opportunity for international investors

Ted Zhong, CEO, Q Towers: I’m a telco veteran with 15 years of executive experience. Before I founded Q Towers I was with China Netcom, a nationwide telco later merged into China Unicom, and Wasu Media Network, a listed carrier similar to COMCAST.

Q Towers was founded in 2007 and has been the pioneer of introducing tower business to China. So far we have 100 ground based towers (GBTs) and 20 rooftops with an extraordinary tenancy ratio of 2.8.

TowerXchange: Please introduce us to the Chinese tower market; we’ve heard reports that there are 1-1.3mn towers, of which China Mobile currently own around half, with Unicom on 30% and Telecom on 20% – before the assets are transferred to China Tower Company (CTC). Are we about right?

Ted Zhong, CEO, Q Towers: If we say 1-1.3mn BTSs rather than towers, then the numbers are correct. Unfortunately Chinese carriers did not distinguish their BTSs as towers, DAS or rooftops historically. We can only estimate that half of them are towers.

Most new build towers in China are monopoles – they consume less land and look prettier!

TowerXchange: How complete is coverage and the progress from 2G and 3G to 4G, and the associated network densification? At what rate are new towers being built?
Ted Zhong, CEO, Q Towers: Unlike anywhere else in the world, the Chinese carriers do not allow subscribers to roam between each other’s networks. That’s why all three wireless carriers here need complete coverage, and they have achieved that.

For instance a Provincial capital city in China would require one to two thousand new builds of BTSs and at least half of them would be GBTs. There 30+ cities like this and hundreds of cities with lower numbers.

Coverage in China is at 98%+ percent, which is rare in the rest of the world, and densification builds are seemingly endless.

Since all three carriers in China were SOEs (State-Owned Enterprises), they have a mandate to provide 100% geographical coverage. Even for remote areas with few subscribers.

TowerXchange: I understand that Q Towers were pioneers in the creation of an independent tower market. What is the structure of the Chinese tower market before and after CTC? How many independent towers are there and who owns them?

Ted Zhong, CEO, Q Towers: Before CTC was established there were only a few private tower operators in the market with small portfolios. The total number would have been around 2,000 nationwide.

After CTC made its grand entrance, hundreds of small towercos popped up throughout the country.

My assumption would be that they own around 15,000 towers in total. Usually these owners come from a telecommunication contractor background. It makes sense for a pipeline company move into the tower business.

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TowerXchange: What are the implications of the creation of CTC for China’s independent towercos?

Ted Zhong, CEO, Q Towers: The creation of CTC has removed couple crucial obstacles for independent towercos.

1. It validated the market.
2. It forced the carriers to change their budgeting system at a corporate level: no more capex and lots and lots of opex. This broke the glass ceiling we once had with all carriers when their total expenditure on leasing sites exceeded their opex capacity.
3. CTC will soon settle a valuation and risk control benchmark for all financial institutions in China. This will allow us all to access more affordable debt, and will ensure the recognition of towers as pledge-able assets.
4. CTC is offering US$80,000 to acquire towers from the market, so there is one more exit for us.

TowerXchange: Is that a standing offer of US$80,000 per tower regardless of the tower cash flow generated per site? It sounds like an attractive offer for some towers, but not a great offer if you have a tenancy ratio of 2.8!

Ted Zhong, CEO, Q Towers: Right now CTC don’t seem to care how many tenants are on a tower – they’re offering to buy existing sites because they are struggling to meet the targets set by the carriers’ search rings.

CTC was contracted to build 120,000 new towers.
but I would estimate they only have capacity to build around a third of those sites. 120,000 is a huge number for a new company to build, so the industry is turning back to independent developers to supplement their capacity because they realise they can’t put all their eggs in one basket. CTC is looking for every possible opportunity to fulfill the search rings, for example, if they can use one operator’s tower to fulfill another operator’s site requirement, they will co-locate even though the existing towers haven’t been transferred to them yet.

**TowerXchange: When do you think the transfer of China Mobile, China Unicom and China Telecom’s existing towers to CTC will actually take place?**

**Ted Zhong, CEO, Q Towers:** A press release suggested the legacy tower assets would be injected into CTC by the end of August 2015,

The asset registers probably need to be audited and cleaned (which is why it’s impossible to provide an accurate tower count for China), so I think full integration will be at least one year from now.

**TowerXchange: Can you still build towers independently? Can you acquire other towercos?**

**Ted Zhong, CEO, Q Towers:** The truth is everyone is building towers and leasing to all three carriers as we speak.

**TowerXchange: Are we right that China Mobile has not shared much infrastructure, but Unicom and Telecom have shared on a case by case basis, meaning few towers have multiple tenants on them in China?**

**Ted Zhong, CEO, Q Towers:** Yes.

**TowerXchange: What kind of tenancy ratio growth has been achieved in China?**

**Ted Zhong, CEO, Q Towers:** Q Towers has 2.8, but it is not realistic to expect to sustain such high tenancy ratios at a large scale. We believe a tenancy ratio of 1.8 – 2 is a realistic near term goal for independent Chinese towers.

**TowerXchange: What lease rates are typical in China?**

**Ted Zhong, CEO, Q Towers:** Lease rates are consistent in China. In well-developed areas,
lease rates are around US$800-1,000 per carrier per platform per month. In remote areas it’s US$650-700 per carrier per platform per month. Once CTC settles pricing guidelines, the rent may rise higher than historical numbers.

Each carrier does not need just one platform because each carrier runs multiple networks and needs multiple tenancies. So whereas in the U.S. each carrier might need only one RAD centre, China Mobile alone own three different networks which require three different platforms. Admittedly towercos don’t usually charge 3x, providing a discount for purchasing in bulk.

**TowerXchange: What business model is operated by Chinese towercos; steel and grass or full service inclusive of power?**

**Ted Zhong, CEO, Q Towers:** Our position is analogous to that of a landlord. There are three components to the service we prove: tower, shelter and connections to the electricity grid, and we sometimes use them as bargain chips – if you want lower rental rates, maybe we exclude one of the services. We have limited responsibility for security: we provide the shelter, but anything outside the shelter remains the tenant’s responsibility, not the tower operator’s.

We don’t provide backup batteries, diesel generators (DGs) or air conditioning; these remain the responsibility of the carrier. Although I’ve never seen an onsite DG – the Chinese operators all have portable backups, and almost all sites are on grid.

Frankly I’ve not seen a country that enjoys such reliable power supply in Asia.

**TowerXchange: Is it quick and easy to get a permit to build a tower in China?**

**Ted Zhong, CEO, Q Towers:** Compared to a tower market like the U.S., there are less specific permitting requirements in China. Permitting a tower in the U.S. is subject to a zoning system which my American friends describe as a “long and painful road!” In comparison, the process of securing permission to build a tower in China has never been as strict as in the U.S.; there is no specific permitting process for towers in China. This is because historically telecom companies were SOEs, so there was no such thing as permitting, they would just build. There are still urban planning regulations of course, but the government still treats Chinese MNOs like insiders.

There is no registration system that says a tower operator owns land, or that title can be exchanged, indeed lots of people build telecom towers in China without following any procedure, and the reality is that many of the existing towers to be rolled into CTC have not followed a procedure, but they will still be fine.

However, Q Towers and members of our consortium of the country’s leading independent towercos all follow a code: we all secure urban planning permission and certificates of rights of way, which we feel represents best practice in China. We’re hoping the creation of CTC will raise the bar for independent tower operators by instigating a more formal, specific process for permitting telecom towers as CTC’s assets need to be run through the risk management processes of banks.

**TowerXchange: What do our international readers need to know about land ownership and urban planning in China?**

**Ted Zhong, CEO, Q Towers:** Legally the Chinese government owns all the land, but usually they will rent or sell certain usage rights to all kinds of entities, including SOEs and private companies. So it’s not the land owner but the usage rights owner who has to be negotiated with and paid if you want to build a tower.

Even if the usage rights owner signs a contract, legally you still need the permission of the government, so you must apply to the local Urban Planning Bureau (similar to the Zoning Board in the U.S.). As in many tower markets, if you have right connections you are more likely to get the answer you are hoping for! It remains more challenging to secure approval to build towers in urban than in sub-urban and rural areas.

**TowerXchange: How is the area around a tower protected to ensure that, for example, another towerco cannot build a tower across the road from yours?**

**Ted Zhong, CEO, Q Towers:** I feel the protection of tower assets in China is greater than in India,
for example, where it seems you can build almost anywhere. Chinese towers are protected by local and central government.

Local government has the capability to protect against the building of parallel infrastructure. A department which you might translate as ‘City Administration’ can issue a notice to tear down an unpermitted site over the road from an existing tower, or they can intervene directly to prevent the build.

Central government protection provides even more robust protection of cell site locations. All carriers and their senior executives are appointed and managed by the government; there is a department SASAC who says who goes where and who stays – they’re ultimately the entire Chinese telecom industry’s boss. That department has issued a directive that essentially translates as anybody who overbuilds towers – the person who is responsible will be removed from their post and will not regain their position for the next three years.

The Chinese government, your boss, is telling you if you build parallel infrastructure, then kiss goodbye to your career!

I haven’t encountered any overbuild in China since then.

**TowerXchange: What is the ownership structure of Q Towers? Can international entities participate in the Chinese tower market?**

**Ted Zhong, CEO, Q Towers:** Q investments owns 90%+ of the company while TZG and a prominent US tower entrepreneur (personally) owns the rest.

We have been active in the tower business for eight years and we have encountered no regulations to prevent us from securing foreign direct investment.

**TowerXchange: Why is Q Towers primarily backed by international investors as opposed to by the Chinese capital markets?**

**Ted Zhong, CEO, Q Towers:** The Chinese capital markets lack maturity; they are severed from the rest of the world, more politically dominated.

Consider the two most obvious ways to finance a tower company: debt and equity. Your cheapest option is securing debt direct from a bank, but if the bank does not accept your main assets, telecom towers, as pledge-able assets, then raising debt is not an option.

The other option is through equity. If you want to issue a public offering and get listed in China, the first requirement is that your company has to be profitable. Yet an expanding towerco typically doesn’t achieve profitability for several years. While the tower industry is recognised internationally as a sound platform for debt funded acquisitions, the requirement to be profitable means an IPO is a dead end for many Chinese towercos too.

Venture Capital and Private Equity firms here have no idea what the tower business is – most have same ideas as banks: if the company is not immediately listable in China, it’s not investible. Even when those investment firms call their headquarters in the US, back there they have concerns about a perceived lack of scalability and transparency of Chinese telecom towers.

**TowerXchange: What does it cost to build a typical Ground Based Tower in China? And are...**
there any benchmarks for the value of a Chinese telecom tower?

Ted Zhong, CEO, Q Towers: The average cost for tower and its foundation should be US$48,000. We need a benchmark for the valuation of Chinese tower assets to provide proof and recognition of their value to banks.

CTC has the aforementioned standing offer to acquire towers for US$80,000 each, but that does not take into account tenancy ratios, lease rates and the quality of the assets, so it’s not a good benchmark.

I would expect the spinoff of CTC to be finished by the end of this year, which would suggest an IPO by 2017. Before that they will get huge loan from the Chinese National Development Bank, backed by a pledge of their own tower assets. That will set a benchmark for valuation of towers as pledge-able assets. Until Chinese banks recognise telecom towers as pledge-able assets, they don’t know how to sell them and they don’t know what they’re worth.

TowerXchange: How are Q Towers and your peers in your consortium seeking to create the scale necessary to attract ‘smart money’?

Ted Zhong, CEO, Q Towers: We are currently working on an idea to form an investment vehicle under which we can place 500-800 towers from various high quality, legally sound and robustly constructed independent Chinese tower portfolios, which together expect to grow to over 1,000 towers in the next six months. That investment firm would then have a track record of building and rolling up a substantial portfolios of Chinese towers.

There is the possibility of integrating these portfolios into a single trading entity, indeed all the members had at one point been prospective acquisition targets for Q Towers, but whilst we continue to try to secure the right capital to aggregate towers, the other companies have continued to operate by themselves and have done well.

Ultimately I feel that any of us fighting alone can’t win the war, but together we would represent a very profitable combination for a foreign investor looking for a growth opportunity with a potential future exit strategy either domestically to CTC or perhaps to an international towerco like American Tower, Tower Bersama or Digital Bridge.

TowerXchange: Having spoken to several international investors with a track record of investing in telecom towers, it seems that the number one concern when it comes to evaluating opportunities in China is a lack of transparency.

Ted Zhong, CEO, Q Towers: I’m not surprised. Few Chinese tower companies have English language websites, and there is limited information available on CTC.

We’re hoping to bring a delegation of stakeholders in the Chinese tower industry to the TowerXchange Meetup Asia this year to meet with the international community, to share best practices, and to share our insights into the investibility of Chinese towers.

TowerXchange: Please summarize your vision for the future of Q Towers and of the Chinese telecom tower industry.

Ted Zhong, CEO, Q Towers: The Chinese tower market is facing its first gold rush. However the local capital markets were not completely ready to lead the first round. There is a great window for seasoned international investors to take the lead and support the first wave of consolidation.

Comparing China with India, the regulatory environment, the infrastructure, the scale, and value chain have much in common. I have strong reasons to believe that China will lead the global market both in terms of size and valuation (CTC will be listed in China and the Central Government and MNOs as share holders/customers will be happy to see a really high valuation)
Vietnam’s disaggregated tower market

As demand for mobile data increases in Vietnam, pressure is building on all the major stakeholders to densify networks.

The Vietnamese telecoms market is on the verge of opening up as telecoms providers race to meet demand for connectivity; we spoke with Patrick Tangney to hear his thoughts on the restructuring of the market and what to expect in the Vietnamese tower market in the coming years. Patrick is a lawyer by trade and also worked as an investment banker at Citigroup before moving over to the principal investment side. He co-founded Alcazar Capital, which focuses on greenfield telecom projects, and has co-founded two tower companies in Southeast Asia: Golden Towers in Vietnam and Irrawaddy Green Towers in Myanmar.

Keywords: 3G, 4G, Alcazar Capital, Asia, Hutchison, Infrastructure Sharing, Irrawady Green Towers, Golden Towers, Market Overview, MIDC, Mobifone, Tower Counts, Vietnam, Vietnamobile, Viettel, Vinaphone

TowerXchange: Who are the main companies in the Vietnamese tower market?

Patrick Tangney, Chairman, Golden Towers: Vietnam is at a relatively early stage of its development as an independent towerco market: most of the towers are owned by the operators with some exceptions. The MNOs own more than 75% of the towers in the market and the rest are owned primarily by private individuals and companies often focused on other activities. There are some private portfolios, and some smaller companies, but few entities that you could classify as a towerco in the traditional sense: the private tower market is quite disaggregated. There are a handful of IBS-oriented companies that would qualify and a couple of companies that resemble more traditional tower companies. These include Golden Towers, another holding group that has approximately 2,000 towers, and a third company with roughly 500 towers. There are a number of privately owned portfolios in the 100 to 750 tower range, but it’s not clear what their market share is. There are also numerous smaller portfolios with fewer than 100 towers.

TowerXchange: What is the total tower count in Vietnam?

Patrick Tangney, Chairman, Golden Towers: The exact numbers are hard to pin down, but there are perhaps 45,000 towers owned by the MNOs. Viettel owns about 45% of the assets, Mobifone and Vinaphone together roughly the same level, with smaller operators holding the remainder. If you
Vietnam’s top three MNOs will need to create at least 50,000 new tenancies either in existing towers or by building new towers

include the independent portfolios there is a total of approximately 60,000 towers including rooftops.

TowerXchange: What is driving demand for new sites? And are there new towers being built by MNOs currently?

Patrick Tangney, Chairman, Golden Towers:
Tower strategies vary from operator to operator. The key growth driver over the past several years has been data and this is only going to increase. Vietnam is at a relatively early-stage 3G environment with smartphone penetration at 25%, which is much higher than even two years ago. This in turn is driving data usage and there has been increased demand for content over mobile including video, music, games etc. in the classic developing market paradigm where very young populations leapfrog directly to mobile as the principal gateway to the internet. Google did some research on the Vietnamese market and found that slightly over 80% of smartphone users watched video, for instance, the third highest rate in the world, and 75% accessed the internet. Email, social networking and other data-oriented activities over mobile devices are also steadily increasing.

This uptick in data service demand has signalled a need for further capacity, and this is without factoring in LTE, which will be another driver when launched in 2016. As a result, there is a real need for densification; the smaller operators in Vietnam are at a disadvantage in terms of infrastructure and they need to do whatever they can to maximise return on capital invested. It’s very likely that they will continue to look at co-operaing with towercos rather than spending huge amounts on new infrastructure to compete with the market leaders.

The larger companies like Viettel also do some co-location on private towers where it’s hard to get permits due to zoning. Given the strong demand for tower space, they look at the existing network first in these situations, then they look at build to suit. Some of the market leaders, especially Mobifone, have a history of working with private tower owners. The estimates of new tower requirements are high; the smaller MNOs are going to have to find tenancies on some existing towers to continue to expand their coverage. Beyond this, there is expected to be a 30% increase in demand for capacity every year.

Vietnam’s top three MNOs are expected to need to create at least 50,000 new tenancies either in existing towers or by building new towers.

TowerXchange: How is the restructuring of the Vietnamese MNO market progressing?

Patrick Tangney, Chairman, Golden Towers:
Historically Viettel was the leader followed by Mobifone and Vinaphone. Vietnamobile (Hutchison) and Gtel entered the market more recently. In 2013, the government passed legislation effectively requiring that Mobifone and Vinaphone cease to both be owned by the Ministry of Post and Telecommunications. Last year, the ownership of Mobifone was shifted to another ministry as a result.
As part of the equitisation of government assets, Mobifone is expected to bring in a foreign partner for a minority stake and list on the local stock exchange, creating even greater separation from Vinaphone. This is yet to be defined in terms of the division of ownership and the role of the foreign company, but is expected to happen by sometime in 2016. Mobifone has been in active discussion with a number of foreign operators.

This isn’t the first instance of foreign ownership in Vietnam; Hutchison owns Vietnamobile together with with Hanoi Telecom. The partners there are in discussion about how to take that JV forward; there will need to be a lot of investment to deliver data services.

Gtel is the smallest MNO. Gtel has a strong backer and there are ongoing discussions about bringing in some further assets, capital and spectrum. It is possible that as part of the LTE rollout Gtel may focus on data/LTE as a major part of their strategy, but that remains to be seen.

There are ongoing discussions to lay the groundwork for LTE services; the first meaningful rollout will likely happen later in 2016.

**TowerXchange: What is the condition of the towers in the smaller portfolios? Are there any opportunities for investment there?**

**Patrick Tangney, Chairman, Golden Towers:** At the moment there aren’t many companies with real towerco DNA operating in Vietnam. There are a lot of smaller companies with a pure steel and grass model who have one tenant per tower and no investment in increasing tenancy; they tend to look at their portfolio as a kind of annuity.

That being said, the infrastructure of the smaller portfolios is generally in decent shape and isn’t too old - in fact many of the towers are less than ten years old. Of course, some improvement would be required to bring them up to international standards. These towers haven’t been managed with co-location in mind; the owners would get their anchor tenant and then there is often no further active marketing or investment.

The small towercos are not required to provide power, maybe backup power sometimes, though the grid in Vietnam is very good. These towers are often capable of multiple tenancy with limited structural reinforcement. They can often take two tenants with limited or no reinforcement. The tenancy ratio of the smaller portfolios in general is quite low, not too far from one; it’s rare to find a portfolio of towers exceeding 1.25 given the build-it-and-clip-coupons model of many owners, who own towers as one part of larger, unrelated businesses.

**TowerXchange: What will it take for a Vietnamese towerco to drive to scale?**

**Patrick Tangney, Chairman, Golden Towers:** In Vietnam, leaving aside IBS, there is probably room for two or three companies to achieve scale purely from purchasing smaller portfolios and, to the extent that MNO sale-leasebacks become a feature of the market, that could support another incremental company or two in theory. I tend to think the market will have two or three larger independent towercos over time.

It’s important to remember that there has been effectively no sale and leaseback to date, although discussions are ongoing.
Indus Towers on the implications of the spectrum auctions, plus how they made 40,000 cell sites run diesel-free

Creating optimised, environmentally friendly, shared infrastructure to support continuing skyrocketing demand for data and connectivity in India

The world’s largest and most renowned joint-venture towerco, Indus Towers has been hard at work efficiently providing passive infrastructure on a non-discriminatory basis to Indian telecom operators and wireless broadband service providers since its founding in 2007. The company is actively upgrading its portfolio to reduce its carbon footprint and increase its efficiency, and is also playing an important role in the development of India’s Smart Cities.

Keywords: Indus Towers, India, Towercos, MNOs, Operational excellence, 3G, 4G, Opex reduction, Managed services, Energy efficiency

Read this article to learn:
- How to overcome common obstacles associated with creating a joint venture towerco
- The challenges predicting new infrastructure required to support 4G data demand
- The implications of recent spectrum auctions in India
- Indus Towers’ vision for Smart Cities: supplementing macro sites with a heterogeneous layer
- Indus Towers’ award-winning green energy project

TowerXchange: Indus Towers is the most famous example of a joint venture towerco in the world - looking back at the history of the company, how were Airtel, Hutchison (now Vodafone) and IDEA able to structure a joint venture where many other operators in other markets had failed?

Bimal Dayal, COO, Indus Towers: Firstly the purpose for which Indus Towers was formed was very clear amongst the shareholders from the outset and remains clear to this day. Indus Towers was formed to share expensive passive infrastructure. Transferring assets to a joint venture towerco represents a good method of taking cost out of the system.

As competition intensifies, passive infrastructure costs are becoming the biggest line item for MNOs. Total opex which the towercos represent is over 30% of Indian MNOs’ total costs; a very significant part of opex which needs to be constantly optimised. All the operators have achieved the optimisation we set out to achieve, and our stakeholders have recognised the same. We must give credit to our operator shareholders who brought together their operating teams and, also enabled the Indus Board to be distinct from the people who run operations within each MNO.

These ‘Chinese Walls’ are important – without them, Indus wouldn’t have reached where it stands today.

TowerXchange: We’ve seen many attempts to form joint venture towercos elsewhere in the world flounder due to boardroom politics –
shareholders not being able to agree on equity ownership, assets injected et cetera. How did Indus Towers overcome such challenges?

Bimal Dayal, COO, Indus Towers: Leadership plays a vital role in this; I’d be lying if I said that the determination of which assets would be included in the venture, and the impact on the equity ownership of the company, was not an issue.

It was critical that the three parties looked at their own benefits rather than comparing with their competitors.

It came out as a big commitment from Indus shareholders, to go down this route of collaboration with competitors. It took about 6-8 months to arrive at a resolution to integrate certain assets and to transform them into equity.

TowerXchange: How will the latest round of spectrum auctions affect the Indian tower market in terms of capital?

Bimal Dayal, COO, Indus Towers: The auction concluded yesterday, and my colleague and I were speculating about the implications for Indian’s leading MNOs’ debt to equity ratio, and whether it would lead to dilution. Each MNO’s investment in spectrum has been particularly impressive given that it has been funded on their own balance sheets.

The way the auction has played out, each large player has consolidated its position, retained and added spectrum. Those with spectrum are set to accelerate their rollouts, deploying capex to gain market share before their competitors ‘eat their lunch’. There will probably be further consolidation among the smaller operators left without spectrum.

2014 was a very good year for Indian towercos, and next year will be even better – demand for new sites will outstrip supply.

TowerXchange: Where is the bottleneck when demand for new sites outstrips supply?

Bimal Dayal, COO, Indus Towers: Site acquisition is always the biggest bottleneck. From our perspective, our capability to deliver sites is adequate, though at a high level, it’s the policy framework that makes it difficult to acquire sites. Even though the big cities already seem cluttered with cell sites, there are hot spots where the operators need more capacity and therefore more sites. Today, it is becoming challenging to acquire new sites especially in city areas. The policy framework is still under evolution in most states, so it can be tough to complete due diligence and attain statutory compliances for acquiring sites. At the same time, landlords have become more knowledgeable and rental benchmarks are rising. The issues concerning EMF and other reservations from neighbors and societies further add to the challenges we face on the ground.

TowerXchange: Some analysts have suggested that India will need twice as many towers for the 4G era, increasing from 400,000 today to 800,000. Do you agree with this forecast? How will this infrastructure growth be financed, and what role will the towercos continue to play?

Bimal Dayal, COO, Indus Towers: I must emphasise the growth of data in the Indian market, driven by competitive pressures and customers’ increasing willingness to pay for and consume data. Phenomenal like-for-like traffic growth means more towers are needed, but forecasting the number of new towers needed for 4G is challenging as the situation remains dynamic. If 4G is rolled out on 800 or 900 MHz spectrum that’s one thing, but if 4G comes in on 2.3 GHz we would need many more towers; it’s all down to physics.
TowerXchange: Indus Towers just announced a plan to use streetlights as towers; could you share some more detail on this?

Bimal Dayal, COO, Indus Towers: We have a variety of infrastructure going in at street level; the street furniture or street lights can all be used as sites for small cells. This change is happening as we speak for operator network rollouts and it represents a big change for the towercos.

This strategy must be viewed in the context of India’s ongoing plans to develop cities as Smart Cities. This is a major ambition of the country’s leadership and the ministries are trying to create their own definition of a Smart City. The way I’ve been trying to position the towerco’s role in the Smart City is straightforward; it’s not about bricks and mortar but about digital connectivity. Smart grids, Wi-Fi and smart signaling all need high bandwidth digital connectivity and that’s exactly what a towerco provides.

Our role in the Smart City is to take street infrastructure and strengthen it to give seamless corridors for Wi-Fi, 2G, 3G or 4G to any operator. We are operator agnostic – anyone can put up their antennas and equipment at our sites. This means transitioning from tens of macro sites to suddenly talking about 20,000 small cells and micro cells in one go; it completely changes the equation.

TowerXchange: Do you have any idea how many micro cells and small cells are in Indian networks, or at least in Indus Towers’ network today, and how those numbers may increase in the coming two to three years? And do you anticipate the majority of such new sites being installed by towercos as opposed to MNOs?

Bimal Dayal, COO, Indus Towers: Though I may not have the exact number on the records, there should be a good number of micro/small cell sites installed in the country. These sites especially provide street coverage and we have a few installed in places like Ahmedabad. With the advent of 4G and the government’s focus on Smart Cities, I believe there is an opportunity to reach at least 15-20,000 small/micro cell sites across the country in the next three years.

The role of towercos is essential in the smart cities landscape. Being MNO neutral in providing services, towercos should see a good opportunity in this business in comparison to MNOs themselves. On the other side, MNOs may not be able to achieve the scale and efficiency against the levels of...
investment required for these projects.

**TowerXchange: India has a very mature independent towerco market; do you expect to see consolidation in the near term or do you think the competitive landscape will remain stable?**

**Bimal Dayal, COO, Indus Towers:** There have been many attempts at consolidation and there are ongoing talks, so I can’t say it’s not going to happen. The requirement for many more towers and many more tenancies on long term leases makes this business very attractive for people to pick up. Let’s watch this space together.

**TowerXchange: Congratulations on Indus Towers’ recent GSMA Green Mobile Award. Tell us about your green energy project to transform 35,000 sites to zero diesel consumption, leveraging FCUs, smart batteries and other innovations.**

**Bimal Dayal, COO, Indus Towers:** This is the 4th year in a row Indus Towers have been nominated for the GSMA Green Mobile Award, and the second time we’ve won the award, all for different initiatives.

The initiative for which we won the award this year was for converting existing sites from indoor to outdoor, switching off the air conditioning and using Free Cooling Units or other technologies. If we switch off air conditioning, power consumption falls by more than 25% like for like. When consumption falls by that amount, we can put larger battery banks onto the site and remove diesel completely. Through this intervention alone, we have saved 35 million litres of diesel, and our customers have benefitted phenomenally and have appreciated this initiative.

The beauty of such investments is that you do it once and you benefit from savings over a period; the overall impact is nearly perennial. Across our portfolio, Indus Towers has converted 25,000 sites from indoor to outdoor – currently almost 40,000 sites run diesel free.

Our Green Site programme is a different project, focused on enhancing battery bank capacity so we don’t have to use diesel.

**TowerXchange: You conclude by mentioning the Green site programme - can you talk to us about the energy storage technologies you have used to eliminate diesel from tens of thousands of cell sites - under what circumstances are lead-acid batteries sufficient, and under what conditions is it worth investing in Lithium-Ion? And have you piloted any other advanced batteries?**

**Bimal Dayal, COO, Indus Towers:** Indus has always been exploring innovative solutions to reduce diesel at sites. We have been using VRLA+ batteries to provide enhanced backup during power outages. We have also initiated installation of Li-ion batteries, especially in the areas where we have long power cuts with intermittent power supply. VRLA+ battery solutions take a long time to charge and are more suitable for sites with random power outages, whereas Li-ion support long outages owing to their fast charging capabilities. We have also initiated installation of a combination of both battery solutions to support our movement towards zero diesel at a site. Our technology team has designed innovative combo solutions with the one outcome being diesel abatement.
Umang Das is a man who needs no introduction in the tower industry in India. Starting out in 1987, Umang has been involved with the mobile communications industry in India since its inception, and was also responsible for the creation of India’s first independent towerco. All these years, guiding the fledgling industry past early obstacles until a tipping point in 2005 when scale was achieved. Now Umang focusses his energy on defining the next steps for the tower industry, and identifying new opportunities for the development of telecom infrastructure and its benefits for the society.

Keywords: India, Asia, Viom Networks, C-Level Perspective, MNOs, Towercos, Monitoring & Management, Investors, O&M, Construction, Capex, Opex Reduction

Read this article to learn:
- Tracing the origins of the mobile and towerco industries in India
- The development of India’s towerco model and the first steps
- How the Indian tower industry achieved scale
- How India’s first US$1bn tower transaction was funded
- How the capex cost for a greenfield tower in India decreased from US$200,000 to US$25,000

TowerXchange: How did the Indian mobile market develop prior to the launch of tower companies, and what was your experience of that evolution?

Umang Das, Chief Mentor, Viom Networks: I got into the industry in the year 1987, at the outset of the privatisation of Indian telecom. Prior to that year, everything had been controlled by the government’s Department of Telecommunications. We were taking baby steps towards introducing the first telephone instrument and data terminals. At that time, the policy had been introduced to allow Indian companies to form joint-ventures with foreign companies and there were licences given out for various product and service streams in telecom.

After pioneering the telecom business with Compton Greaves, we started initiating the GSM technology in 1994 and the cellular business started taking hold in the country. By this time, I switched over to the Modi Group, a leading venture group and investor in new technologies. The government issued the first ever eight GSM licenses in the four biggest cities in India. We partnered with Telstra to start Modi Telstra and secured one of the two licenses in Calcutta. At that time, we had limited knowledge about the industry, however, we were committed to introduce the mobile services in India.

Having secured the license at the end of November 1994, we enabled the first mobile phone call in India to be made just eight months later on 31 July 1995. This first mobile call was made between the then Minister of Communications of India and the then...
Chief Minister of West Bengal.

Our TEC certification came through on 7 August, hence enabling our full commercial launch on 23 August 1995. This was the first commercial mobile launch in India.

By 1995 tenders opened up mobile telecommunications for the rest of the country, so in addition to Calcutta we won two more prime circles – Punjab, the “granary of India”, and Karnataka, which includes Bangalore, India's IT hub.

Once again, we were the first to roll out in both new circles launched under the brand name - Spice Telecom, a Modi Group joint venture with Motorola and Distacom. The company was led by Dr. B K Modi and partnered with Rick Siemens, ex-Hutchison. I was appointed as the Managing Director of Spice, the first consumer oriented mobile brand in India. We completed in 1996, the launch of mobile services in Punjab and Karnataka – which were again the ‘firsts’ for these circles. However, the biggest obstacles remained in form of licensing costs.

The initial slow pace of rollout in India dramatically accelerated in 1999 when the government made a forward-looking shift from fixed license fees to a revenue share regime. With the fixed license fee frozen and thereafter a percentage of revenue shared with government, paying license fees out of what you earned made sense.

From 1999 onwards, Indian telecoms saw sharp growth. The initial two operators per circle were joined by the mandatory government operators BSNL and MTNL, and joined in many circles by fourth operators including Reliance and other companies. Whereas prior to 1999 the business had focused on educating consumers on why to use mobile when it was more expensive than fixed line telephony, after 1999 the new entrants and fierce competition pushed down tariffs.

TowerXchange: Was this about the time you started to realise there was an opportunity to share infrastructure?

Umang Das, Chief Mentor, Viom Networks: All the operators needed a lot of infrastructure. India is a huge geographical area and to provide full coverage you needed around 45,000 towers. No operators were all-India at that time. We all had certain circles and in the case of Spice Telecom, we needed 3000-4000 towers per circle. So, we needed more than 10,000 towers. Each individual site by itself would then cost around US$200,000; hence towers represented 70% of network costs.

Around this time, my friend, TV Ramachandran and I catalysed the formation of the COAI (Cellular Operators Association of India) with all of the MNOs (Mobile Network Operators). Mr. Ramachandran became the fulltime Director General, and Dr. B.K. Modi became the Chairman. With a degree of natural comfort in dialogue among operators, we asked ourselves “why not share towers?” However, the early days of tower sharing in 1999-2000 were limited to barters; these were not as successful because people kept their cards close to their chests. They treated towers like the family jewels, and the operations guys still thought differently from the shareholders. Those initial barters were un-invoiced exchanges and if one party had 500 towers in an area, and another 1,500, then 500 would be the most that could be shared.

TowerXchange: When did barters give way to commercial leases and the first independent towerco business models in India?

Umang Das, Chief Mentor, Viom Networks: The first breakthrough was in 2005 when I was still Managing Director of Spice. I told Dr. Modi that because we were restricted to just three circles while other players such as Airtel, Reliance and Hutchison had made acquisitions to be present in more circles and were looking like all-India
operators. To compete with them, we had to roll-out rapidly and be innovative. If 70% of capex goes into passive infrastructure, why not partner with one of the infrastructure companies that were not operator owned?

In the year 2005-06, we contracted with Quippo, the equipment leasing firm of SREI. SREI is driven by Hemant and Sunil Kanoria, two entrepreneurs renowned for infrastructure finance and leasing of equipment for construction, roads, ports, oil et cetera. Given the 15-20 year licenses the operators had signed, we proposed to the Kanorias to get into the long term contracts that the tower and telecom business represented. Sunil was very entrepreneurial and accepted the idea, and our first order for independent infrastructure led to the building of 50 towers in Punjab. Spice Telecom had converted the capex model to an opex model – instead of funding the towers with capex, we had to pay rental, but the rental was pretty high. Together with the Kanoria brothers, we encouraged other operators to share the infrastructure.

Our first target was Hutchison, whose CEO Asim Ghosh was a friend of mine. We asked Asim, why not share our 50 towers? His initial response was not positive as he preferred to build his own towers. However, we reasoned with Asim that time to market and revenue generation would negate the adverse effect on EBITDA of the rental costs, so he took a leap of faith and acquired tenancies on many of those first 50 towers. This suited Spice because we got a 10-15% discount on rental rates, and of course it suited Quippo SREI because they had two tenants instead of one. Hutchison soon found it was good a idea – they suddenly had 50 towers providing new revenue and new customers with a lower rental rate, and they achieved this much faster than building their own.

Those first 50 towers represented the birth of the shared infrastructure, independent towerco business model in India. We took the idea to Bharti Airtel and met Mr. Sunil Bharti Mittal, and before long had both Hutchison and Airtel agreeing to the principle of co-location.

Meanwhile some UK private equity investors – Ashmore Group – and some partners from Israel started Tower Vision. Tower Vision had sites in Karnataka, so both of the original independent towercos were partners of Spice. We also brought Quippo into Karnataka – Quippo were agile and had a strong balance sheet, so could invest without advances. With the help of our local contacts they were able to get to market quickly.

Hutchison soon found it was good idea – they suddenly had 50 towers providing new revenue and new customers with a lower rental rate, and they achieved this much faster than building their own.

TowerXchange: How did the tower industry reach scale in India?

Umang Das, Chief Mentor, Viom Networks: I distinctly remember TV Ramachandran and I meeting with the then Minister of Communications, whose enthusiasm for infrastructure sharing was critical to the creation of “Project MOST” (Multi Operator Shared Towers), a government supported programme created in late 2006 to early 2007.

This generated a lot of excitement about independently owned infrastructure companies backed by the government.

Around this time, Airtel, Hutchison and Idea started to set up their own towerco by pooling their existing tower assets. Indus Towers was conceived in 2006, and had an impact from 2007-08, starting with 70,000 towers from day one. As a 100% shareholder-owned entity, it was quite distinct from Quippo, which was 100% non-operator owned. While Indus
was larger in volume, almost all their initial tenants were internal and there was limited external marketing of the towers for three or four years whilst they tackled problems with overlapping sites. Between 2006 and 2008, Quippo grew from those initial 50 to 5,000 towers through acquisition. The independent status of Quippo Telecom Infrastructure Ltd. gave tenants more comfort, so our tenancy ratio rose to 2.5 and beyond.

After the partners in Indus Towers hived off their 70,000 towers, Reliance and Tata followed. Reliance hived off assets into their own 100% owned towerco, while Tata Teleservices hived off their assets into 100% owned WTTIL. However, WTTIL invited the participation of another towerco to manage and run the entity, and Quippo bid for and won the rights to merge their 13,000 towers. Now, the Tata-Quippo joint venture portfolio grew to 18,000 towers. In doing so, Quippo became a significant entity and we decided being pioneers was not good enough unless we were growing!

Another seven or eight operators entered the Indian market in 2008, and several decided that the only way for faster rollout was to launch through independent towercos who would provide them with an existing platform and due focus as customer clients. In particular, Uninor, Telenor’s Indian opco, became the only company to proudly proclaim that they didn’t invest a dime in building their own towers. We were able to become all-India operators. Our work with Uninor gave Quippo the opportunity to rollout 16,000 towers in a single year - a world record in its own right for the sheer scale of deployment across a massive geography like India. This made our tower count jumped to over 36,000 in 2009-10, with a tenancy ratio of 2.3.

**TowerXchange: How did you finance India’s first US$1bn tower transaction with WTTIL? What were the main challenges in integrating and scaling the combined Tata-Quippo business, and how were those challenges overcome?**

**Umang Das, Chief Mentor, Viom Networks:** It was a big challenge to merge two distinct cultures in one merged entity. Tata were very process-oriented, whereas Quippo had a more entrepreneurial mindset. So, we hired McKinsey to advise on strategy, whereas KPMG was hired to advise on operationalising the integration. From these learnings, came the ‘War room’ concept which is a 360 degree approach towards ‘no surprises’ strategy wherein all key stakeholders, including customers, operations personnel and field workforce, periodically sit together to ensure transparency and speedy resolution of issues. Conceptualized and initiated by us, the ‘war room’ soon became a popular and well-accepted concept across the industry.

Our second challenge was figuring out how to roll out 1,500-1,800 towers per month, three to four times the volume we had been historically doing. The operational aspects of the rollout were best understood by SREI Quippo, so the governance model ensured all operations were led by Sunil Kanoria as Vice Chairman. While we created accountability to timelines et cetera, our roll out capacity scale-up was driven by the Kanoria family, who leveraged their contacts with vendors to boost our output from 500 to 1,500-1,800 towers per month.

The third challenge was raising over US$1bn of acquisition capital. Raising even US$1bn is not difficult if you have a solid business model, and reliable shareholding partners. Tata had a tremendous brand, and SREI were very good at fund raising, financing and leasing. With all of that in their DNA, SREI could manage bank contacts to raise big capital.

**TowerXchange: If the market entry and rollout for Uninor represented ‘the good times’ for Viom Networks, did the cancellation of 122 MNO licenses in 2012 represent ‘the bad times’?**

**Umang Das, Chief Mentor, Viom Networks:** While the cancellation of 122 licenses had put the telecom industry in India on a stand-still mode with lot of uncertainty, the tower industry also faced a huge brunt with companies like us facing a set-back of close to 15,000 tenancies. As a company we decide to sit back and re-strategize the way business should be done and resultantly, we managed to record our maiden profit in one of the most difficult periods in the year 2012.

The loss of all those tenancies helped us focus on
cash flow, on reducing opex, and on consolidating our relationships with the incumbent market leading operators. Our profit margins have increased year on year ever since. It became critical that we could still make healthy IRR. Our idea is to exceed 20% IRR even with a single tenant on a tower. We developed tower designs for structures that were not necessarily shared at the outset, but which had a modular design so they could be easily upgraded for additional tenants. As tower designs became lighter and lighter, we became highly cost optimised.

TowerXchange: Given your economies of scale and accumulated experience, how far have you been able to drive down costs, for example the capital cost of a new tower which you mentioned was once US$200,000 at the outset of the mobile telephony era in India at the turn of the millennium.

Umang Das, Chief Mentor, Viom Networks: One of the key value adds of infrastructure sharing is bringing down costs. As a result of focusing on quality, innovation and cost reduction, towers which once cost US$200,000 to roll out each were brought down to US$50,000, and today below US$25,000. India has the lowest cost tower rollouts in the world. In that context, I find it hard to understand US$200,000 per tower valuations in Africa. That high cost structure is going to prove difficult to sustain in the long term; the key to success will be the optimisation of costs.

We achieved this sizable reduction from US$200,000 to under US$25,000 per tower in India through five key strategies:

1. Using lighter, simpler tower structure designs, we went site to site evaluating the wind speed and wind load capacity. There is a big difference in the weight of steel one needs to deploy for 40kph compared to 200kph. Every new site was audited to determine whether an angular, tripod or four legged tower was needed. One of our key differentiators is strong R&D and design team in which we have invested US$25mn per year.

2. Optimising power management. We have managed to deliver a better outcome for every litre of diesel put into gensets by identifying and reducing over-consumption.

3. O&M is a big black box with lots of scope for cost optimisation, including site security.

4. Smarter negotiations with landlords, and equipment and service providers. Both of these relationships are based treating them as partners, not as suppliers.

5. We appointed hundreds of “Asset Managers” – business managers with total responsibility for 40 sites each. The Asset Managers use their local knowledge and resources to optimise each site under their responsibility.

Most important of all was to be more than just infrastructure suppliers to our customers; we had to understand them and develop deep relationships.

This may sound ‘soft’ but it delivered real financial results!

TowerXchange: Do you anticipate there being consolidation among India’s towercos in the near future?

Umang Das, Chief Mentor, Viom Networks: I don’t think small towercos with less than 5,000 towers will be able to survive and we see consolidation happening in the market. Increasingly, the threshold for scale is at 40,000-50,000 towers in India and smaller towercos are not able to secure customer confidence to grow so I don’t see many new players coming in.

India is largely driven by operator growth and in the latest auction, spectrum was acquired by India’s existing MNOs, strengthening their competitive position and getting them into the 800-900 MHz band.

TowerXchange: Should the towercos business model extend beyond passive infrastructure into active equipment?

Umang Das, Chief Mentor, Viom Networks: Yes, we should extend beyond passive infrastructure sharing. Expanding the scope of our offering is critical in the context of data demand growth.

As long ago as 2008-09, government policy permitted active and passive infrastructure sharing. My vision is to create an end-to-end infrastructure outsourcing strategy, a win-win partnership...
between towercos and MNOs. This will enable MNOs to almost become MVNOs, focusing on VAS and customer care, while their towerco partners focus on infrastructure end to end. We might have been a bit soon for the market when we formed and took over Quippo Telecom Infrastructure Limited, and later became Viom Networks. This trend of ‘end-to-end infra solutions’ is now the way forward for all established mobile operators.

TowerXchange: What is the scale of the Indian tower industry and of Viom Networks today, and what does the future hold?

Umang Das, Chief Mentor, Viom Networks: With mobile coverage almost achieved in India, and over 400,000 towers in the country, the remaining requirements are for rural sites and urban infill sites. Viom Networks are looking at widening our portfolio, and entering new markets, while continuing to optimise costs. However, our core business remains our existing towers and customers. Today Viom Networks owns 43,000 towers with over 100,000 tenancies with a tenancy ratio of 2.4, the highest in the Indian tower industry. Our independent, shared model is a proven win-win for all operators. We reduce opex, eliminate capex and eliminate the management headache of managing passive infrastructure. I feel that towers are not just for the telecom industry – a tower can be an ‘oasis in the desert’ for the provision of financial, education, government, and other valuable end-user services. India’s towercos have been granted infrastructure status in recognition that our towers represent an integral part of the country.

The data revolution also creates opportunities to expand our portfolio and profile into fibre, the active part of the solution. We believe that any items we can share on a site: the tower, power, fibre and antennae should all be shared.

Both in my capacity as Chief Mentor of Viom Networks and DG of TAIPA, we are interested in independent energy entities seeking to provide decentralised power solutions beyond the reach of electricity boards. Just like independent towercos helped MNOs focus on their core business, so the ESCOs can support towercos as their anchor tenants while also offering utility power, streetlights and other services to the local community.

My focus is now on creating new growth strategies and determining how Viom and the tower industry can add value through end to end service provision including passive infrastructure, power, fibre and other active infrastructure. From a multi-dimensional applications approach, one of the most recent and interesting examples in New Delhi is utilizing the 20 sq ft space of a street pole to offer services such as Wi-Fi, electronic surveillance, with fibre connectivity in addition to conventional street lighting.

In terms of international growth, as the only independent, non-operator-owned towerco of scale in India, Viom Networks is the only towerco who are developing markets overseas. We have looked at Africa, Myanmar amongst others with energy management as a unique entry strategy. We have already become a knowledge partner to several operators and are getting into the EPC and Managed Services model in Myanmar and Africa – a pioneering concept for emerging markets.

Umang Das recently joined the TowerXchange “Inner Circle” informal advisory board.
Apollo prove the bankability of the tower+power business model

One of Myanmar’s two largest towercos secures US$280mn in debt and equity. Proven power service helps secure a further PO for 717 towers from Telenor

Apollo Towers Myanmar has been contracted by Telenor to build a total of 1,827 towers to date, of which at time of writing (early August 2015) 1,100 had been lit. With a full service tower+power proposition, Apollo is building fast and is positioning itself secure co-locations and become one of Myanmar’s two largest towercos. TowerXchange spoke with Apollo CEO Philippe Luxcey, a 20 year mobile veteran who had previously served as CEO of Orange in Uganda and Cameroon, and Corporate Finance Manager, Henry Butler, who had recently helped secure substantial new debt and equity for the towerco.

**Keywords:** Apollo Towers Myanmar, Asia, Asia Insights, Bankability, Batteries, Build-To-Suit, Business Model, C-Level Perspective, Camusat, Capacity Enhancements, Co-Locations, Construction, Country Risk, Debt Finance, Dimensioning, Foundations, Greenfield, GTL, Hybrid Power, Ieng, Insights, Leadcom, MIL, Myanmar, Network Rollout, O&M, OPIC, Private Equity, Skilled Workforces, SLA, Stakeholder Buy-In, Tenancy Ratios, Towercos, Unreliable Grid, Uptime, Who’s Who

**Read this article to learn:**
- The challenges of the first phase of rollout and the different characteristics of the latest phase
- How Apollo has maximised service continuity during monsoon rains
- How Apollo got the banks and DFIs comfortable with their ability to deliver power
- The specific investments Apollo have made in power systems to ensure continuity despite Myanmar’s highly unreliable grid
- How Apollo’s CEO foresees demand for co-location

**TowerXchange:** Thanks for taking the time to speak to us today. Please tell us what Apollo has built to date in the first phases of the rollout?

Philippe Luxcey, CEO, Apollo Towers Myanmar: In phase one of the rollout we secured an initial contract to build around 1,110 sites; most of these have already been delivered. There is a small number of sites that more challenging. We are sorting through those as we speak.

**TowerXchange:** How would you characterise the differences between the locations of towers you rolled out initially, compared to those you have been contracted to build in the next phase of the rollout?

Philippe Luxcey, CEO, Apollo Towers Myanmar: The first phase of the rollout was concentrated in the main cities, in the densely population areas. We have a contract to build 717 more towers for Telenor in the next phase of the rollout, but we’re not really pushing into rural Myanmar yet – these are more suburban than urban sites but we are building now in States like Shan, Kachin, Chin, Kayah, Rakhaing et cetera.

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All that really distinguishes the first from the latest phase of the rollout is that there is a new Purchase Order (PO) for this next phase – in reality there is some overlap in terms of execution. Our first phase build is all but complete, and we’ve already started building the 717 towers in the next phase.
TowerXchange: So does the next phase of the tower rollout remain within reach of Myanmar’s transport infrastructure, or are you having to hand-carry equipment for the last miles to some sites?

Philippe Luxcey, CEO, Apollo Towers Myanmar: We select sites which meet access criteria, and so far we have been able to deliver all towers by truck. Myanmar may have a finite number of tarmacked roads, but there are lots of small mud roads which, if not flooded, you can still use for access.

TowerXchange: It is unfortunate that the latest phase of contracts were awarded just before the rainy season – how have the monsoon rains affected Apollo?

Philippe Luxcey, CEO, Apollo Towers Myanmar: It’s true that we received our PO just before Myanmar’s Water Festival – there are countrywide holidays for almost three weeks from 10 April to early May – but after that we were able to commence site acquisition and building towers. In fact we already have 60 sites on air from the second batch of 717. We have civil works under way for a further 200+ sites, but we’ve had to put about 100 sites on hold until flood waters recede.

Apollo has been exceptionally fortunate that we have only a handful of sites that are flooded, as we designed the majority of our sites with raised platforms.

It’s normal to face challenges rolling out during rainy seasons. I recall in 2007 the launch of a microwave backbone running from the South to the North of Cameroon was significantly delayed due to rain. It has an effect on some tasks yes, but we can still get a lot done during the rainy season.

TowerXchange: How mature is the supply chain of telecom contractors in Myanmar now compared to when you arrived?

Philippe Luxcey, CEO, Apollo Towers Myanmar: We decided to work with four big well known contractors from the outset. Leadcom, Camusat, GTL and Ieng have deep experience in emerging markets, both Africa and Asia, as well Eastern Europe, so for them Myanmar was just one more new country, it was not an exceptional challenge. Of course it took time for them to select and train local subcontractors. There was no tower building background in Myanmar like in Africa where you have contractors who move from one operator to another. Here the country was opening so everything was new. It took time to adjust, but now it’s working well.

TowerXchange: Congratulations on raising debt a US$250mn loan from OPIC, recently supplemented by US$30mn in equity from local company MIL. Please tell us about your experiences raising capital for tower ventures in a country with perceived high country risk like Myanmar.

Henry Butler, Corporate Finance Manager, Apollo Towers Myanmar: That perception of high country risk underpins all our discussions.

One of the other Myanmar towercos, who operated
a simple business model with no power risk, were the first to secure debt funding through a consortium of commercial banks out of Singapore. They offshored some of the risk, and structured it with a large cornerstone of equity, so the ‘greenfield’ risk was significantly reduced at the start of the project. With no power and associated SLA penalty risk, they were able to present a straightforward business model with long term recurring revenues, and were able to secure debt on a relatively low gearing. Of course, if you have access to a parent guarantee that is always going to help offset some of the market or country risk.

However, as the award of next phase build contracts illustrates, providing power services is a source of competitive advantage for Myanmar towercos. Although when Apollo first approached the debt market, the perception was that power was trouble, and that achieving the SLAs was going to be challenging, so we had to get over that hurdle. We spent a great deal of time getting the banks and DFIs comfortable with Apollo’s ability to deliver power, explaining that if you get power right in emerging market towercos you’re going to be the partner of choice – operators have quickly realised that if it’s a choice between tower and power or just the tower, then it’s really no choice at all. Having different suppliers for tower and power can be very tough.

The education process required that we demonstrate our ability to deliver the uptimes required by SLAs, and to improve the banks’ comfort in the potential for co-location growth. Their due diligence teams visited Myanmar, met with our management teams and visited a number of our towers. On this point, a lender’s confidence in the management team is vital. The banks built confidence in the experience our management team had accumulated in Africa, Thailand, Nepal, Cambodia and Malaysia, and in the experience and involvement of our shareholders, TPG and Sanjiv Ahuja.

We spent a great deal of time getting the banks and DFIs comfortable with Apollo’s ability to deliver power, explaining that if you get power right in emerging market towercos you’re going to be the partner of choice

Any lender that comes into Myanmar or any market like it needs to be aware that they’re not necessarily able to control as many variables as they might in a developed market – think of the lack of hedging products in Myanmar – lenders have to be flexible. OPIC were pragmatic about the realities of building a tower business in Myanmar.

You either have to pay for country risk, or you offset it by minimising contract risk, in the end you probably have to do a bit of both in Myanmar.

TowerXchange: Tell us a bit more about your recent equity raise.

Henry Butler, Corporate Finance Manager, Apollo Towers Myanmar: We wanted to focus on a small group of specialised investors who could add value to our business, and so it was great to announce last week that we’re partnering with Myanmar Investments International Limited (MIL). MIL are listed on AIM in London but are on the ground here with Mike Dean and Aung Htun, who is a Myanmar national. They’re an intelligent and thorough outfit who managed to complete a great deal of due diligence in the weeks running up to closing. They were already invested into Myanmar, believe in the growth story, and they were willing to get involved and get involved at in depth levels. Myanmar is not easy, so shareholders need to be engaged – a hands off approach doesn’t work here.
TowerXchange: Let’s go back to the point about convincing the bankers that it was worthwhile engaging with the complexity of power in Apollo’s business model. What operational evidence were you able to provide to make your case?

Henry Butler, Corporate Finance Manager, Apollo Towers Myanmar: Of course it’s true that there are more moving parts when towercos provide power. But there is also more opportunity to extend your growth story – particularly in Myanmar when the next phase of the rollout has seen all contracts awarded to towercos who provide power – a lender wants to see businesses who grow and wants to grow with them. And we’re dimensioning the power systems for two tenants from the outset on our next 717 sites, and it’s easy for us to add an extra battery bank for a third tenant.

I believe provision of power, not only steel, must be a core competency of any emerging market towerco.

Philippe Luxcey, CEO, Apollo Towers Myanmar: Securing capital required that we demonstrate that we had a good operation, good people, and good contractors. Today we are delivering an average of 99.95% uptime, which demonstrates our ability to meet what might appear to be stringent SLAs.

TowerXchange: What specific investments in power systems have you had to make to deliver such strong uptime statistics?

Philippe Luxcey, CEO, Apollo Towers Myanmar: Today we are using the same solutions as towercos in other countries – there is no energy revolution. A good battery bank for backup is often sufficient in Africa, with generators only on critical sites, but one of our key learnings has been that in Myanmar we need generators on all sites except rooftops.

We’ve been able to connect to the grid at almost every site we’ve built so far in Myanmar, but the quality of the grid is very poor. In Africa generally you have grid power or you don’t, there may be outages but when the grid is available it’s generally 220V. Here you might get 110V, 120V, 130V and that’s much more challenging for power equipment to deliver the 48V DC required to power telecom equipment and recharge the batteries.

We’re using charge discharge battery and DG hybrids – we have deployed no renewable energy so far. Most of our phase one sites were in the Yangon region, which is at a latitude not ideally suited for solar, and there is insufficient wind resource for wind power. The situation will be different in Mandalay and further North, but in the South renewables often aren’t an option. And during the monsoon season you would need sufficient DGs to achieve the desired autonomy even if you had solar.

TowerXchange: How do you foresee demand for co-location? Will KGSM co-locate?

Philippe Luxcey, CEO, Apollo Towers Myanmar: We are seeing demand for co-location growing every day. We have a long term contract with KSGM and a contract with Ooredoo, while of course Telenor is our anchor tenant. What is attracting Ooredoo and KSGM is the quality of our sites. For example most of our ground based tower sites are designed with an elevated one metre slab for power and telecom equipment, so even when the area is flooded with water we can maintain continuity. We view it as critical to maintain 24/7 service especially with regards to power.

Philippe Luxcey will be speaking at the TowerXchange Meetup Asia on November 24 and 25 in Singapore. For more details visit www.towerxchange.com/meetups/asia
IGT leads drive to increase efficiency of Myanmar tower rollout

Leading towerco in Myanmar creating efficiencies through local staffing, O&M, technical and business model innovations

Having been attracted to by the challenge of Myanmar’s greenfield infrastructure rollout, former deputy CEO Ayad Chammas has recently been promoted to CEO of Irrawaddy Green Towers (IGT). Lebanese, born and raised in Doha, Ayad has two degrees; a BSc in Civil Engineering and an MSc in Construction Management / Project Management. He has 21 years’ experience in O&G and telecom infrastructure projects including engagements in the UAE, Oman, Georgia, USA, Qatar, Russia and Kazakhstan, working with national and multinational large operating companies such as ADCO, PDO, BP, Total, QP, Dana Gas, Sajgas, KOC, KPO, KLPE, GASCO, in the energy sector.

Keywords: 3G, Asia, Asia Insights, Bankability, Batteries, Build-to-Suit, Business Model, C-Level Perspective, Capex, Co-locations, ESCOs, Energy Efficiency, Infrastructure Sharing, Insights, Irrawaddy Green Towers, KPIs, KSGM, Lease Rates, Myanmar, NOC, Network Rollout, O&M, Off-Grid, Ooredoo, Operational Excellence, Opex Reduction, Opex Sharing, RMS, Rectifiers, Rooftop, Skilled Workforces, Telenor, Tenancy Ratios, Towercos, Uptime, Who’s Who

Read this article to learn:

- Are O&G infrastructure professionals an untapped source of talent for towercos?
- The geographical characteristics of IGT’s tower network and the proportion off-grid
- Resourcing efficiencies: investing in local skills and striking the right balance between outsourcing and in-house resourcing
- Procurement efficiencies: smart sourcing, standardised specifications and the potential for ESCOs
- Driving down cost per tower, driving up tenancy ratios

TowerXchange: I’m surprised we don’t encounter more senior management at towercos who have an O&G infrastructure background as skills and experiences seem to be readily transferrable.

Ayad Chammas, CEO, IGT: After almost 20 years in O&G infrastructure, Myanmar represented a fantastic opportunity to build telecom infrastructure in a virgin market.

There a lot of the same concepts when dealing with O&G and telecom infrastructure: dealing with challenging geographies, understanding the impact of the environment, learning about the people and politics, and managing project implementation economics.

Telecom infrastructure rollouts are similar in nature to O&G – the primary differences are to do with scale and timeframe. A telecom rollout is geographically bigger than most O&G projects, unless you’re doing a cross country pipeline, but the key difference is the timeframe. A telecom rollout has a series of monthly to six week targets – delivery is based on monthly KPIs, whereas mega projects in O&G typically have three to four years, which gives you more time to maneuver and to mitigate against geographical or political issues in order to meet the end date. In a telecom context, we have 30 or less days per tower, less time to maneuver, no time for building contingencies. From site acquisition to tower erection and installation of power systems – sometimes we’re building 150-200 towers per month. Telecom infrastructure is deployed in a shorter time and is logistics and communication...
intensive. I’ve been on fast track jobs in O&G, where the value of the barrel creates the pressure for the delivery date per the contract, but there is more pressure in telecom; every month is a new project and there are different targets to be achieved in different areas that are geographically distant and diverse in nature.

TowerXchange: What have IGT been contracted to build and what have you built to date across the first three phases of the rollout?

Ayad Chammas, CEO, IGT: IGT has been contracted to build 1,800 towers for Telenor and 1,100 for Ooredoo. In addition to that, we have co-location agreements with both international operators plus MPT KDDI.

So far we have built 1,500 towers out of total portfolio of 2,900 towers.

Work on the towers from the Ooredoo contract has started and key purchase orders for these have been placed. I’m proud to say that our delivery team continues deliver and to do an excellent job despite of the severe weather, complex terrain and substandard transport infrastructure.

TowerXchange: Were there significant differences in terms of location characteristics and co-location potential between the (almost complete) first and second phases of the rollout compared to the new contracts awarded for phase three?

Ayad Chammas, CEO, IGT: In terms of location of the sites, our first 1,500 were very much spread over the 16 States/divisions of Myanmar. We started in Yangon, but our initial contract, which was from the second phase of rollout, was predominately outside main Myanmar central corridor, and we were first there for Telenor in States such as Shan, Kachin, Rakhaing and Chin in the North of the country. So while other towercos have concentrated their build on the central corridor, we have focused on more peripheral and Southern states. We are now seeing more capacity sites that are located in the major cities such as Yangon, Mandalay, and populated towns / commercial towns and border cities with China and Thailand as well as touristic places.

In terms of co-location, we have more potential in major cities and commercial towns. Rural areas however have made a slow start with some exceptions, it is important to say that we have realised more potential in co-location in the past two months, which has exceeded our expectations and we may very well be looking at a figure exceeding our target for our portfolio by end of this year.

TowerXchange: Does the more geographically dispersed nature of IGT’s towers mean more are off-grid and beyond the reach of transport infrastructure? If so, what are the implications for engagement with local communities?
We are proud of our active local training programme. Our line Managers are doing a great job training local teams on the basics of roll out, generator and battery maintenance, troubleshooting, and remote monitoring. We train technicians in Burmese at a dedicated facility in our HQ. We have more than 250 people local on our payroll, supplemented by 50-60 expats.

Ayad Chammas, CEO, IGT: Around 60% of our sites are off-grid, and many are beyond the reach of transport infrastructure.

We believe if we want to flourish we have to think global and act local, for example by hiring O&M teams from local villages. We see this as a win-win because the population have supported us in the rollout – engaging them in tower maintenance and operations is a small way to pay back societies for their support.

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TowerXchange: Different towercos have different business models. Some are very lean with every non-core function outsourced, others are more resource intensive keeping many functions in-house. Which functions sit ‘on the payroll’ at IGT and what is outsourced?

Ayad Chammas, CEO, IGT: Monthly our executive directors meet and try to address these issues. At the moment IGT are a cross: for example we have in-house site acquisition, and an in-house site building team, we hire smaller contractors, buy our own power solutions, and install through service providers. At the same time, we are shifting to an EPC finance model – we are retaining control of the schedule but giving part of the rollout to proven contractors.

Outsourcing might be good for economics, but it comes at the expense of flexibility of rollout and towerco’s ability to cater to operators’ specific needs, such as expediting sites they need on air as soon as possible. Keeping some in-house reserve resource is necessary to deliver great customer service and to build a reputation for operational excellence.

EPC contractors are like a train – once you load the train, and set it on track, it takes time to reach the desired speed, and they can be difficult to change course. So for example when the recent floods devastated the Northern States of Kachin, Rakhaing, Sagaing, parts of Mandalay and Shan, we were able to shift priorities to temporarily favour rolling out in the drier States in the South using in-house contractors.

TowerXchange: How can Myanmar’s towercos drive efficiency as you achieve scale, particularly in terms of smart sourcing and O&M?

Ayad Chammas, CEO, IGT: Efficiency and optimisation is an area I personally have been engaged in directly and quite extensively for the past year or so.

There are a number of initiatives that we took on board since August 2014. To name of few; smart sourcing whereby we have reduced our capex by nearly 30% and still there is scope to reduce further. We have shared with our contractors and suppliers a uniform rate card that we have negotiated based on bulk purchases and by planning ahead in procurement. We have done a lot of work with our engineers on optimised infrastructure designs; the use of low cost and quick deployment RDUs has
proven extremely useful in our rollout. Outsourcing of O&M and smart fuel buying (directly from the source), effective logistics yet ensuring that we provide the best uptime in the industry - as acknowledged by the customer – these are only few of many initiatives we have taken on up so far. Here I give a lot of credit in doing so to our finance and procurement teams who have worked relentlessly on driving down the cost of the business while we continue to roll out and meet our targets.

**TowerXchange:** How have you balanced the demands of standardisation and bulk purchasing savings with the need to customise each site to customer requirements and local conditions?

**Ayad Chammas, CEO, IGT:** We have more than six different power vendors on our vendor portfolio plus a further 10-15 tower suppliers who we use regularly.

We have managed to standardise specifications. Our power team set standard specifications for power and hybrid system design, enabling us to scale to three to four tenants with minimal changes, adding battery banks and rectifier cabinets plus, in some cases, an extra standby generator.

From a compliance point of view, it is important to have a good portfolio of experienced vendors who know what we want. We need to be able to upgrade power systems to add an additional tenant within 10-15 days at the most. Our in-house power team has done a great job building up fit for purpose specifications, helping us to quickly adapt to accommodate a second or third tenant. Our basic specs are two tenant ready as we realised need to be able to move quick to meet operator expectations: most of our battery banks do not require supplementing for a second or, in some cases, third tenant.

**TowerXchange:** Given that IGT is the only towerco to secure contracts from both Telenor and Ooredoo, you will be well placed to answer this: now that Ooredoo is commissioning sites with tower+power, are their requirements very similar to Telenor, or are there still significant differences in terms, for example, of wind load and energy requirements of their respective equipment?

**Ayad Chammas, CEO, IGT:** There is a slight difference between the requirements of the three operators we are engaged with at the moment. On the power side, every operator possesses their own power demand depending on their equipments’ specifications. We didn’t have to change tower or power system designs because we have catered for both cases during our initial design and set up phase of the project. Despite the fact that we’re managing a lot of co-locations on a monthly basis, we have encountered no issues in modifying and adding capacity. IGT has a proven power model that caters for both companies requirements, it is “plug and play” and can easily be modified to suit up to four tenants at this point in time.

**TowerXchange:** Do you think Myanmar’s towercos must all provide tower+power, rather than just ‘steel and grass’, to be competitive going forward? And do you think there is appetite for towercos to subcontract energy to ESCOs?

**Ayad Chammas, CEO, IGT:** Absolutely. This has been our major strength – besides Apollo, we are the only towerco to provide both tower and power as an integrated offering and that is the biggest
attraction to customers like Telenor, Ooredoo and MPT. As regards outsourcing of power to ESCO’s that is a distinct possibility and we are examining and assessing that as one of the options.

A lack of mature ESCOs was a problem a year ago, but not now – we see a lot of players in the local market who are qualified with the financial and technical capability to handle substantial volumes. We work with some on a capex model, and when the time is right we may work with them on an opex basis. They are working on understanding their own internal economics to suit Myanmar – they need a lean organisation, the right people, and they need to be in country long enough to analyse costs and offer a better deal on power. More companies now understand the cost of managing and handling power, so we'll soon see something like an ESCO in this market.

**TowerXchange:** Please summarise your vision for the future of the towerco business model and of IGT in Myanmar.

**Ayad Chammas, CEO, IGT:** We are living a telecom revolution in Myanmar, a revolution which is having a very positive impact on society. Mobile broadband will help people embrace change and advance.

We see ourselves as one of the major factors of that positive change. We have a CSR programme, and we train a lot of local people, people who previously had no experience of working in a multinational environment are now interacting with foreigners – we have 10-12 different nationalities in IGT; our local staff are learning from us, and we’re learning from them – it's cultural exchange of ideas. This country is beautiful, the people are friendly, and this rollout offers the potential for many to advance their careers – we’re helping in a big way, responsibly investing in people. This gives us the ability to remain cost efficient – investing in local people pays back on a social, productivity and cost efficiency basis.

The fact is that towerco business is here to stay, not just in this part of the globe but all over, it just can not be disputed. In today’s world of falling tariffs and call rates and limited spectrum ability, especially in ASEAN countries, a shared telecom infrastructure is the only way for an operator to remain cost effective. The explosion in data traffic with increasingly higher penetration of smart phones, innovative consumer apps, enhanced by increased affordability is driving both coverage and capacity needs and therefore an ever-increasing demand for towers. In this context, the towerco business model not only makes the operators asset-light but also people-light and allows them to focus on their core competencies. Further, with introductions of newer radio technologies like LTE (and now even 5G trials are taking place), an existing and upgradable tower infrastructure provides the operators a unique ability to become nimble and yet remain cost effective in new service offerings.

I am proud that IGT are now the #1 towerco in Myanmar: with 1,500 sites and another 1,400 to come, Our vision is to retain our leadership and emerge as the predominant player in this industry, the player which provides the best value and the most efficient network uptime to all our customers. We have invested significantly in technology, people and processes and are focused on developing a local ecosystem to support our vision. We are constantly evaluating both organic and inorganic growth opportunities and continue to explore innovative solutions to cut down our costs, enhance productivity through deployment of innovative tools and technologies and continue to focus on building people skills.

We are strongly committed to the country and are the third largest foreign investors (in the telecom sector) in the country. We have initiated several CSR activities and are very active in local community engagement.
Next phase of Myanmar rollout must be about sharing and efficiency - IGT Chairman Arun Kapur

TowerXchange also spoke with IGT Chairman Arun Kapur, who suggested “sharing towers has begun in Myanmar. We’ve gotten good traction, particularly with Ooredoo and KSGM, and anticipate having co-locations on around 700 of the ~2,000 we’ll have in our portfolio by year end 2015, with a tenancy ratio around 1.3. Achieving those kind of tenancy ratios may be difficult on the phase one towers, where Ooredoo and Telenor built almost in parallel with a high degree of overlap. But because IGT’s allocation was part of phase two, we have less overlap, and have attracted huge interest from Ooredoo in co-locating, particularly on the rooftop sites they need for 3G.”

The other theme of our conversation with Arun was efficiency, particularly relating to the capital outlay per site. “All of Myanmar’s towercos will have to experiment with new structures to bring capex down and to bring loads down. The Asian tower industry started in India, where the first set of towers I built in 2005 delivered a 25% IRR from a single tenant, with lease rates close to US$2,000. By 2012 lease rates were down to US$500 in India, but it took towercos seven years to innovate and create the necessary capex and opex efficiencies – we must make the same improvements much more quickly in Myanmar.”

“Achieving such efficiencies calls for a strong partnership approach between MNOs and towercos,” continued Kapur. “MNOs can’t treat towercos like any other vendor; we’re investing 60%+ of the capex on their behalf! We’re connected via an umbilical chord, so if the MNO squeezes the towercos beyond a certain point they make it more difficult for us to raise capital, which harms them as much as us. We need a realistic, sustainable cost structure in Myanmar. Any towercos will fall by the wayside if they fail to recognise and embrace the drive toward efficiency by optimising staffing costs, site design, O&M and technology deployment, or who fails to leverage RMS to monitor uptime and SLAs. Like it or not, Myanmar will mimic more mature tower markets, and that means costs have got to come down.”

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“While an ecosystem of local skills and competencies has been developed, we still can’t buy towers or generators locally – everything is still imported. Local distributors are still building their service capability but in the meantime they need to create a margin. We need smart sourcing and smart buying; vendor categorisation and classification – this is nothing new, but it takes time to do it well.”

“This time last year, IGT had 70% expat staff, now we have 70% local staff,” continued Kapur. “We have outsourced selectively and fostered a large local ecosystem of contractors, encouraging our partners to invest in and build local teams. We have invested in a state-of-the-art tower operations centre (TOC) and in site technology which has enabled us to achieve the best uptime in the industry (recognised on several occasions by Telenor).”

IGT Chairman Arun Kapur felt that the innovations in power systems and business models would be the primary sources of efficiency. “Energy business model innovations will be crucial from a fundraising and capital structure point of view. MNOs started by outsourcing towers+power to towercos, and now we’re talking to several powercos who could buy out all our power assets, introducing liquidity and reducing the burden to raise further capital.”

“I’ve seen the capital cost per tower in Myanmar already come down by as much as 40%, over a third of which is still the power system. The power systems alone on the next 2,000 towers could cost US$50mn, so innovations in both power system technologies and business models will be critical,” concluded Kapur.

Arun Kapur, who is a member of TowerXchange’s ‘Inner Circle’ Advisory Board, and Ayad Chammas will both be representing IGT at the 2nd annual TowerXchange Meetup Asia, taking place on November 24 and 25 at the Marina Bay Sands in Singapore. For more details visit www.towerxchange.com/meetups/asia.
Market analyses

We at TowerXchange pride ourselves on providing the definitive guide to all of the world’s active tower markets, providing a detailed country-by-country breakdown of key statistics and qualitative analysis which is constantly updated. As the tower industry grows and evolves, the TowerXchange community is growing along with it and providing an up-to-date overview of new trends and across all of the key regions.

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119 Pakistan
122 Thailand
128 Vietnam

www.towerxchange.com
Editorial: The emergence of the tower industry in Bangladesh

Bangladesh has considerable pent up telecoms demand, and the towerco model will play a key role in fulfilling this.

The next tower industry land-grab in Asia may be in Bangladesh, with towerco penetration forecast to rise to 50% within the next two years... if the formative regulatory regime for towercos proves attractive. In this editorial, TowerXchange summarises the mobile market and the tower markets in Bangladesh – finding a market full of contradictions: high population density but a need for rural tower sharing, adequate energy capacity yet three months of extreme grid unreliability, and a market ripe for towerco investment and sale and leasebacks, but held up pending the establishment of a clear regulatory regime for towercos.

Keywords: 3G, 4G, Airtel, Axiata, Asia, Asia Research, Bangladesh, Banglalink, Bharti Infratel, CityCell, edotco, Grameenphone, Market Overview, Qubee, Research, Robi, Sale & Leaseback, Telenor, Teletalk, Tower Counts, TowerXchange Research, VimpelCom

By Ian Ferguson, Head of Asia, TowerXchange

An introduction to the telecoms market in Bangladesh

Bangladesh is a unique tower market with great potential for future growth. With a population of 160 million this is a small market compared to its largest neighbours India and China; but sizable compared to Southeast Asian markets such as Thailand and Myanmar. Bangladesh also has some of the world’s most dense urban populations (160mn people live in a country slightly smaller than Iowa!), but considerable population remains spread around smaller centres and rural areas; according to the CIA Factbook, Bangladesh is 33.5% urbanised with just under 17mn people in metropolitan Dhaka, and ~4.5mn in Chittagong. Although it has its regulatory issues to overcome and some challenging operational conditions on the ground, Bangladesh is still a huge market and it represents considerable opportunities for telecoms growth.

In 2014, the GSMA estimated the number of telecoms sites at 25,858 and this relatively mature network provides nearly 90% geographical coverage. With 800-1,000 new towers being erected per year, TowerXchange now estimate that there are ~27,000 towers in Bangladesh.

Bangladesh has a healthy, competitive telecoms market; there are currently six MNOs: Grameenphone, Banglalink and Robi lead the market with 52.3mn, 32mn and 26.6mn mobile subscribers respectively (Source: BTRC April 2015). The smaller players are Airtel with 8.3mn, Teletalk...
Mobile subscriber market share in Bangladesh

<table>
<thead>
<tr>
<th>Operator</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grameenphone</td>
<td>42%</td>
</tr>
<tr>
<td>Banglalink</td>
<td>21.4%</td>
</tr>
<tr>
<td>Robi</td>
<td>25.7%</td>
</tr>
<tr>
<td>Airtel</td>
<td>6.7%</td>
</tr>
<tr>
<td>Teletalk</td>
<td>3.2%</td>
</tr>
<tr>
<td>CityCell</td>
<td>1%</td>
</tr>
</tbody>
</table>

Source: BTRC April 2015

with 4mn and Citycell with 1.2mn. As of Q4 2014 the GSMA estimated 76% SIM penetration, but it’s still early days for 3G and 4G as mobile broadband penetration is sitting at 6%. “Bangladesh is already 60% penetrated. With around 25% of the population below the poverty line, subscriber growth is already leveling off – but Bangladesh is nevertheless our highest growth country.” said James Maclaurin, former CEO of edotco, in an interview with TowerXchange last year. The CIA Factbook estimated Bangladesh’s GDP per capita (PPP) at US$3,400 in 2014, and suggests that the Bangladeshi economy has grown at an annual average of about 6% over the last two decades.

Bangladesh’s ARPU of US$2 is on par with the subcontinental average, but there is a huge class divide. According to Hardiman Telecommunications, demand for sharing in the small cities / towns / rural areas of Bangladesh will be the salient characteristic of its tower sector.

When people in the rural areas have money, they invest in phones as soon as possible and as a result rural sites are starting to appear. Rural subscribers are keen to use data from the outset which is different from other markets and reflects how ubiquitous demand for data is now; it may also reflect the relative youth of the population, over 50% of which is under 25. Currently a substantial rural population is concentrated in the uncovered 10% of the national territory and further network expansion is still needed. Spectrum will have to be allocated to cover these areas and the 2,100 MHz band for the rural area isn’t there yet; a second round of auctions was postponed in May and should take place in June.

The towerco market and demand for infrastructure sharing

The BTRC created a favourable environment for infrastructure sharing in 2011, helping the average tenancy ratio in the country rise to the current level which TowerXchange would estimate at 1.3. Thus far we have seen infrastructure sharing deals between Banglalink and both Grameenphone and Robi, as well as between Airtel and CityCell. A trusted source in Bangladesh suggested that since 2011, Banglalink, Robi and Airtel have shared around 25% of new towers, and also forecast a 20-25% growth in sites (tenancies plus new builds) in the next 12-18 months.

To date edotco is currently the only towerco operating at scale in Bangladesh after their acquisition of 5,300 tower assets from Robi, also part of the Axiata Group. WiMAX to LTE operator Qubee was also included in this agreement to share passive infrastructure, and was the second tenant on several of these assets. The regulator initially blocked the Robi-edotco transaction, which was eventually granted with the towerco acquiring 49% equity instead of the 80% originally applied for. According to local media reports, edotco paid US$68.7mn to acquire 49% of the equity in Robi’s towers, the equivalent of US$140.2mn had they...
been permitted to acquire 100% which works out to just under US$26,500 per tower. However, it is difficult to use this, the only major tower transaction to date, as a valid benchmark for Bangladeshi tower valuations as this was a transfer of assets from an Axiata opco to Axiata’s own towerco.

edotco has plans to expand on its foothold in this market, and intends to build 1,500 new towers to meet demand from its clients such as Teletalk, the local state-owned MNO that already leans heavily on co-location in their network planning strategies. With such a dense population, real estate is extremely hard to come by in urban centres and

Estimated tower count for Bangladesh

<table>
<thead>
<tr>
<th>MNO</th>
<th>Tower Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grameenphone</td>
<td>7,800</td>
</tr>
<tr>
<td>Banglalink</td>
<td>6,000</td>
</tr>
<tr>
<td>edotco</td>
<td>5,300</td>
</tr>
<tr>
<td>Airtel</td>
<td>3,800</td>
</tr>
<tr>
<td>Teletalk, CityCell and non-traditional MNOS</td>
<td>4,100</td>
</tr>
</tbody>
</table>

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“One of the most unstable grids we have experienced”

The electrical grid is also subject to unique conditions in Bangladesh, prompting one energy storage vendor to declare Bangladesh as home to “one of the most unstable grids we have experienced”. Overall the reliability of the grid has increased to a reasonable level for most of the year, but the region is prone to cyclones and monsoons with high winds and torrential rains leading to flooding from April to June. “For three months a year it’s chaos in Bangladesh with monsoon floods everywhere,” said a participant in the Bangladesh round table at the TowerXchange Meetup Asia 2014. “Sometimes you need a boat to cross a road.”

These storms are difficult to predict, and the power supply is often switched off for safety when they
hit. As a consequence, Bangladeshi MNOs and towercos must plan their sites with significant levels of autonomy in mind, especially considering the difficulty in reaching some of the more remote sites; gensets and batteries are still very much in demand and relied on heavily during the three monsoon months of the year. This has encouraged infrastructure sharing as the MNOs see the benefit in avoiding installation of multiple gensets and batteries.

Hybrid energy solutions are also attracting a lot of attention, and carriers and towercos are planning to use them to increase efficiency and autonomy during extended outages. edotco has plans to roll out 150 pure solar installations to support some of its most inaccessible sites.

What will happen next in the Bangladeshi tower market?

In spite of these obstacles, the Bangladeshi tower market is clearly poised for growth, and TowerXchange expect to see the current number of 5,300 towerco-controlled assets grow and the level of towerco penetration to increase from 20% to 50% over the next 18-24 months.

There are some initial hurdles to consider: some companies have cited concerns about the immature regulatory environment in Bangladesh and its relations with towercos, especially with regards to equity ownership and taxation. For more information on Bangladesh’s evolving regulatory environment for towercos, read “BTRC has unique opportunity to attract tower industry investment into Bangladesh.”

Speculation has already begun about where the next major tower deal will come from. Bharti Infratel has expressed an interest in the Bangladeshi market; although Bharti’s a local opco, Airtel Bangladesh has only ~7% market share and a portfolio of around 3,800 towers. There are also rumours that VimpelCom may look to divest the tower assets in Bangladesh belonging to its subsidiary Banglalink. At ~6,000 towers this is the third largest portfolio in Bangladesh and a transaction of this size could be a major step towards the acquiring tower company achieving scale in this market. As observed by Hardiman Telecommunications, with such a gap between the three market leaders and the smaller players, consolidation in Bangladesh is practically inevitable. There may also be other interested parties from the Indian telecoms and tower markets seeking further international opportunities; the Indian market is stabilising after the 2012 regulatory restructuring, valuations of Indian tower assets are rising and balance sheets are swelling. There may be opportunities to recapitalise with private equity, while large companies in the Indian market may also look at management contracts as well as acquisitions in Bangladesh.

Overall, TowerXchange feel there is tremendous potential in the Bangladesh tower market. There is a good runway for growth, with multi-SIMing meaning mobile phone penetration may be under 50%. The economics of coverage extension lend themselves to shared infrastructure, and we could see an increase in the number of PoSs of up to 25% in the next 12-18 months. At least three of Bangladesh’s MNOs are keen to focus their investment on 3G and 4G rather than on passive infrastructure, creating an ideal environment in which towercos can acquire and build towers, enabling MNOs to concentrate on expanding and modernising their networks.
Editorial: A first look at the Cambodian tower market

Cambodia has strong demand and pent-up growth; the towerco model will play a key role in fulfilling this potential.

Cambodia may be the next market to watch in Asia, with strong demand for new telecom services and need for new business models for infrastructure ownership and management to help meet this demand. In this editorial, TowerXchange summarises the mobile and the tower markets in Cambodia – finding a country with significant growth potential, with 130%+ mobile penetration and a crowded operator market. However there are still obstacles to be overcome, such as the challenging power grid situation.

Keywords: 3G, 4G, Axiata, Asia, Asia Research, Cambodia, Camtower Link, Cellcard, edotco, Huawei, Market Overview, Metfone, qb, Research, Royal Group, Sale & Leaseback, Seatel, Smart, Tower Counts, TowerXchange Research

Read this article to learn:
- An overview of the telecoms and tower markets in Cambodia
- Regulatory support for infrastructure sharing
- Grid conditions on the ground in Cambodia
- Obstacles to growth for towercos

An introduction to the telecoms market in Cambodia

Cambodia is an up-and-coming tower market with the potential for organic and inorganic growth. With a population of 15.8 million this is a small market compared to its larger neighbours Thailand and Vietnam, but it is a young population that is growing quickly with a 1.7% increase in 2014. Cambodia has experienced strong economic growth over the last decade. Cambodian GDP grew at an average annual rate of over 8% between 2000 and 2010 and over 7% since 2011, according to the CIA Factbook. Although it has its regulatory issues to overcome and some challenging operational conditions on the ground, Cambodia is still a market with strong potential and it represents considerable opportunities.

Cambodia’s efforts to expand and upgrade its telecom infrastructure have been successful despite its status as one of the less-developed countries in the region. There was very little infrastructure remaining from before the Khmer Rouge regime, and as a result, Cambodia leap-frogged the rebuilding of fixed-line infrastructure and launched into alternative technologies, jump-starting its telecommunications infrastructure with digital and mobile technology. As of Q4 2014, the GSMA estimated the number mobile connections at 23.9mn and a remarkably high SIM penetration of 154%.

There are approximately 9,000 towers in Cambodia and a growth rate of 3% is expected in 2016. Cambodia has a crowded, competitive telecoms market; there are currently five MNOs: Metfone
(Viettel), Smart (Axiata) and Cellcard (Mobitel) lead the market with 9mn, 7mn and 3mn mobile subscribers respectively. The other operators qb (CADCOMMS) and Seatel (Southeast Asia Telecom) have a combined market share of approximately 1mn between them. There is likely to be some consolidation in the Cambodian market, some of which has already taken place with the number of operators dropping from nine licensed operators in 2011 to five in 2015, most recently with former VimpelCom OpCo Sotelco (trading under the Beeline brand), being acquired by market leaders Viettel. In 2012 Axiata’s Hello merged with Latelz Company’s Smart Mobile in a US$155mn deal. Network integration was completed in August 2013.

There has also been a recent shift in the market with a new agreement between Cambodia’s Ministry of Posts and Telecommunications and the Chinese Ministry of Industry and Information Technology (MIIT) which was signed in January 2015. Under the deal, both sides will exchange information, experience and expertise in the development of telecoms and ICT and this agreement may result in new Chinese entrants to the Cambodian operator market. Cambodia also selected the Chinese vendor Huawei as a strategic partner for its ICT development.

4G has been launched in Cambodia with Smart first offering services in Phnom Penh in January 2014 and Seatel switching on services in July 2015. It remains to be seen how aggressive 4G rollouts will be in Cambodia, and whether its launch will encourage any new players to come into the market.

To date edotco is the leading towerco in Cambodia with a total of 1,700 towers. edotco has plans to expand on its foothold in this market in the short term, but in the long term they expect the volume of tower builds to level off. In the meantime they plan to focus on offering end-to-end managed services along with DAS and small cells to optimise use of infrastructure and remain competitive.

Local turnkey infrastructure firm Camtower Link also owns and operates a small independent tower portfolio.

Power grid issues and landmines

The lack of a dependable power grid represents one of the biggest challenges facing the Cambodian tower market. The development of infrastructure suffered a major setback during the Khmer Rouge regime and this is still under development to reach the regional standard. The government has been working steadily on this in recent years and now the number of off-grid sites has been reduced to between 20 and 25%. There are also some security risks when deploying towers on remote sites as there are still minefields in the countryside which are the legacy of thirty years of war in Cambodia; experts estimate that another ten to twenty years will be required to clear all of them.

Regulatory development

In 2012 Cambodia established an autonomous telecoms regulator, the Telecommunications Regulator of Cambodia, as an entity independent of the Ministry.

Cambodia mobile subscriber market share

<table>
<thead>
<tr>
<th>Operator</th>
<th>Subscribers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metfone (Viettel)</td>
<td>9mn</td>
</tr>
<tr>
<td>Smart (Axiata)</td>
<td>7mn</td>
</tr>
<tr>
<td>Cellcard (Mobitel)</td>
<td>3mn</td>
</tr>
<tr>
<td>qb (CADCOMMS)</td>
<td>0.5mn</td>
</tr>
<tr>
<td>Seatel (Southeast Asia Telecom)</td>
<td>0.5mn</td>
</tr>
</tbody>
</table>

Source: TowerXchange
Cambodia’s telecoms operators recently voiced opposition to a draft law from the Ministry of Posts and Telecommunications Cambodia (MPTC) in July 2014 which stated that no company can operate infrastructure assets and also provide retail services. This legislation would have required telecoms operators that choose to retain their retail operations to sell off their network assets and rely on government-controlled infrastructure providers or towercos. The draft law also reportedly stated that all telecom licences would be reassessed on new criteria, and some companies could be forced to hand back their existing permits. In addition, the draft law also stated that ‘to ensure the effective security, national stability and public order, the minister of the MPTC has the right to order operators to transfer their systems, which control their telecom operations, to the Ministry.’ To date this law has not passed, and the Cambodian government is under pressure to make its legislative drafting process more transparent, which would help to encourage infrastructure development and foreign investment.

The Cambodian government supports the idea of infrastructure sharing to increase the efficiency of telecoms assets, and it also supports 100% foreign ownership to give a boost to telecoms investment and development. A new telecommunications law should come into effect in the first half of 2016 which should have a significant impact on infrastructure sharing in Cambodia.

What to expect next in Cambodia

With new legislation expected to take effect in the near future, LTE being rolled out, and new operators poised to enter the market, Cambodia should see some exciting new developments, and the tower market may continue to attract foreign investment. Prior to edotco’s entry into the market, the last time foreign towerco looked into a potential purchase in Cambodia was in 2012 when Tower Bersama was reportedly engaged in talks with Mobitel to acquire its tower assets.

With such a crowded operator market serving a relatively small population, the greatest efficiencies in Cambodia may be realised in partnership with a single, or at the most two, towercos of scale. This capacity is reflected in the tower industry’s appetite for Cambodia, which would typically see only the top two to three operators as suitable anchor tenants for a market entry. There may be finite room for many additional towercos in Cambodia with market leaders Viettel historically reluctant to partner with towercos, Smart already working with edotco, and Mobitel backed by the Royal Group (Cambodia’s largest privately owned conglomerate, which has strong connections to government).

With telecoms coverage of the population already at 90% it remains to be seen how many new towers will need to be deployed to extend and densify the network to support the demand for 4G services, and this will also be impacted by the new entrants and whether they build new towers or share with the existing market leaders. Overall, if the government continues to support infrastructure sharing, increases transparency and encourages foreign investment, Cambodia should remain a modest yet investible tower market.
China Tower Company absorbs 1mn towers
Tower companies now own two in three of the world’s telecom towers

It remains unclear just how big China Tower Company is. Bernstein reported a tower count as low as 765,000. Local press reports suggest CTC may have as many as 1.5mn towers on their balance sheet. The reality is probably somewhere in between – TowerXchange estimates CTC will have a tower count of 1.16mn, based on local sources in the tower industry, who also suggest that a layer of local independent developers own a further ~20,000 Chinese towers.

The reality is that the usual issues of inaccurate asset registers, MNOs continuing hesitance to reveal the full extent of their networks, and the pace of network expansion, mean it’s unlikely anyone knows precisely how many legacy towers are being injected into CTC and, while the financial terms of the deal to inject China Mobile, China Unicom and China Telecom’s towers into CTC were announced in October 2015, no actual asset counts could be found in local or international coverage.

The exact pace of Chinese tower network expansion also remains unclear. When launched, CTC had an initial contract to build 120,000 new towers, with local reports suggesting many of the delivered sites were sourced by subcontracting to or buying from local independent developers. More recent reports suggest CTC has an order book of 409,000 towers, of which 271,000 have been delivered – take those numbers with a pinch of salt. Infrastructure sharing is believed to have reduced China’s new tower requirement by as much as 33%, but the numbers are still huge: various reports suggest CTC could build a further million towers in the next two years, driven by 4G rollout and associated network densification.

Read this article to learn:
- Reports of the scale of CTC and of their BTS programme
- Breakdown of the ownership of CTC
- The valuation of the towers transferred to CTC
- The implications of the creation of CTC for the penetration of the towerco business model worldwide

Source: TowerXchange
What is clear is that CTC will operate any backup power solutions at their sites, providing a full power service, and that China’s MNOs will no longer build their own towers. All three MNOs announcements make statements to similar effect, here quoting from China Unicom: “The Sellers have undertaken to the Tower Company that they, together with their subsidiaries, shall in principle cease to construct any infrastructure facilities (including telecommunications towers) as well as indoor distribution systems for main public transportation venues (including subway, railway, highway, airport and transport terminal), large venues and key buildings (including commercial and residential buildings used by multiple owners and government buildings) from 1 January 2015.”

The creation of CTC has already stimulated infrastructure sharing in China; China Telecom Chairman and Chief Executive Wang Xiaochu disclosed that about 70 per cent of an initial pool of 60,000 towers provided by CTC were put to use in the first half of 2015.

Various analysts ascribe an initial valuation of CTC at CNY214-230bn (US$34-36bn). 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 and below the US$80,000 per tower CTC was offering to acquire independent developers’ towers. 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. Few of China’s sites are camouflaged, which also reduces their valuation. With the leaseback rate still under negotiation, the low acquisition cost also suggests lease rates in China may be below the current independent tower average of around US$650-1,000, depending whether the site is rural or urban.

Behind the public façade of the creation of CTC, and the focus on efficiencies and resource sharing, the reality is that China’s carriers have been cautious about spinning off their towers to CTC, which in part explains the participation of China Reform Corporation in bringing some central government strength and capital to push this critical infrastructure venture to full fruition. The involvement of China Reform Corporation, a kind of sovereign wealth fund with a particular focus on reforming state-owned enterprises, also hints at a potential future IPO of China Tower Company in Hong Kong, which many analysts forecast taking place as soon as 2017.

1.4% 39% 82% 44% 76% 27% 100%

China 1,180,000 / 1,180,000 towers
Europe 158,911 / 600,000 towers*
India 304,144 / 400,000 towers
CALA 69,975 / 160,000 towers
USA 114,139 / 140,000 towers
MENA 2,040 / 139,800 towers
SSA 48,214 / 122,739 towers

* Europe includes JV infracos as towercos. Independent towercos own 9%

Sources: TowerXchange, RBC, Delta Partners, Mott MacDonald

2,025,946 of the world’s 3mn telecom towers are now owned by towercos

Sources: TowerXchange
India: How do towerco business models affect tower valuations

Contrasting operator-led and independent tower company acquisition opportunities, using India as an example

Why is an independent towerco’s tower often worth more than an operator-captive tower? How much value is added if an operator carves out their assets into their own towerco, and leases them up? How does one evaluate the investibility of new carve out towercos? India is a great example market to compare tower business models since all four aforementioned business model variants are represented, and since examples of all four business models could be coming to market in the near term.


Read this article to learn:

- Comparing the price paid per towerco tower with price paid per operator-captive tower in international tower transactions over the last four years
- Estimated tower counts and tenancy ratios for India
- Deal flow returns to the Indian tower market: who are the prospective buyers and sellers?
- Comparing an independent towerco with an operator-led towerco portfolio, using Viom Networks and Reliance Infratel as examples
- The investibility of a potential BSNL carve out towerco

How do you scale up a tower company? The build-to-suit model creates a lot of capital value and is a great way to startup, but building a portfolio site by site is a painstaking way to reach scale. If you’re lucky enough to have access to affordable capital, the path to achieving economies of scale can be shortcut through strategic acquisition. But what should you buy? Are the assets of another independent towerco always worth more than operator-captive towers?

Since the start of 2011, towercos have acquired 10,125 towers from other towercos (counting only the six transactions where the price was disclosed). The average value of a towerco tower in international markets (i.e. everywhere except the USA) was US$233,855.

Since the start of 2011, towercos have acquired 88,835 towers from MNOs (counting only the 44 transactions where the price was disclosed). The average value of an operator tower in international markets (i.e. everywhere except the USA) was US$147,820.

This simplistic deal comparison analysis of course neglects several critical factors – the lease rates, tenancy ratios and operating costs are often not in the public domain which means we cannot compare the acquisition of towerco’s towers with those of MNOs in terms of Tower Cash Flow (TCF) multiples. Where we have seen TCF side by side, the multiples are generally similar, indicating that the main reason that a towerco tower is generally more valuable than an operator tower is that the tenancy ratio is generally higher. Nonetheless, the
sample size in this analysis is just about big enough to suggest that an independent tower has generally been valued at a little over 1.5x that of an operator-captive tower over the last four years.

It remains a widely accepted truth that a portfolio of high quality independent towers built with multiple tenants in mind is typically worth more than an operator-captive portfolio, which is usually built to meet the needs of just the one tenant. But it’s not that black and white – there are high quality independent towerco portfolios and less good independent towerco portfolios. There are operator-captive portfolios built for a single tenant, with a tenancy ratio very close to one, and then there are operator-led towercos with high quality structures and tenancy ratios over two (although, usefully to keep things simple for the above analysis, no operator-led towerco portfolios have changed hands since 2011).

Let’s use India to further explore this discussion the point.

**Deal flow returns to Indian tower market**

First some context on the Indian tower market. Recent spectrum auctions have stimulated increased appetite to acquire Indian towers. “We believe there could be acceleration in 3G deployments following the March 2015 low-and mid-band spectrum auctions,” said Jonathan Atkin, Managing Director, RBC Capital Markets. “Low 3G penetration nationally (8%) and in urban areas (25%) provide an attractive backdrop for leasing growth. 1,800 MHz is a plausible band for LTE deployment, while 800 MHz spectrum, currently utilized for 2G, is a logical candidate for continued band realignment to 3G.”

After a hiatus in tower transactions widely attributed to the restructuring of the cellular operator market in the wake of the cancellation of 122 operator licenses in 2012, India’s cellular operators’ new spectrum, and associated need for capital, has re-invigorated the tower transaction pipeline. Investment bankers are dusting off their tower industry rolodexes again in India – it’s tower sale season India!

It seems like everyone is either a buyer or a seller in the Indian tower industry today. In the past weeks and months we’ve seen reports that Reliance Infratel and their 52,000 towers could be sold, reports that IDEA Cellular has 11,000 towers for sale, reports that BSNL could finally carve out their 62,000 towers into a long-mooted towerco, while Viom Networks (42,200 towers), Tower Vision (~8,600 towers) and Ascend Telecom (~4,500 towers) have all been touted as potential acquisition targets in the recent past. And the tower business of GTL Infrastructure (29,432 towers) is probably acquirable by anyone with an appetite for a turnaround project.

Whilst “Thousands of Indian telecom towers for sale” may not be a new headline, neither is “American Tower seeks all-India footprint” – the world’s most acquisitive towerco having previously rolled up XCEL, Transcend Infrastructure, over 4,000 towers from Essar Group and, more recently, KEC International. American Tower’s organic growth rate in India has trebled in the last year; they added 1,351 Indian towers in the last 12 months, up from an increase of 409 in the preceding 12 month period. But organic growth alone is not going to get American Tower where they want to be in India. “We believe American Tower would consider further M&A in India in order to gain scale beyond its current 13,000 sites (e.g. Viom or Reliance Infratel),” said Jonathan Atkin, an analyst who follows American Tower for RBC Capital Markets. In fact, American Tower still has only 13,289 towers in India – a substantial portfolio in any other market, but less so in India where 40-45,000 towers are required to have a deep “all-India” footprint, enabling operators options not to be inhibited by a limited ownership pattern.

American Tower has reportedly been in protracted negotiations to acquire some or all of the equity in Viom Networks. But our sources suggest those negotiations have reached an impasse, both on the basis of a divergence in strategies for diversification of the business model beyond macro towers, and on the basis of a seemingly insurmountable gap between valuations. Unsourced rumours in the press suggested American Tower bid a little over US$3bn for Viom Networks, while Viom’s CEO has publicly stated a valuation of US$4bn.

One of the obstacles to the fully-fledged resumption of tower transaction deal flow in India is the lack of a meaningful benchmark for the valuation of an Indian tower since the 2012 market restructuring. Between 2008 and 2012, 42,007 Indian towers changed hands at an average cost per tower of
US$115,028. But since the cancellation of 122 MNO licenses there has been only one small Indian tower deal (earlier in 2015, American Tower acquired KEC International, including 381 towers, for US$13mn – just US$34,121 per tower). The 2012 market restructuring saw Indian towerco’s lose thousands of tenancies almost overnight, taking a big bite out of operating profits. But Indian tower companies are managed by astute, experienced leaders, and the 2012 setback inaugurated a new level of focus on site level efficiency and profitability. For example, Viom Networks delivered their maiden profit in FY2012/13.

So what better indicates the value of an Indian telecom tower; Indian towercos ability to cost effectively erect a new site for as little as US$25,000, the acquisition of a few hundred KEC International towers for less than US$35,000 per tower, or the tremendous potential for India’s towercos to harvest tenancy and tower portfolio growth from India’s transition to mobile broadband, fuelled by spectrum acquisitions?

The potential of Indian towercos to create capital value is illustrated by the soaring share price of Bharti Infratel, up over 350% since a low of Rs 126 in 2013 to Rs 443 (at time of writing). Bharti Infratel’s performance is also fuelled by generous dividend payouts and by the towerco’s recent inclusion in the MSCI (Morgan Stanley Capital International) Global Index. Bharti Infratel’s market cap at time of writing had risen to ~Rs 850bn or just over US$13bn, a market cap which, combined with a tower count of 85,892 (including the 42% equity holding in Indus which sits on the Bharti Infratel balance sheet) suggests a valuation of a little over US$150,000 per tower.

Bharti Infratel’s soaring share price also introduces another critical factor into the Indian tower market: a second credible trade buyer. Could a seller ever feel they would attract a “full value” bid if American Tower (an infamously canny buyer) were the only credible counterparty bidding at auction? Bharti Infratel may now have a US$1bn acquisition and improvement budget, with an appetite for domestic sale and leaseback opportunities, as well as diversification into Wi-Fi, DAS and fibre, and/or an expansion into Bangladesh, should the Bangladeshi regulator create favorable market conditions.

As well as two strategic buyers with appetite and low cost capital (and we wouldn’t rule out the possibility of edotco being a third major towerco bidder), there are also prospective FII buyers of Indian towers like Macquarie, Blackstone, Carlyle Group and Providence Equity. And of course India
## What we know about the towers that might be for sale in India

<table>
<thead>
<tr>
<th>Owners</th>
<th>Count</th>
<th>Comentary</th>
<th>Business model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascend Telecom: 73% New Silk Route, 27% TVS Interconnect</td>
<td>4,500</td>
<td>The last of India’s ‘big little’ towercos, Ascend was merged with ITIL in 2011, at which time the joint entity had a tenancy ratio of 1.6. Ascend has a presence in all 20 telecom circles, and was reportedly on the block at the end of 2013, seeking a US$400mn valuation (US$89,000 per tower).</td>
<td>Independent towerco</td>
</tr>
<tr>
<td>BSNL: state-owned</td>
<td>62,000</td>
<td>State-owned operator BSNL has not been leasing up their towers as proactively as others and has a tenancy ratio close to one. New Chairman and Managing Director Anupam Shrivastava is determined to turnaround losses of ~US$1.3bn and bring BSNL into profitability, a strategy which he has suggested may include the carve out of a towerco.</td>
<td>Prospective new carve out towerco</td>
</tr>
<tr>
<td>GTL Infrastructure: Global Holding plus Corporate Debt Restructuring cell</td>
<td>29,432</td>
<td>GTL Infrastructure has struggled financially since acquiring 17,000 towers from Aircel for US$1.8bn in 2010, only for many of Aircel’s opcos to fall victim to the market restructuring of 2012, which meant many of the additional 20,000 tenancies anticipated in the original deal would never materialise. Therefore, GTL’s tenancy ratios reportedly lag their peers at 1.5, and the company has not significantly expanded its portfolio. GTL is selling assets to service substantial a debt burden.</td>
<td>Independent towerco</td>
</tr>
<tr>
<td>IDEA Cellular: Abitya Birla 49%, Axiata 20%, Providence Equity 10.6% and others</td>
<td>11,000</td>
<td>Speculation has resumed concerning the potential sale of 11,000 IDEA Cellular towers. Sources suggest the towers have been relatively well leased up for operator-captive towers, with a tenancy ratio of 1.8, which goes some way to justify IDEA Cellular’s reported valuation of US$1.2bn, or US$109,000 per tower.</td>
<td>Operator-captive / SLB</td>
</tr>
<tr>
<td>Reliance Infratel: 96% Anil Ambani / RCOM, rest between Quantum, NSR Partners, Galleon, HSBC Daisy Investment, Drawbridge Towers, and Investment Partners B</td>
<td>52,000</td>
<td>Reliance Infratel has been the subject of sale rumors since 2008, particularly in 2010 when an IPO was abandoned due to unfavorable market conditions, and a sale to GTL Infrastructure reached got as far as term sheets being exchanges before also being abandoned. Reliance Infratel’s tenancy ratio is around 1.6. The majority of tenancies come from parent company RCOM, owned by Anil Ambani, and his brother Mukesh Ambani’s Reliance Jio. A sale price of US$3.1-3.9bn (including debt) has been suggested, which at the midpoint would suggest a valuation of US$75,000 per tower.</td>
<td>Operator-led towerco</td>
</tr>
<tr>
<td>Tower Vision: Fore Group 34%, Quadrangle Capital Partners 31%, Jarvinia 11%, RP Capital 8%</td>
<td>8,600</td>
<td>Founded in 2006. Estimated tenancy ratio 1.6. Although a deal has never materialised, the sale of Tower Vision has been rumored on multiple occasions, most notably in 2013 when the company was reported to be on the brink of an US$566mn sale to American Tower valuing their portfolio, which then consisted of 8,000 towers, at US$70,800 per tower.</td>
<td>Independent towerco</td>
</tr>
<tr>
<td>Viom Networks: 54% Tata, 18.5% SREI, 27.5% shared between Macquarie SBI Infrastructure, IDFC, GIC and Oman Investment Fund</td>
<td>42,200</td>
<td>Formed in 2005. Viom Networks was India’s first independent tower company. The business grew rapidly through a combination of acquisition (buying 18,000 towers from Tata Teleservices in 2009), a massive build programme for Uninor and substantial organic growth. Today Viom Networks’ tenancy ratio is a market leading 2.4, with a healthy diversity of tenants. On/off negotiations for a sale to American Tower seem to have broken down. Openly discussing a prospective IPO, Viom Networks’ CEO suggested an enterprise value of US$4bn, or US$97,000 per tower.</td>
<td>Independent towerco</td>
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has no shortage of prospective sellers. Let’s climb back on the rumor mill, recycle some of the stories, categorise each opportunity by business model, and share our take on the reality of which towers could be acquired in India, and how their business model affects valuation.

**A deeper comparison of an independent towerco with an operator-led tower portfolio: using Viom Networks and Reliance Infratel as examples**

A hypothetical buyer of Indian towers may be confronted with two similar sized potential portfolios they could acquire: Viom Networks has 42,200 towers, Reliance Infratel (RITL) has ~52,000 (although RITL has been inconsistent in defining their tower count – in their FY12/13 annual report they said they had “nearly 50,000” towers, in FY13/14 it was “43,379” – we await the FY14/15 report with interest)! Tenancy ratios show a wider differential: Viom Networks claims to have a market leading tenancy ratio of 2.4, with an order book that could propel that to 2.7 by year end 2015, compared with around 1.6 at Reliance Infratel (Reliance Infratel’s tenancy ratio is not in the public domain – we’ve received estimates ranging from 1.41 to 1.84 from various sources, thus quote 1.6 as a weighted midpoint).

Let’s compare the tenancy mix.

We would estimate that ~85% of RITL’s tenancies come from either Reliance Communications (RCOM) or Reliance Jio (JIO). RCOM is a solid anchor tenant, JIO is a solid second tenant, and there are currently no ownership linkages between RCOM and JIO. However, one cannot escape the feeling that while Mukesh Ambani’s JIO needs voice services and towers, while his brother Anil Ambani’s RCOM needs spectrum, some form of future asset integration seems possible. RITL’s TCF doesn’t all derive from RCOM and JIO: the company recently signed co-location agreements with Aircel and Tata Teleservices, for example.

Viom Networks’ tenancy mix has greater diversity. Tata Teleservices represent 31% of Viom’s customer base. However, Tata Teleservices’ dispute with joint venture partner NTT DoCoMo may compromise investors’ valuation of those tenancies. A further 31% of Viom Networks’ customer base comes from India’s other incumbent cellular operators: Vodafone India, Airtel and IDEA Cellular, plus JIO. Another 25% of tenancies come from Aircel, Videocon, BSNL, MTS Sistema and various others, including a small proportion from non-traditional MNOs such as ISPs. Viom’s diverse tenancy mix is rounded off by Telenor’s Uninor: “by sharing with each other, Tata Teleservices and Uninor were able to become all-India operators,” said Viom Networks’ Umang Das in a recent TowerXchange interview. “Our work with Uninor gave (Viom Networks) the opportunity to rollout 16,000 towers in a single year.”

A comparison of the debt positions of RITL parent RCOM and Viom Networks is also revealing. According to Moody’s, “while RCOM has begun to reduce its debt level – most recently with the US$1bn equity raised via the issue of warrants and a qualified institutional placement completed in June 2014 -- its leverage, as measured by adjusted debt/EBITDA, remained high at 5.2x for the 12 months ending 31 December 2014”. Meanwhile, in a recent interview in the Economic Times, Viom Networks CEO Syed Safawi said: “we are actually one of the very few companies to have reduced 15% of our net debt, well over Rs 1,000 crore, in the last 18 months in India... At the moment, our debt stands below Rs 7,000 crore (around US$1bn).”

In summary, RITL has the larger portfolio with a healthy tenancy ratio and good tenants. Having been built greenfield, rather than assembled through various mergers and acquisitions, RITL has minimal overlapping towers. RITL’s is a relatively new portfolio of towers, with an average age around five years, reflected in the fact that RITL towers are designed for India’s culture of infrastructure sharing: almost all their sites have a capacity to co-locate four tenants. “Understandably, Reliance is keen to proceed with a sale before the market is flooded with assets,” said BMI in a recent analysis. “We expect the sale of Reliance Infratel to attract considerable interest from local and international towers specialists alike... The company’s strategic presence in key metropolitan markets and its location in spectrum-rich circles mean demand for its towers is high; Reliance Infratel’s pan-India fibre backbone would be useful in reducing costs associated with routing traffic between its towers.”

Viom Networks’ portfolio may be smaller, but organic growth and tenancy ratio growth are both higher, indeed Viom claim to have secured a massive 25% share of incremental tenancies.
Viom’s tenancy ratio is significantly higher, and their tenancy mix is more diverse than that of RITL. There is a little risk in both companies’ tenancy mixes, but no more than is normal for a prospective tower deal. “Viom Networks is perceived as being better positioned and better run than Reliance Infratel,” summed up one analyst. Indeed, Viom Networks has the necessary headroom to be a buyer rather than a seller, although management seem less inclined to buy more Indian towers, and more inclined to invest internationally in an end to end “AssetCo+ServCo” model, which they call ‘Viom Next’.

All of this means Viom Networks is in less of a hurry to sell and, with their peer Bharti Infratel’s valuation soaring, they may feel they can realise a better valuation through IPO than through trade sale. TowerXchange therefore feel Viom Networks’ towers should attract a higher valuation, but Reliance Infratel may be more motivated to sell, thus are more to be likely acquirable by buyers seeking volume at an more easily justifiable price.

What would be the investibility of a carved out BSNL towerco?

In a March 2015 interview with TeleAnalysis, BSNL Chairman and Managing Director Anupam Shrivastava said that his company’s “tower leasing proposal has gone to the ministry for its consideration. The proposal focuses on creating a separate business unit, creating a separate subsidiary company within BSNL which is fully owned by BSNL and creating a joint venture.”

However the carve out of a BSNL towerco is structured, the prospect of some of India’s “old growth” towers coming to market is an exciting opportunity for network planners.

“BSNL being a Government owned company have not adopted the sharing model aggressively, and their tenancy ratio remains very close to one. Discussions about creating a separate BSNL towerco have been going on for a long time and the general feeling is that they will have to do this one day due to their financial issues and to generate funds. Their single tenancy ratio means their assets currently don’t have maximum value,” said TR Dua, DG of TAIPA in an interview in TowerXchange.

BSNL is already making progress: JIO recently signed a deal to lease 4,000 BSNL towers at a typical market rate of Rs 38,000 (~US$600), hence TowerXchange’s estimate their prospective towerco would today have a tenancy ratio of 1.1.

Sometimes a low tenancy ratio is indicative of a longer, faster runway for growth by tapping pent-up demand. The BSNL towers have not been proactively marketed, and many are in unique locations where it would be very difficult to permit another site nearby, locations which other Indian MNOs have long coveted. Should they choose a joint venture structure which enables third party participation in the venture, a BSNL towerco
would be a unique and attractive investment opportunity. If the value of BSNL towers is suppressed by lower initial tower cash flow (TCF) growth compared to their peers, it is somewhat compensated by the wider between current TCF and a theoretical ceiling of TCF.

Conclusions: it’s not the business model that matters, it’s what you do with it that counts

The tower company business model creates long term recurring revenues and efficiencies that generate significant capital value. Having looked at Indian examples, TowerXchange understands why independent towercos are generally valued higher than operator-captive towers, but not all tower companies are created equal. There are independent tower companies with stagnant organic and tenancy ratio growth, and/or with mountains of debt, and there are independent tower companies built to create ‘annuity revenues’ – where owners have built nice solid cash flow – thank you very much – and haven’t leased them up as aggressively nor optimised operational efficiencies. Then there are thoroughbred tower companies with strong infrastructure sharing culture, such as India, Sri Lanka or the U.S., towers with additional tenants on them as a function of bi-lateral swaps or commercial co-location sales. MNOs who build and lease up robust towers, in good locations, with a full set of permits and a long, favorable and transferrable lease can attract towercos-like valuations.

Ultimately the most valuable tower in terms of current and prospective future TCF may not be the same as the most acquirable tower. The motivation of the seller is critical, as of course is the fit with the investment acquirer: how many towers overlap with their existing sites? Does the prospective acquisition create new or deepen relationships with anchor or substantial second tenants? Do third party towercos have a significant competitive footprint? The buyer’s investment thesis is critical: is the buyer seeking growth potential – are they looking for a platform into which they can invest tower marketing savvy to drive tenancy ratio growth? Or is their investment thesis more predicated on recurring TCF: towers can provide a solid “pensionable” income, and thus attract infrastructure funds to their proven long term cash flow generation potential.

### Top fifteen measures of the value of a tower portfolio

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
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<tbody>
<tr>
<td>1. Lease rate</td>
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<td>2. Tenancy ratio</td>
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<tr>
<td>3. Potential future tenancy ratio</td>
<td></td>
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<tr>
<td>4. Amendment revenue (additional space leased by anchor tenant)</td>
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<tr>
<td>5. Potential for additional amendment revenue as 3G and 4G rollout</td>
<td></td>
</tr>
<tr>
<td>6. Desirability and uniqueness of locations</td>
<td></td>
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<tr>
<td>7. Credit worthiness of tenants</td>
<td></td>
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<tr>
<td>8. Cancellation clauses</td>
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<tr>
<td>9. Completeness of permits</td>
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<tr>
<td>10. Transferability of leases / remaining lease duration</td>
<td></td>
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<tr>
<td>11. Ownership or ROFR on land under tower</td>
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<td>12. Operating efficiency</td>
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<td>13. Age and performance of any energy equipment</td>
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<tr>
<td>14. Quality and capacity of structures and implications for improvement capex</td>
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<tr>
<td>15. Integrity of the asset register</td>
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Whilst these are all tangible, quantifiable measures of value, intangible measures are often of equal if not greater importance, the foremost of which is the experience of the management team.

Similarly, not all operator-captive towers are created equal. Some were rushed to market, taking shortcuts on permitting, and built as economically as possible with the minimum capacity to meet only the needs of their owners. Such towers often come with a tenancy ratio very close to one. They require significant improvement capex, and the investment of significant overhead to legalise the sites. But then we see operator-captive towers built in markets with a strong infrastructure sharing culture, such as India, Sri Lanka or the U.S., towers with additional tenants on them as a function of bi-lateral swaps or commercial co-location sales. MNOs who build and lease up robust towers, in good locations, with a full set of permits and a long, favorable and transferrable lease can attract towercos-like valuations.
The Indonesian towerco success story (updated October 2015)

What can we learn from the well-oiled machine that is the Indonesian tower market?

Indonesia’s towercos represent a selection of best practice case studies combining efficient organic growth, strong MNO relationship building yielding substantial sale and leasebacks, as well as a rational rollup market for the consolidation of middle market towercos. Towercos own more than half of Indonesia’s towers, build more towers in Indonesia each year than they do in Myanmar, and have delivered solid tenancy ratio and TCF growth.

Keywords: Towercos, Market Overview, Tenancy Ratios, Market Forecasts, Build-to-Suit, Bankability, Pass-Through, Off grid, DAS, Small Cells, Sale & Leaseback, Indonesia, PT Telkom, Telkomsel, Mitratel, XL Axiata, Hutchison, Tower Bersama, Protelindo, STP, KIN

Read this article to learn:
- How many towers are in Indonesia and who owns them?
- What has been the history of tower transactions in Indonesia and what might still be in the pipeline?
- What has been Indonesian towerco’s growth trajectory in the last four years?
- What levels have tenancy ratios reached and how much further could they rise?

It didn’t used to be this way. As recently as 2008, Indonesia was over-populated with MNOs sub-optimally deploying capex to build parallel infrastructure – it’s a familiar emerging market telecom story. But Indonesia really isn’t an emerging market. It’s the world’s #4 mobile market, with thriving endemic industries – now including a thriving local tower industry that owns 57% of the country’s 69,458 towers, and which serves a more sustainably structured operator market led by five key players.

Some credit the start of the Indonesian tower industry success story as the 2006 regulatory policy change that enforced tower sharing. Others point to Tower Bersama’s initial transactions to ‘roll up’ passive infrastructure assets from Telenet Internusa, Bali Telekom, Mobile-8, Prima Media Selaras and SKP, soon followed by Protelindo’s landmark sale and leaseback deals with Hutchison. Whoever started it, Indonesian towercos, particularly Tower Bersama and Protelindo, became the darlings of the telecom investment community. Debt was made available and capital flowed enabling further organic and inorganic growth. Successful bond issuances and IPOs followed.

The ebb and flow of sale and leaseback deals since 2008 has led to Tower Bersama, Protelindo and STP deploying around US$2bn to acquire 12,220 towers from Indonesia’s operators, and they’ve built a similar number of build-to-suit and build-to-fill sites over that period.

Tower Bersama’s innovative share swap acquisition
of Mitratel now stands cancelled, owners Telkom having terminated the deal at the behest of the commissioner. The future of Mitratel and their 5,500 towers remains uncertain. As a result Protelindo is still the market leader with 12,156 towers, Tower Bersama is a close second 11,154 towers, and STP consolidated their position as #3 with 6,790 towers. Indonesia is host to a ‘long tail’ of diverse tower businesses, foremost of which include IBS Tower with 2,185 sites, Retower with 450, and innovative newcomers KIN with 600 towers. KIN is still flush with a capital injection from telecom and towerco thoroughbred PE-firm Providence Equity and fuelled by a strategy to roll-up selected small local towercos, of which Indonesia has dozens.

Indonesian towercos’ EBITDA and tenancy ratios have long been admired. While tenancy ratios may have temporarily stabilised at 1.7-1.8, co-locations are being added – it’s just that Indonesian towercos are building new and acquiring less mature inventory which suppresses topline tenancy ratio growth. Tenancy ratios over 2.5 remain achievable in the long term.

For now at least, Indonesia’s towercos remain unencumbered by the complexities of energy management; even though, according to Wellington Capital Advisory’s David Burke, around 25% of Indonesia’s cell sites are off-grid and another 15% on unreliable grids, power is a pass through, and Indonesia’s largest towercos are currently concentrated in areas where the grid is more extensive.
For Indonesia’s ‘Big Three’ towercos, the prized assets are Telkom / Telkomsel’s 17,615 remaining operator-captive towers, the most pervasive network in the country, of which the operator has admitted as many as 13,000 could be sold, although there is no financial imperative to divest. With the cancellation of the Mitratel deal, it is unclear whether these assets can still be acquired or whether Mitratel is destined to continue as a captive towerco, in which case it could be a vehicle for the management of the aforementioned 13,000 Telkom towers. Meanwhile, XL Axiata has already hinted that a further 4,500 towers could be divested as the company pursues its ‘asset light’ strategy, and Indosat may yet consider divesting some or all of their remaining 6,500 towers.

The other major factor in the future of Indonesia will be diversification of product offerings to adapt to LTE. STP and Protelindo appear to be on the front foot in this regard with their diversification into fibre, microcells and DAS. As of September 2015, STP had a 2,454km fibre network and 384 microcell poles. Protelindo recently acquired iForte and their 450 micro cell towers, seven Hotel BTS and 700kms of fibre.

It’s difficult to forecast the future of the Indonesian tower industry because there are no readily comparable benchmark markets. Protelindo, STP and Tower Bersama learned what worked and what didn’t work in other tower markets, and they’ve created a unique and highly lucrative tower industry in a dynamic and rapidly expanding mobile market.
Introduction to the Malaysian tower market

Around a third of Malaysia’s 20,000 towers are owned and operated by independent towercos, the largest of which is edotco, plus several State-backed regional towercos.

There are a number of different combinations of market dynamics that make a country a ‘perfect fit’ for independent towercos. Malaysia is one such ‘perfect fit’: three strong, competitive operators each with substantial market share; a wave of new LTE license holders seeking to co-locate rather than deploy their own sites; a data-hungry subscriber base fuelled by growing disposable incomes; and an established culture of tower sharing. Malaysia is home to edotco’s headquarters and first live opco, and home to a multitude of smaller, regionally-focused State-backed and independent towercos.

Source: Digital News Asia

Keywords: Meetup Preview, Editorial, Towercos, Market Overview, 3G, 4G, New License, Capex, Co-locations, Densification, Regulation, Off-Grid, IBS, DAS, RANsharing, Infrastructure Sharing, Asia, Malaysia, Celcom, Maxis, DiGi, edotco, BPIT, Sacofa, Touch Matrix, D’harmoni, KJS, Common Tower, Infra Quest, Yikedhina, Perak Integrated Networks, Asia Space, Desabina, Melaka ICT Holdings, Rangkaian Minang, PDC Telecommunications, Perlis Comm

Read this article to learn:
- Tower ownership and estimated tower counts for Malaysia
- The license regime, lease pricing and contractual terms established by the CMA and BPIT
- Organic and inorganic growth opportunities in Malaysian towers
- Opportunities in FTTT, IBS and small cells
- Time to market pressures for new LTE licensees creates demand for co-locations and RANsharing

The size of the independent tower industry in Malaysia

Malaysia has around 20,000 telecom towers, of which 3,500 have so far been carved out and transferred from Axiata to edotco. edotco has been trading for one year and is the newest and largest of several independent towercos operating in Malaysia. Many of Malaysia’s towercos are State-backed, regional players, some of which have been operating since the millennium.

Towercos own around a third of Malaysia’s towers, a similar proportion to Indonesia, but lagging the mature Indian market where towercos own two thirds of the towers, and trailing Myanmar, which stands as a unique case with 15,500 new towers all being rolled out by towercos by 2017 (according to GSMA GPM forecasts).

MNOs still own the majority of tower assets in Malaysia, although there is substantial bi-lateral sharing, with around half of each MNO’s towers having a single tenant, with the other half shared with their competitors or co-located on the third party sites.

While DiGi and Maxis both currently retain their towers, both have been rumored to be considering launching their own carve-out towercos.

An established culture and regulatory framework supporting infrastructure sharing

Malaysia’s independent tower industry was...
effectively inaugurated by the Communications and Multimedia Act (CMA) of 1998, which recognised an infrastructure class license for “Network Facilities Providers”.

Some State-backed infrastructure companies have near-monopoly status within their State, other regional markets are more open. Many of the important granular decisions in the regulation of the Malaysian telecom tower industry, such as matters concerning land title and infrastructure access permits, are typically in are taken at State rather than Federal level.

The State-backed towercos have an association known as BPIT which creates a framework within which the towercos abide by standard lease pricing and contractual terms. One of the noteworthy consequences of this market structure is that State-backed tower companies’ lease prices are believed to be discounted by 25% after 7-10 years. Therefore lease pricing on macro towers is well established and widely confirmed with in Malaysia, although there is more flexibility for the increasing number of Malaysia’s towercos that have ventured into provision of ‘Special Structures’ (such as lamp posts which have modular, upgradable designs).

There are a handful of completely independent tower developers in Malaysia, some of which offer disruptive pricing options significantly lower than the norms established by BPIT. While such companies seem to be targeting specific, attractive locations, the profitability of such an approach remains questionable.

**Organic and inorganic growth opportunities in Malaysia**

The maturity of network rollouts, combined with aforementioned State-led regulation of new site
permitting, and the dominance of local State-backed towercos in some parts of the country, mean opportunities to build new towers are limited in the Malaysian market. It seems that independent towercos can secure permits to build new towers in around half of Malaysia’s States, with the State-backed towerco having exclusive rights in the other half. However, Malaysia boasts more or less umbrella 3G coverage (with 2G EDGE); the MNO’s coverage varies between the high 80’s and low 90’s percent.

There are still opportunities for organic growth for towercos in Malaysia. Malaysia’s three incumbent MNOs announced 2014 capex budgets totaling RM 3bn (just under US$1bn). Cell site densification, driven by growing data demand and the technical specifications of LTE, mean infill sites are needed in Malaysia’s dense urban areas, but the demands of regulators and aesthetics mean smaller lamppost-style structures (often still sharable) will generally be preferred to macro towers.

The fragmentation of Malaysia’s tower market may offer edotco, or prospective new market entrants, an opportunity to grow inorganically through the acquisition of one of the better performing, larger State-backed towercos operating in the more demographically attractive states, obviously subject to the consent of regulators.

At time of writing, it did not seem likely that either of the remaining MNO’s towers were likely to become available under sale and leaseback in the near term (although DiGi and Maxis have both been rumored to be considering launching their own carve-out towercos). However, as TowerXchange has seen in several other tower markets, it’s amazing how quickly MNO’s stance on tower divestitures can change when a towerco of scale enters their market!

**Cell site energy in Malaysia**

Less than 5% of Malaysia’s cell sites are off-grid, for example only 140 of edotco’s 3,500 Malaysian sites are off-grid. Malaysia’s grid power is generally reliable. More challenging transport infrastructure conditions in the East of Malaysia mean cell site autonomy is a greater priority here than in the West of the country.

However, this doesn’t mean energy efficiency is not important in Malaysia – burgeoning data demand is driving the energy load on some sites to and beyond capacity, and Malaysia’s high availability expectations means many high traffic connector sites have backup power sources and battery banks.

**Fibre to the tower**

A surprising proportion of Malaysia’s cell sites still rely on microwave backhaul but, with LTE coming, fibre to the tower is becoming a priority. As more urban sites are connected with fibre, the removal of heavy microwave dishes frees up valuable space for co-location sales.

With data traffic rising and the price per MB of data falling amid price competition, the cost of fiberization may prompt collaboration and fibre sharing.

Malaysia already has some active fibrecos offering bandwidth to operators, but their reach is limited and more are needed. There is less of a shortage in the trunk as at the costly metro access and last mile / fibre to the tower.

**Potential for IBS, small cells and Wi-Fi offload**

The majority of cell sites in Malaysia are still conventional macro sites. IBS remains a premium solution, with multi-tenant DAS representing around 10% of edotco’s portfolio for example, but with a pipeline for perhaps 3-4 times as many IBS.

Malaysia needs improved indoor coverage, especially in dense urban areas, prompting the usual debate about the relative merits of small cells and Wi-Fi.

**LTE rides a wave of collaboration and RANsharing**

Malaysia recently issued eight LTE licenses, subject to a condition that 10% of the population be covered within the first year. With such time to market pressures, the majority of new LTE entrants are co-locating on towers and a lot of RANsharing is taking place.

There seem to be minimal restrictions upon RANsharing within Malaysian towerco’s contracts, with the view prevailing that with the MVNOs piggy
backing on the radio area networks of Malaysia’s three incumbent MNOs, there will come a time when growing capacity demands will prompt ‘tenants’ sharing RAN to seek their own fully fledged networks. The three established MNOs simply can’t give capacity to everyone indefinitely.

Incumbent operators Celcom and Maxxis are felt to offer the best 4G coverage, with the initial focus being on Malaysia’s biggest cities, beyond which 4G coverage is spotty rather than continuous.

**Conclusion**

The unique structure of the Malaysian telecom market means there are no benchmarks for international comparison. While 3G coverage is mature and there are plenty of macro towers, FTTH, special structures and IBS are needed to provide capacity as LTE takes root. With the permission of regulators, there seems an obvious opportunity to create economies of scale through the consolidation of some of the country’s more profitable state backed and independent tower companies. With eight new LTE licenses creating a race to market, there remains the possibility that DiGi and/or Maxis’s tower assets may follow Celcom’s in being made commercially available for co-location

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Several of the key stakeholders in Malaysian towers will be represented at the TowerXchange Meetup Asia, taking place on November 24 and 25 in Singapore. For more details, visit [www.towerxchange.com/meetups/meetup-asia](http://www.towerxchange.com/meetups/meetup-asia)
Consolidation among towercos starts as rollout approaches halfway point

With the acquisition of MTC by edotco announced, Myanmar is now home to six tower companies, four of which are deeply engaged in the third phase of the rollout. New towers are going up by the dozen and the rollout remains broadly on track with GSMA forecasts suggesting 7,600 towers would be constructed by the end of 2015 and 17,300 by the end of 2017. The build rate may be impressive, but how are tenancy ratios progressing? TowerXchange’s Myanmar rollout FAQ summarises the latest market dynamics and baseline data.

Keywords: Research, Asia Research, TowerXchange Research, Tower Count, Who’s Who, Towercos, edotco, Construction, Market Overview, Investment, 3G, Capex, Lease Rates, Urban vs Rural, Tenancy Ratios, Market Forecasts, Network Rollout, Build-to-Suit, Bankability, New Market Entrant, Leasing & Permitting, ARPU, Regulation, SLA, Off-Grid, ESCOs, Solar, Fuel Cell, Greenfield, Dimensioning, Rooftop, Private Equity, Debt Finance, Customs, RMS, Site Management System, Infrastructure Sharing, Asia, Myanmar, MPT, KGSM, KDDI, Sumitomo, Ooredoo, Telenor, YTP, MECTel, Viettel, MCIT

By Kieron Osmotherly, CEO, TowerXchange

Read this article to learn:
- Competitive dynamics between MPT, Telenor and Ooredoo, and the prospects for a fourth MNO
- How many towers have been built in phases one and two, and who has been awarded contracts to build phase three towers?
- edotco to acquire MTC - will further consolidation follow?
- How are lease rates and tenancy ratios affecting the investibility of Myanmar’s towercos?
- What you need to know about cell site electrification, energy equipment suppliers, importation and ownership in Myanmar

Mobile market

1. Who are Myanmar’s operators?

State-backed incumbent operator, Myanmar Post and Telecommunications (MPT), now backed by KDDI-Sumitomo joint venture KGSM, remains the market leader, although their market share declined from 66.6% to 50.3% between Q4 2014 and Q2 2015.

International new licensees Ooredoo and Telenor launched services in August and September 2014 respectively, and both raced to a million subscribers within weeks. Telenor has more subscribers in total, Ooredoo has more 3G subscribers.

2. What is the latest on Myanmar’s prospective fourth operator?

At time of writing, Myanmar’s Ministry of Communications and Information Technology (MCIT) had postponed the allocation of the nation’s fourth mobile licence due to delays in selection from 17 local companies who applied to join a consortium with an international counterparty which would receive the coveted fourth license. Local ISP Yatanarpon Teleport (YTP), which was granted a limited private operator license in February 2015, remains a favorite.

Seeking to raise over US$1bn in international investment, YTP has been the subject of on-off partnership rumours, starting with Thailand’s True
3. Will the Myanmar military play a role in the telecoms rollout?

The precise role of MECTel, part of the military-owned Myanmar Economic Corporation which had been announced as a joint venture partner of MPT, remains unclear – they could become part of YTP’s consortium, they could yet emerge as a fifth operator.

Military participation in the Myanmar tower rollout has its advantages. For example, the assumption that many rural towers will need to be built with capacity for microwave backhaul may be incorrect as apparently there are thousands of military bunkers connected by fibre. In addition to possibly making this fibre available as a transmission network, the military continue to own a significant amount of land.

4. What spectrum has been allocated to Myanmar’s two new international MNOs, and have any LTE trials taken place?

According to Hardiman Telecommunications, Telenor and Ooredoo each received 2 X 5 MHz in the 900 MHz band, and 2 X 10 MHz in the 2100 MHz band. Both have suggested a future migration to LTE. Telenor acquired a further 5MHz of 2100 MHz spectrum in 2015 for US$75mn. MPT undertook trials of LTE using 20 MHz in the 1800 MHz band during the course of 2013. YTP currently operates WiMAX, and claims 40 MHz in the 2600 MHz band and has announced plans to migrate to LTE.

5. How have mobile subscriber numbers grown in Myanmar, and what mobile penetration does that represent?

There were 27.8mn mobile subscribers at the end of Q2 2015, representing 54% penetration. Subscriber numbers increased by almost 10mn since Q1 2015 when 18.1mn subscribers were reported, itself representing a 33% YOY increase from the 5.4mn subscribers reported a year earlier before the launch of Telenor and Ooredoo.
6. How many of those subscribers are on smartphones?

80% of Ooredoo subscribers are smartphone users, compared to around two thirds of Telenor’s. Bear in mind that mobile services and early adopters remain concentrated in Myanmar’s relatively affluent big cities, so that proportion is expected to fall as coverage is extended into rural areas with lower GDP per capital.

7. What was each operator’s market share at the end of Q2 2015?

Telenor continues to add over 3mn subscribers every quarter, concluding Q2 2015 with 9.5mn subscribers, 55% of which were active data users. This represented 34.2% market share. Around 1.5mn of Telenor’s subscribers are 3G users whereas all 4.3mn Ooredoo subscribers are 3G. Ooredoo added 1mn subscribers, finishing Q2 2015 on 15.5% market share, down from 18.2% the previous quarter.

MPT had seen subscriber numbers fall (by 2.6mn) for the first time in Q1 2015, but recovered to climb to 14mn in Q2, retaining market leadership with 50.3%.

8. What levels of ARPU are being reported?

Telenor reported higher than anticipated ARPU of US$6.4 in Q1 2015, impacted by early adopters with high usage, slipping to $5.7 in Q2 as lower ARPU generators in rural Myanmar were connected. Ooredoo’s 3G-only network continues to generate slightly higher ARPU of US$6.5. In their Q1 2015 conference call, Ooredoo CFO Ajay Bahri suggested "what you are seeing right now is the ARPU from the high-income and high-GDP areas. As we move to more semi-urban areas, I think you will obviously see an impact of that as well. And within the urban areas, as we move to the next segment of the customers, I think that one should expect some sort of an ARPU decline.”

9. Any sign of price wars breaking out?

In October 2015 MPT dropped Internet charges from 7 to 6 kyat per MB, with voice calls coming in at 23 kyat per minute. In comparison Ooredoo offered a lower rate of 4.5-5.5 kyat per MB.

10. How much capex is being deployed by the new licensees?

Telenor continues to deploy capex more aggressively into Myanmar. Telenor’s total capex deployed in Myanmar to date is US$692.1mn, including US$106.9mn deployed in Q2 2015.

Ooredoo deployed US$416.3mn capex in Myanmar, including US$54.7mn deployed in Q2 2015.

11. How many towers have been built to date?

Estimated current state of the Myanmar rollout

Source: TowerXchange
Phases one and two of Telenor and Ooredoo’s rollout, which concentrated on Yangon, Mandalay, Naypyidaw and the transport links between these three largest cities, are now complete. Together with MPT / KGSM’s towers, TowerXchange estimate 7,410 towers have been built in Myanmar, although not all are on air.

Telenor added 718 new sites in Q1 and a further 536 sites in Q2 2015, bringing their total at the time to 2,308.

Ooredoo are less open about their tower count, which is believed to be approaching 2,000.

MPT has around 2,400 sites, with increasing use of co-location as well as continuing to build.

12. What does that translate to in terms of coverage?

MPT still has the widest coverage in Myanmar, but Telenor now connect to 113 townships which is roughly two-thirds of all townships in the country, while Ooredoo currently cover 35mn citizens, just under 70% population coverage.

13. What caused the phases one and two of the rollout to run approximately three months late?

Phases one and two of the rollout suffered operational delays for a variety of reasons, from the time taken to establish and train local construction resources, and the inability to complete certain tasks during the monsoon season, to bureaucratic delays, from importing equipment (at one point the rollout effectively ran out of steel!) and permitting sites, to the year-plus taken to grant licenses to Myanmar’s towercos. This has created knock-on financial delays, compounding the already challenging task of attracting investment into Myanmar's towercos.

It remains to be seen whether Myanmar's towercos can pick up the pace of rollout during phase three and enable Telenor and Ooredoo to meet the aggressive coverage obligations set out in their licenses.

14. What has been the progress to date of phase three of the rollout?

Phase three of the rollout is well under way with the four towercos involved, IGT, Apollo, EFT and MIG, building dozens of new towers per month. Priorities had to be shifted during the rainy season, when it became difficult to pour foundations in the Northern States, but site acquisition and equipment delivery continued, and build contractors focused on the drier Southern states.

“All that really distinguishes the first from the latest phase of the rollout is that there is a new Purchase Order (PO) for this next phase – in reality there is some overlap in terms of execution,” stated Apollo CEO Philippe Luxcey in a recent TowerXchange interview. “Our first phase build is all but complete, and we’ve already started building the 717 towers in the next phase.”

15. A-Z of Myanmar’s towercos: What did each towerco build in phase one and two, and what contracts have been secured in phase three?

Apollo Towers built around 1,100 towers for Telenor in phases one and two and have since secured a contract to build a further 700 towers for Telenor in phase three. Apollo Towers is Chaired by serial towerco entrepreneur Sanjiv Ahuja, who was the original Chairman of Eaton Towers in Africa and who is behind the new Staghorn Infrastructure venture in the US. Ahuja’s Tillman Global Holdings and Texas Pacific Group are the majority shareholders of Apollo Towers Myanmar, whose Managing Director is Philippe Luxcey. Apollo provides a ‘full service’ tower and power offering.

Digicel Myanmar Tower Company (MTC) built 1,250 towers for Ooredoo in phases one and two of the rollout. MTC’s portfolio featured some prime urban locations secured by Digicel’s site finders in advance of the company’s ultimately unsuccessful bid for an MNO license in Myanmar. Axiata-owned towerco edotco recently announced intent to acquire a majority stake in MTC from Digicel for US$221mn. edotco are believed to have beaten competition from PAMEL and American Tower to secure the assets. The acquisition remains subject to regulatory approval and the consent of minority shareholder Yoma Strategic Holdings, chaired and 37% owned by local tycoon Serge Pun. CEO Oliver Coughlan represented MTC at the most recent TowerXchange Meetup Asia. Digicel MTC provides a conventional ‘steel and grass’ offering – anchor tenant Ooredoo retains ownership of power assets.
Eco-Friendly Towers (EFT), a subsidiary of diversified Myanmar conglomerate Young Investment Group, is a new entrant towerco. EFT has secured an order for roughly 700 phase three towers from Telenor. EFT were 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. Young Investment Group Chairman Thiha Aung represented EFT at the most recent TowerXchange Meetup Asia. EFT provides a ‘full service’ tower+power offering.

When we last checked in with Irrawaddy Green Towers (IGT), they had built 1,500 of 2,000 towers in phases one and two for Telenor, and have reportedly secured an order for a further 1,000 phase three towers, this time from Ooredoo. IGT was initially established as a partnership between Alcazar Capital Limited and Viom Quippo, whose former Group President Arun Kapur continues to serve as Executive Chairman and who, together with then CFO Karim Dakki, represented IGT at the most recent TowerXchange Meetup Asia. Today IGT’s sponsors still include Alcazar Capital, plus EPC Investors, M1 Group and Barons Telelink (a local Myanmar company). IGT provides a ‘full service’ tower+power offering.

Myanmar Infrastructure Group (MIG) is a joint venture between majority shareholder Singapore Myanmar Investco (SMI) and Golden Infrastructure Group (GIG), a venture involving Dan Ryan of Square1 Infrastructure. MIG had proved themselves building rooftops and poles in 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 have secured a contract to build 503 towers in phase three of Ooredoo’s rollout. MIG has access to the capital markets via SMI’s Singapore stock exchange listing. MIG provides a full service tower+power proposition.

Pan Asia Majestic Eagle Limited (PAMEL, sometimes referred to as Pan Asia Towers or PAT) built 1,250 towers for Ooredoo 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 yet announced any participation in the third phase of the rollout, and was reportedly engaged in intense negotiations with Ooredoo on lease rates.

The final picture of phase three of the rollout may not yet be complete. TowerXchange sources suggest that Telenor may have a couple of hundred additional phase three sites to award, Ooredoo perhaps as many as 1,000 (which could be an opportunity for PAMEL or edotco).

16. What is TowerXchange’s verdict on edotco’s
edotco’s acquisition of a majority stake in MTC and their portfolio of 1,250 towers sets a benchmark price per tower of US$176,800 in Myanmar. While this is a considerably higher price than India, where towers changed hands for an average of US$114,301 between 2009 and 2015, lease rates in India are typically just US$600 whereas is Myanmar lease rates range from US$1,400 to US$1,700, driven by relatively high opex.

Another factor which justifies the price paid for MTC’s towers is that they were built in phase one of the rollout (which concentrated on Myanmar’s three biggest cities, Yangon, Mandalay and Naypyidaw), and built on highly desirable sites secured by Digicel in advance of their own ultimately unsuccessful bid for an operator license in Myanmar.

Whether US$176,800 remains a sustainable benchmark price for a Myanmar tower remains to be seen. But the premium paid by edotco to secure some of Myanmar’s most attractive towers, and to establish their maiden transaction beyond the Axiata footprint, seems justifiable to us.

17. Will phase three of the rollout draw towercos deeper into rural areas?

“Geographically the first round of towers was aimed at getting coverage up the central spine of Myanmar. Now it’s going to be much more spread out, mostly in rural areas, with fewer rooftop towers,” said Apollo Towers CEO Phillippe in a recent article in the Myanmar Times.

“It will become more difficult in terms of access roads as we begin to build in more remote places, and there’s still a lot of Myanmar to cover.”

18. Are Myanmar’s towercos finally licensed?

All four towercos (Apollo, IGT, MTC and PAMEL) who rolled out towers in phases one and two received “Network Facilities Service (Class)” or NFS(C) licenses on 3 February 2015, just over a year after Ooredoo and Telenor were granted their licenses.

MIG and EFT’s licenses have been applied for. Any delays to licensing MIG and EFT are unlikely to be problematic as a precedent has already been established by the MCIT to allow towercos to trade whilst license applications are progressed.

19. Is the regulatory regime around Myanmar’s towercos now complete?

“The Ministry of Communications and information Technologies has not yet issued all of the rules and regulations required to be issued under the Telecommunications Law, leading to continued regulatory uncertainty in key areas,” said Nicholas Towle of DFDL in a recent edition of NCRA’s “Myanmar: All That Matters.”

Mature tower markets are often characterised by regulation introducing a uniform approach to permitting, standardising processes across the various municipalities and authorities whose permission is required to build a site. However, in Myanmar permitting remains “a long process, and the government has so far not been able to arrange for a ‘blanket’ permit to override the need for individual permits in each case,” said DFDL’s Towle in the same publication. “Some tower companies have had to rely on letters of ‘no objection’ from village and town chiefs to give the go-ahead for construction and this is not a satisfactory legal basis for the future.”

Proving title within incomplete land registries, with many farmers having not yet applied for land use rights under the Farmland Act of 2012, complicates site acquisition for towercos. And even once they’ve secured a site, towerco’s exemption to the usual rule restricting foreign entities from leasing land for more than one year seems to not always be recognised by Myanmar’s Office of Registration.

20. What does a towerco’s “Network Facilities Service (Class)” or NFS(C) license cost in Myanmar?

The fees payable for an NFS(C) license in Myanmar are currently MMK 12.5mn per year (~US$12,000), plus 0.5% of relevant revenues and a MMK 2.5mn application / registration fee (~US$2,400).

21. What are prevailing lease rates in Myanmar?

Lease rates are seldom in the public domain, but TowerXchange research suggests that Telenor’s phase one and two lease rates were ~US$1,400pcm,
TowerXchange research suggests that Telenor’s phase one and two lease rates were ~US$1,400pcm, with Ooredoo’s a little over US$1,700. The difference is explained by the heavier, more power hungry but ultimately efficient equipment mounted on Ooredoo’s towers.

Such lease rates are relatively high by Asian standards, but equipment and construction costs are much lower elsewhere on the continent, particularly in India, where local towercos benefit both from economies of scale and from certain tax breaks as a result of being conferred infrastructure status. A better benchmark might be some of the more challenging SSA tower markets, in which case Myanmar’s lease rates appear on the low side.

22. What has been the progress of tower sharing in Myanmar?

Telenor and Ooredoo continue to appoint different towercos and, to date, have shared few of the towers built during phases one and two of the rollout.

Initially it looked like a more co-ordinated approach might be taken for phase three, known as “Project Optima”, in which Telenor would be the anchor tenant and Ooredoo would co-locate, but the strategy floundered, owing to difficulties agreeing a uniform lease rate given the different load requirements of Telenor and Ooredoo’s equipment.

Ajay Bahri, CFO of Ooredoo, said in their Q1 2015 conf call: “In terms of tower sharing... it has been a little more challenging to come to a conclusion than we initially anticipated, which is not unusual in a highly competitive environment as well where each one is trying to launch earlier than the other. But as in all markets when a little stability comes in, which is what we assume we should be reaching through, a more higher percentage of sharing would be evident then.”

Petter Furberg, CEO of Telenor Myanmar said in an email to the Myanmar Times: “Telenor is focused on building a long term sustainable cost structure which will allow us to offer the most affordable services to the mass market in Myanmar and at the most remote places in Myanmar; tower sharing is an important element to make this happen.”

Tenancy ratios remain much nearer one than two, but Myanmar’s towercos remain bullish about the prospects for improved lease up rates as networks fill up with capacity and cell splitting is required, and as MPT and, eventually, YPT expand through co-location. YPT seem to be planning extensive co-location, quoting CEO U Shane Thu Aung in the Myanmar Times: “we will come in very fast and use the existing infrastructure,” going on to suggest YPT had ongoing discussions with tower companies, but had not yet commissioned any sites.

When TowerXchange visited Yangon last year, it was apparent that few of incumbent operator MPT’s then 1,800 cell sites, consisting primarily of guyed-masts, had the structural capacity for multiple tenants, and sure enough MPT has since confirmed that less than 100 of their towers are suitable for co-location.

23. How investible are Myanmar’s towercos?

There has been plenty of capital interested in tower investments in Myanmar, but CFOs report it has been tough to close financing, particularly debt.
Myanmar has an under-developed domestic bank market, until now host to only a handful of small local banks, with no foreign banks allowed until an imminent change in the law. Even when debt can be sourced through foreign banks, typically in Singapore, securing authorisation to draw down the debt from the Central Bank of Myanmar can cause further delays. With so little credit available, with the local currency the Kyat not readily convertible, and with minimal US$ reserves in Myanmar, the mechanics of servicing a debt deal have proved extremely challenging in Myanmar.

The investibility of Myanmar’s tower companies is inextricably linked with two critical factors – lease rates and tenancy ratios. Lease rates remain under pressure, particularly from Ooredoo who are seeking parity with the pricing secured by Telenor despite using heavier equipment. Meanwhile, since Telenor and Oordeoo continue to rollout largely independently of one another, tower sharing and tenancy ratios are not being maximised. We expect both lease rates and tenancy ratios to ‘shake out’ in the long term, but in the short term, Myanmar’s MNO’s are outsourcing the financing of their rollout to towercos who are less credit worthy counterparts than themselves, then squeezing those counterparts as if they were suppliers not partners.

“It’s important to make sure no shortage of capital holds back development,” said IFC representative Vikram Kumar in the Myanmar Times in May 2015. “The World Bank Group is fully committed that nothing holds back telecoms,” he added.

Forecast tower site growth and grid connections in Myanmar

Note: we asked the team at Flexenclosure, who have rolled out power solutions at 1,100 cell sites in Myanmar, whether their experiences backed up the GSMA’s projections for the mix of off-grid versus unreliable versus reliable grid. They suggested that the proportion of off-grid, projecting to represent a little over half the sites by 2017, was broadly accurate, but they felt that many grid sites which were modelled as reliable were actually unreliable, with high voltage spikes and interruptions once or twice a day to grid services even at downtown Yangon sites. Thus they suggested the size of the yellow segment of the bar chart should be smaller than the orange!

TowerXchange sources suggest an IFC investment into at least one of the Myanmar tower companies is imminent.

24. Can the towercos acquire the land under the towers in Myanmar?

No. All land belongs the government in Myanmar; citizens can only lease land. If foreign companies secure an investment permit they are allowed to enter into long term leases of up to fifty years, with two ten year term extensions.

25. Who is building the towers in Myanmar?

The towers being built for Telenor and Oordeoo will be owned by the towercos, but they are subcontracting the construction work to specialist managed service providers.

While most subcontractors employ substantial local workforces, it seems the lion’s share of the business to date has been won by proven international turnkey infrastructure firms such as Camusat, Leadcom, i engineering and GTL Infrastructure.
while firms like GSM Telecom Partners are being drawn up the value chain from tower manufacture into project management.

26. How many towers are needed in Myanmar in the next four years? And how many will be on-grid, how many on unreliable grid connections and how many off grid

Despite delays, the Myanmar tower rollout remains broadly on track with the growth projections contained within the excellent GSMA Green Power for Mobile forecast published a year ago (download it here!), which suggested a total tower count of 17,300 by 2017, up from 7,600 in 2015 (a reminder: TowerXchange estimate the current tower count in Myanmar to be around 7,410, and it seems perfectly plausible that a further 190 towers might be lit by year end). Therefore we continue to use the GSMA model as the benchmark, in which it was forecast that there would be just under 10,000 prospective green power sites in Myanmar in 2017 requiring an investment of US$388.5mn but yielding US$137.4mn in annual opex savings for a 2.83 year RoI period, based on reducing diesel consumption by 83%.

**Power**

27. Who owns the energy equipment at Myanmar’s cell sites?

A ‘Mexican standoff’ in tower power strategies took place in phases one and two of the rollout, as 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. This made it very difficult for Telenor to co-locate on any Oordeoo phase one and two towers as they would have had to change their energy business model.

Thankfully, phase three of the rollout finally sees both Telenor and Ooredoo’s appointed towercos take on responsibility for acquiring and operating power systems.

28. What exactly is Ooredoo deploying that is so different from Telenor?

Ooredoo is using 4 way Rx diversity with a dual antenna configuration, an innovative approach that requires 30% less sites to generate the same coverage. This is a great approach from an holistic network planning perspective, but each site consumes ~20% more power than traditional solutions, so they are complex sites to dimension.

29. What will be done with those phase one and two power assets originally owned by Ooredoo?

Ooredoo appear increasingly inclined to outsource the management, or ultimately divest, the power systems they initially retains on their ~2,500 phase one and two sites.

Whilst various ESCO models and suppliers have been considered and rumoured, TowerXchange understands that at least a portion of Ooredoo’s Myanmar power assets have been outsourced to IPT PowerTech.

30. Why haven’t we seen the ESCO business model widely adopted in the Myanmar tower rollout?

One challenge is that ESCOs want to build distributed, micro-generation with telecom towers as anchor tenants. But ESCOs need permission to sell excess power to local communities and businesses, and to sell excess power back to the grid. That permission has not, to date, been forthcoming from Myanmar’s regulators.
Another challenge is identifying a kWh rate that Myanmar’s MNOs and towercos find digestible. In virgin territory like Myanmar, pricing is going to be a challenge. For example, few sites have yet been lit in the Northern States beyond the reach of the better roads, in an environment where unrest persists, so there is little data on the delivered cost of a litre of fuel to the country’s most difficult to operate sites. For an aspiring ESCO the risk is not just in the selection and installation of capital-intensive hybrid power systems, it’s also in the Service Level Agreements that MNOs and towercos use to assess quality and consistency, and in the application of penalties when performance targets are not met.

ESCOs’ capital requirement and risk exposure is multiplied when one considers the scale required to make an ESCO a credible business partner in Myanmar – is 100 sites enough? 500? 1,000? Indeed, do any ESCOs have the balance sheet to finance power at the ~5,000 or so sites each MNO or towerco might have in Myanmar by 2018?

31. Whose energy equipment is being deployed to Myanmar’s cell sites?

Every energy equipment vendor in the world seems to have a Myanmar case study on their website! However the companies most often mentioned in TowerXchange’s conversations with the Myanmar towercos have been Flexenclosure (who have done a lot of work with Apollo), Heliocentris (IGT), Pace Power, Eltek, Cummins and EnerSys.

32. What is Myanmar’s electricity generation capacity?

According to informed estimates in the NCRA Energy Sector Brief, Myanmar had 3,495 MW of installed capacity in 2013. Because 76% of Myanmar’s power is generated by hydroelectricity, firm capacity (the amount of energy that can be guaranteed to be available) peaks at 1,958 MW during the monsoon season, dropping to 1,554 MW in the dry summer season.

33. How does the availability and reliability of grid power compare in Myanmar’s three largest cities compared with the rest of the country?

Electrification stood at 26% of the population, dropping to an average of just 13% in rural areas. The cost per kWh was estimated at US$3.5-5 for household use, and US$10-15 for private industry.
leaving other regions practically in the dark. Within the grid, only Nay Pyi Taw, Myanmar’s capital, gets a steady supply of electricity for 24 hours a day while people and businesses in most other cities including Yangon have to resort to the use of small generators which makes electricity very expensive.”
Source: the NCRA Energy Sector Brief, June 2014.

34. Is the climate in Myanmar conducive to solar and wind power?
Solar radiation is sufficient for solar power to be a viable option in all but the farthest Northern reaches of Myanmar, although wind resources are finite; seldom above the 5.5-6m/s generally held to make wind power a viable option.

35. How will power be provided at rooftop sites?
Rooftop sites represent a challenge for backup power – even if the landlord has a backup generator, is he allowed to sell power to the owners of a rooftop installation? With the structural capacity and permissions limiting the number of rooftop sites suitable for DG backed up power, fuel cells may be an option for many sites.

36. How do Myanmar’s operators figure the TCO compares between solar hybrid and CDC hybrids?
One Myanmar operator revealed that their TCO comparisons, inclusive of the cost of installation, suggested that at a low power 1.5kW site, the TCO crossover between solar hybrid and CDC hybrid was after two and a half years, pushed out over five years with a 2.5kW load and over six years with 4.5kW multi-tenant loads.

37. How important is vendor finance?
Given the multi-tenant, higher load environment likely to evolve in Myanmar, MNOs and towercos will find justifying the funding of renewables difficult, particularly with so many other demands on their finite capex. With debt and equity capital raising still a challenge, vendor finance is critical. For example, Flexenclosure’s access to European export credit agencies provides good interest rates for opex models, which has helped them secure their largest order to date from Myanmar.

One Myanmar operator summed it up succinctly: “we’ve got to ensure alignment between technical requirements and financial realities to ensure the best TCO solution is adopted – not simply cheapest capex solution. If we can’t get funding, we can’t do it.”

38. What are the opportunities for RMS and site intelligence solutions in Myanmar?
Data on grid availability and quality is practically non-existent in Myanmar, and is necessary to inform the selection and configuration of power solutions. RMS also provides important data on which to base the optimisation of fuel usage (and reduction of fuel theft, although few instances of theft have been reported in Myanmar to date); DG start/stop and runtime; battery charge, discharge and replacement; and the efficient use of any renewables. Integrating and aggregating data from different suppliers is key, based on which performance metrics can be generated for the comparison of sites and the evaluation of equipment and service providers.

Tarantula has announced that IGT is using their system, while iTower, by Infozech Software, is being deployed by another of Myanmar’s towercos. Ooredoo is using NeXsysOne to project manage their Myanmar rollout.

Other pertinent facts about Myanmar

39. What is the population of Myanmar?
In 2014 Myanmar’s first census for 30 years revealed a population of 51,419,420, concentrated in the Yangon (14.3%), Irrawaddy (12%) and Mandalay Regions (12%). 29% of citizens of Myanmar live in urban areas.

40. What is the local currency and how has it been performing against the US$?
In the last year, the Myanmar Kyat, or MMK, has fallen a little over 10% against the US$ from a high of around K 960 to a low of around K1,100 to the US$ (at time of writing).

Forex risk remains the first challenge cited by most towercos and their subcontractors working in emerging markets, and Myanmar is no exception. Towercos and MNOs in Myanmar are spending US$ and earning Kyat, so are exposed to fluctuations in the valuation of the Kyat, and US$ are increasingly hard to come by.
Recommended further reading

Third party research

- The GSMA’s Green Power for Mobile’s excellent “Sizing the Opportunity: Green Telecoms in Myanmar – Market Analysis”
- Myanmar Census, May 2014
- Assessing the potential for Green Power for Mobile: Telenor Myanmar
- NCRA’s Myanmar: All That Matters
- NCRA Myanmar Energy Sector Brief

MNO interviews

- TowerXchange’s Interview with Ole Martin Gunhildsbu, COO, Telenor Myanmar

Towerco interviews

- TowerXchange’s Interview with Ayad Chammas, new CEO of Irrawaddy Green Towers
- TowerXchange’s interview with Oliver Coughlan, CEO, Digicel Myanmar Tower Company
- TowerXchange’s interview with Philippe Luxcey, CEO, Apollo Towers Myanmar

Legal and regulatory resources

- Myanmar licensing rules from the MCIT
- Local law firm Polastri Wint & Partners on the legal and regulatory environment and site acquisition challenges in Myanmar

Profiles of Myanmar’s tower builders

- Camusat’s perspective from the front line of the Myanmar tower rollout
- i engineering: surveying, building and strengthening towers for the era of infrastructure sharing
- Leadcom’s experience building 83 sites (concurrently!) in Myanmar for Apollo

Power and site management system provider perspectives

- Flexenclosure secures $multi-million deal to rollout eSite for Apollo Towers
- Infozech’s footprint in India and Myanmar
- Tarantula’s successful move to Southeast Asia
- Eltek on the challenges and opportunities of green solutions in Asia
- EnerSys supplies over 600 sites in first entry phase of installation in Myanmar

Selected TowerXchange editorials on Myanmar

- Commentary on the abandonment of the joint rollout in phase three
- How to resolve the ‘Mexican standoff’ on tower power in Myanmar

Finally, latest Asian tower market data to contextualize Myanmar tower rollout

- TowerXchange’s analysis of the independent tower market in Asia

Meet the key stakeholders in the Myanmar tower rollout at the next TowerXchange Meetup Asia – for dates and details, visit our website at: www.towerxchange.com/meetups/asia!

41. When is Myanmar’s rainy season and what are average precipitation levels?

Monsoon season runs through June, July and August with shoulder months in May, September and October. During the rains, a lot of rural tracks become impassable, and it can be impossible to lay foundations in sodden ground.

42. What do companies need to know about importing telecoms equipment into Myanmar?

Quoting local law firm Polastri Wint & Partners in their 2014 TowerXchange interview: “Until recently, private telecommunications operators and contractors were not permitted in Myanmar. Only Government-owned enterprises had the right to import telecommunications equipment – the market has only just liberalised. With an investment permit issued by the Myanmar Investment Commission and an import permit, issued by the Ministry of Commerce, foreign towercos and their suppliers can import telecommunications equipment, with the recommendation of the Ministry of Communications and Information Technology, and where relevant, with the issuance of a telecommunications equipment license issued by the Posts and Telecommunications Department (which list of equipment will be formalised once the Telecommunications Rules have been enacted). Importers will be required to provide detailed information on the equipment proposed to be imported including the volume and specifications of such equipment, as part of the application for an investment permit.”
An introduction to the mobile market in Pakistan

With a population of over 185mn and a growth rate of 1.64% according to the UN, Pakistan is the world’s sixth largest country. The population of Pakistan is spread across its territory, and only 38% live within urban centres. Although the telecoms industry in Pakistan faces several challenges including transportation infrastructure and grid issues, unstable regions sometimes culminating in instances of tower sabotage, there is strong demand for connectivity in this country and the government is willing to support its development from a regulatory perspective.

As of Q4 2014 GSMA Intelligence put the number of mobile subscribers in Pakistan at 138.1mn, and SIM penetration at 74%. Geographic coverage of the country is over 90%. This is no small feat given the existence of the Federally Administered Tribal Areas (FATAs) which require a high degree of local knowledge and connections to operate in.

The MNO market has a healthy level of competition with five active service providers. Mobilink (VimpelCom) leads the market with 38.1mn subscribers, Telenor is a close second with 37.3mn subscribers, and Zong (China Mobile) is third with 27.2mn subscribers. Ufone is the fourth largest provider with 18.3mn subscribers, and Warid is a distant fifth with 10.9mn subscribers. It’s early days for mobile broadband penetration, with just over 13mn 3G and 4G subscribers in the country, representing 10% of the market, but with a young
population (median age 23.2) this is expected to grow quickly.

3G was first launched in Pakistan in Q4 2014 and coverage now exceeds 50-60% in top population density markets; service launches in new cities are continually coming to market. Zong (China Mobile) and Wateen (Abu Dhabi Group) have also launched 4G LTE services and their coverage is expanding rapidly. The CIA Factbook estimated Pakistan’s GDP per capita (PPP) at US$ 4,700 in 2014 and listed the GDP growth rate in 2014 at 4.1% which will help support this development. At the same time international investments, particularly from China, are increasing as the high level of demand is starting to offset the risks associated with this market.

Pakistan is host to the usual cluster of non-traditional MNO prospective tower tenants, one of the most important of which is Wi-Fi broadband service provider BurQ, which is targeting 2,500 tenancies in the next four years – read about BurQ in an interview later in this special feature.

**Pakistan’s tower market**

At this point there are only two companies with any substantial activity on the ground in Pakistan: edotco and Towershare, and the vast majority of the estimated 28,000 towers in the country are still operator captive. edotco is soon to receive approval to begin construction of its first 200 build to suit sites, and plans to leverage its 13,000km fibre network to deliver 3G and 4G. Towershare has a small footprint and is helping its MNO clients to optimise their existing infrastructure, often in challenging areas of the country. The acquisition of over 4,500 of Warid’s towers by Towershare has been announced but not yet closed. TowerXchange has confirmed that two more of Pakistan’s five MNOs have an appetite to monetise their towers. According to the PTA there are six other local companies with licenses to provide infrastructure, at least one of which has been acquired by Towershare, but to date the others haven’t made any significant rollouts or participated in any major deals.

At this point the field seems to be wide open for more tower transactions and infrastructure sharing as demand for connectivity is surging and the average tenancy ratio is still relatively low at an estimated 1.3 with only 30% of the towers on the ground being shared. In addition to this the towers that have been rolled out to date have not always been planned with overall efficiency in mind and there are several areas with significant overlap, as mentioned in our interview with Towershare this month. Finally, ARPU is very low at US$2 meaning that MNOs in this market are under strong pressure to optimise networks and ensure profitability.

**Progressive regulation, but local inconsistencies**

The regulator in Pakistan is very proactive in supporting the development of telecoms in Pakistan and is perceived to be one of the region’s most progressive; the PTA was just re-elected for a third four year term as a member of the ITU council. There are, however, still unique operational challenges and regulatory issues in Pakistan.

Like many other markets different states and municipalities have their own regulations on telecoms infrastructure and rights of way. The layers of bureaucracy added by different regional
governments also means that the tax regime in Pakistan is costly and complex. Changing policies can lead to the economics of infrastructure deals being unpredictable in the long term. It requires a good deal of familiarity with this market to negotiate permits. Infrastructure maintenance is also challenging on the ground and requires personnel with experience dealing with the different local governments.

**Unstable grid**

The instability of the power grid is another obstacle to be overcome in Pakistan. This is a market that still experiences regular outages, typically around eight hours per day and potentially longer in the Summer months when the grid is further strained. There has been active investment in the grid and there are several coal and hydro plants set to come online over the next couple of years. However, it remains to be seen if this will be enough when as many as 1,000 to 2,000 new towers are expected to be rolled out per year to support demand for capacity. As in other markets in the region, autonomy and efficiency are the watchwords and both edotco and Towershare are poised to integrate battery hybrids and renewables.

**What to expect next in Pakistan**

With a market that is seemingly so ripe for the towerco model and infrastructure sharing, the industry is eager to know where the next major tower deal will come from. There is ongoing speculation that the number one and number two MNOs in this market, Mobilink, owned by VimpelCom, and Telenor are actively seeking to divest their tower assets. Exact numbers aren’t known at this point, but based on market share these portfolios are somewhere in the region of 5,000 to 7,000 each, and it would have a huge impact on Pakistan’s fledgling tower industry if these came to market at the same time. There could be several potential buyers for these portfolios including Pakistan’s two most active towercos, Towershare and edotco, while Indian or even Indonesian towercos with an interest in expansion into a new market, with sufficient capital to invest, and with an appetite for a relatively high risk, high reward tower market may also participate in a Pakistani tower auction.
A guide to the Thai telecom tower market

AEC Advisory maps the shifting landscape as Thailand’s BTO regime gives way to a new era of tower companies

As Build Transfer Operate (BTO) agreements conclude, Thailand appears to be on the brink of resolving long standing tower ownership disputes through the formation of what is likely to be three groups of tower companies. TowerXchange connected with AEC Advisory Co-Founder and Managing Director, Dominic Arena, who has extensive experience of working with operators, investors and government stakeholders, to understand who owns what, and what the future could hold for Thailand’s telecom towers.

Keywords: 4G, AEC Advisory, AIS, Asia, Asia Insights, Batteries, Build-to-Suit, Business Case, CAT, Capacity Enhancements, Carve Out, Co-locations, Construction, DIF, DTAC, Deal Structure, Decommissioning, Densification, Hybrid Power, Infrastructure Sharing, Insights, Lawyers & Advisors, MNOs, Market Forecasts, Market Overview, On-Grid, Operator-Led JV, Regulation, Renewables, Rooftop, TOT, TRUEIF, Telenor, Tenancy Ratios, Towercos, True, Valuation

Read this article to learn:
- How the concession / BTO regime has hampered the development of Thailand’s telecom and tower markets
- What we know about the structure of the three towercos which are set to resolve ownership disputes
- Factors affecting the valuation of Thai towers
- Co-location to date, the impact of current and future spectrum availability on demand for towers
- The availability of fibre and grid power in Thailand, including the opportunity for renewables

TowerXchange: Please introduce yourself, AEC Advisory and your substantial experience consulting to Asian telcos, particularly in Thailand.

Dominic P Arena, Managing Director, AEC Advisory:
I am co-founder and MD of AEC Advisory; a corporate advisory firm, primarily focused on the TMT, Digital Applications and Service, Energy and Government sectors. Our clients include telcos, satellite operators, tower companies, media operators, governments and regulators, and investors.

Our services include market entry analysis, feasibility studies, restructuring, M&A advisory and post transaction support as well as policy and regulatory work with government ministries and agencies.

Our focus is the ASEAN region, but our clients are expanding our regional remit – we go where they take us. For example, we have recently been working for one of our clients in China and even as far afield as a license application in Iran.

I started in the industry 21 years ago as a telecoms engineer with Vodafone Australia and later joined KPMG Consulting in 2001 when we came to Asia to help launch a mobile operator joint venture. I’ve lived in Singapore and Thailand for most of the past 15 years, working all across Asia including in Australia with KPMG Advisory where I was the responsible Director for the telecom and media business advisory practice. Post KPMG, I was the
Regional Director for BT’s consulting business across the Asia Pacific region and prior to co-founding AEC Advisory, I was the Managing Partner for Value Partners’ South and Southeast Asia corporate advisory business up to early 2014.

TowerXchange: Please introduce us to the telecom tower market in Thailand – it seems to be quite politicised by the BTO ownership dispute. Who owns what? What are the network characteristics?

Dominic P Arena, Managing Director, AEC Advisory: You are correct; the Thai telecom towers market is quite complicated by the legacy BTO arrangements. The concession / Build – Transfer – Operate (BTO) regime was adopted in the 1990’s to drive the development of the Thai mobile market. Whilst at the time it probably seemed like a reasonable approach – by offering private, efficient companies the chance to build important infrastructure using the spectrum rights and licences of the inexperienced and inefficient State Owned Enterprises – it is fair to say that the development of the mobile market in recent years has actually been hampered by this concession / BTO regime as they entered their sunset years.

Under the regime, 25 year concessions to build and operate nationwide 2G networks were given to three mobile operators – True (now owned by CP Group and China Mobile), AIS (now Temasek/Intouch and SingTel) and DTAC (Telenor plus local investors).

In return for the concessions, the operators entered into a 20-30% top line revenue share agreement with the state owned concessioners – CAT Telecom (for the 850 and 1,800MHz bands) and TOT (for the 900MHz band) and committed to return the ownership of their ‘networks’ to the state agencies.

As the concessions now expire (the only concession active beyond September is between DTAC and CAT Telecom, which expires in 2018), the suboptimal design of the BTO concept has become apparent. People are now wiser to the long term value of network assets, especially towers and transmission, and the operators do not want to give ownership (and operational management) of their network back to CAT and TOT. The 2G active equipment itself has little value, but the towers and other passive assets still have considerable retained value. Since all the customers remain with the private operators (who have all now purchased licensed spectrum and also built some of their own towers outside of the concession regime) they want to own and operate those assets, and have argued that passive assets such as the towers did not constitute ‘network equipment’ to be returned under the BTO.

The initial response of both the operators and the state owned entities (SOEs) was enter into legal dispute processes to resolve the ownership issues, however given Thailand’s ambiguous BTO contracts, complex legal processes and many layers of telecommunications related laws (which have seen the SOEs argue for post-concession rights embedded in previous constitutions and regulations prior to the formation of the National Broadcasting and Telecommunications Commission), there was little chance of any agreements being reached for several years, leaving the entire industry in limbo with billions of dollars in stranded assets and billions more in duplicate investment being planned (and deployed).

However, over the past year consensus has been reached that a commercial solution rather than a legal solution is the only way to resolve the ownership disputes.

As a result, all operators, private and SOE, are currently negotiating and putting in place agreements to release their tower assets into joint ventures in order to avoid stranding those valuable assets and wasting more capital, while at the same time providing a means for the nearly bankrupt SOEs to enjoy some sustainable long term revenues to cover large employee welfare entitlements.

DTAC has reportedly almost reached an agreement with CAT for their 11,000 towers under concession - in return for the cancellation of all ownership disputes, wherein CAT will become the 49% shareholder in a joint venture with DTAC who will own the remaining 51% share. The Board of CAT has already acknowledged the JV as the logical way forward.

Similarly, AIS are reportedly attempting to do the same - a JV with TOT for their 12,000 towers under concession, although they appear to be a few steps behind in timing.
Last year, True listed the True Telecoms Growth Infrastructure Fund (TRUEIF, now know as DIF) on the Stock Exchange of Thailand (SET) for around US$1.8bn into which they injected all their non-concession tower and fiber assets – and they are reportedly seeking to inject their 7,500 towers under dispute with CAT into the fund in return for giving CAT a shareholding, as yet to be determined.

Therefore It is likely that we shall soon see three tower companies operational in Thailand – CAT / DTAC, AIS / TOT and DIF (already operational and paying handsome dividends of over 7%).

It’s important to recognise that each of the operators have built towers outside of the concession framework, as illustrated in figure one.

**TowerXchange: The JV structure seems complicated; especially in terms of tower valuation.**

Dominic P Arena, Managing Director, AEC Advisory: Valuation of towers in Thailand is a complicated issue. It is worth scrutinising the DTAC / CAT joint venture in more detail to see the difficulties in assessing value.

Typically in Asia, US$100,000 to US$150,000 per tower is the valuation norm. Based on public information, in the DTAC / CAT venture, the entry value per tower will be well below this range even including the fact that the transaction also includes fibre transmission. Even given that CAT will receive dividends from the venture, compared to typical tower valuations the asset valuation in the JV seems low, something resembling replacement value only.

There are two main reasons why the value per tower may be lower than the norm. Firstly, DTAC has already paid for the towers once when they built them. Secondly, and this is the main reason; DTAC is the single and only anchor tenant on the towers so the tenancy ratio for valuation is likely to be 1.0.

Therefore, it looks like a ground zero valuation at the replacement cost of the towers. But also note that most of the towers in Thailand were constructed as single tenant towers due to the BTO regime, hence it is also likely that lots of improvement capex will be required for retrofitting and strengthening for multi-tenant sharing of these assets.

In addition, there is a significant overlap in tower locations. I recall 14 years ago when I came to Thailand to help launch the TA Orange network, being the third entrant using the same 1.8GHz spectrum band as the second player, their network plan largely resembled that of DTAC wherein the towers were built in close proximity.

Valuations for the towers outside the concession process, designed from the outset for multiple tenancies and built by AIS, DIF or DTAC for example, could attract valuations per tower within the

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**Figure one: Estimated tower ownership in Thailand**

- Proposed DTAC-CAT towerco
- DTAC towers built outside concession
- AIS disputed towers built under CAT concession
- Potential AIS – TOT towerco
- AIS towers built outside concession
- DIF (formerly TRUEIF)

Source: TowerXchange
normal range I mentioned.

**TowerXchange: How aggressively will DIF, CAT and TOT’s towerco JVs be leasing up the towers?**

**Dominic P Arena, Managing Director, AEC Advisory:**
There is considerable upside when you look beyond the current situation with the concession towers. There are three existing MNO players, 4G coming and a potential fourth entrant, and even 3G has only ~50% population coverage and 25-30% landmass coverage, so there will still be demand for towers beyond the roughly 47,500 towers currently in operation.

There could be a need for additional towers up to 66,000 over the next 15 to 20 years given the huge demand for mobile broadband services and lack of FTTH in Thailand.

For these reasons, I believe that the Thai tower market is at that “hockey stick” moment; poised for rapid growth.

We already see this with co-location deals that are happening. First DTAC signed a co-location deal with DIF that covers around 200 sites. Then just in mid August, DTAC signed a second deal with AIS for sharing up to 2,000 towers. The next round of tower sharing deals could be in the multiple thousands of sites.

The prevailing national tenancy ratio is low – currently averaging 1.05x tenancy ratio across all towers and all operators but higher in DIF at around 1.8. The 4G roll out on 1.8GHz next year followed by 2.3/2.6GHz in the absence of 700MHz (due to broadcasting conflicts) and the requirement to cover more of the Thai landmass will drive more sharing.

**TowerXchange: Are there opportunities for international investors / towercos to get in on the Thai tower market?**

**Dominic P Arena, Managing Director, AEC Advisory:**
I believe that yes you can get in. If you are a brand new player in the market with no existing relationships with an operator then I think it would be very difficult. But if you have prior relationships with the shareholders of the private operators and proven partnerships in other markets, then I think it is possible.

A couple of years ago, some of the regional tower companies came to take a look around but it was somewhat early and still lacking clarity on ownership of the assets, plus they may have misunderstood the mind-set of the Thai stakeholders. AIS, the largest player, has not shown interest in selling towers; AIS has 12,000 towers under concession but have 10,000 other towers that are outside the concession regime which they invested in as parallel capacity, so their mentality to date has been to spend capex (they have low gearing so can easily afford it) and keep control.

Telenor has partnered with towercos in other markets and the drivers for them are different. DTAC has 11,000 under dispute with CAT and only 800 further towers where they have guaranteed tenure as their own. Their motivation is likely less about cash and more about security of tenure and long term efficiency / opex reduction.

With regards to True, their plan is to move all their tower assets in to DIF and even to use the fund as a consolidator of industry assets. As a listed fund, their motivation is driven by fund value maximisation in which they remain the largest single shareholder.

**TowerXchange: What are TOT and CAT’s drivers and obligations?**

**Dominic P Arena, Managing Director, AEC Advisory:** It’s important to understand that TOT and CAT’s only profitable income is the revenue share payments from the mobile operators. They are restricted in their ability to streamline their cost base and have little ability to contribute capex to future network investment. They are purely interested in long-term steady income to pay employee welfare benefits.

**TowerXchange: What is the regulator NBTC’s position on infrastructure sharing – is there an established regulatory regime governing Thai towers?**

**Dominic P Arena, Managing Director, AEC Advisory:** To operate, tower companies need a license as a telecom facilitator. Obtaining a license is a simple process. You pay a small admin fee and that’s is it.
Tower companies are subject to infrastructure sharing regulations, which say you must share towers and also should not build near an existing tower – however such regulations to date have been challenging to enforce in the BTO transitional period.

Also, as a foreign company, any tower investor would be restricted to only owning 49% of the venture.

**TowerXchange: How will future spectrum auctions and next generation network rollouts drive demand for new towers, co-locations and densification?**

**Dominic P Arena, Managing Director, AEC Advisory:**

The auctions and next gen network rollouts can only be positive for tower companies. The bandwidths being auctioned will only generate more demand for tower sharing and new tower builds.

The capital city Bangkok accounts for 15% of the total tower stock in country and a large part of those towers are rooftops and not really leverageable for multi tenancy.

30MHz of 1,800MHz and 20MHz of 900MHz are coming to market in spectrum auctions due later this year – the latter for 2G and 3G, 1,800MHz almost exclusively for 4G. 2.1GHz is currently used for 3/4G today and 1,800MHz will be the expansion band.

700MHz still complicated – when digital TV was launched in Thailand it was put in the wrong part of the band so the ITU digital dividend doesn’t currently exist in Thailand.

Therefore we expect that 4G will go on 1,800 and 2,100MHz – that will underpin a lot of demand for additional sites and sharing. 2,300MHz and 2,600MHz spectrum is also coming in the near future.

**TowerXchange: Is there a degree of parallel infrastructure in Thailand? Would decommissioning be part of a towerco play?**

**Dominic P Arena, Managing Director, AEC Advisory:** There is a significant degree of parallel infrastructure and I think there will be some decommissioning eventually, but we’re still in the early stages – as I said, the beginning of the hockey stick.

If we had 700MHz clear around the corner we’d have more consolidation because there would be less demand for towers, but with restricted sub-1GHz (apart from 850/900MHz) and data demand growing at over 35%, I anticipate no huge consolidation of parallel infrastructure.

Once the tower JVs are established, the focus will be on how to drive revenues from the existing towers and on what additional sites will be needed for new spectrum. Only after that will there be a focus on what to do with redundant towers – which cost almost as much to decommission as to build.

Only DIF have the vehicle and appetite to be a consolidator and have the financial capability to decommission. The DIF has very little debt (0.18 Debt/NAV) but a high leverage ceiling (3.0 Debt/NAV) so it is only getting started.

**TowerXchange: The traditional market entry route in for an independent towerco would be to acquire a stake in an existing passive network – what about if somebody came with a pure BTS offering? They’d need a local partner, but would that be a credible play?**

**Dominic P Arena, Managing Director, AEC Advisory:**

Probably not, as there are a number of good local players building towers in Thailand and they are well entrenched with low cost bases. They are not
towercos so they don’t bring finance or co-location expertise, but they have strong hold on the market.

An affiliate of one of the Indonesian tower company investors tried a build to suit offering approach a couple of years ago, setting up a small local operation but had little success and ultimately pulled out. Were they too early? Not really, because AIS and DTAC were building their own 3G towers then, as was SOE TOT, but it’s just challenging against the local established players.

TowerXchange: The operators are having to pay twice for their existing passive network, CAT and TOT are capital constrained – who is going to finance the next generation rollout? Could someone come in with significant capital to build capacity? If the local players are purely builders, why couldn't international towercos deploy capital to build a few thousand independent towers and lease them back to the operators?

Dominic P Arena, Managing Director, AEC Advisory: There is nothing stopping them, but cash not a problem for a local player like AIS – they were still making 48% EBITDA margin after paying 25% of their top line revenues to TOT!

DTAC is somewhat more cash constrained, hence their interest in entering into tower sharing deals. You need to remember that they have over 90% of their towers under the concession regime and in dispute, so when CAT got an injunction to stop them putting 3G and 4G equipment on their disputed towers it somewhat focused them on

JV negotiations. As we know, DTAC are pursuing tower sharing first and there may be a future need for new build towers. But ultimately there may be sufficient supply of existing towers to co-locate on.

The dark horse is DIF and they are not to be taken lightly by any foreign competitor. I already alluded to their funding capacity but to be specific, based on SEC regulations they can gear up to 3.0x Net Asset Value and at current valuations this means they still technically have borrowing capacity of US$6.2bn!

TowerXchange: What is the quality and connectivity of electricity grid and fibre?

Dominic P Arena, Managing Director, AEC Advisory: All towers in Thailand now have fibre and there is a huge amount of backhaul fibre in Thailand. DIF alone has over 1.1 million core-km of fibre with their recent purchase of an additional 300,000 core-km from True.

Since the 3G rollout, all new sites have been on fibre rings. There is very little microwave backhaul: during tropical storms there is too much fade with microwave, and latency is inadequate for 4G.

The electricity grid in Thailand is very good – blackouts are rare, although fairly regular flash brownouts do occur. For nearly all sites, basic battery backup is more than enough.

The problem does not lie with electricity provision but with cost. Power is extremely expensive in Thailand and is about to get more expensive.

Power is extremely expensive in Thailand and is about to get more expensive. Therefore renewable power solutions are definitely of interest.

Under the concession regime, there was no real rental market to establish lease rates and power pass through costs, however with DIF the tower rentals are net of utilities which are paid by the anchor tenant (True). If power assets do get wrapped into the JV towercos from concession assets, then we will see whether rental will include or pass through utilities costs. As we know that DIF operates a power pass through, the other towercos probably will be similar.

Talks to create an AIS-TOT towerco were cancelled in October 2015 after this article was published.
Spotlight on Vietnam - Understanding the opportunities

As the Vietnamese MNO market is restructured, and with 4G auctions coming soon, what are the opportunities for local and international tower companies?

With smartphone usage soaring and demand for data reaching new heights, Vietnam's telecoms industry and infrastructure are starting to attract international attention. The restructuring of Vietnam's MNO market is still a 'work in progress', but the government has announced that LTE will be rolled out in 2015 and the first licenses will be awarded in early 2016. The stage is set for sustained telecoms and tower market growth in Vietnam.

Keywords: Editorial, MNOs, Towercos, Market Overview, 3G, 4G, Tenancy Ratios, Infrastructure Sharing, Capacity Enhancements, Build-to-Suit, Pass-Through, Leasing & Permitting, ARPU, MLA, Sale & Leaseback, Masts & Towers, Asia, Vietnam, Viettel, MobiFone, VNPT, Vinaphone, Vinamobile, GTel, SoftBank, FPT Telecom, SEATH, VinaCapital, Golden Towers

Read this article to learn:
- Why Vietnam is an attractive market for towercos
- How the restructuring of Vietnam's MNO market is progressing
- Spectrum to be made available and timelines for the 4G auction
- The structure of Vietnam's tower market today and opportunities in the future

Geodemographics and baseline statistics on Vietnam's mobile market

More than half of Vietnam's 93mn population are aged under 25, with population density concentrated in the country's two largest cities, Hanoi (~6.5mn) and Ho Chi Minh City (over 7mn population, and which generates around half the country's GDP). According to GSMA Intelligence statistics for Q4 2014, SIM penetration is 150%, although multi-SIMing is common. 89% of the market is prepaid, with mobile broadband penetration at 21%. According to Appota, smartphone penetration was a corresponding 23.25%. All three leading MNOs offer unlimited 3G data for VND70,000 per month (a little over US$3). ARPU was reported at US$3.38 per month in Q1 2014 and has remained relatively stable. Mobile data speeds in Vietnam are among the slowest in the world, at an average of 1.48Mbps, ranking 112th out of 113 countries surveyed by NetIndex.

What is clear is that Vietnam is one of the fastest growing and most attractive mobile markets in Asia. Smartphone ownership doubled to 23.25% from 2013 to 2014. As a result, data demand is rising rapidly, even prior to the rollout of 4G, driving capacity requirements for network planners at Vietnam's MNOs and creating demand for Vietnam's many small towercos.

The MNOs in Vietnam are continuing to invest in new infrastructure to expand their coverage. The three market leaders Viettel, MobiFone and VinaPhone have been rolling out new sites steadily.
to continue to meet increasing demand, requiring approximately 11,000 new towers or tenancies per year.

**The operator landscape in Vietnam**

Vietnam is host to five incumbent operators, with potential new entrants to be attracted by the 4G auction, and all are potentially creditworthy tower tenants, representing an atypically deep pool of prospective counterparts for towercos. As of Q4 2014 Viettel had 46.6% of the market, MobiFone 31.5% and VinaPhone 15.4%. The smaller market players Vietnamobile and GTel Mobile had 3.8% and 2.8% respectively. Viettel has an estimated tower portfolio of ~20,250, MobiFone has ~9,000, VinaPhone has ~11,000 and Vietnamobile and GTel Mobile own the other ~4,750 towers between them. A further ~10,000 towers are owned by towercos and other smaller holding companies.

During FY2014, Viettel reported worldwide revenues of over US$9bn, up 20% YOY, and a base of 55.5mn domestic mobile subscribers. Viettel typically builds over 1,000 new towers every year in Vietnam, but to date has kept their towers on their own balance sheet. Viettel is also market leader in Cambodia and Laos, has rolled out successfully in Mozambique and Haiti, and recently acquired licenses in Cameroon and Tanzania. While Viettel has a track record of swiftly rolling out their own low cost towers, they have recently embraced co-location, becoming tenants on IHS’s towers in Cameroon and opening discussions with Golden Towers about co-location in Vietnam. TowerXchange have even heard rumors that Viettel might consider selling the ~1,600 towers they have rolled out in Mozambique.

Ministry-owned #2 and #3 players MobiFone and VNPT (Vinaphone) are in the process of being formally separated, with the former currently under the management of Vietnam’s Ministry of Communications and seeking foreign investment ahead of an IPO scheduled for late 2015.

VinaPhone has ~11,000 and Vietnamobile and GTel own the other ~4,750 towers between them. A further ~10,000 towers are owned by towercos and other smaller holding companies.

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have been linked with MobiFone, which could attract a valuation of US$2-3bn. Telstra and Sweden’s Comvik International, which held a 45% stake in MobiFone from 1995-2005, are also believed to be interested. Approximately a third of MobiFone’s substantial tower portfolio are third party owned – indeed the majority of independent towers in Vietnam have MobiFone as an anchor tenant.

VNPT is also believed to be in discussions with foreign investors, and has submitted its own restructuring plan, proposing to separate the company into three businesses; VNPT-Net, specialising in network infrastructure, VNPT-Vinaphone, the mobile services business, and VNPT-Media. VNPT had historically relied on MobiFone’s towers, so represent the highest prospective volume of new business for the co-location and build-to-suit markets.

The restructuring of #4 MNO Vietnamobile will be critical to financing their customer acquisition efforts, and to improving their credit worthiness as tenants or build-to-suit partners. The operator is currently subject to a build-operate-transfer type agreement within a partnership between Hutchison and Hanoi Telecom. Protracted negotiations continue which could result in the operator being more conventionally structured and financed.

Despite being the fifth ranked operator in Vietnam, GTel Mobile (formerly known as Beeline when owned by VimpelCom) owns a substantial portfolio of towers. GTel are now owned by the Ministry of Public Security, and are believed to be seeking LTE spectrum, so have an expansive mindset.

There have also been rumors of the prospective entry into the Vietnamese market of Japan’s SoftBank as a sixth MNO, potentially via participation in the forthcoming 4G spectrum auction.

4G spectrum to be auctioned in 2016, fibre freely available

At a conference in March, Deputy Minister Le Nam Thang strongly hinted at a 2016 timeframe for the auction of 4G spectrum in Vietnam. The auction is expected to include spectrum in the 2.3GHz and 2.6GHz bands, as well as refarmed spectrum on the 900MHz band.

4G had been piloted in Vietnam as long ago as 2010, with Viettel, VNPT and leading ISP FPT Telecom among those granted limited test licenses.

Fibre is extensively available in Vietnam and easy to connect to – few towers are burdened with microwave dishes.

The structure of Vietnam’s tower market today

While MNOs retain almost 82% of the country’s towers, Vietnam is home to over thirty towercos and small independent players with double and triple digit tower counts. The most acquisitive towerco seems to be Golden Towers which recently
closed title on over 400 towers with over 1,000 more pre-closing and in the pipeline. Golden Towers markets their sites more aggressively than most independent towercos in Vietnam, where the prevailing tenancy ratio is in the 1-1.3 range. Golden Towers has had success acquiring and rolling up some of Vietnam’s smaller tower portfolios, most of which have sprung up as a function of a family’s ownership of a critical piece of real estate, or as a function of towers acquired by or awarded to current or former employees, particularly of VNPT.

The largest towerco in Vietnam is currently Southeast Asia Telecommunications Holdings (SEATH), itself the product of rolling up three smaller towercos. SEATH is a holding company owned by VNI (VinaCapital’s Vietnam Infrastructure Limited). According to the company’s Q3 report, on 30 September 2014, they had “close to 1,930 towers” in Vietnam with a tenancy ratio of 1.2, an EBITDA margin of 50.3% and net margin of 20% over the first nine months of 2014.

Grid power is extensively available and fairly reliable, thus Vietnam’s towercos operate a ‘steel and grass’ business model, with energy costs passed through to the tenant and the operator’s retaining their own backup power solutions.

**Driving Vietnam’s tower business to scale**

Towercos have the same three options to achieve growth which they have everywhere else; let’s examine those scenarios to see how the market might evolve in Vietnam.

1. Organic growth through build-to-suit: Permitting and building towers a handful at a time in response to search rings issued by Vietnam’s MNOS might enable towercos to zero-in on sites attractive to additional tenants, to negotiate long leases on favorable terms with landlords, and to build more robust, higher value structures. However, it’s a slow process, typically taking four to six months to permit a new tower. With the fragmentation of Vietnam’s towercos, and with Viettel not using towercos for their build projects to date, no-one is going to get to scale fast on build to suit contracts alone.

2. Rolling up small towercos: At his roundtable at the TowerXchange Meetup Asia 2014, Golden Towers’ Patrick Tangney talked about a “buy to suit” market in Vietnam. With a substantial pool of ~10,000 independently owned towers in Vietnam, Golden Towers have often been able to buy towers in desired locations, at times acquiring entire portfolios. Some of the world’s largest towercos, including American Tower, SBA Communications, Crown Castle, Viom Networks, Tower Bersama and ProTELindo, started out by rolling up smaller towercos. “Buy to suit” might not propel a towerco to 10,000 towers overnight, but it might enable a towerco to reach the scale where they can be the most credible bidder in the event of a substantial sale and leaseback opportunity coming to market in Vietnam.

3. Sale and leaseback (SLB): A substantial SLB in Vietnam would require a substantial capital raise, but TowerXchange believes there would be no shortage of private equity firms interested in putting several hundred million dollars of capital to work in Vietnamese towers. As for the prospects of a large scale SLB, there’s nothing on the near-term horizon until the dust settles on Vietnam’s protracted MNO restructuring saga. However, in a 12-24 month window we could see a portfolio of towers brought to market, most likely from the MobiFone-VNPT axis. One note of caution around SLBs in Vietnam: the quality of MNO-captive towers varies significantly in Vietnam, with lots of guide wire towers with finite capacity, and inevitably a degree of deferred maintenance, which will both have implications for post acquisition improvement capex if a deal does come to market.

**Conclusion**

As the restructuring of Vietnam’s operator market finally nears conclusion, the next boom in this attractive Southeast Asian telecoms market could be found in telecom towers. A diverse ecosystem of incumbent towercos exists, but the business is not conducted as formally as in more established tower markets, for example MLAs can be as short as three pages. The most sophisticated and active player seems to be Golden Towers (whose MLA is 300 pages!), whose current strategy of rolling up selected independent towers on a “buy to suit” basis could see them well positioned to be the most credible local counterparty should a substantial sale and leaseback opportunity emerge from the restructuring of MobiFone and VNPT.
Demand forecasts for passive infrastructure equipment and services in Asia

TowerXchange examines demand for six different categories of equipment and services across the dozen most active Asian tower markets

Telecom infrastructure is being transformed in a dozen key markets across Asia, where towercos own and operate between 20% and 70% of each country’s towers. What are the implications for the supply chain? What equipment and services are the towercos buying? How do their requirements vary according to the structure of each tower market?


Read this article to learn:
- How reliable is the grid, and who is responsible for acquiring and maintaining energy equipment in each market – towercos, or is power a pass through to MNOs?
- Are RMS and access control systems installed on most cell sites? Are Site Management, or ILM, systems used in the NOC?
- How many new towers are being erected and what does that tell us about the opportunity for tower manufacturers and construction firms?
- Are DAS, IBS, small cells and microcells being deployed into urban networks?
- Is there a pipeline of tower transactions – SLBs or strategic acquisitions – to generate substantial advisory engagements?

Meet the key stakeholders at this year’s TowerXchange Meetup Asia, taking place on November 24 and 25 at the MBS, Singapore!
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<td><strong>Australia</strong></td>
<td>Low</td>
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<td>Telstra Optus Vodafone</td>
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<td>Crown Castle recently sold their 1,772 tower subsidiary CCA to a consortium led by Macquarie. Broadcast Australia is the other towerco of scale – they have some MNO tenants on their ~600 towers. A few smaller tower transactions are anticipated to rollup small towercos, but it seems unlikely market leaders Telstra would sell their assets. There are around 9,000 towers in Australia, but many more may be required by the rollout of the National Broadband Network (NBN), a shared LTE network, which means it’s a good time for tower manufacturers and builders. RMS adoption will evolve over time. With grid power widely available and backup power sources not often used, Australia is not a priority for towerpower vendors. Power is typically a pass through so MNOs retain responsibility for power.</td>
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<td>edotco has acquired 5,300 of the 27,000 towers in Bangladesh and the VimpelCom (Bangalink) towers may be next. Bharti Infratel are interested in entering the market, but are seeking favourable regulatory conditions. Potential deals make Bangladesh a priority for tower transaction advisors and strategic consultants. 800-1,000 new towers are going up per year, making Bangladesh attractive for tower manufacturers and turnkey infrastructure (TI) firms. The rainy season demands exceptional cell site autonomy which makes Bangladesh a key market for energy, particularly energy storage.</td>
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<td>edotco operates 1,500 towers in Cambodia, where CamGSM and MobiTel have both been rumored to be considering tower sales in the past but not recently. RMS is not yet widely deployed in Cambodia, but edotco plans to invest in a remote tower operations centre in 2016. 20% of sites are off grid in Cambodia. The grid sites are provided both by SOE Electricité du Cambodge and by a range of private microgrids and distributed generation projects. Battery backups are on all sites, with DG on off-grid, MSC, BSC and hub sites. Power is a pass through, so MNOs not towercos remain the buyers of energy equipment. Not much demand for small cells but IBS are starting to be deployed in airports, malls, hotels and condos. With the top three MNOs boasting 90%+ coverage and new entrants increasingly co-locating rather than building, there is limited demand for tower manufacturers and TI firms.</td>
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The tower market is changing in China – around a million towers will be transferred from the three SOE MNOs to newly formed China Tower Company (CTC), which already has a contract to build 120,000 towers. CTC already has 10,000 employees but it’s still a brand new company with new governance processes to be established, new systems to be deployed and new preferred supplier relationships to be established. The creation of CTC has stimulated a previously dormant local independent towerco market, which is supplementing CTC’s build capacity. China is building towers (mostly monopoles), rooftops and installing small cells and microcells at a phenomenal rate (over 100,000 per year), so it’s a great market for all vendors if you can compete with local incumbents like ZNV, who have around 60% of the RMS market. The GSMA reports that more than half the world’s green powered sites are in China, yet local towercos report the grid is extensive and reliable, so the jury is out on the opportunity for renewables.

Towercos operate over 300,000 of the 450-500,000 towers in India – at present, a third of the world’s towerco owned towers are in India. Started in 1995, India is the second oldest tower market in the world, so it’s towercos are big, mature and canny buyers! Tower transaction deal flow is returning to India, where as many as 200,000 towers may be coming to market for sale, IPO or carveout (government owned operator BSNL is seeking to create a new 70,000 tower towerco). It’s a great time to be a tower advisor in India! Meanwhile, India is home to the most advanced ESCO projects in the world, and some of the most cost-efficient passive infrastructure manufacturers and service providers, many of which export as well as serve their huge domestic market. Li-Ion is making significant inroads versus VRLA batteries in India. RMS is widely used. And the ongoing spectrum auctions and progress of 3G rollout and eventually 4G mean India may need hundreds of thousands of new towers in the coming years. While there are only a few thousand small cells and microcells in India currently, Indus forecast there will be 50,000 by 2020, making India second only to USA (well, maybe China too) for small cells market potential.
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<td>Indonesia</td>
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<td>Telkomsel Indosat XL (Axiata) Hutchison Bolt</td>
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<td>Towercos own 57% of Indonesia’s ~70,000 towers, making it one of the most mature tower markets in the world. XL Axiata (~6,500) and Indosat (~5,800) may have an appetite to sell their remaining towers in the medium term, but the real question concerns the future of Telkom’s towers who have about 13,000 sellable assets in their 17,615 tower portfolio, but no apparent incentive to sell. That said, Telkom did create its own towerco, Mitratel, which owns a reported 5,500 towers. Mitratel was to be transferred to Tower Bersama under an innovative share swap agreement which has been postponed pending government investigation. With operator towers to be bought and towerco consolidation continuing, Indonesia is a fertile market for advisors. The reliability of the grid in the dense urban areas means the opportunity for energy equipment vendors is finite, but there are remote sites requiring good autonomy. Note that power is a pass through in Indonesia, so MNOs are the buyers of energy equipment. We’ve spoken to RMS and access control vendors with substantial Indonesian contracts. Organic growth is considerable: 3,000+ towers are erected in a good year, and the local ecosystem of TI firms is very fragmented.</td>
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<td>Celcom (Axiata) DiGi Maxis</td>
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<td>Towercos own around a third of Malaysia’s 20,000 towers. edotco has carved out 3,500 towers from Celcom in Malaysia. A further 3,200 towers are owned and operated by a diverse group of State-backed independent towercos. DiGi and Maxis currently retain their towers but there have been rumors they could create their own towerco, so there may be opportunities here for the advisory community. There is plenty of demand for new structures as the 4G era begins, but much of the work is undertaken by the aforementioned state backed towercos who have a dominant position in terms of permitting in half the States, so TI firms and tower manufacturers need to develop relationships with Malaysia’s towercos. While only 5% of Malaysia’s cell sites are off grid, data demand has driven the load on some sites beyond capacity, so battery banks are widely used. Demand for infill sites makes Malaysia ripe for street furniture, with DAS and IBS starting to be deployed by edotco and MNOs. edotco has already selected its site management system.</td>
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At one point it seemed like the busdev team from every telecom vendor in the world was camped out in the Traders Hotel lobby taking meetings, but hyperbole has given way to hard work in Myanmar as the rollout enters phase three. Only towercos offering tower+power have secured phase three contracts, and appetite for opex business models is increasing. While a little over 5,000 of a forecast 17,300 towers by 2017 have been lit, phase one was in dense urban areas, phases two to three are pushing into the suburbs and beyond. While most of the towers built to date have been grid connected, that grid has proved very unreliable, with frequent outages and voltage irregularities. As such, generators are on all ground based sites and battery banks are widely used. We’re yet to see the full anticipated demand for cell site autonomy, although hybridisation may be restricted to batteries rather than renewables in the South of the country as wind resources are limited and the rainy season means finite opportunity for PV. Myanmar’s ecosystem of TI firms and local subcontractors is maturing fast. RMS and site management systems are widely used. Towerco investment due diligence and consolidation, starting with the sale of Digicel MTC, means the advisory community will remain busy. Some IBS have been deployed in Myanmar.

News has leaked of Tower share’s acquisition of Warid’s 4,500 towers of Pakistan’s ~28,000 towers, but the transaction has yet to be formally announced. Both #1 Mobilink (VimpelCom) and #2 operator Telenor’s towers have also been rumoured to be coming to market and, with edotco’s license now secured, there are at least two prospective buyers to keep the advisory community busy. 1,000-2,000 towers are going up every year in Pakistan, making the country a great target for tower manufacturers and TI firms. The unstable grid means eight hour outages are common, and can extend longer in Summer months. Both edotco and Tower share have spoken openly about plans to hybridise sites with batteries and renewables.
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75% of Thailand’s ~47,500 towers have been transferred, or will soon be transferred, to one of three towercos established to resolve BTO disputes. True created and successfully IPO’ed TRUEGIF in late 2013, a fund in which 12,138 towers and over a million kilometers of fibre have been transferred. Meanwhile a joint venture towerco is being finalised between DTAC and CAT, while AIS and TOT seem likely to create a similar venture. New towercos mean new opportunities for vendors. 10,000 AIS and 800 DTAC towers built outside the BTO concession are set to remain operator-captive. Thailand has a degree of parallel infrastructure, suggesting a few decommissioning opportunities, but imminent spectrum auctions for a 4G rollout that lacks sub-1GHz digital dividend spectrum will maximise demand for co-locations and new builds. Anticipate Thailand’s tower stock increasing 50% in the next ten years. While grid power is widely available, electricity is getting even more expensive, fuelling appetite for renewables and energy efficiency. Energy assets are likely to be owned by Thailand’s towercos, but utility costs will be a pass through.

2,150 transferred from Dialog, Axiata’s local opco, have been transferred to edotco Sri Lanka, representing a little over 30% of the country’s 7,000 towers. While TowerXchange have yet to study Sri Lanka in detail, we understand that cellsite densification for LTE is driving demand for infill sites, camouflage towers and IBS.

Golden Towers, a member of the Alcazar Capital family, has embarked on a rollup play in Vietnam where approximately 10,000 of the country’s 55,000 towers are in towerco hands. Opportunities for tower manufacturers and TI firms are phenomenal in a fast growing tower market that some commentators have estimated is adding more than 11,000 towers and tenancies per year – that’s about twice the rate of Myanmar! Towerco rollups will keep advisors and investors busy now, in the longer term the restructuring of the MNO market could create SLB opportunities. Grid power is extensive and reliable in Vietnam and power is a pass through, so any backup power solutions are retained by MNOs. Battery performance would be improved by more widespread use of RMS. It’s early days for small cells and DAS but that may change under 4G.
Brief commentary on Asia’s less active tower markets:

- Afghanistan: Frontier Towers runs ~1,500 towers for Afghan Wireless and Etisalat and MTN attempted to create a joint venture towerco, but IHS weren’t interested. No immediate opportunities for tower industry growth, therefore TowerXchange has yet to study the market in detail.

- East Timor: Too small to provide the necessary economies of scale to tower companies, therefore TowerXchange has yet to study the market in detail.

- Japan: Tough market for foreign investors, and minimal tower activity, therefore TowerXchange has yet to study the market in detail.

- Laos: Seldom mentioned in rumors of potential tower deals, therefore TowerXchange has yet to study the market in detail.

- Mongolia: No immediate opportunities for tower industry growth, therefore TowerXchange has yet to study the market in detail.

- Nepal: Despite infrastructure sharing being leveraged to accelerate post Earthquake recovery, we’ve seen no mention of potential tower activity.

- North Korea: Impenetrable to a Western research firm like TowerXchange, and probably impenetrable to foreign investors!

- Philippines: No immediate opportunities for tower industry growth, therefore TowerXchange has yet to study the market in detail.

- PNG: Too small to provide the necessary economies of scale to tower companies, therefore TowerXchange has yet to study the market in detail.

- Singapore: Market considered both too small and too mature for towercos, therefore TowerXchange has yet to study the market in detail.

- South Korea: No immediate opportunities for tower industry growth, therefore TowerXchange has yet to study the market in detail.
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 activity. From static asset manufacturers to RMS and turnkey solutions providers to hybrid energy solutions, these companies play a critical role in ensuring the 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 TowerXchange Meetup in Singapore this November.

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www.towerxchange.com
An integrated approach to telecom site security

ABLOY’s expansion in the telecom tower industry

ABLOY is one of the leading manufacturers of locks, locking systems and architectural hardware in the world. They are also a leading developer in the field of electromechanical locking technology. The company has been providing security locking solutions to telecom companies globally since the early 1970s, with increased presence in the Southeast Asian market since 1987.

With the evolution of the telecommunication industry, the company has also streamlined its product offering and developed new locking solutions using the latest technology available to meet the challenging demands of providing telecommunication services to end users. In this interview, Edward Lee, Business Development Manager for Abloy South East Asia and Alan Goh, Business Development Manager for Abloy OY (Finland) introduce the company, its footprint, products and strategy in relation to their security solutions and services in the telecom tower industry.

Keywords: Abloy, Southeast Asia, Interview, Access Control, Urban vs Rural, Fuel Security, Site Visits, Shelters, Fencing, Batteries, Diesel Generators, MNOs, China, Singapore, Bangladesh, India, Philippines, Thailand

Read this article to learn:
- Abloy's footprint and client base
- Key security issues in remote telecom sites and how to solve them
- Abloy's cutting edge solutions integrating mechanical and electronic technology
- The need for a change in mindset: a joint approach to site security

TowerXchange: Could you introduce us to Abloy? Which countries are you active in?

Edward Lee, Business Development Manager, Abloy South East Asia: We are a Finnish company, and we are a leading manufacturer of electric locking systems and architectural hardware. We develop easy to use locking solutions to satisfy the needs of end users. Abloy has a global presence spanning over 90 countries in all continents. Our presence in Asia is represented by our direct sales offices in China, India and Singapore where Singapore is the regional co-ordinating office for the Southeast Asian market.

TowerXchange: Who are your main clients?

Edward Lee, Business Development Manager, Abloy South East Asia: Our main clients are in the high security and infrastructure segment where we provide solutions to professional end users such as banks, government institutions, transport and logistic companies. Essentially, we supply to installations with a wide network of applications including utilities and telecommunications companies. In the telecoms industry we work primarily with the operators. Telecom tower companies is a relatively new concept in Asia for us, although securing telecommunication equipment has been one of our major strengths. The route to market has changed and we look forward to grow as a partner of choice with all telecom tower companies, as we believe we have the technology, know-how and capability to service them.
TowerXchange: What kind of security issues is the region exposed to? And how can Abloy help solving them?

Alan Goh, Business Development Manager, Abloy OY (Finland): Security issues that our telecom clients usually encounter are related to the size of their operational sites; managing the various groups of people and individuals with access to them. They need to integrate an efficient locking mechanism into their current processes. Often many of these sites are in remote areas and they are subjected to harsh environmental conditions and they need to ensure that these sites are well secured and also when they need to be accessed, they have to be certain that the locks will work when access rights are granted. Over the years, our clients have continued to choose and recommend Abloy as their preferred security locking solution partner.

With regards to remote sites, these are high risk areas and most of these sites hold very expensive and important equipment and consumables that are required to keep the site itself operational. Hence, they are subjected to theft and pilferages with most incidents resulting in loss of fuel, cables, generators and batteries, often rendering the sites non-functional, resulting in performance downtime for the clients. A reliable locking solution, enhanced with technology and process management – which Abloy offers, creates a stronger barrier and resistance for intruders and saboteurs.

TowerXchange: How does the demand for security solutions differ between Asian countries? And between Asia and other regions Abloy serves?

Edward Lee, Business Development Manager, Abloy South East Asia: Currently, our primary business clients are telecom companies located in India and Bangladesh. Other countries, where our locks have been deployed in traditional landline installations, such as Philippines, Thailand and Singapore are exploring and starting to move towards the independent towerco model. We understand very well, that every country has their own culture and management processes, and hence we know that it is very important to customise our products and solutions according to our customers’ specific requirements, and not roll out a standardised model across the region.

Most of the sites we serve in Bangladesh are located in remote areas, although we do operate in urban areas as well. In the city there are many options for protecting expensive equipment. For instance, some telecom companies store their equipment in residential areas near the site rather than on it. Remote sites have limited options.

In India, our focus has been on mobile network operators rather than tower companies. A tower company runs a site with two or three network operators, and each of the them contracts us individually to provide a locking solution for their equipment. We are working towards getting tower companies to understand the importance of a consolidated security system, taking into consideration that each tower is likely to have...
multiple vendors. We are also learning how we can work and collaborate more effectively with tower companies in this region. The opportunity to network with key players in the tower industry through TowerXchange Meetups is extremely useful to us.

**TowerXchange: Why have tower companies been slower to adopt your solutions?**

Alan Goh, Business Development Manager, Abloy OY (Finland): There are probably a couple of reasons. One would be that tower companies are unaware of our solutions, as our brand has traditionally been associated with mechanical locking, although they are highly reliable and secure. We welcome the towercos to experience our high-tech electronic locking solutions. Secondly, towercos currently rely on operators to each adopt a locking solution for their own equipment, whereas we firmly believe that there are many advantages to be enjoyed with a joint approach to site security. We are most willing to discuss further with the towercos and deploy pilot trials with them to understand how they can save on operational costs over a specific period of time and the possibility of monetising their investment in our solutions.

**TowerXchange: What are telecom companies typical requirements for site security?**

Alan Goh, Business Development Manager, Abloy OY (Finland): We offer many different security products for telecom companies, and these are usually tailored to fit the needs of each individual customer. Most of our clients in the telecommunications industry have been purchasing our master key solutions and some are using electronic locking solutions.

Mechanically, Abloy’s patented and controlled key profile with detainer discs technology is bump proof and virtually pick-proof. Our high product quality and reliability is also ideal for harsh environmental conditions. Not forgetting the endless master-keying capabilities from our comprehensive range of locking products that include padlocks, door cylinders, cam-locks, cabinet locks and key deposits.

To further enhance the mechanical solution, our electronic technology known as CLIQ provides more flexibility in key control for infrastructure projects which are geographically dispersed.

CLIQ technology allows for audit trails so you can see events and times of occurrence from all locations. Easy-to-change access rights are based on time and calendar; e.g. enabling cleaners to be automatically granted access only at predetermined times. CLIQ technology provides unique identification for every opening through encrypted communication. The integration of mechanical and electronic technology is double-checked and secured with Abloy Protec2 CLIQ wherein the CLIQ technology is further tested on top of the mechanical durability and resistance force of our product.

However, if our client wishes to have an immediate communication with various sites, Abloy’s electromechanical locking solution can offer a variety of monitoring signals to inform the security system of the status of the site. Setting the lock to fail secure is a plus point in terms of power consumption. With this setting, the lock does not consume any power at all unless an authorised user presents his or her card to gain access. As such, our electromechanical lock is “greener” for the environment, creating savings in power consumption versus other locking devices that require constant power supply to them.

Testing standards have been raised and Abloy electromechanical locks are tested not only for their mechanical durability and resistance. The individual electrical components encased in our electromechanical locks are tested as a complete unit under the new EN14846 standard, where a complete test is done instead of testing the component parts separately, thus ensuring the best product life cycle of our electromechanical locks to our customers.

**TowerXchange: Did the entrance of towercos in the telecom industry change the way Abloy works? And if so, how?**

Alan Goh, Business Development Manager, Abloy OY (Finland): We understand that telecom companies are divesting their assets to tower companies and we have to adapt our business approach to reach out to attract new clients; namely the towercos. There is likely to be exponential growth and we are quite excited about this. Abloy is ready to ride on the wave of opportunities in this fast developing sector, by partnering closely with towercos to implement the best possible high-tech electronic security locking solution for them.
HOW TO COMBINE HIGH SECURITY AND EASY ACCESS?

ABLOY PROTEC2 CLIQ is secure and easy-to-use access control system. PROTEC2 technology takes care of the mechanical security while CLIQ features allow flexible control of keys, access rights and audit trail. If needed, mechanical locks can still be used as part of the system while maintaining the benefit of having just one key per keyholder.

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www.abloy.sg

Electronic Traka Touch key management system ensures that the keys are in the right hands.

Access rights can be managed remotely with CLIQ Web Manager.

Keyholder can update access rights using WallPD, MobilePD or mobile application.

Time and date based access rights are stored in the key. Accurate audit trails.

Products include padlocks, door cylinders, cam locks, cabinet locks and key deposits.
Cell site security and access control problems?
There’s an app for that!

Acsys has designed and successfully deployed a solution called the CGS (Code Generating System) which allows control centers (such as a telco or towerco’s NOC) to give users with programmed keys access to any site, anytime, anywhere by issuing a single-usage time-limited code that is issued by the software. The user needs to contact the control center by phone or SMS to get the real-time code which in turn alerts the control center that someone is accessing the site. The advantage of the Acsys CGS solution is that any phone can be used, making its application universal.

Keywords: Access Control, Monitoring & Management, Fuel security, Health & Safety, KPIs, Site Visits, RMS, Site Management System, Fencing, Africa, Acsys

Read this article to learn:
- Issuing a single usage, time limited code enabling specific users to access sites using programmed keys
- How to “close the loop” on task management and job ticketing, reducing downtime
- Live chat and access to document repositories to enhance remote worker support
- How customers are using the app to minimise theft, generate KPIs and optimise maintenance processes
- Sharing critical information and images with emergency services to improve H&S

TowerXchange: Tell us about your new app David.

David Meganck, Founder and COO, Acsys: With the rapid proliferation of smart phones, and their lowered costs, and based on the demand of some of our customers, we saw the opportunity to create an app that integrates the CGS into a smartphone app and some added features which are very useful for remote site workers.

One of the significant features is the geo-location or geo-fencing solution. This allows the system to be run automatically and only generate access codes if a user has reached a specific location defined by latitude and longitude. This function also allows the control center to know in real-time where the users are located which can be of very significant value when a site is down and an assessment needs to be made on who is closest to the site and certified for that type of maintenance.

TowerXchange: What other functionality does the app have?

David Meganck, Founder and COO, Acsys: Based on customer input, we also added several other features.

Task assignment, scheduling and reporting - whenever an event is created through the remote site management platform, the user will receive a message with a clear description of the task, location and others. Multiple tasks can be assigned to a user. Upon completion the user can report back to the NOC with the result of his work allowing the NOC to either close or leave the event as pending.
Optionally a dynamic solution can be proposed which, after the creation of the event, the software will determine which available and certified user is closest to a site which is down, leading to an intervention and a significant decrease in downtime. We have often seen that some people travel one hour to get to a site when in fact another technician was only 15 minutes away leading to a waste of resources and increased downtime.

**Event documenting** - events can be documented through picture taking (for example in cases of broken or vandalised equipment) and to document events from the site such as broken trees, floods, fires et cetera. With time, date and location stamp information, this data is genuine, reliable and impossible to defraud.

**Live bridge between user and NOC** - the app also has a chat platform allowing the user to communicate directly with the NOC and other users of the app to get information and advice.

**Document repository** - allowing the user to access data sheets for new equipment and/or other documents that are stored on the company intranet.

**TowerXchange: Please tell us about one of your customers who are using the app.**

David Meganck, Founder and COO, Acsys: Our first customer was mostly interested in the geo-fencing solution as they had dealt with a number of cases where a user gained access to a site and then left without closing it, allowing others to gain access and steal equipment. With the geo-fencing and CGS, the NOC now has real-time feedback of where the user is, and also can control when the user opens and locks a site.

In some cases the company required a vendor to go on site but they arrived only within the limit of the two hours as specified by contract when in fact they could have gone much sooner as staff were available, but since the NOC didn’t know where those staff were and if they were available they had no data on which to base a conversation about improving service with the vendor.

The task scheduling was also a significant step forward as many times issues arose with users going to the wrong sites or carrying out the wrong tasks as communication over the phone wasn’t good, leading to misunderstandings.

As a prominent company in the telco industry, they also felt they had a moral obligation to ensure staff security by knowing where they are. If a member of staff doesn’t move for three hours even though his maintenance task should only take 45 minutes, the NOC knows there might be some issues with the site or the user himself. Moreover the data which is created serves as a benchmark for future interventions in terms of time spent to reach site, and time spent to complete a recurring task.

**TowerXchange: How does the app integrate with site management and job ticketing systems back at the NOC?**

David Meganck, Founder and COO, Acsys: It can work fully independently or fully integrated. The integrated version (ex with Remedy) gives a full and clear reporting of who was assigned to the task, when, where this user was located, when he requested access to get in, when he requested access to get out and how much time was spent on site. By making everything electronic, we also prevent collusion between employees.

**TowerXchange: What does it cost?**

David Meganck, Founder and COO, Acsys: In order to lower barriers so that everyone can use the app, we have decided to make the app free of charge and available to the public on the Android store starting 1 November 2013.

**TowerXchange: How does using the app improve health, safety and security at emerging market cell sites?**

David Meganck, Founder and COO, Acsys: By providing real-time location and location-based code generation we are able to improve operational efficiency in a significant way allowing for more efficient, controlled and rapid response to events. This data in turns serves to create KPIs and benchmarks for similar interventions in the future.

Equally the NOC is now able to see where all their workers are and in the case of conflict or emergency, the NOC can provide support to the user and/or send emergency services to the user’s location. By allowing pictures to be sent to the NOC instantly, events can be acted upon in a more efficient way.
SECURITY & WORKFORCE MANAGEMENT SOLUTION

DETERMINE WHO GOES WHERE, WHY, WHEN, FOR HOW LONG & IN REAL-TIME

WORKFORCE MANAGEMENT
ACCESS CONTROL
TIME & ATTENDANCE

info@acsy.com

www.acsys.com
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 their data, making the solution ideal as companies scale their operations across multiple regions and countries. In this latest in 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 towercos or MNO.

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

Read this article to learn:
- Accruent’s position in the telecom ecosystem and global footprint
- How Siterra helps manage the full tower site life cycle
- How Siterra enables working with subcontractors
- The benefits of a SaaS site management platform

TowerXchange: Please introduce your company – where do you fit in the telecoms infrastructure ecosystem?

Kevin Reichle, General Manager of Telecom, Accruent: We have developed an enterprise Software as a Service (SaaS) product for tower companies which encompasses lifecycle management tasks like site construction, help with 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 Mobile Network Operators (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-location. What makes our company unique is that it has the capacity to manage the entire process from marketing through to fulfilment and 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 in the field – who is using it and what results have been achieved?

Kevin Reichle, General Manager of Telecom, Accruent: Our solution has strong credibility in the market. Thirteen of the top 121 tower companies...
listed by Tower Xchange are already current Accruent customers. At present, we operate in 12 countries across five continents and have a particularly strong focus for 2016 in the Asia Pacific region. One of our largest strategic customers is based in Australia and we are actively prospecting in other Asian markets including China. We are constantly adding new portfolios for our current customers and carrying out implementations in multiple countries.

At first, many of our clients purchase the 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 including reporting, colocation, license management, project management, vendor management, and site-centric systems.

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 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?**

Kevin Reichle, 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 customer may want to get information on the amount of available space on a tower, or they may wish to inform tower companies of exactly what’s available on a tower in a particular city or region. They will be able to do all of this through our portal.

Our solution can also be used to support contract and service provider management – in fact, it has practically unlimited uses.

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 show that it has completed its operation. 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 towercos’ unique business processes and workflows?**

Kevin Reichle, 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 platform is also fully configurable so customers can adapt it to meet their specific requirements.

In fact, we’ve 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
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 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?

Kevin Reichle, General Manager of Telecom, Accruent: The main benefit comes in being able to understand the condition of the assets. Being able to keep track of inventory is another benefit, particularly for large, international tower companies. Smaller companies, on the other hand, are looking to maximise their tower valuation for strategic buyers so that is 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 equipment.

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?

Kevin Reichle, 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. Of course, our professional services and customer teams are always available if needed, but we are strongly of the opinion that our customers should not be dependent on us for their daily business needs.

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.
Drive accountability and quality assurance into every project executed with proof of task completion. With Siterra, you can manage the entire lifecycle of sites and equipment from construction to maintenance and decommission.

➢ Colocation management
➢ Asset management
➢ Site management
➢ Project management
➢ Business intelligence

Contact us for a demo at sales@accruent.com
The maturation of the telecom power ecosystem toward power as a service

How Cummins provide reliable power with the lowest TCO and optimised capex

As a trusted name in the power generation industry for its diesel generators for a wide range of industrial applications, Cummins Power Generation also provides state of the art hybrid power solution to telecom cell sites. Alan Zhao leads Cummins dedicated global team serving the telecom cell tower industry. In a career spanning 28 years, Alan held various technical and business roles at Cummins and at Motorola where he managed their 2.5G, 3G and 4G advanced technology development programmes. Currently Alan is Director of Cummins’ Telecom Business, a role which he says combines his passion for telecoms and growth segments in energy industry.

Keywords: Who’s Who, Energy, Opex Reduction, Capacity Enhancements, Business Model, Uptime, Off-Grid, Unreliable Grid, ESCOs, Hybrid Power, LPG, Retrofitting, Dimensioning, Procurement, RMS, Spare Parts, Infrastructure Sharing, Africa, North America, South America, Asia, Ooredoo Myanmar, Cummins

Read this article to learn:
- Evolving toward a situation where MNOs and towercos don’t have to think about power
- The trade-off between energy efficiency, capital cost and time to market
- The need for greater transparency on towercos’ TCO criteria and multi-tenant business models
- Cummins’ appetite to provide ‘power as a service’

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

Alan Zhao, Director – Telecom Business, Cummins Power Generation: To better define where Cummins fits in the telecoms ecosystem we must first understand what makes up that ecosystem:
- Active equipment, which includes revenue-generating infrastructure such as electronics, antenna and controls;
- Passive or enabling infrastructure, which includes real estate, tower structures, power equipment and utilities.

Cummins is a global leader in power generation. We leverage our tradition of reliable, dependable power in partnering with MNOs and towercos to better understand their specific KPIs, providing a unique value proposition; achieving the lowest Total Cost of Ownership (TCO).

Traditionally Cummins has been associated with our market-leading diesel generators, but we also have a complete range of hybrid product offerings specifically designed for telecom site application. This wide range of product offering allows us to provide the right solution for our customer's specific capability requirement.

TowerXchange: How do you see the role of power companies evolving if one end of the spectrum is pure upfront capex sales, and the other extreme is a pure opex business model where power is provided as a service?

Alan Zhao, Director – Telecom Business, Cummins

TowerXchange Asia Dossier 2015
Power Generation: From the perspective of companies like Cummins and our peers, the pure capex model is the lowest risk approach. But the critical question is what does the end customer want from a power perspective?

As a provider of power equipment, Cummins finds itself in a unique position to be able to assist our customers in optimising capex to reduce opex. Again, at Cummins we don’t see ourselves to be aligned to either extreme. We have relied on our vast experience in designing, engineering and manufacturing superior power products to align to the needs of our customers and their KPIs, whether their focus is on capex or opex.

As the industry and our customers continue to evolve, it is incumbent upon providers such as Cummins to evolve along with them. However at this stage, I don’t think the telecom power industry have fully understood or agreed on the real operational risks and challenges in providing that basic, reliable power infrastructure. Because of that lack of agreement and understanding, you get a very different view from different players in the telecom power industry. So at the moment I don’t believe we have a healthy ecosystem to go to the extreme ESCO end of spectrum of where end customers don’t have to think about power and ESCOs provide it as economically as possible.

TowerXchange: Coming back from studying the rollout in Myanmar, it seemed to me that energy efficiency is being traded off against time to market – is that a familiar scenario?

Alan Zhao, Director – Telecom Business, Cummins Power Generation: Yes, we’re very familiar with that scenario. Given the maturity of the business cycles and economies in certain geographies, optimising energy efficiency and time to market may be conflicting priorities. It’s something which we’re experiencing right now in Myanmar. Even though renewable hybrid is more energy efficient, traditional power sources are taking priority in some cases owing to their fast deployment.

We have to understand that Myanmar is a country where first hurdle is to make the power available. Only after power is accessible does having higher efficiency solution become relevant.

The tradeoffs of energy efficiency against expediency is a complex one. But our success is measured by a simple question: do I have power? We know that our customers and their subscribers want a communications vehicle that is ubiquitous. Reliable power is vital to maximising availability and ubiquity.

TowerXchange: Tell us about Cummins’ footprint in emerging markets – do you have any idea how many cell sites are using Cummins solutions for backup or primary power?

Alan Zhao, Director – Telecom Business, Cummins Power Generation: Cummins is usually number one or two in market share in each of the regions in which we operate. We understand telecom customer’s needs, and traditionally have been very strong in larger applications such as BSC, MSC and data centres. In last few years, we have made big strides in lower power load scenarios like cell towers. Our customers, like Huawei, now rely on us as their one-stop shop for all their power needs including for cell sites, MSC, BSC and data centres.

Our footprint in emerging markets is substantial. For example, we’re a preferred vendor for Ooredoo Myanmar – we’re shipping several hundred generators. We have invested significantly in Africa and as a result we are currently executing
The definition of TCO is not consistent and clearly agreed upon by different stakeholders like towerco, opcos and their equipment vendors. In particular, the time horizon over which energy equipment investments are evaluated is seldom clear.

TowerXchange: How has the entry of independent towercos into Africa, LatAm and Asia affected your business? Given their aggressive SLAs, how do towercos' requirements differ when it comes to UPS?

Alan Zhao, Director – Telecom Business, Cummins Power Generation: Not all towercos have the same business model. For example, some towercos may have traditionally considered power as a potential vulnerability for their business, which may lead them to operate in markets where grid power is more reliable. On the other hand, others who operate in emerging economies where a reliable grid may not be available, power is a much greater concern. Therefore Cummins offers different solutions and strategies to meet those differing business models.

TowerXchange: How do you efficiently upgrade the power solution at a single tenant site to accommodate multiple tenants?

Alan Zhao, Director – Telecom Business, Cummins Power Generation: Looking at today's radio technology, adding one more BTS may not create much of a power rating issue – we can easily deal with that. Again, this all goes back to understanding the customer's business model. Tenancy ratio generally is a key indicator of profitability as it relates to revenue generated per tower site. As a provider of power solutions to our customers, we must understand the customer's business today, what are their current and future power requirements, how they intend to grow and at what rate, and then size a solution that operates efficiently, both in the short term and future.

TowerXchange: Is the in-built RMS capabilities of your solutions an alternative to third party RMS sensors, or a complimentary data feed to be integrated into a consolidated view of different systems at a cell site?

Providers. Much of the information around cell site power is very proprietary, which I understand, but the lack of transparency creates inefficiencies as we attempt to move the industry to a healthier ecosystem. As an industry we need to be more standards driven, and more transparent about how we define the “Total” in TCO, in a given context.

Our generators have been installed at cell sites for MNOs like Telenor, Vodacom and STC, and we have also done several projects globally with Huawei.

I can't give you the exact number of sites; it's hard to get to that level of granularity at our volumes. But I can say that we work through 6,000 service locations, with distributors in 190 countries.

TowerXchange Asia Dossier 2015 | www.towerxchange.com/meetups/meetup-asia152
Alan Zhao, Director – Telecom Business, Cummins Power Generation: Cummins provides hybrid energy solutions with a built-in remote monitoring capability. We offer flexibility to integrate with existing sensors in the case of brownfield sites. Additionally we offer a complete Cummins solutions with new sensors for Greenfield sites. As an example, we integrated a third party data feed with our solution per request of our customer in Myanmar.

In my view, sensors are just enablers of RMS. Remote monitoring may lose its value if it is not leveraged as a toolset for opex reduction. Remote monitoring offers little value in its own right; people don’t want 20 more emails, they just want reliable power! So Cummins differentiates our solutions by leveraging remote monitoring information, and combining it with local service support to enhance our ability to provide reliable power.

TowerXchange: Finally, please sum up how you differentiate Cummins from other solution providers in telecom power?

Alan Zhao, Director – Telecom Business, Cummins Power Generation: I’d like to sum up Cummins’ differentiation in three broad categories:

1. Cummins’ superior product and features: The reason we’re number one or two in most markets is simply because we have a better, more reliable product, and our customers vote with their pockets. You can count on Cummins to continue to provide that level of product differentiation.

2. Cummins’ value add: Cummins offer the best warranty on the market; it’s longer and it offers better coverage. The customer has a single point of contact with Cummins and can avoid confusion over accountability of service and warranty issues. Power relies on strong service and parts availability, and Cummins’ global service network helps telecom companies in 190 countries, from over 6,000 service locations. Cummins has achieved unrivalled success in international markets because we know what it takes to support our customers.

3. Cummins’ financial stability and scale: Almost all telecom companies are global in nature, with a need to serve customers globally without having to add 50-100 suppliers to manage all this complexity. A global company like Cummins can leverage our financial strength to help give OpCos peace of mind. It’s hard for smaller regional companies to match the stability and financial scale Cummins has, which enables us to deal with the maturation toward power as a service at a global level. Too often there is a mismatch between what aspiring ESCOs want to be and their financial strength. Cummins don’t take risky steps we can’t stand behind; if we do something we have the strength and scale to stand behind it.

Cummins look forward to continuing to work with TowerXchange to provide the information necessary to transform the telecom industry and the telecom power industry. I feel the challenges are less at the level of exciting new technologies, but more work needs to be done at an operational business level.
Meet our hybrid power line-up.

For cell site operators, tight control of total cost of ownership and capital expenditure is vital to profitability. Cummins Power Generation’s hybrid power solutions answer the challenge. Our innovative, modular generator-battery-solar systems use load-based charging technology to maximize efficiency and reduce fuel consumption, so delivering lowest TCO while optimizing capex.

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Cue Dee brings tried and tested features and functionality to the field

Leveraging 20+ years of experience in telecoms infrastructure to develop a versatile and cost-effective solution

TowerXchange asked Patrick Hedlund, Business Development & Key Account Manager at Cue Dee, to explain the quality differentiators of their flagship product, the X-Tower, and the benefits of standardised solutions versus custom-built towers.

**Keywords:** Africa, Alcatel Lucent, Al Madar, Asia, Asset Lifecycle, Capacity Enhancements, Ericsson, Globe, Huawei, Infrastructure, Sharing, Installation, Loading, Masts & Towers, Méditel, Procurement, Retrofitting, Steelwork, Tower Design, Tower Manufacture, Who’s Who

Read this article to learn:
- Cue Dee’s background, global footprint and partner ecosystem
- Cue Dee’s past deployments and plans for the future
- How the X-Tower delivers a versatile and cost-effective solution
- Cue Dee’s approach to custom tower design and manufacture

TowerXchange: Please tell us about your company.

Patrick Hedlund, Business Development & Key Account Manager, Cue Dee: Cue Dee is a manufacturer of telecoms towers including guide posts, antenna brackets, and wind measurement devices. We were acquired in April 2015 by the Lagercrantz Group, which is active in seven countries in Europe and in China and the US. The Group has more than 1,200 employees and revenue of approximately US$375mn. The company has been listed on Nasdaq Stockholm since 2001.

TowerXchange: Please tell us about where you fit in the telecoms ecosystem?

Patrick Hedlund, Business Development & Key Account Manager, Cue Dee: We mainly work with Mobile Network Operators or systems integrators like Ericsson, Nokia, Huawei and Alcatel Lucent.

During 2013 CUE DEE and Elektroskandia decided to take the existing cooperation to the next level. Elektroskandia Shanghai has taken over production of CUE DEE’s popular X-Tower system. This was a natural step since the big markets today are in Asia and Africa where Elektroskandia has a strong presence. CUE DEE has retained ownership of the X-Tower system and will still develop and market it, but the production will be handled by Elektroskandia Shanghai.

We hope that this intensified cooperation will bear fruit and that we will be able to better support our
customers. Our sourcing plant in China has a high capacity and they also have supply brackets. We also have access to a local logistics company that has a 95% equity in deliveries.

**TowerXchange: Can you give us some examples of successful deployments? Which markets were they in and who were you working with?**

Patrick Hedlund, Business Development & Key Account Manager, Cue Dee: We have done a lot of work in Africa; for starters we supplied Al Madar the largest operator in Libya with towers for 1,100 sites over a period of eight years with integration undertaken by local companies. In Morocco we provided 238 towers to Méditel, In total we supplied to over 80 countries globally. These towers were adapted to the individual markets and demands of the sites, and they were all greenfield developments. In Asia some projects have included providing towers to Ericsson for Globe in the Philippines and some projects in Taiwan as well.

**TowerXchange: What are some of the key differentiators of Cue Dee’s towers?**

Patrick Hedlund, Business Development & Key Account Manager, Cue Dee: We use an optimised design, the X-Tower system, which incorporates a wide range of features and specifications that meet most Mobile Network Operator and towerco requirements.

The towers range in size from 20m to 60m, and they come in 4m segments so they can be scaled to meet the needs of the site. We use high quality galvanised steel, and only solid material instead of tubes to prevent corrosion. The towers are stable and resilient, and optimised to withstand winds of up to 200km/h. Our standard model will hold one tenant with an area from 5 to 15 square metres; they are lightweight, easy to install without a crane or helicopter, and have a small footprint. The X-Tower can also be outfitted with other features such as climbing barriers, lightning rods, booms, top spires, fall arrest system, obstruction lights, brackets, etc.

Offering standardised towers enables us to deliver the most cost-effective solution for most instances, and they can be rapidly deployed, reducing time to market. We also have some other types of smaller-scale standardised towers including rapid-deployment units (RDUs) and cell sites on wheels (COWs) for specific scenarios such as live events.

**TowerXchange: Do you also offer customised solutions for scenarios where the standard model doesn’t work?**

Patrick Hedlund, Business Development & Key Account Manager, Cue Dee: Yes, we also provide custom-built towers in cases where the tower needs to carry heavier loads, when they need to hold more than one tenant, or when a backbone tower is required. Customised towers are generally for smaller projects, for example a special order from an MNO when they have a specific requirement. We start off with a brief and calculate the materials required, the cost and the time requirements and what kind of time to market can be expected. We design everything from the base up and optimise it using TNX and RSTAB, analysis software for 3D steel structure calculations.

**TowerXchange: What can we expect next from Cue Dee and the X-Tower?**

Patrick Hedlund, Business Development & Key Account Manager, Cue Dee: As we continue to leverage our 20+ years of experience in telecoms infrastructure, we’re constantly looking at new ways to adapt our products. As we expand our global presence we’re moving beyond the remote sites in less developed markets. Now we’re looking at some of the more dense markets in Asia and developing new models that incorporate features like multiple tenancies as standard to meet their unique requirements.
Eltek on challenges and opportunities 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 Kenneth Bodahl and David Leal to find out Eltek’s stance in the Asian market.

Keywords: Who’s Who, Meetup Preview, Energy, O&M, Opex Reduction, Batteries, Fuel Security, Business Model,ESCOs, Hybrid Power, Renewables, DG Runtime, Procurement, Site Visits, Skilled Workforces, RMS, Africa, Myanmar, Eltek

Read this article to learn:
- Where Eltek see their role within the all-Asia opportunity
- Poor grid markets such as Myanmar, Bangladesh and Pakistan
- The opportunity for Eltek in Myanmar and the involvement of the Norwegian trade mission
- Green deployment in Myanmar

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 Sales President, APAC, Eltek: Eltek have been the number one power vendor for all major MNOs in the Asia region over the last ten years. We pride ourselves on providing our customers with reliable solutions using state-of-art technology, including high efficiency and density.

Eltek works closely with all key MNOs in the region including Singtel’s, Axiata’s and Telenor’s companies providing DC power solutions from base station power to mobile switching centres throughout their network.

We have also been leading the way in green solutions thanks to our solar hybrid products for off grid sites and for sites connected to unreliable grids.

TowerXchange: Talk to us about some of the more challenging grid markets where you operate such as Myanmar, Bangladesh and Pakistan

David Leal, Regional Sales 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 poor infrastructure, vandalism and political instability.

We work closely with our customers to provide
alternative power solutions to those sites which have grid issues to ensure their uptime requirements are met at the lowest possible cost. In this process we also test and evaluate third party products that work with our solutions to ensure what we have proposed will solve the customer's problems. We believe in a “win-win proposition” with our customers and that all problems can be solved!

TowerXchange: What has been Eltek’s experience of opening the doors to do business in Myanmar? How has the involvement of the Norwegian trade mission facilitated that?

Kenneth Bodahl, EVP, Business Development, Eltek: Myanmar is currently the highest profile development country in the region. It provides opportunities to all vendors but the amount of challenges it includes are also great.

Prior to the official award of the licenses, we had had deep discussions with our many partners and customers on the rollout plans including towercos, ESCOs, OEMs and MNOs. It’s a challenging place to do business due to the current political reform, its geography and issues with local material procurement but despite all of this, we see great promise.

Yes, since Eltek is a Norwegian company we have been working with the Norwegian trade mission and focused on developing Myanmar. We had built a Solar Hybrid system which was donated to the Green Economy Green Growth, GEGG-Myanmar Association. This solution was installed at the Myanmar Scientific and Technological Research Department in Yangon. The grand opening was in December 2014 which was attended by the Norwegian Royal family.

TowerXchange: When TowerXchange visited Myanmar in spring, there was a general assumption that off-grid sites would rely on DG or DG and batteries. It now looks like the local industry is going straight into green power. What has been your experience?

David Leal, Regional Sales President, APAC, Eltek: The initial rollouts are all in cities where the grid is available and all the vendors are rushing against tight rollout deadlines in order to meet MNOs’ launch dates.

In spite of the fact that we are receiving more and more RFPs on green solutions, the actual deployment remains slow and we put this down to the fact that everyone is learning the challenges of doing business in Myanmar as they move forward. We do believe green deployment will be a long term reality in Myanmar so Eltek will continue in its investment in this area.

TowerXchange: Which model is going to be prevalent in Myanmar and beyond, in Asia? Upfront-capex or pure-opex? (as exemplified by Ooredoo’s shift from retaining power to sending out an RFP for an ESCO).

David Leal, Regional Sales 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 some of the new pop up companies will survive in the long term. From our side no matter which model is chosen, power is always needed so Eltek will always be there to support. We look forward to working with them all in light of Eltek’s slogan “Always On”!

Eltek will host a round table on ‘Technology verses cost in green deployment’ at the TowerXchange Meetup Asia, taking place on November 24 and 25 in Singapore. For more details, visit: www.towerxchange.com/meetups/meetup-asia
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How to achieve high 9s uptime at unreliable grid and off-grid cell sites

Improving efficiency and extending the lifecycle of gensets and batteries

Rectifiers, converters, inverters, chargers and controllers are often critical to the efficient operation and integration of multiple energy sources at unreliable grid and off-grid cell sites. One of the pioneers in this field is New Zealand developer and manufacturer Enatel, who you’ll find exhibiting at the TowerXchange Meetup on October 1 and 2. We caught up with Damien O’Regan to find out more about Enatel’s capabilities.

Keywords: Who’s Who, Energy, Opex Reduction, Batteries, Loading, QoS, Uptime, Off-grid, Unreliable Grid, RoI, ESCOs, Hybrid Power, Renewables, Solar, DG Runtime, Dimensioning, Outdoor Equipment, Rectifiers, Africa, Enatel

Read this article to learn:
■ How Enatel have overcome the consolidation of backup power to deliver high 9s uptime
■ How to optimise the relationship between the genset and batteries to extend lifecycles
■ The importance of modularity and scalability in meeting the different and changing requirements of individual sites
■ Designing systems that are pre-wired for the integration of solar

TowerXchange: Where do Enatel fit in the telecoms infrastructure supply chain?

Damien O’Regan, Global Sales Manager, Enatel Energy: We are a New Zealand-based energy equipment manufacturer. Enatel Energy designs and manufactures a range of rectifiers, converters, inverters, solar and wind chargers across multiple voltages for telecoms and industrial applications.

Enatel is made up of three divisions. Enasolar manufacture a range of grid-tied solar inverters whilst the Motive Power group supply a suite of modular, high efficiency fast chargers. These are able to automatically identify the types of battery connected over powerline and apply the necessary voltage and charge profile. A long association with leading battery manufacturers has been a crucial contributor in identifying industry challenges and driving charger innovation.

TowerXchange: What are your channels to market?

Damien O’Regan, Global Sales Manager, Enatel Energy: We are headquartered in Christchurch, New Zealand, with direct representation via an operation in Croatia who manage parts of Europe; with Enatel Shenzhen responsible for the domestic Chinese market. However our primary business model is one that identifies and supports highly capable local partners. The results and potential is evident, for example in one instance I worked with a distributor that grew from 3 to 200 staff, driven primarily by the demand for DC power systems.
Strong relationships are crucial in tailoring systems to meet specific requirements within local environments - Enatel supplies power modules and system building blocks for integration. Alternatively, turnkey indoor and outdoor solutions are available. Our designers and decision makers are only ever one call away - we maintain very high levels of engagement, support and training.

TowerXchange: What is the ‘sweet spot’ for Enatel’s solutions - on-grid, unreliable grid, off-grid? What’s the typical load?

Damien O’Regan, Global Sales Manager, Enatel Energy: Our typical applications have historically been grid connected standby power solutions where operators demand the highest levels of uptime. Demand and growth in emerging markets meant less grid dependence. Providing energy solutions for off-grid sites is a more recent challenge and one that allows us to apply innovative solutions to produce demonstrable and desired benefits.

Our portfolio can support any load requirements from a 100W to 100s of kW’s, but in a hybrid context we most frequently find ourselves supporting 1-3kW loads. Whilst it’s possible to go outside this, careful dimensioning and evaluation of economics is necessary.

TowerXchange: Has backup power become a commoditised market?

Damien O’Regan, Global Sales Manager, Enatel Energy: Within telco networks it’s a fair conclusion based on volumes supplied, system generalisations and dollar per Watt erosions over past decades. However, sufficient and sometimes significant differentiation can still remain, particularly with the emergence of niche applications and recognition of particular capabilities. Commodification risks ‘me-too’ products that fail to suitably meet industry principles and foundations. Systems may aesthetically and technically appear similar, but that’s largely a consequence of industry drivers. Clear distinctions normally exist at nuts, bolts and deliverables level. We’ve refused to compromise - the bottom line is we must be able to support and maintain high 9s availability.

Tower companies target uptimes between 2 to 4 nines (99% to 99.99%) which represent site downtimes of three days to one hour per year. For partial grid and off-grid sites, delivering higher nines goes beyond rectifier MTBF’s and design architectures. It must in combination also include capabilities that address application specific issues, for example, a dependency in diesel generator uptime, information insight and self-healing elements. The towerco model is attractive because of the focus on operators, where delivering QoS means that maximising site uptime is a natural caveat.
For CDC hybrids, fast recharge requirements can overload and stall generators. The DC power community addresses this by limiting battery recharge parameters, sequentially starting rectifiers and delaying aircon startups to avoid excessive inrush currents.

Increased emphasis must be placed on power conversion devices, particularly as their performance and management capabilities are instrumental in significantly extending lifetimes. Our SYNERGi solution automates and optimises energy generation. During installation, one needs to simply enter the generator nameplate kVA, push the start button to commence the commissioning charge - no further human intervention required to revisit and retune. It automatically caters for variables which may be due to tenants, altitude, wear, weather and diesel quality. It will regularly determine what parameters are required for optimum energy output and automatically adjust to maximise them.

TowerXchange: How do you integrate renewable energy and CDC batteries without placing excessive wear on the diesel generator?

Damien O’Regan, Global Sales Manager, Enatel Energy: The vast majority of all off-grid BTS outages relate to generator issues. Almost total site dependence can rest solely on a generator. For CDC hybrids, fast recharge requirements can overload and stall generators. The DC power community addresses this by limiting battery recharge parameters, sequentially starting rectifiers and delaying aircon startups to avoid excessive inrush currents. The relationship between the generator and cyclic batteries is critical - it necessitates tight but adaptive management. Each element is in continuous change within an environment that also never remains constant.

Increased emphasis must be placed on power conversion devices, particularly as their performance and management capabilities are instrumental in significantly extending lifetimes. Our SYNERGi solution automates and optimises energy generation. During installation, one needs to simply enter the generator nameplate kVA, push the start button to commence the commissioning charge - no further human intervention required to revisit and retune. It automatically caters for variables which may be due to tenants, altitude, wear, weather and diesel quality. It will regularly determine what parameters are required for optimum energy output and automatically adjust to maximise them.

TowerXchange: Is there still a place in the long term planning of cell site energy for diesel generators at off-grid cell sites?

Damien O’Regan, Global Sales Manager, Enatel Energy: Constant speed AC diesel generators have a bad reputation. Not totally without justification given obvious environmental and economic impacts, but it’s been unfairly compounded, particularly by 24/7 operation. There are already well proven and significant improvements available. Fundamentally this is still about efficiently moving and storing energy. We know a single litre of diesel can be converted into approximately 3 kWh of energy and a review of break specific fuel consumption data is a quick way of digesting generator actualities. Our objective was to develop a solution that was generator agnostic and addresses real-world challenges.

While tower operators should always be looking to reduce their dependence on diesel, present day realities mean diesel generators will be with us for a while. With a reduction in loads and other influencing factors, alternative generation and storage mediums will increasingly come in to play.

TowerXchange: Tower operators always want to know that suppliers are proven in emerging market contexts - what is your installed base in emerging markets?

Damien O’Regan, Global Sales Manager, Enatel Energy: We have many hundreds of thousands of products installed, with the majority in emerging markets. Our power modules have very high levels of protection beyond those you’d typically find.

Enatel was established in 2002 by the same team.
that founded Swichtec Power Systems, which was pioneering high frequency switch-mode power in telecoms during the mid-80’s. Swichtec grew rapidly and was supplying to the major Chinese operators in 1990s. We opened a large wholly owned facility there in ‘96. Swichtec’s products were recognised as being innovative, robust and there’s good reason you still see them operating in many networks 20 years later. Swichtec became the DC business within Eaton Corporation.

The original Swichtec management team and founding head engineer Dennis Chapman, started Enatel. All remain intimately involved.

Our initial hybrid systems were limited to mining and military contexts. Recent demand has increased and as a consequence, we are engaged in discussions regarding more significant projects.

**TowerXchange: Talk to us about how the challenge of hybrid dimensioning to meet the unique requirements of each site can be married up with the economic consideration where less customisation usually means less cost.**

**Damien O’Regan, Global Sales Manager, Enatel Energy:** The application of hybrid power is complicated, primarily due to the extensive variations within a site and across multiple sites. This has limited the wide deployment of ‘silver bullet’ solutions.

Inherent site variability means a hybrid conversion that works at one site, won’t necessarily work at all or as well on another. This can limit their successful deployment with time and cost complications. We see many sites dimensioned on the safe side to fit within particular capabilities. Such systems then risk being more about compromise, than optimise.

For us, addressing this variability was the catalyst in developing a unique dynamic solution which allows the expediting of multiple site deployments.

**TowerXchange: What specific parameters do you need?**

**Damien O’Regan, Global Sales Manager, Enatel Energy:** Average site load is most critical parameter and almost always assumed to be greater than actual. We look to utilise the existing generator if possible for cost effectiveness and significant operational potential.

We also need:

- Generator - size (kVA &/or kW rating). Is it generator only? 1 or 2 generators?
- Battery preferences (if any)?
- Are there site noise curfew requirements?
- Air conditioning/cooling requirements (if any)?
- Will the site require solar or wind? Is there any likelihood of grid?
- Fuel management?
- Alarm & communication requirements? Etcetera...

**TowerXchange: What’s the RoI in your systems?**

**Damien O’Regan, Global Sales Manager, Enatel Energy:** That’s always an interesting question. Within a CDC environment we can deliver an eight month payback, with a better than 80% DG runtime reduction and 70% diesel savings. However, whilst these numbers are all possible and others make similar declarations, the results remain highly dependent on existing configuration. Generally you can say between 12 and 24 months payback.

We developed a tool to anticipate benefits, which
helps to reveal tangible effects in making slight configuration adjustments to meet desired balances between CAPEX and OPEX. For example, it’s possible to see impacts of particular battery types, capacities and strings. What influence on lifetimes will introduction of solar have in that location? What are the fuel savings and delivery implications? It provides insight into what all the idiosyncrasies can equate to. Our primary objectives focussed on delivering a solution that produces the lowest OPEX and greatest uptime.

**TowerXchange: How do you design a solution to be scalable in the event that additional sharing tenants or new technologies are added to a site, without oversizing and incurring inefficiencies?**

**Damien O’Regan, Global Sales Manager, Enatel Energy:** One of the luxuries of our business is its inherent modularity and scalability.

The drivers and designs required to support multiple tower tenants are not totally unique. Almost two decades ago we saw similar requirements with LLU (local loop unbundling) deployments - where it was necessary to provision DC systems for the inclusions of multiple operators within enclosures and exchanges. This modular architecture has been part of telecoms power specifications since day one. The best results are most often realised by simple approaches and none are simpler. Its success is related to having the simplicity and scalability to meet periods of change and rapid growth while meeting QoS expectations.

Core to the architecture is a central 48v DC bus which allows for seamless integration of new tenants. This modularity intrinsically supports flexibility.

The DC power community continues to expand controller capabilities, where they nowadays are more representative of PLCs. They provide intelligence in managing modules and peripheral site infrastructure, such as climate control. Increasingly they are used for metering and load management. Functions such as our PowerSave, place rectifiers on standby depending on load, so regardless of variations, the system always maximises conversion efficiencies.

**TowerXchange: How can you ensure your systems are ready for the integration of renewables?**

**Damien O’Regan, Global Sales Manager, Enatel Energy:** Enatel’s solar business introduced solarreadyhomes.net; where homes are pre-wired to allow for more cost effective migration to solar, at such time home owners chose to do so. This has been successful and widely adopted.

We applied that same model to telecoms, making systems that are pre-wired for solar, so when you wish to integrate solar power, it’s an extremely simple process and the system will intelligently blend in this renewable energy source.

In comparison, retrofitting solar is more complicated, particularly if solar regulators are a type which cannot be intelligently controlled for optimal operation in combination with grid and generator inputs.

**TowerXchange: What do you see as the most exciting developments for the future of cell site energy?**

**Damien O’Regan, Global Sales Manager, Enatel Energy:** We naturally have huge interest in where energy storage innovation is heading. Bi-directional topologies also offer exciting possibilities. Various factors will ensure incremental efficiency gains. Our rectifier efficiency exceeds 96.5% and solar/wind chargers approach 98% - we continue to explore advancements and have demonstrated higher conversion efficiencies.

The mobile network is largely about ‘the great Outdoors’ and the inherent challenges this brings. Packaging variations will elevate robustness and address cooling challenges, especially in combination with hardened batteries.

Solar and wind will play increasing roles in everything we do.

Time is right for dialogue around ESCO models and we have some past experiences. The electricity price within a PPA will among many things be dependent on contract durations, risk skewing and site characteristics. Mitigating the risk is crucial. A PV spot price falling 70% over four years highlights potential exposures to volatilities.

It’s important we remain cognizant of energy trends and technology advancements; otherwise there
is a danger that we simply solve the problems of yesterday and not those of tomorrow.

TowerXchange: To sum up, how do you differentiate Enatel’s solutions from your competitors?”

Damien O’Regan, Global Sales Manager, Enatel Energy: We don’t outsource manufacturing - design, development, and build are all done in New Zealand. This allows us to be highly agile and collaborative. Our business model is proven. We have exceptional product reliability and unique functional capabilities which are testament to Enatel’s rapid ongoing growth.

We embarked on our hybrid path many years ago and during 2010 interviewed a number of key industry stakeholders, including the largest operators and towerco. This reinforced our committed and considered development efforts.

We believe SYNERGi represents a solution that is unlike any other. It departs from traditional hybrids with the inclusion of a unique and advanced generator control capability.

Loads vary due to multiple tenants and across multiple sites. The SYNERGi solution is generator agnostic and dynamically adapts to maintain maximum efficiencies ensuring extended lifetimes, maximized uptime and limits human intervention. This capability in combination with the intelligent, intuitive management of solar and wind harvesting offers a highly compelling package.

See you at our future events!

Meetup Europe 2016
18-19 April, London

Meetup Americas 2016
16-17 June, Boca Raton

Meetup Africa 2016
20-21 October, Johannesburg

Meetup Asia 2016
Q4, TBC

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Making advanced lead acid batteries the primary energy source

Global stored energy leaders EnerSys® present a case study comparing Diesel Genset (DG) battery hybrid with 24/7 DG

In the quest to reduce DG runtime and OPEX, an increasing proportion of cell sites which previously ran dual Diesel Gensets (DGs) 24/7 are now combining Charge Discharge Cycle (CDC) batteries with a diesel genset – in many cases with the battery bank becoming the primary source of power. In order to understand the economics of this transition, and the relative merits of different energy storage solutions, TowerXchange spoke to market leaders EnerSys®.

Keywords: Who’s Who, Energy, Opex Reduction, Batteries, Energy Storage, Energy Efficiency, Off-Grid, Unreliable Grid, ROI, Hybrid Power, DG Runtime, Site Visits, Asia, Indonesia, Myanmar, EnerSys®

Read this article to learn:
- EnerSys®' credibility and experience as a proven leader and innovator in energy storage
- TCO comparisons of different energy storage solutions in a DG/battery hybrid context
- The suitability of Thin Plate Pure Lead (TPPL) batteries for PSOC conditions
- How EnerSys® works with project partners to ensure that the requirements to fulfill warranty terms and conditions reflect the practical capabilities of the system and application
- Installation examples from Indonesia and Myanmar

TowerXchange: Please re-introduce EnerSys® for any readers unfamiliar with your company.

Cheng Heng Hong, Vice President Sales & Marketing, Asia and Robert Pounder – Reserve Power Marketing Director, Asia, EnerSys®: EnerSys® is the global leader in stored energy solutions for industrial applications in reserve power, motive power, aerospace and defense. Our extensive range of quality products includes Premium Thin Plate Pure Lead, Tubular OPzV and OPzS, Ni-Cad, Li-Ion and outdoor cabinet enclosures.

With over 125 years’ experience in battery manufacturing, EnerSys® is the proven leader and innovator in reserve power batteries with customer-centric solutions. As mobile telephone networks evolve and continue to rapidly expand in emerging markets, there is great demand for reliable, improved power capacity solutions that can perform in harsh conditions. EnerSys® works in close partnership with leading companies and offers complete answers to a diverse range of telecom applications requiring stored energy. As part of the offering of energy storage solutions we also provide online support tools such as the battery sizing program (BSP). BSP is an advanced battery sizing engine with a built in battery layout configuration tool for all critical applications such as telecom, data center, rail and utilities. It also includes advanced calculations for use with telecom including hybrid sites. Together with our customers we effect smart decisions which combine our expertise and service with leading products resulting in the most effective, powerful and
reliable energy storage technology available.

TowerXchange: Please compare the TCO for a fairly typical off grid cell site running dual DGs with a similar site where deep cycle batteries have been installed.

Cheng Heng Hong, and Robert Pounder, EnerSys*: Compared to sites running on dual DGs, a site with single DG having cyclic batteries as back up generates savings if the batteries were actually used for longer duties.

While a battery with cyclic capability is important, it is equally important to size the battery to maximise OPEX savings balanced with a calendar life that reflects the rate of cyclic usage and the charge acceptance capability of the battery. Typically a three year calendar life is desired before a battery is replaced, therefore based on one cycle per day the battery requirement is thus approximately 1,100 cycles life. For EnerSys® TPPL SBS Eon technology this number of cycles equates to a percentage depth of discharge (DOD) of approximately 75%.

This example gives a comparison of a site running 24/7 on diesel genset compared to a genset/battery hybrid. It also gives a comparison of different lead acid technologies with EnerSys® TPPL (SBS Eon Technology) providing the greatest OPEX savings.

The result is reduced OPEX cost through reduced generator runtime and therefore reduced fuel consumption, extended generator maintenance.

### Case study example of DG/battery hybrid comparison with DG (24/7)

<table>
<thead>
<tr>
<th>Savings</th>
<th>TPPL</th>
<th>Gel</th>
<th>Flooded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel savings/year</td>
<td>5074.075</td>
<td>2954.49</td>
<td>2856.4</td>
</tr>
<tr>
<td>Maintenance reduction/year</td>
<td>12589.22</td>
<td>11326.77</td>
<td>11234.68</td>
</tr>
<tr>
<td>Genset replacement avoidance/year</td>
<td>6748.17</td>
<td>6154.639</td>
<td>5520.086</td>
</tr>
<tr>
<td>Total savings/year</td>
<td>24411.47</td>
<td>20435.9</td>
<td>19611.16</td>
</tr>
</tbody>
</table>

### Hybrid site TCO comparison Lead acid technologies

![Graph showing comparison of fuel savings, maintenance reduction, genset replacement avoidance, and total savings for TPPL, Gel, and Flooded technologies.]

TPPL provides the greatest savings compared to Gel and Flooded technologies.
intervals, reduced storage space, reduced transport and installation costs.

Even further reduction of TCO can be seen from a hybrid site that employs a second input of power, such as Solar PV. This significantly increases battery life. Often we offer pure lead battery solutions, which could more efficiently capture any additional surplus energy from the sun or DG by using a higher charge regime which will in turn increase the site efficiency, thus less DG run hours.

**TowerXchange**: Where the battery bank has become the primary instead of the secondary energy source, what are the implications for DG runtime, and for battery replacement cycles?

Cheng Heng Hong, and Robert Pounder, EnerSys®: In the aforementioned TCO comparison, the battery has become the primary power source with for example, the TPPL SBS Eon Technology battery providing back up for 17.25hrs (72%) per day and genset 6.75hrs (28%) per day. In this scenario, the number of cycles provided by the battery is approx 2,700 with 2.16 cycles per day and a calendar life of approximately 3.4 years.

The concept is therefore to use the battery in a cyclic operation instead of a standard float backup. The system would typically control the discharge of the battery every day during the night, and recharge using the DG during the day.

Significant fuel and maintenance costs are saved, and that payback would justify such an investment.
How this can be made possible? This application of battery is classed as cyclic, used in partial state of charge, which means not each cycle will return the battery to 100% state of charge, thus enabling more diesel savings.

The thin-plate grids in TPPL batteries offer greater plate surface area and shortened ionic pathways, resulting in an overall reduction in internal impedance. With lower impedance, the TPPL batteries sustain a higher average voltage on constant power discharge. Additionally, reduced impedance allows the batteries to be charged in about half the time of conventional batteries, without sustaining damaging effects. Therefore TPPL batteries are suitable to use in a partial state of charge condition.

In summary, the following key advantages of TPPL batteries make EnerSys® PowerSafe SBS an excellent choice for hybrid applications:

- PSOC (Partial Stage of Charge) compliant
- Up to 1,800 cycles (50% DOD) with operating temperature up to 50°C
- Recharge time < 2 hours (50% DOD, 2.4Vpc, 1.0C10 re-charge current)
- Low self discharge – 24 months shelf life
- Up to 50% more capacity (in same foot print compared to tubular gel OPzV)
- 15 years design life according to Eurobat
- Wide operating temperature range (-40°C to +50°C)
- Made in Europe and USA

TowerXchange: Forgive my being rude, but it's often suggested that lead acid battery manufacturers’ warranties are meaningless as they require compliance with installation and usage guidelines that are not practical in an emerging market context. How does EnerSys® ensure your warranty is more meaningful?

Cheng Heng Hong, and Robert Pounder, EnerSys®: EnerSys® works very closely with project partners to ensure that the requirements to fulfill the warranty terms and conditions reflect the practical capabilities of the system and application, i.e. duty cycle control features, system monitoring, data recording.

We are involved from design, implementation to a complete end to end solution. This ensures having the right products together with other peripheral equipment such as the enclosure, systems, distribution and controllers that suit the application and environment.

EnerSys® has a flexible approach to the primary and secondary control features of the Charge/Discharge Cycle (CDC) that allow the tower owner to optimise the operating strategy to suit the limitations of the system and in addition, extensive testing allows EnerSys® to provide the user with preferential warranty terms whilst minimising risk.

For hybrid applications, we have separate manuals which are different from ones we use for normal float charge applications. We also educate our users on using the products, provide training and offer maintenance program.

There must be a reason why EnerSys® is a global leader in stored energy solutions, and remain strong after 125 years. We deliver what we promise. EnerSys® manufactures and supplies the highest quality and most reliable products in our chosen markets and then consistently meet and strive to exceed our customers for service, technical support and value for money. Our warranty is backed up
by sales and manufacturing locations in over 100 countries around the world.

TowerXchange: Please share one or two examples of tower portfolios where EnerSys® energy storage solutions have been installed.

Cheng Heng Hong, and Robert Pounder, EnerSys®: As we are unable to name our customers, I can only cite a few of these examples.

We successfully supplied over 40,000 blocks of EnerSys® PowerSafe SBS Eon Technology to several of Indonesia’s largest telecommunication networks and services providers utilising the ruggedness of the SBS Eon Technology’s characteristics.

Another success story comes from our tireless effort in Myanmar whereby over 8,000 blocks of EnerSys® batteries were supplied to over 600 sites with various on-grid and off-grid conditions, including hybrid applications. These are only the orders received from the first entry phase of installation in Myanmar, we are working toward upcoming projects too.

The mission was made possible through joint efforts between distributors and EnerSys®. This demonstrates our commitment by working closely with users to understand and meet all technical requirements. EnerSys® is now the preferred supplier for unstable grid applications to the operators and the installation base of EnerSys® batteries has continued to grow.

TowerXchange: Finally, please sum up how you would differentiate EnerSys® from other energy storage solution providers

Cheng Heng Hong, and Robert Pounder, EnerSys®: EnerSys® has a global and worldwide presence and coverage through its own subsidiaries in all continents – Americas, Europe, Africa, Middle East and Asia-Pacific.

In Asia, EnerSys® has presence in seven countries and 18 local offices for sales and application support.

We have a comprehensive product range and access to all commonly used battery technologies and are therefore in a position to help end-users to the most cost-effective (TCO) solution technically and commercially.

EnerSys® has 17 research laboratories situated in the USA, Europe and Asia and are constantly looking for new chemistries, plastics, separators and advanced technologies. It is our mission to ensure these new technologies are able to work together to form a battery with an expected life. Process improvements, measuring consistency in the manufacturing cycle is also a major part of the engineering and research teams effort to maintain the higher standards that EnerSys® sets for itself.
Underground Solution for Telecom!

EnerSys® launches innovative theft deterrent solution to save telecom companies resources and improve network uptime.

In the quest of fighting battery theft, EnerSys® has embarked on research into a solution that is proven to be safe and effective. EnerSys® EUBS™ is an underground battery solution that guarantees uninterrupted power supply to your mission critical applications.
Do you trust your data?
Site power monitoring and data analysis for informed decision-making

Are you in control of your business? Network energy costs can constitute up to 60% of operating expenses for towercos, yet many lack the tools they need to effectively control this significant and ever increasing cost. With no clear, real-time view of their hybrid power systems, it has been virtually impossible to proactively monitor and manage opex efficiency-driving activities and costs. Power related site data is massively important to towercos and as networks increase in both size and the number of tenants hosted, data will drive the difference between profitability and failure.

Keywords: Energy, Monitoring & Management, Opex Reduction, Fuel Security, Energy Efficiency, Hybrid Power, KPIs, Site Visits, RMS, Site Management System, Flexenclosure

Data is useless if there’s no structure to how it’s:
1. Monitored and captured
2. Compiled
3. Analysed and reported, and
4. How it’s used in informed business decision-making

Oceans of unstructured data are impossible to navigate, while gaps in data mean you won’t have enough information to make truly informed decisions. Data must be both complete and organised. But that in itself is not enough - precise reporting and analysis turns data into an invaluable tool that can properly inform major opex and capex investment decisions. Data that you can truly trust.

Monitoring data

“Trust” is a big problem here.

The limited nature of most site energy systems means that the only way to gain a network overview is to monitor a disorganised stream of alarms, data sets and KPI values from multiple sources – a process that is time consuming, expensive and extremely prone to error.

Many towercos (and more broadly, mobile operators) find themselves frustrated with the systems they have today - typically simple standalone hardware-based systems that use sensors to plug into various elements of the site. Typically sensors monitor the gate entrance, temperatures, power generated from available sources, power used by tenants, and fuel usage.

Read this article to learn:
- The implications of sensor failures and network connectivity interruptions when using stand-alone hardware based sensors
- The case for integrating intelligent monitoring with the power system
- Using reliable data analysis to minimise network energy costs
- Leveraging reliable data to make informed decisions on the deployment of capex
A lot of money is spent on installing these systems to collect data, but the associated hardware can be very unreliable which in turn impacts the reliability of the data itself. This is compounded by the fact that these sensors are most often added after the main site power solution has been installed, with external placement and additional exposed cabling increasing the potential failure (and tampering) points. It’s not simply the fact that sensors can fail though, but that these hardware-based systems have no intelligence built into them to trigger an alarm that a sensor has indeed failed. So not only is no data being captured, but there’s also no record of the moment data capture ceased, leaving whatever data had been collected up to the point of failure next to useless. And at a practical level it means that people have to constantly travel to the sites to (somewhat ironically) monitor the monitoring system! This is because if a sensor is not delivering any data, you have no idea if the sensor has failed or if the site element it’s monitoring has failed, or perhaps even both. For example, if the grid sensor fails, how do you know if the grid is still providing reliable power or not? And for what period of time? If you then multiply this problem by the hundreds or perhaps thousands of sites in a network, and then again by the number of monitoring sensors at each site, it’s a very cost and time intensive issue to try to stay on top of and it’s not hard to see why towerco business analysts are having a nigh on impossible time coming up with meaningful and trustworthy numbers on which to base critical investment decisions.

The solution

The solution is having a software-driven intelligent monitoring system fully integrated with the power system right from the start, rather than adding it after the fact. This reduces the number of potential failure points and the performance of the sensors themselves can be monitored, with alarms flagging issues in real time, allowing for immediate action and resolution. This also allows for the easier combination of sensor output and system behaviours into smart alarms, like combining voltage generated and power used.

Compiling data

Capturing accurate data at the sensor level is one challenge. Compiling complete data at both site and network levels is another. This requires connectivity from all the sites to a central database, but with network connectivity often breaking down, data that has successfully been captured at the sensor level can then just as easily be lost during transfer. And
with standard hardware based monitoring systems, there is often no way to recover the data once it is gone.

And whose responsibility is it? Towercos spend a lot of time fighting with monitoring system suppliers about responsibility, but it’s always a discussion that’s being had too late - whether the monitoring system or the network was at fault, the end result is the same.

The solution

The solution is an intelligent system that organises, time stamps and stores all collected data locally and checks with the central energy data warehouse what has been sent versus what has been received, so that any data lost during a network outage can be retransmitted. For example, Flexenclosure’s eManager site monitoring system guarantees 100% complete and accurate site reports regardless of communications breakdowns, thus ensuring that data is never lost.

Analysing and reporting on the data

Collected data needs to be analysed or it remains a combination of virtually useless numbers. Typically, Towercos need to have analysis scripts written bespoke in efforts to try to make sense of enormous workbooks of Excel data compiled by disparate sensors on site. This is a complicated and incomplete solution compared to having the analysis and reporting capability fully integrated into the system from day one. This can be done for the most crucial data points like fuel consumption, genset performance, power generated, power used, cooling data, battery use and equipment temperatures, as well as logistics data such as diesel refuelling, generator servicing, cooling filter replacements, and data required for battery warranty issues. The system also needs to be customisable, allowing users to create bespoke easy-to-read reports that seamlessly overlay with the standard ones, supporting every aspect of their business. This provides better opportunities for data analysis, management of opex, tighter tracking of assets, immediate bad site detection, faster response times to site critical failures and reduced frequency of site visits.

Informed business decisions

Reliable data is very important to inform major business decisions spanning both network energy opex cost control and broader investment and management. These fall into two key categories: Operational (opex) and Investment (capex).

- **Operational**: Accurate real-time performance data and alarms allow for effective planning and budgeting of maintenance and refuelling, and enable energy managers to make better commercial and technical decisions. It also means they have the crucial data required for the proactive management of unforeseen events, ensuring reliable site power and optimised performance across their networks by always having the right technician at the site, exactly when needed and with the right tools and parts.

The solution is an intelligent system that organises, time stamps and stores all collected data locally and checks with the central energy data warehouse what has been sent versus what has been received, so that any data lost during a network outage can be retransmitted.

For example, diesel management and refuelling is often impossible to do accurately using hardware-based systems. Did we really use that much fuel? Has any been stolen? Was it ever delivered in the first place? Is there no data because we haven’t needed to use any diesel for this period? Or is the sensor faulty again? These are all typical questions that most often can’t be accurately answered using a hardware-based system. But a fully integrated intelligent solution can combine the output of, for example, fuel level, fuel flow, power generated and power used sensors to give a remarkably complete picture that can accurately inform critical questions such as diesel planning.
The operational issues go far beyond daily site planning though. In order to bill tenants correctly, sensors and monitoring systems really need to be reliable, especially if they are connected directly to a billing system detailing tenant energy use. The scope for undermining good customer relationships through system failure does not bear thinking about.

**Investment:** Reliable data is also critical for informing future investment decisions. For example, with the right data it’s relatively easy to calculate whether a given grid connection is reliable enough to merit paying the fixed connection fee charged by most power companies... or if investment can be justifiably made to upgrade the power system... or whether in fact it would be more cost effective to move to an off-grid solution with solar power.

**Conclusion**

Data should be providing accurate quantitative and qualitative historical performance analysis, trend benchmarking, forward planning and real-time monitoring for true energy optimisation. But towercos are struggling to understand how to best crunch the data they have in the most useful way, with incomplete raw numbers and a lack of analysis and reporting tools resulting in a lack of trust in the data that seriously impairs informed business decision-making.

The answer is a fully integrated intelligent solution like Flexenclosure’s eManager, that lets you look across your entire network as well as performing deep dive analyses on a site-by-site basis. Now, rather than making broad decisions based on overall and incomplete network-level results, reliable data is available to help drive profitable business planning. Data you can trust.
Flexenclosure’s eSite™ is a diesel-battery hybrid power system for telecom sites that delivers 24/7 network uptime and cuts diesel costs, CO2 emissions and energy related OPEX by up to 90%. eSite delivers the best sustained performance over time versus any competing hybrid power system. Contact us today to see what eSite can do for your network.
Lithium ion batteries could eliminate the need for diesel generators

Perspectives on a new generation of energy storage solutions

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, Asia Pacific, Interview, Batteries, Opex Reduction, Energy Storage, Lithium, Off-Grid, Unreliable Grid, ESCOs.

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

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

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

TowerXchange: Who are your key clients and which products are they showing their interests the most?
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. 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.
Rapid roll-out multi-tenant hybrid solutions
Heliocentris’ achieves unprecedented growth and quad nines uptime in Myanmar

Doubling their footprint from 1,000 to around 2,000 towers through a massive roll out in a burgeoning Myanmar tower market has enabled Heliocentris to refine their offering not only in terms of technology but also process, partnership and flexibility. They’re now keen to take the lessons learned in Asia and apply them in the African market, where their presence is already established and growing.

**Keywords:** Africa, Asia, Batteries, Brownfield, Build-to-Suit, ESCOs, Energy, Energy Efficiency, Energy Storage, Fuel Cell, Greenfield, Heliocentris, Hybrid Power, Installation, Monitoring & Management, Myanmar, NOC, O&M, Off-Grid, Opex Reduction, RMS, ROI, Regulation, Renewables, Skilled Workforces, Solar, Unreliable, Grid, Urban vs Rural, Who’s Who, Wind

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**Read this article to learn:**
- Heliocentris’ readiness to provide ‘Power As A Service’ (PAAS) business models
- How a rapid rollout of energy solutions for 20 sites a week was achieved in Myanmar
- The importance of monitoring and control solutions in the African market
- Locating and training a skilled workforce to maximise the lifecycle of your technology investments
- Simple shortcuts for increasing efficiency in legacy equipment

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**TowerXchange: Tell us about your current offering and footprint.**

Jens Fiedler, VP Sales & Marketing, Heliocentris: Heliocentris offers energy solutions for autonomous, complementary and emergency power supply of distributed stationary applications, supplemented by I&C, O&M services and financing to enable an offering of opex-like business models to customers, especially tower companies. We are component agnostic, have a world class remote energy management system and a vertical technology portfolio enabling completely autarkic carbon free solutions based on fuel cells and electrolyzer products combined with solar technology. This is unique in the market and offers the customer not only solution engineering in order to optimise solutions to their specific needs, but also enables us to offer financed power businesses, up to a full ‘Power As A Service’ (PAAS) offering, for which Heliocentris is well prepared.

The rollout in Myanmar of close to 1,000 sites over the past year demonstrated the strength of our organisation and partners, and we are currently raising the footprint to above 2,000 sites equipped with our advance energy management system for operators and towercos. Myanmar now represents around 50% of our footprint and Africa around 30%, although we expect to grow our business there.

Andrew Gruar, Business Development Manager, Heliocentris: We have deployed networks in Mozambique and Zimbabwe and also deployed
networks with some of the Middle Eastern MNOs including Etisalat and Du. Over the last year we’ve doubled our operational sites footprint. Based on customer demand, we have been deploying an average of 20 sites, at peak even up to 70 greenfield sites per week in Myanmar. That’s a compliment to the product but also to our ability to commission teams, interoperate with other vendors’ equipment and manage ongoing O&M through a power NOC. We can replicate that in Africa and apply the same competence where the market isn’t focused on both legacy and greenfield sites.

**TowerXchange: How has Heliocentris grown in the tower market and what has fuelled that growth?**

**Jens Fiedler, VP Sales & Marketing, Heliocentris:**

Years of expertise in energy management and hybrid solutions is the foundation of our business which has translated into substantial growth. Years of development of our advanced and field-proven energy management system yielded a leading approach to remote management of hybrid power solutions for telcos and other businesses. The uptime we achieved - Quad 9 (99.99% uptime) - in Myanmar is a big success for our clients and for our system.

In terms of the origin of the business, the first key success for us was in the Middle East with companies like Du, later on supplemented by business in Africa then in Asia.

Another significant commercial change which took place last year is that we’re now publicly listed on the Frankfurt stock exchange. This improves our ability to finance and support different service models and gives us more scope to offer clients mutually beneficial business models.

We also have another business in education and research. We call it ‘empowering the future engineers’ and we offer services and products starting from schools and into universities and companies. Our aim is to provide the tools to educate future engineers about renewable power and systems so people can work with solar power and fuel cells et cetera and understand them better. It’s a worldwide project: we have business in Latin America, Africa and North America.

**Andrew Gruar, Business Development Manager, Heliocentris:**

From our recent conversations with several African towercos we know that in Africa they have been through at least two generations of remote monitoring and energy hybrid systems. A variety of technologies have been deployed to varying degrees of success, meaning every three years infrastructure owners ended up spending more money trying to improve power systems and control. We want to help create an environment where we can help to train our clients’ workforces, in product and process, create a competence centre and ensure installed systems are properly looked after in the field.

**TowerXchange: How have you found customer response to your solution in the African market? Which products are most popular and how does that vary across the continent?**

**Dr Sakib Khan, General Manager sub-Saharan Africa, Heliocentris:**

Due to the diversity of the African telecommunications market Heliocentris is well placed to offer a wide range of power solutions, from autonomous solar and fuel cell solutions to generator/battery hybrid systems through to simple remote monitoring. The response from African customers has been extremely positive, in particular due to the fact we have an office with supporting staff based in Johannesburg who are extremely well versed in doing business
in Africa, and rapidly supporting projects in Africa. Our battery/genest hybrid system, enabled by our energy management system has been very well received due to the significant savings it offers. Our remote management NOC software receives praise from our users, as well as our flexibility in providing customized solutions.

TowerXchange: As operators turn their attention to meeting regulatory requirements in rural areas and on maximising capacity through urban infill, do you see a change in what the market demands?

Dr Sakib Khan, General Manager sub-Saharan Africa, Heliocentris: Towercos are now some way through acquiring and optimising the ‘most desirable sites’ in Africa’s most densely populated areas, and now are asked by operators, through build to suit programes, to increase number of sites and colocations in rural and off grid sites.

This drives interest in ‘Fit & Forget’ solutions: power cubes, solar integration et cetera; minimising the use of ‘technology’ and focusing on minimal maintenance, total system deployments. The ultimate goal would be to purchase power, not solutions. However Heliocentris is prepared to support almost every site situation with an optimum power solution while also reducing carbon emissions.

Moreover, we are exploring how we can support tower companies and MNO’s in providing power to remote communities with the BTS site as the “anchor” in a mini-grid construct. This enables the use of productive power instead of just consumptive power for communities and increases social development.

TowerXchange: In a sector where both capex and opex are kept to a minimum, can you talk us through the numbers, which make your solution stack up?

Jens Fiedler, VP Sales & Marketing, Heliocentris: We can’t talk about specific numbers since each and every solution differs but mostly there is strong interest in ROI of less than three years and provision of financing on a long term basis. Even where fuel is a pass-through there are opportunities to save money and resources, which are distributed either through shared saving models or fixed rates which reduce over time. It’s hard for renewables like solar power to deliver that kind of ROI within three years however we have solutions and cases which can support this kind of requirement.

TowerXchange: Tell us more about operations and maintenance? How does that compare to the other energy options on the market?

Jens Fiedler, VP Sales & Marketing, Heliocentris: O&M is the biggest part of a long term contract so people are interested to reduce the burden here. You can have highly trained people but the equipment should be easy to use and manage remotely, providing for flexibility in terms of operational costs. It is extremely important to implement efficient solutions and processes, prepared for multi-tenant growth, long life utilisation of components such as batteries, and the lowest possible number of maintenance site visits.

We installed a monitoring system for a client in the Middle East and just through raising visibility we reduced fuel loss by 20%. There are companies in the market who offer tools and monitoring across the entire supply chain, and they have revealed that most of the theft takes place within the supply chain, not on site. With this in mind we’re on the way to implementing mobile operations within our offering to reduce theft.

TowerXchange: What are your ambitions for the future? As the African market shifts towards independent towercos, are you finding a need to change your services to suit?

Jens Fiedler, VP Sales & Marketing, Heliocentris: Heliocentris have a strong foundation in the design and delivery of Energy Solutions, including Energy Management, RMS, Hybrids, Batteries, Solar & Fuel Cells. Our ambition is to provide towercos with Certified I&C and O&M services, direct or through partners, to ensure the longevity and cost benefit is sustained in the African market.

As towercos scale, increasing tenancy ratios, building new sites, winning new clients, we aspire to support their technology and process advances, and offer solutions and business models, including finance/risk share for mutual benefit. Our ambition – to invest in Africa.
Your Partner for Managed Power Services

One-Stop Shop – Solution Engineering, Full Turnkey Solutions, O&M, Energy Management System & RMS Software
Next level communication: the growth of artificial intelligence in passive infrastructure

Huawei want your air con to talk to your batteries, and your diesel generator to speak to your engineer, creating intelligent networks across the globe

Huawei’s impressive global scope and position as market leader in the telecom and telecom power sectors has won them significant business in the African market to date. Their intelligent RMS system allows the NOC to monitor, diagnose and communicate the health of the network and infrastructure, combining site-level details with network-level visibility. Huawei see that a data explosion in Africa is imminent, and that towerco data management systems still need significant work in order to allow seamless and effective control of their growing networks. TowerXchange spoke to James Qiao, Vice President of Marketing & Sales Support at Huawei Telecom Energy about their exciting intelligent solution and plans for growth in Africa.


TowerXchange: What do Huawei foresee in the future development of the African communications market?

James Qiao, Vice President of Marketing & Sales Support, Huawei Telecom Energy: Smartphone penetration in Africa is quite low, about half of the global average: the global average is about 30%, in Africa it’s below 15% which means there’s significant potential in Africa for mobile broadband growth. Also I see all the major service providers in Africa have already defined their strategy on mobile broadband which will promote data services in the African market and lead to more network construction and site build up. This implies significant opportunities for both towercos and Huawei.

TowerXchange: What challenges are African towercos facing and how can Huawei help?

James Qiao, Vice President of Marketing & Sales Support, Huawei Telecom Energy: I see that towercos in Africa are facing significant challenges. Some challenges are on the financing side, also some long-term profitability concerns, and on how to improve the resource sharing rate.

I believe the financing issue will be solved eventually, that’s not the blocking issue. As long as we have a justified business case there’s no reason why towercos can’t get financing. But long-term profitability and long-term sustainability are more of an issue. Today the situation is not so satisfactory. I see a lot of issues, as an example,
very high fuel costs. Lack of grid availability means many sites are powered by diesel generators which are old and don’t operate in an efficient way. Another example is tenancy ratio, today the tower tenancy ratio is about 1.2 in Africa but when we look at the leading towercos in some developed countries such as the US the tenancy ratio is around 2.5-2.7.

There are challenges on the management systems as well; some towercos run several management systems from several vendors which are silos with no interaction. Lack of unification costs more on OPEX and also creates a lot of trouble. When you look inside towercos’ existing sites, most of which were inherited from the MNOs, many of the configurations are very complicated and difficult to manage, systems from many different vendors which may not even exist any longer, obsolete and less reliable technologies, less energy efficient technology solutions... In terms of building new sites, hard to reach places, difficult site acquisition and energy acquisition are the major challenges. Looking forward, towercos will also have to look at building and growing sites along a well-defined evolution path, evolving to support future higher user traffic, higher service demand, and support the future convergence of the IT and CT worlds in a much more effective and efficient manner. These challenges must be addressed and these are the things Huawei is good at and can contribute to, with its world leading platform it has established around all CT, IT, power electronics, renewable energy, chipset, software, and artificial intelligence technologies.

**TowerXchange: What is Huawei’s vision for the future of cell site energy in Africa?**

**James Qiao, Vice President of Marketing & Sales Support, Huawei Telecom Energy:** When people talk about cell site energy and power systems they think of legacy products or solutions which are bulky, less efficient, and not quite reliable and scalable. Besides, in the past power systems were also just dumb devices without much built-in intelligence, people had to schedule routine tasks and visit cell sites in person to undertake maintenance. Maintenance was labour intensive and required a large number of highly skilled technicians. Even worse, there were large amounts of unstable diesel gen-sets running on the networks of Africa, leading to high fuel consumption, high maintenance cost and telecom service outages.

We envision the future cell sites in Africa have to be more reliable, more energy efficient, more scalable, easier to be built up, and easier to be maintained and managed, including energy management.

In terms of cell site energy, Huawei proposes three level energy efficiency. At system level, Huawei provides the highest energy efficient power systems in the world. And with site level and network level energy efficiency implementation, we ensure the maximum overall network-wise energy efficiency. Huawei’s specially designed site and energy solutions also ensures the highest level of reliability, scalability and simplified operation, maintenance, site and energy management.

**TowerXchange: Do you anticipate energy equipment remaining a capital purchase by towercos and MNOs in Africa, or do you anticipate OPEX sharing and ESCO business models playing an important role? Where does Huawei see its role within the ESCO proposition?**

**James Qiao, Vice President of Marketing & Sales Support, Huawei Telecom Energy:** Actually we see both business models existing concurrently. Today some towercos are following the CAPEX purchasing model. The technology vendors provide the solution and equipment and the MNOs own the assets after installation. There are also some towercos that would prefer an OPEX model to pay from the future energy saving or maintenance cost reduction, due to the shortage of initial funding or due to their uncertainty about the value of new generation site and energy solutions, especially on the quantification of energy savings and the overall OPEX savings.

Some towercos may chose the OPEX model at the beginning, however, I believe after careful evaluation and after they see the results from real-world practices, most of them will eventually move on towards CAPEX model, because with OPEX model, it’s true they pay less to technology solution providers at the initial stage, however, over years the accumulated payments will most likely be much higher than the CAPEX model. The value of new technologies is there, and I believe MNOs and towercos will realise that through practices.

Huawei is flexible, today I think the majority of
our revenue, 95% or more is still coming from the CAPEX model. However, in some cases, if the customer prefers, we can work with the the towercos and MNOs to find out solutions around the OPEX and ESCO model. The decision will be on project basis, case by case.

**TowerXchange: Should remote monitoring capabilities be embedded into energy equipment, or should a third party RMS be used to integrate performance data from all equipment on a cell site?**

James Qiao, Vice President of Marketing & Sales Support, Huawei Telecom Energy: For Huawei, we focus on both aspects of efficiency, energy efficiency and management efficiency. Management efficiency and OPEX reduction is critical for towercos business success, and RMS plays an important role there.

Let’s take a look at an example of the power system. We want to be able to remotely schedule how the power system works. If there’s an electricity tariff change between busy and non-busy hours, for example, if in the daytime electricity charge is higher than that of the night, do you want to be able to control the behaviour of the power systems to take advantage of the lower tariff at night, such as storing electricity power into the battery at night, while during the day when the tariff is higher, taking power from the battery to reduce the extra operating costs?

Huawei’s solution is we schedule the battery charging and discharging in a smart, automated, and remote way.

And for the batteries, do you want your staff to schedule routine site visits to understand if the battery is healthy or not? In the US if you send one person to visit a cell site, it will cost over $300, even if he finds nothing wrong. In this case, this site visit is purely unnecessary. Let’s imagine a network of 10,000 cell sites with one unnecessary site visit per site annually, the saving potential is huge. The labour cost of skilled technician in Africa is lower, but still accounts for a majority part of the OPEX and it’s worth taking a serious look into.

Huawei’s solution is to plant intelligence onto each individual battery cell, it will automatically perform a health check for each individual cell and will tell us how much capacity they have if they’re fully charged, how much electricity power they can provide, how long from now you need to change or replace the battery cell et cetera. It can report all the health check information, no matter if it’s about battery cells, diesel gen-sets, or other systems, to the centralised site monitor on the cell site, which can aggregate information and send it to a centralised management platform in the NOC. The team can then understand the situation of each of the tens of thousands or hundreds of thousands of battery cells in their network. They can then schedule visits for the sites which have problems so there are no wasted site visits. The engineer can combine trips and deal with all the problems at once.

These are just two little examples among many more. Basically, Huawei’s remote site and energy management platform has multiple capabilities compared with the legacy platforms which typically just provide an alarm to alert you once something has gone wrong, meaning when engineers go to the site the damage is already done. So we don’t just provide the alarm, we provide performance monitoring, health check, intelligent analysis, proactive maintenance, end-to-end energy management, and reporting. We also offer mobile apps. Let’s take another example. Huawei’s energy management will monitor power consumption for all energy consuming devices, including each load or network equipment, the gen-sets fuel consumption, the energy consumed by air con et cetera. If we have 100 similar sites across a certain region, and ten of them are consuming 20% more electricity than the other sites, these kinds of issues would be visible on our platform, then you can quickly analyse whether the air con is set too low or if there is something wrong with the enclosure or network devices or other stuff, and take immediate action to correct the situation. By introducing artificial intelligence and proactive management into the traditional dumb infrastructure, we can ensure the highest level of overall site energy efficiency, and identify potential issues before they compromise site performance, reliability, or generate very high OPEX.

**TowerXchange: Tell us about what sets Huawei apart from its competitors in the African market?**

James Qiao, Vice President of Marketing & Sales
Support, Huawei Telecom Energy: Today we have already reached the number one DC power market position in terms of annual shipments globally. Huawei's market share is 24.7%; we lead the second place competitor by 6%. We have about 1.7mn power systems running day and night in the networks of 310 different MNOs across 170 countries. In almost every country you can find Huawei's power systems. That means Huawei's power systems are proven to be reliable in the field and we have a lot of field experience.

And in Africa, Huawei already serves all major MNOs, we understand the MNOs, we understand their networks, we understand the deployment scenarios, and we already have superior service capabilities in the region.

The power systems are different with telecom network equipment. Power systems are very diversified, they need to survive in all different environments, protecting, powering and cooling network equipment; mountains, coastal, city centre, rooftops, desert, stable-grid, unstable-grid, off-grid – it's really tough to build the complete and profound portfolio which can support all those different scenarios well. Today, we have all these in place already, and we are still continuously making them better, by leveraging our technology leadership in digitalization, internetworking, and artificial intelligence in both the CT and the IT worlds. I believe, Huawei's field experiences in the region, along with the global reach in almost every country both product-wise and service-wise will make Huawei an ideal partner for both international and regional towercos.

See you at our future events!

Meetup Europe 2016
18-19 April, London

Meetup Americas 2016
16-17 June, Boca Raton

Meetup Africa 2016
20-21 October, Johannesburg

Meetup Asia 2016
Q4, TBC

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Smarter Decision

Huawei power solution wants your air con to talk to your batteries, and your diesel generator to speak to your engineer, creating intelligent networks across the globe...

www.huawei.com
Surveying, building and strengthening towers for the era of infrastructure sharing

ieng Group is a proven partner to towercos in eleven African countries and in Myanmar

Multi-country turnkey infrastructure solution provider ieng Group has seen their business transform from an initial focus on site build and upgrade, to focusing on longer term O&M contracts. ieng Group increasingly see Africa’s ‘Big Four’ towercos as their primary clients for managed services, tower surveys and strengthening, and for build-to-suit programmes. ieng Group has also recently opened an office in Myanmar.

Keywords: Who's Who, Managed Services, O&M, Construction, Installation, Batteries, Capacity Enhancements, Build-to-Suit, SLA, Hybrid Power, Greenfield, DG Runtime, Site Surveys, Skilled Workforces, Multi-Country Partner, Infrastructure Sharing, Asia, Myanmar, Africa, Algeria, Burkina Faso, Cameroon, Congo Brazzaville, DRC, Ethiopia, Ghana, Rwanda, Uganda, Zambia, Eki-Struct, ieng Group

Read this article to learn:
- ieng Group’s capabilities, footprint and credentials as one of Africa and Myanmar’s leading TI firms
- The impact of tower transactions on the managed services ecosystem
- Balancing the business between recurring, stable O&M contracts and higher margin, less predictable EPC contracts
- Contrasting the approaches to energy efficiency programmes of towercos in Myanmar and Africa

TowerXchange: Please introduce ieng Group – what role do you play in the telecoms infrastructure ecosystem?

Kadri Hakim, COO, ieng Group: ieng Group is one of Africa’s leading turnkey infrastructure solution providers. We are established in twelve countries: Algeria, Burkina Faso, Cameroon, Congo B, DRC, Ethiopia, Ghana, Rwanda, Uganda and Zambia. Our newest and soon to be biggest operation is Myanmar. Our headquarters are in Lebanon. We’re a cash flow funded, Lebanese-Canadian company, co-founded by myself and CFO Rami Shibley.

TowerXchange: What are ieng Group’s capabilities, and can you tell us who some of your key clients are?

Kadri Hakim, COO, ieng Group: We plan, procure, build, optimise and maintain telecom infrastructure. We also provide tower manufacturing through our partner Eki-Struct.

Most of our business now comes from the Big Four African towercos, although we also work with MTN, Airtel, Orascom and Ooredoo.

TowerXchange: Did you win your managed services contracts after the towercos acquired the towers, or was the relationship with ieng Group transferred from MNO to towerco with the tower transaction?

Kadri Hakim, COO, ieng Group: We were already providing managed services to the MNOs – after
the acquisitions our contracts eventually became with the towercos.

Towers are the core business of the towercos – they know exactly what they want, and they know exactly what it costs. They want the same services we are currently providing to MNOs, but with a higher service quality – reflected in the SLAs.

**TowerXchange: What is the balance of your business between EPC contracts and O&M?**

**Kadri Hakim, COO, ieng Group:** When we started the company in 2007, all our business was EPC – site build and refurbishment. When the EPC business started slowing down from 2009-10, we went into O&M. We now have more than 3,000 sites under management.

O&M provides good recurring, stable business; we know the work is coming. We try to stabilise our operations on O&M revenue, such that any EPC revenue is the cherry on the cake.

**TowerXchange: Do you foresee there still being a role for the tier one OEMs, Ericsson, Huawei, Nokia and ZTE, in managed services for passive infrastructure in Africa?**

**Kadri Hakim, COO, ieng Group:** When they were maintaining both the active and passive infrastructure for the MNOs, it made sense. But towercos don’t own active equipment, so they have no need to use a vendor like that for managed services. We believe the towercos will work more and more directly with companies like us to manage their passive infrastructure, leaving MNOs still working with vendors for the management of active infrastructure.

**TowerXchange: When towercos enter a new market, how do managed services providers like ieng Group position yourselves to secure new contracts?**

**Kadri Hakim, COO, ieng Group:** We find out about the tower transactions after the deals close, not before. We use the experiences and credentials we have from our existing relationships with the towercos to enter new markets.

**TowerXchange: What are the implications for your business of the current wave of tower transactions in Africa, with towercos acquiring 17,877 new towers in the last quarter alone?**

**Kadri Hakim, COO, ieng Group:** We believe all the managed service providers will see a surge in their businesses. Towers are the core business of the towercos, they are well financed and will invest in new site builds, refurbishment programmes, strengthening for co-locations and energy efficiency programmes.

With the recent wave of tower transactions, towerco’s short term focus is to understand and stabilise the networks they just acquired, and to understand the quality of sites – based on which they will determine which towers they have to refurbish or upgrade. Then they will tackle co-location sales and building new sites for their anchor tenants – the framework agreements often include a build to suit programme.

**TowerXchange: What do you anticipate being the impact of the increasingly important role of towercos on the build to suit market?**

**Kadri Hakim, COO, ieng Group:** Whenever we’ve been asked to execute build-to-suit programmes for
the towercos, they've built towers with capacity for at least three tenants.

We're not seeing a lot of single tenant towers being installed any more – EPC contracts from MNOs have decreased significantly.

TowerXchange: What factors influence the cost of upgrading a single tenant tower and power solution to be suitable for multiple tenants?

Kadri Hakim, COO, ieng Group: The power system has to be upgraded or replaced to suit the new power requirements. The tower part is more complicated and depends on the load of the existing tower structure. We have been providing tower strengthening services to a lot of towercos. We do a structural analysis of tower to see if it is suitable to take another operator. If it isn’t suitable, we provide and implement a strengthening solution. Occasionally we find there is no solution and the tower has to be replaced – or we might find that the cost of strengthening is so great that it’s preferable to build a new tower.

TowerXchange: How do the priorities of the Myanmar towercos differ from those in Africa?

Kadri Hakim, COO, ieng Group: The towercos in Myanmar are undertaking a massive build to suit program rather than acquiring existing networks which involves refurbishment, upgrades and tower strengthening services. Myanmar is witnessing for the first time a substantial telecom site deployment, so the priorities and challenges are very different. Because it’s new network being deployed, all the towercos have the possibility to utilise the most recent technologies in telecom passive infrastructure, for example they are putting in place the most recent hybrid power systems; energy efficiency programmes and security locking systems.

TowerXchange: Finally, please sum up how you would differentiate ieng Group from other turnkey infrastructure firms in SSA and Myanmar.

Kadri Hakim, COO, ieng Group: ieng Group has an edge thanks to our well-structured, flexible management system which allows us to adapt to the local culture with our global experience. We understand what's required locally to adapt our structure and be the most efficient turnkey infrastructure firm in each country. We are also fortunate to have a young, experienced, motivated, smart management team that excels in their work.

ieng Group is happy to follow its clients into new countries – we typically start two new operations every year. This includes following the Big Four towercos as they enter new markets in Africa. We know how they work, and they know what to expect from us.
A leading provider of infrastructure solutions

837 EMPLOYEES
ISO 9001, 14001, OHSAS 18001 CERTIFIED
3278 SITES UNDER MANAGEMENT

Telecommunications and Power Services
- Design, Engineering & Construction
- Procurement, Logistics & Warehouse Management
- Power Supply
- Operations & Maintenance
- Mast & Tower Solutions
- Testing & Commissioning
- Site Planning, Acquisition & Property Services
- Network Equipment Installation Commissioning & Swap-out

14 offices
14 countries
Improving profitability through ‘Discipline of Action’ leveraging automation

How to overcome operational challenges such as financial asset register accuracy, maintenance task management and theft prevention

The telecom tower industry is growing extensively with an ever increasing customer base to cater to operators across the world. Tower operators need to ensure 99.9% uptime for their sites and maintaining this figure is becoming a challenging task. To attain this uptime, 24 X 7 monitoring of tower sites is required. The need for real-time tracking of passive infrastructure, including people, assets and energy, has created a demand for a comprehensive tower management tool which can help to synchronise this data monitoring as well as generate meaningful actionable events to improve and keep up the agreed service levels.

Keywords: Access Control, Asset Lifecycle Platform, Asset Register, Batteries, Infozech, KPIs, Monitoring & Management, Operational Excellence, RMS, Site Management System, Site Visits, Who’s Who

Read this article to learn:

- How ‘Discipline of Action’ enables MNOs and towercos to synchronise RMS with other critical data enabling financial gains and reduced opex
- How Infozech enables the creation of a Remote Operating Centre (iROC)
- Capabilities in energy tracking, billing, battery, access, maintenance and asset management
- Online analytical processing: an automated analytics platform

TowerXchange: What are the key issues faced by tower companies in terms of operational management?

Ankur Lal, CEO, Infozech: Tower operators face several issues in terms of operation management. These issues begin right from site acquisition and continue through the lifecycle of tower operations.

At the time of site acquisition, tower operators do maintain a financial asset register but what they lack is operational data registers such as AMC renewal, the vendor associated with AMC, warranty of assets etc. CFOs are finding it difficult to map the actual operational cost with financial cost. There is a lack of automated process to validate specifications of the assets deployed at various remote sites.

It is becoming more and more difficult for tower companies to perform preventive and corrective maintenance at tower site in a timely manner to ensure 99.9% uptime. In the present scenario, maintenance activities are tracked through inefficient manual processes. There is urgent need of a solution that helps the maintenance team to manage their tasks and also offers real time tracking of all preventive and corrective activity at the sites. This would enable tower operators to reduce their revenue losses and penalties.

The biggest issue faced by tower operators is that tower sites are prone to theft. Most of the time thefts are reported as a legal issue but no knowledge base is maintained for such thefts for future reference. In order to derive pattern and meaningful intelligence
to avoid theft, one needs to analyse theft related data. Once the tower companies have identified and analysed the assets that are susceptible to theft in each region, they can easily take proactive actions to protect the assets from being stolen.

Infozech precisely addresses these issues by implementing “Discipline of Action” with its iTower product suite.

TowerXchange: How does consolidated RMS data from various vendor ecosystems help in effective decision making?

Ankur Lal, CEO, Infozech: Monitoring of tower sites is a tedious task. Operators have several sites with thousands of alarms being triggered every month. Decision makers are often overwhelmed with the huge amount of monitoring data. It’s easy enough to get distracted when you’re working with too much data. RMS data collected from sites contains noise. In order to efficiently utilise this data, it becomes vital to filter out the noise. This in turn enables tower operators to perform intelligent actions and take better management decisions. Noise can be eradicated by the 80:20 rule. Once the unwanted data has been filtered out it becomes easier to analyse desired outcomes, business challenges, best case scenarios, and worst case scenarios. It also enables tower operators to perform comparative analysis of various vendors.

Infozech’s iTower represents effective data into organised reports, monitoring screens and dashboards which enable tower operators to identify pain points and plan operational activities efficiently.

TowerXchange: What does the iTower suite consist of and how will it help customers to implement “Discipline of Action”?

Ankur Lal, CEO, Infozech: iTower has nine core modules through which “Discipline of Action” can be implemented.

iROC (Infozech’s Remote Operating Centre): iTower has a comprehensive module to remotely monitor the tower operations, called iROC. It provides an end-to-end solution, from data fetching, tracking, monitoring to controlling and reporting. With the help of iROC, tower operators can manage day-to-day activities from a remote location and control the critical events through real-time dashboards and reporting tools. iROC can integrate, aggregate and correlate alarms from different power or RMS

Efficient tower operations: Infozech has played a major role in developing products and applications that are helping Indian and International tower industry to build a culture of data based accountability, leading to DISCIPLINE of ACTION.
vendors on a single platform. Thus, the user can save a lot of time and resources to track and monitor the site and improve their uptime. All site alarms are tracked from generation to closure using this module. For some of our customers, iROC is the main operational dashboard for 24X7 monitoring of the sites for SLAs of uptime and help them to take actions on a real time basis.

**iETS** (Infozech’s Energy Tracking Service): The majority — about 30-40% of total operational cost— of running a tower’s operations is its energy costs. iETS helps passive infrastructure providers to get access to real time information about electricity usage and the movement of fuel. iETS offering is closely supported by experts that train and encourage the field staff to adhere to the company’s processes of fuel supply uptake and usage. Tower companies can further enhance their portfolio’s carbon footprints with the help of iETS. Through this module, energy sources can be tracked effectively, thus extra money spend on managing energy resources can be saved.

One of our customers uses iETS to track daily variances in budgets (or P&F costs). iETS provides them an Executive Dashboard, which the senior management team reviews with regional heads on a weekly basis to track past progress, and create plan for upcoming week – both the past deviances and the future plan can be seamlessly recorded and accessed in iETS. Over time, this culture of data based accountability helped our customer to win a prestigious recognition from a third party audit firm.

**iMaintain** (Infozech’s Maintenance Management): iTower always keeps a check on maintenance activities happening on the site through this module. iMaintain helps operators to address the asset maintenance issues effectively and efficiently by scheduling different maintenance (Preventive / Corrective / Predictive) activities and resolving critical events through the incidence and theft management feature. Users can manage the site and can opt for preventive maintenance rather going for corrective maintenance, thus reducing operational cost. Tracking the maintenance leads to a higher ROI on the assets on site.

Infozech’s iTower represents effective data into organized reports, monitoring screens and dashboards which enable tower operators to identify pain points and plan operational activities efficiently.
One of our customers use this to enable operations teams to undertake corrective maintenance on time thereby increasing the uptime for the site. By maintaining the matrix for roles and responsibilities for maintenance, the efficiency of the operation is tracked and improved month by month.

**iBill** (Infozech’s Billing Module): To run a tower optimally, there are a high number of consumable items such as electricity, diesel and other energy sources. iTower has a module called iBill to ensure that all the consumption related data can be integrated for reliable billing. iBill helps tower operators to automate their billing process by integrating all vendors/telecom operators thereby reducing billing conflicts. Tower operators can easily access the power and fuel consumption data from a centralised location along with the recovery of energy usage. Using iBill, tracking of fuel and energy consumption is easy and transparent, so that the user gets billed only for the exact amount of their consumption. Users can manage billing for various operators in a single go.

One of our customers uses iBill to generate bills for all their tenants on time thus meeting the SLA to ensure service continuity, quality and timely output. Various types of agreements between towercos and operators are catered to e.g. fixed cost, pass through, retrospective and supplementary billing. Another customer generates bills based on data from varied sources (e.g. RMS, average data, and fuel bills) to then compares and analyses these before deciding which one should be sent to the operator. A workflow which allows customer to view and approve site level data of the bills ensures a reduction in payment delays due to billing disputes.

**iAnalytics Energy** (Infozech’s Energy Analytics module): Passive infrastructure providers can now address their specific questions and improve their operational performance by taking the right decisions enabled by online analytical processing. The data captured across various automated modes can be easily correlated and aggregated into the Infozech’s Analytics platform where it can be further processed for real-time action and delivery. Future analysis for various sites infrastructure and operations can be done using this module, and in doing so, the user can save both time and resources by planning events in advance.

**iAnalytics Battery** (Infozech’s Battery Analytics Module): This module helps in improving performance and life of a battery through continuous tracking, monitoring and control. It includes reporting and analysis of various battery parameters which are crucial for the functioning of a battery. Based on the operating conditions, the remaining life of the battery can be predicted and recommendations can be made on controllable parameters like depth of discharge so that overall life of battery is increased.

**iAsset** (Infozech’s Asset Management): iAsset enables tower companies to understand the location and type of asset present at the site. With the integration of site assets into a master database, iAsset allows users to keep a check and audit the site. Asset movement activity can also be captured to keep tracking of assets in a real-time. Health reports are generated to monitor the utilisation of remote assets.

**iAccess** (Infozech’s Access Management): Infozech’s belief in providing secure solutions for this industry has resulted in the development of the iAccess module. iAccess provides a platform for tower operators to securely access their sites and monitor the site accessibility as well as the performance of guards and field personnel. This module works seamlessly when integrated with access control devices for time/duration based access codes. This contributes to enhancing the life of different equipment located at the tower sites.

**TowerXchange**: Finally, please sum up the role of Infozech in improving the profitability of the international tower industry.

Ankur Lal, CEO, Infozech: Infozech has played a major role in developing products and applications that are helping Indian and International tower industry to build a culture of data based accountability, leading to DISCIPLINE of ACTION. The tower industry faces huge challenges such as inefficient tracking of assets and resources, unavailability of relevant and integrated data, accuracy of the bills generated and the lag time between getting the billing data and generating the final bill. Moreover inability to make sense of collected data to take the right business decisions. iTower addresses all these challenges with its suite of products thus helping tower operators find the right ways to improve their bottom line.
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How RMS adds value to multi-tenant towers

Invendis enables separate energy bills for each tenant, resolves SLA disputes, reduces manpower costs and gives management visibility into tower performance

Invendis (INVENt and DIScover) is a telematics technology developer from Bangalore, the Silicon Valley of India. They have developed an RMS solution that adapts perfectly to the tropical climates in India and Africa, and which is in use today monitoring over 24,000 towers, most with multiple tenants. Invendis are one of the few RMS suppliers to have successfully passed through a North American towerco’s rigorous partner selection process – naturally, TowerXchange wanted to learn more...

Satish Kulkarni, CEO, Invendis: Invendis started its operations in 2007 as a telematics company for vehicle tracking and mobile workforces. In 2008 we got into telecoms as the industry needed telematics for static platforms such as shelters and fuel tanks.

2008 was an exciting time in Indian telecoms, and there are many parallels to Africa today. A lot of new licenses were being issued and a many international new market entrants were coming in. Towers were being hived off as separate independent towerco entities.

With the big operators and towercos commanding portfolios of 60-100,000 towers, as a startup Invendis decided to focus on new, smaller towercos with less than 5,000 towers. We did demonstrations to three towercos, one with 1,800 towers, another with 200, and a third with 2,200. Our first order came in for systems for all 1,800 towers six months after the demonstrations. We secured a second order from the 200 tower company before they were acquired by a large American towerco, then we were shortlisted to get a PO for the 2,200 tower business before they were acquired by the same towerco! So this large North American towerco came to us as a legacy supplier.

TowerXchange: Where do Invendis fit into the telecoms infrastructure ecosystem?

Satish Kulkarni, CEO, Invendis: Between 2008 and

Keywords: Who’s Who, Monitoring & Management, Opex Reduction, Batteries, Installation, Air Conditioning, Unreliable Grid, Hybrid Solution, Fuel, Site Visits, RMS, Infrastructure sharing, Africa, India, South Africa, Invendis

Read this article to learn:

- How to optimise selection of energy source to reduce energy opex
- The criticality of remote management of air conditioning in tropical climates
- Insights into how towercos trial and buy solutions
- A comparison of RMS installation costs in India and Africa
- Why equipment with integrated sensors is an opportunity not a threat for RMS companies
Our approach is to move the customer operations from a reactive mode to a proactive mode by monitoring various parameters including alarms to detect and eliminate a potential site outage and also to optimise the equipment usage and operational expenses.

Now we have installed end-to-end RMS in 6,000 towers in India, and we’ve also added energy management, alarm extension and inventory management for another 15,000 towers. So our domestic installed base is around 21,000.

About three years ago, after our domestic rollout, we decided to see what we could do in other markets. The North American towerco had just acquired about 2,000 towers in South Africa, so we brought our reference credentials from India, we responded to their RFP and were invited to participate in a trial, then agreed commercial terms and secured the order. Deployment started a year ago on the first 250 towers, with the total order being for 600. Deployment will be complete by the end of July. So our installed base in Africa will be 600.

We are currently participating in other African trials and have been shortlisted in Uganda, and have active prospects in Kenya, Nigeria and Tanzania.

In Oman we have a major rollout of approximately 400 telecom exchange buildings, and 250 systems about to be installed in Kuwait.

**TowerXchange: Please tell us how tower operators can achieve RoI in remote monitoring and control systems such as yours?**

**Satish Kulkarni, CEO, Invendis:** Our approach is to move the customer operations from a reactive mode to a proactive mode by monitoring various parameters including alarms to detect and eliminate a potential site outage and also to optimise the equipment usage and operational expenses.

We are not just a remote monitoring company, we consider ourselves an energy optimisation company. We optimise the selection of energy source to reduce energy opex.

Our systems are most commonly installed at multiple tenant sites and we implement hybrid system based on power source and temperature. Cell sites have three major power sources: an often unreliable grid, 99% of towers have a diesel generator, and many have a huge battery bank (in some cases there is also solar or wind power, but in most cases it’s still grid, diesel generators and batteries). Our systems help decide which power source to use to optimise operational expense and also increase the battery lifetime.

As long as you have grid power, the site runs on the grid. The moment grid goes down, what used to happen was the DG was switched on because the tower operator didn’t know how much charge was in the battery. With RMS, you can run batteries more often and run them for deeper cycles to optimise battery lifetime.

Many parts of India and Africa share a tropical climate, which means air conditioning is needed to keep the temperature in the shelter down to 25-30°C and operate the telecoms equipment within specified operating temperature ranges. When the cell site is running from the battery bank, air conditioning is often switched off. However, if RMS is installed we can monitor the temperature and run the air conditioning off the DG if the temperature exceeds a threshold of 35°C.

However, the biggest difference between Africa and India is that in India the infra company owns the shelter and the DC power is shared between the operators where as in Africa the shelter is often owned by the operator and the infra company provides AC power to the operator and hence we install RMS devices inside the shelter in India and in Africa we install outside the shelter using weatherproof enclosures.

**TowerXchange: What is the typical capital outlay per site to install your system?**
Satish Kulkarni, CEO, Invendis: In India, the cost is around US $2,000 per site for the equipment and installation, with 6-7 months to RoI based on monthly savings of US $300-350.

In Africa because of import duties, local regulatory mechanisms, and very high installation costs (technical manpower can be six to seven times the cost in India), typical installed costs might be around US $4-5,000 per site. The costs are also higher in Africa because of the geographical distribution of cell sites, poor transport infrastructure, and more complex specifications to manage multiple tenants at sites on an unreliable grid. So RoI in Africa can be around 10-12 months.

The cost also varies based on geography, sensors, accessories and services required by the customer.

TowerXchange: How do the requirements of remote monitoring and control change when managing multi-tenant sites?

Satish Kulkarni, CEO, Invendis: Different tenants often use different active equipment with different specifications and different power consumption. So in multiple tenant scenarios, towercos need visibility of how much power each tenant has consumed so that each operator can be billed separately.

In the absence of RMS, the towerco would divide the power consumption bill between tenants, but tenants are increasingly unhappy with such arrangements, especially if they’ve invested in new low energy equipment that can use a quarter of the power.

Secondly, RMS resolves disputes as to whether the active equipment or power solution was responsible for any outage. BTSs take a long time to power up after any outage, and SLAs often mean penalty clauses are triggered if the towerco lets the power go down.

The third way RMS adds value for multi-tenant sites is by reducing expensive technical manpower costs. Previously maintenance teams may have visited every day to check the site, but with RMS now they only need visit when an alarm is triggered and a site visit is necessary, and you know what expertise is needed and what spare parts are required to stabilise or resolve the incident.

RMS plays a major role in ensuring the health of the tower site passive equipment and helping to prevent or minimise site power outages by acting proactively before an incident occurs which leads to outage, SLA penalties and compromised quality of service.

Finally, RMS plays a very important role in giving towerco management an overall picture of tower performance.

TowerXchange: What were your impressions of selling to that North American towerco – what can you tell us about their procurement process?

Satish Kulkarni, CEO, Invendis: When they acquired four towercos in India, including the two towercos with whom Invendis had contracts, they held up equipment rollout and said they’d consolidate and normalise RMS requirements across the entire organisation. So they sent us their specifications and ultimately trialled two different RMS companies. After a full technical evaluation, including the last 3-4 months on multiple sites, they refined their requirements, wrote a new specification, and issued a new order for RMS at approximately 1,000 towers.

So this towerco took a four step approach after acquiring new towers; first they held up deployments scheduled by the acquired business, second they issued new specifications, third they trialled alternate suppliers, and fourth they issued refined specifications based on the trial.

Working with the North American towerco has been a great experience. They have worked closely with us to define their requirements and refine our
solution to meet those requirements, and we now have almost 3,000 of their towers running on our software.

We don’t see any major differences between the way that Africa’s big four towerco trial and buy RMS.

Towercos tend to standardise the equipment and operation of their towers. However they understand that every tower has different equipment (especially older towers with multiple tenants using different equipment vendors), so a degree of customisation is required for every site.

**TowerXchange: Is there a danger that the monitoring devices embedded in new hybrid equipment will reduce investment in dedicated RMS?**

Satish Kulkarni, CEO, Invendis: Who owns the sensor hardware is becoming less important – remote monitoring is a data-driven market. Successful remote monitoring requires a software platform to capture and normalise data and render it in a uniform way to support decision making.

We have supplied software in India, the Middle East and in Africa that integrates data from our own sensors and data from Emerson, GE Power Management Systems and other intelligent equipment with embedded wireless communication.

The equipment inside the cell site comes from a wide variety of companies that are experts in a certain field, whether it’s power management systems, batteries et cetera. Even if remote monitoring is built into the genset, I’m not sure how much these systems talk to the different equipment at the cell site. Hence the need for dedicated, equipment agnostic and sensor agnostic RMS systems to integrate data from hardware manufactured by different vendors into a single platform.

I don’t think RMS vendors feel that integrated sensors are a threat to our business. These other companies specialise in power management – how many R&D dollars are invested into remote monitoring? We’re investing fully in remote monitoring and energy efficiency.

**TowerXchange: Finally, please sum up how you differentiate Invendis from your competitors.**

Satish Kulkarni, CEO, Invendis: Invendis is an end-to-end company – from software to remote monitoring equipment, temperature/fuel monitoring and alarms, we have expertise in all three disciplines.

We have a software platform running 24,000 towers across 6 countries.

Ours is the newest hardware on the market – our latest equipment is from a design three months old. Competitors’ industrial equipment was often designed five to six years ago, and doesn’t have the same customisation capabilities.

Africa needs solutions designed for emerging markets, not systems designed in Europe or America where they are used to clean, uninterrupted power and don’t have the same need for robust outdoor equipment as Africa.

Another differentiator is our speed of rollout. Having done 21,000 towers in the last four years, I don’t think our competitors have done even 5,000. To install in 21,000 towers you need robust installation processes. Invendis has only been in Africa for a couple of years, yet we’ve already deployed in two countries.

Finally, Invendis is a technology-driven company, not a box manufacturer. Our expertise is systems development and software development, so our systems are very robust, with no need for manual interventions.
Khaled Habbal, VP & COO, IPT PowerTech: When IPT PowerTech was established in 1993 we were not a telecom service provider, but a provider of automotive and specialty batteries. As the telecom sector picked up in 1995-96, we thought we could add a lot of value so we started selling batteries to the telecom sector. We expanded into selling power systems in late 1990s, and later added site construction services, telecom services, and managed services and maintenance to create a one stop shop for telecom infrastructure equipment and services.

We made a strategic decision to become one of the few companies in the region, if not the only one, to combine product R&D and manufacturing capabilities to ensure optimum delivery. That combination of products and services together enables us to provide the maximum benefit to our customers.

Our journey has been an evolution from being a regional, Middle Eastern power systems integrator and batteries vendor, expanding into 11 countries on three continents with 1,700 employees across two main divisions. Our power division provides a wide range of power products for telecom sites; from batteries to power systems, hybrid systems, power generating sets, energy efficient solutions, and our own enclosure manufacturing and assembly. Our telecom services division provides managed services, with three main pillars:

- Meeting the challenge of energy efficiency at unreliable grid and off grid sites in Myanmar
- Developing and scaling a zero-capex, ESCO proposition
- The two different energy efficiency investment strategies employed by African towercos

construction – the building of telecom sites and the laying of optical fibre; maintenance and managed services; and telecom installation and network services.

While some suppliers sell energy systems with a certain promise of efficiency, it is all too easy for clients to struggle to achieve that efficiency in the field. IPT PowerTech provides a single point of accountability – we put our money where our mouth is.

TowerXchange: The perception is that telecom product development and services are very different businesses with different P&Ls – how have IPT PowerTech managed that combination from a corporate financial point of view?

Khaled Habbal, VP & COO, IPT PowerTech: One of IPT PowerTech’s strengths is that we are self-funded which gives us freedom in decision making. Naturally, we take well calculated risks.

The way we run our managed services business has delivered a very consistent balance sheet. We sign long term contracts over three, five or ten years. Because of our focus on operational excellence in delivery, our financial risks are minimised. Yes there is a lot of overhead in managed services compared with pure product development, for example we have had to build a significant workforce to manage more than 3,500 sites in Africa, but we find that if we excel operationally, the business is in a good place in the medium to long term.
the electricity grid in Myanmar is growing steadily through public and private investments, with projections that over the next ten years we could see 50-60% of telecom sites connected with high quality grid
state of emergency in four states due to flooding. Markets like Myanmar bring with them particular risks due to their geographical location and climate. As such, it’s essential that our teams are distributed throughout the country to ensure mean time to respond (MTTR) is reduced to the minimum economically possible in order to maximise uptime.

In contrast the challenges in KSA are completely different. Power is more stable, over 90% of sites are grid connected, but in KSA the challenge is the large geographical area – balancing resource allocation to achieve targeted MTTR whilst delivering a profitable service. Like in any market, SLAs and KPIs are differentiated according to the importance of each site – so it’s critical to negotiate reasonable agreements that take into account logistical challenges.

TowerXchange: How would you characterise the tower and tower power market in MENA, where the towerco business model is only starting to be adopted, relative to the more mature towerco market in SSA?

Khaled Habbal, VP & COO, IPT PowerTech: The last five years have seen a revolution in SSA telecoms – IHS, Helios Towers Africa, Eaton Towers and American Tower have transformed the market with a very positive impact for themselves, for their MNO counterparts and for the environment as they increasingly rollout energy efficient solutions that are more eco-friendly than the previous 24/7 operation of DGs.

Once this business model comes to MENA there will be a change in the status quo. But the energy logistics challenge does not exist in the Gulf region, even in North Africa; in Algeria and Morocco the grid is significantly better than in most countries in SSA.

TowerXchange: As emerging market telecoms evolve toward ‘energy as a service’ business models, do you see IPT PowerTech evolving into an ESCO and selling energy by the kWh?

Khaled Habbal, VP & COO, IPT PowerTech: This is at the heart of our strategy. IPT PowerTech has evolved from a product company, adding services, then combining products and services, and over the last years we’ve been talking about opex models to sell energy by the kWh. We have already started offering kWh propositions – providing energy to a certain number of sites on a kWh basis, using a zero capex, opex business model.

In fact IPT PowerTech is the first company to offer an opex business model in Nigeria five years ago. We went into Airtel after their acquisition of assets from Zain offering a kWh model, but the concept was ahead of its time – it was not as exciting as it is today.

We believe IPT PowerTech is most suited to offering opex business models given that we develop, manufacture, install and maintain our own solutions – we have the faith in ourselves, in our products, in our management, and in our field workforce to sell energy by the kWh – you need to have that belief because you’re taking all the risk on your back.

TowerXchange: I understand that IPT PowerTech has worked with several of the leading tower companies in SSA, including American Tower, IHS and Helios Towers Africa – are the towercos investing substantially in energy efficiency programmes and hybrid energy yet, or does the focus of your work with them remain on maintaining legacy diesel-based power systems?

Khaled Habbal, VP & COO, IPT PowerTech: We’ve seen different towercos go in one of two different directions when it comes to investing in energy efficiency programmes. Some towercos invest ‘full
2. We have more than 20 years of experience. With proven R&D teams and 1,700 experts in the field we are the most specialised power solution provider in this industry, operating in areas where power has always been a challenge.

3. On the other hand we reinvent telecom infrastructure by being a one stop shop for any telco, towerco or vendor in terms of infrastructure services from site acquisition, to the building of sites, managed services and maintenance, telecom installation and integration.

Some towercos invest ‘full blast’ in energy efficiency from early on and it takes them 12-24 months to upgrade the power systems on most of their sites. Other towercos... install RMS to monitor sites for 12-18 months after which they decide where and how to invest in energy efficiency.

You can run those assets into the ground, or you capitalise on their immediate refurbishment and resale value and invest in a more efficient solution that delivers ROI in 12-18 months. It all depends on the way each towerco looks at TCO. It is also driven by the availability of capital to invest. Towercos are mostly generating capital to acquire new towers, they don’t always have the financing needed to invest in energy efficiency across the entire portfolio until they complete a new round of funding.

TowerXchange: Finally, please sum up how you would differentiate IPT PowerTech from other turnkey infrastructure providers for telecoms?

Khaled Habbal, VP & COO, IPT PowerTech: IPT PowerTech distinguishes itself by merging the worlds of power and telecom. We have our own manufacturing facilities in Lebanon and Romania, which means we are uniquely able to combine high quality in-house products coupled with our own services proposition.

Our outstanding management team, both in our headquarters and at country level who are leading the operations, reflects the fact that our people are as valuable as our products and services.

Our company slogan, “redefining power solutions, reinventing telecom infrastructure” is illustrated in three ways:

1. We always redefine and customise power solutions to maximise quality of power delivery and economise power costs in the light of the declining ARPU.

What matters most is Total Cost of Ownership (TCO). Having acquired a new portfolio of towers, a towerco may find themselves owning a number of inefficient diesel generators with several thousand hours of potential runtime before they need replacing.
Aviation obstruction light for telecom tower

About Nanhua

For more than 24 years, Shanghai NANHUA Electronics has been focused on the designing, manufacturing and marketing of industrial application products. NANHUA has begun the promotion and application of Aviation obstruction light system for telecom towers in the year 2007. NANHUA has full experience in manufacturing of the complete line of cost-effective obstruction lighting and control solutions for the telecom towers, chimneys, high buildings, port machinery and any other high structures that could threaten the aircrafts. NANHUA products have been proven to be professionally designed and highly reliable.

NANHUA Electronics is located in Shanghai, China, with a factory of 6000 square meters, 310 staffs till June of 2014, including 37 members in R&D center and ISO 9001 quality authentication certification.

Products Features:
- Over 150,000 installations in 81 countries
- Vibration and shock-proof construction
- Strictly designed according the ICAO and FAA obstruction standards
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Qowisio’s Ultra Long Range technology cuts the cost of RMS by 30%

Proven RMS vendor enables towercos and MNOs to share one controller between multiple sites, and to provide new VAS within the IoT ecosystem

TowerXchange has seldom come across a remote monitoring competitive differentiator in as significant as Qowisio’s Ultra Long Range radio communication technology. Whereas once upon a time, every remotely monitored site had its own controller with a finite number of ports to add extra sensors, Qowisio’s Ultra Long Range communication technology, combined with the wireless, ‘plug and start’ design of their solution, means that several sites within a 35 kilometer radius can share a single controller, consolidating data from up to a thousand sensors. Capital cost savings: 30%. Opex cost savings: priceless!

Keywords: Who’s Who, Monitoring & Management, QoS, Operational Excellence, Off-Grid, Unreliable Grid, Site Visits, Skilled Workforces, RMS, Africa, Europe, France, Tanzania, Qowisio

Read this article to learn:
- How many sites and sensors can be controlled from one QowisioBox controller?
- How ultra long range technology saves both capex and opex
- How improved tamper-proofing adds even more savings
- Opening up new opportunities to create VAS within the IoT
- ‘Plus and Start’: Improving ‘deployability’ by making the system wireless, easy to install and remotely configurable

TowerXchange: First, what is your background Cyrille – how did you come to be running an innovative remote monitoring and energy management company?

Cyrille Le Floch, CEO, Qowisio: My background is as a radio engineer and designer of mobile networks for Bouygues Telecom, Orange and latterly T-Mobile. In particular with Orange, who operate in a number of markets where the electricity grid is incomplete or unreliable, I often faced challenges to secure power and ensure QoS.

I took those experiences in the field into designing a remote monitoring system that could meet the needs of mobile network operators, while being robust enough to function in challenging markets such as SSA.

TowerXchange: Please introduce Qowisio’s ultra long range radio communication technology – why could this be a game changer in remote monitoring of cell sites?

Cyrille Le Floch, CEO, Qowisio: With the emergence of the independent towercos, who often buy towers from different operators, sometimes towers are only a few hundred meters apart. Similarly, network densification for 4G will require cell splitting – more sites, closer together.

In the past, remote monitoring systems had needed a controller on each tower to consolidate data and transmit it back to the NOC. However, Qowisio realised we could share one controller between
multiple sites, increasing the security of an already robust solution, while reducing capex and opex.

TowerXchange: How did your R&D team come up with the idea of using ultra long range communication technology to share one controller between multiple sites?

Cyrille Le Floch, CEO, Qowisio: First you have to understand that communication between sensors and the QowisioBox controller has been wireless from the beginning.

We encountered several sites where the BTS was on a rooftop, with the genset and fuel tank at ground level. To avoid expensive cable connections, our R&D team extended the wireless communication range of the controller to 100-300m. We realised if we extended the range still further, one controller could serve multiple sites.

TowerXchange: How many sites and how many sensors can be managed from one QowisioBox controller?

Cyrille Le Floch, CEO, Qowisio: Because ours is a fully wireless system, the capacity of a QowisioBox is over 1,000 sensors. Unlike competitive wired solutions, there is no limit in terms of the number of ports on the controller. We can connect to any new piece of equipment installed in the field directly from the NOC – so it’s easy to extend the sensor network, and the field technician doesn’t have to connect and configure the solution onsite.

TowerXchange: It seems to us that a tower owner can pay anything from $500 to $10,000 per site for RMS depending on the quality and functionality of the solution they select. What are the potential cost savings enabled by Qowisio’s Ultra Long Range radio communication technology, and how does that give you an edge in the higher quality end of the market which you address?

Cyrille Le Floch, CEO, Qowisio: Using one centralised controller instead of multiple RMS controllers on each of several nearby sites is efficient from both a capex and opex point of view.

Sharing one controller between three of four sites
Qowisio’s solution is easy to install and maintain. With no cabling, it’s all ‘plug and start’ – the field technician doesn’t need expertise to configure the system. Everything is in the cloud; settings can be changed remotely from the NOC can save more than 30% on capex.

With each controller having two SIM cards, if you have three towers within a couple of kilometers, you need three controllers and six SIM cards with other RMS, but you need only one Qowisio box with two SIM cards, thus reducing transmission opex costs, which can be substantial.

We generate even more savings as a result of making sites more secure. While wired RMS solutions are easier to tamper with to disable fuel monitoring and steal diesel, for example, by simply cutting the wire (even with internal power, the vandalized sensor will need a maintenance visit). With the Qowisio solution, not only may there be no wires but no controller onsite to even attempt to tamper with!

TowerXchange: How proven is the solution in the field?

Cyrille Le Floch, CEO, Qowisio: Qowisio’s Ultra Long Range communication technology has been successfully deployed on over 1,000 sites in France.

We have signed some contracts with towercos already as our long range, wireless communication technology gives us a genuine competitive advantage over classical, wired RMS solutions. As a result, we’re able to supplement towercos’ core business, becoming more of a partner than a supplier.

TowerXchange: How can Qowisio supplement the towerco’s core business?

Cyrille Le Floch, CEO, Qowisio: Qowisio’s Ultra Long Range communication technology enables towercos to access the IoT (Internet of Things) ecosystem and provide new services. As well as monitoring their own and their tenant’s assets, towercos could monitor third party assets within the controller’s radius, like refueling stations’ monitoring sensors, providing more data deeper into their own supply chain, but also transmitting sensor data as a value added service to other businesses, opening up telemetry / M2M revenues beyond towercos’ locations.

With a range up to 35km, it would enable towercos and MNOs using our equipment to connect to any object with an embedded sensor, providing a myriad of data to other companies.

TowerXchange: TowerXchange has profiled 27 different RMS and Site Management Systems, and spoken to hundreds of towercos about their experiences with RMS. For the last three years it has seemed like no single solution has yet been able to meet all the towerco’s requirements. What do you see as the primary challenges to making remote monitoring and energy management work and how are Qowisio working to overcome those challenges?

Cyrille Le Floch, CEO, Qowisio: Many competitive RMS solutions have been developed from industrial monitoring, using wired controllers linked with an Internet or GSM modem, and developed for countries where grid power is stable. Qowisio’s solution has been designed from an emerging market tower operator’s point of view. We recognise the challenges of making advanced functionality simple to deploy, making it remotely configurable, and making it tamper-proof.

Qowisio’s solution is easy to install and maintain. With no cabling, it’s all ‘plug and start’ – the field technician doesn’t need expertise to configure the system. Everything is in the cloud; settings can be changed remotely from the NOC.

We’ve been pushed to design a solution that is robust against tampering, which is especially important when monitoring cell sites in remote areas where diesel is effectively a local currency, and where pilferage is widespread.
REMOTE MONITORING SOLUTION

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Redflow’s innovative application of flow battery technology for telecoms infrastructure shows great potential

Zinc-bromide flow batteries are making waves

TowerXchange caught up with Simon Hackett, Chairman of Redflow Limited and a champion of an innovative new commercial application of zinc-bromide flow batteries. Redflow’s ZBM battery is a good fit for emerging market telecoms. The ZBM supports a ten+ year lifespan of daily cycles that is insensitive to depth-of-discharge. It can be fully charged and totally discharged every cycle without damage. Accordingly - and unlike other battery types - 100% of the battery capacity can be utilised to supply energy to a telecommunications load without needing to ‘oversize’ the battery capacity (as is required with other battery chemistries). Zinc - bromide batteries have generally been considered too large and high capacity for deployment on telecoms sites to date, but Redflow are in the process of changing this.

Keywords: Africa, Air Conditioning, Asia, Australia, Batteries, Blue Sky Energy, Central America, DG Runtime, Emerson, Energy Storage, ESCOs, Hybrid Power, Jaladri, Off-Grid, Opex Reduction, Redflow, RoI, Schneider Electric, Unreliable Grid, Who’s Who, Zinc-bromide

Read this article to learn:

- The background of zinc-bromide flow batteries and Redflow’s new design
- Redflow’s global footprint and partner ecosystem
- The performance of flow batteries in remote sites with unstable grids and high temperatures
- Other potential future applications of flow batteries

Simon Hackett, Chairman, Redflow: Please give us an introduction to your company.

Simon Hackett, Chairman, Redflow: Our Head office and research and development centre is in Brisbane, Australia. Our global presence also incorporates offices in the USA and Europe. Our batteries are manufactured by Flextronics in North America to be sold to the world market. This network provides us with the capacity to sell, integrate and maintain our products internationally. Our batteries are already installed in a range of industries, including telecommunications, agriculture and power distribution, in Australia, Central America, Asia and Africa.

TowerXchange: Tell us about your solution and where it fits in the telecom tower ecosystem.

Simon Hackett, Chairman, Redflow: Redflow has spent the last decade designing and perfecting the world’s smallest flow battery. Most people in the telecoms industry are familiar with the other batteries more commonly associated with tower sites such as lead acid or lithium-ion. Redflow’s ZBM is the first flow battery product that is the right physical size and capacity to serve the needs of the tower ecosystem. The ZBM module has an 8kWh or 10kWh storage capacity, supplying 48 Volts DC at 60-70A typical (120A Max) per module. Multiple modules can be clustered to develop any required energy storage size. This means the ZBM is the first flow battery that can scale up to a 600
kWh shipping-container form-factor module (60 ZBM’s), and that can scale down to 10-20kWh (1-2 ZBM’s) for telecoms towers, small commercial and residential applications.

**TowerXchange: Please tell us about your partners and global footprint.**

Simon Hackett, Chairman, Redflow: We work with energy integration providers such as Emerson, Blue Sky Energy and Jaladri (amongst others). We currently have ongoing trials on tower sites in several markets including Australia, Central America, Asia and Africa, giving us an opportunity to build on our operational experience globally. These trials are progressing well and now we’re sitting on the cusp of some large scale deployments.

**TowerXchange: Batteries are typically deployed in remote sites in developing markets. What are the specific benefits of flow batteries in these environments?**

Simon Hackett, Chairman, Redflow: Flow batteries are particularly suited to use in remote areas where the grid is unreliable. They will perform well over a very long lifetime in harsh conditions and will and suffer no damage if completely depleted. By contrast, lead acid batteries can be damaged or suffer reduced operating life if they are allowed to become fully depleted or if they are disconnected for a long period.

Zinc-bromide flow batteries are able to work in a wide range of ambient temperatures, from five degrees Celsius ambient up to forty five degreesul, which is a major benefit in more hostile climates. The battery will self-protect outside of these temperature limits to avoid damage.

The ZBM is well suited to hybrid solar solutions and it is also a good fit for generator run-time-reduction applications.

A unique capability of the ZBM is an ability to be completely shut down (and taken offline) at any state of charge (including fully charged), for an arbitrary period without loss of internally stored energy. The battery can be brought back online later with the application of a very small external power source for less than 30 seconds. This provides an outcome much like a diesel generator, but with indefinite standby time, no physical maintenance requirement, and no issues with the long term storage of diesel fuel.

**TowerXchange: What kind of life span do flow batteries have?**

Simon Hackett, Chairman, Redflow: Redflow ZBM batteries have a warranted ten year life span based on daily full cycles (and insensitive to cycle depth variation). A 10 kWh ZBM battery can store and recover up to 36,000 kWh over this period. Lithium-ion battery lifespan (by comparison) is a complex function of charge cycle depth and charge cycle energy intensity, with significant ‘reserved capacity’ being needed to avoid the potential for battery pack damage. The lifetime of the ZBM is independent of cycle depth and cycle intensity and are not damaged by full-charge or full-discharge events, even if they occur every single day.

**TowerXchange: Are there any other key differentiators between flow batteries and other types of batteries used on tower sites?**

Simon Hackett, Chairman, Redflow: Flow batteries are real workhorses; they are hardy and will run consistently, require less maintenance, with the on-board control system providing proactive battery management and protection. They’re safer too as the electrolyte is actually a fire retardant. The majority of the battery (even the electrode stack) is made of fully recyclable plastic.

**TowerXchange: Do you envision any other applications for these batteries in the future?**

Simon Hackett, Chairman, Redflow: Currently our primary telecoms/ICT focus is telecom tower sites as our battery is an ideal energy storage solution for that market. They can also be deployed in data centre applications, as well as other non-telco power support roles (such as water pumping stations in weak-grid or no-grid environments). We have seen increasing interest in deployment of these batteries in residential environments, and we expect to have a residential reference energy system design available to system integrators in the first quarter of 2016.
Power, fibre and community development: how Sagemcom are building networks in Africa

Sagemcom build on core competencies and introduce new solutions for the African market

Sagemcom offers a vast number of critical services to African infrastructure providers, from RMS to power optimisation and from fibre to cell site construction. We spoke to their Managing Director of Systems and Networks, Paulo Dias Da Graca, about the future – their newest offerings, the growth of the African market and how technological developments like fibre roll-out and the Internet of Things will affect towercos in Africa.

Keywords: Africa & Middle East, Batteries, Community Power, Energy, Hybrid Power, Interview, Managed Services, Monitoring & Management, Next Billion, O&M, Off-Grid, Opex Reduction, RMS, Renewables, Sagemcom, Site Management System, Skilled Workforces, Unreliable Grid, Urban vs Rural, Who's Who

Read this article to learn:
- How Sagemcom has grown into one of the biggest telecoms service providers in Africa
- The role of community power in rural locations
- How to make tower structure audits, rehabilitation and upgrades affordable
- How to reduce fuel consumption by 30% with Sagemcom’s proven RMS plus smart ATS solution

TowerXchange: Please re-introduce Sagemcom for readers who are not familiar with your company.

Paulo Dias Da Graca, Managing Director, Systems & Networks Department, Sagemcom: Sagemcom is a leading European group in the high added-value communicating terminals market (set top boxes, internet boxes, electricity meters, et cetera) and telecom/energy infrastructures based in France. Group turnover totals €1.3 billion, the headcount of 4,200 employees work in more than 40 countries, and the group has been profitable since it was created. Sagemcom designs, manufactures and ships more than 22 million terminals worldwide every year. Sagemcom has in house R&D and manufacturing capabilities in both terminals and the telecom/energy market.

TowerXchange: Could you describe which services and solutions you provide in the telecom and energy market?

Paulo Dias Da Graca, Managing Director, Systems & Networks Department, Sagemcom: The subsidiary Sagemcom Energy & Telecom concentrates Sagemcom Group expertise, R&D and industrial capacities, in telecom and smart metering, enabling the supply of customised connected systems to utilities, telecom operators, tower companies and services operators worldwide.

The combination of these activities addresses the increasing needs of vertical markets and allows Sagemcom Energy & Telecom to propose efficient...
end-to-end turnkey solutions through its high value added equipment and platforms, easily making smart environments a reality.

In particular we offers solutions and services for smart sites including turnkey construction, tower reinforcement, hybrid and solar power generation, energy optimisation solutions and RMS.

We have built several thousand cell sites, including hybrid and solar power generation, in African countries. We have deployed our in-house RMS solution in several countries including Slovakia, Poland, France, Philippines, Madagascar, Tanzania, DRC and Morocco.

Our smart infrastructure solution includes intelligent traffic systems, optical fibre backbone, fibre to the home/building/curb and fibre to the antenna. We are currently rolling out several FFTH and FTTA networks in locations such as Sénégal, Mauritius and Mali as well as fibre backbones in Madagascar and Senegal.

We have rolled out more than 30,000km of fibre networks in Africa on a turnkey basis in the last few years. This expertise is more and more useful for towercos and telcos as the cell sites are fiberised.

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has been present in Africa for 40 years, with 18 established affiliates. In all these affiliates we have skilled technicians and engineers, both through the local team and in management. This has allowed us to support our main clients and to provide a flexible and effective range of services.

In particular we are currently providing managed services for the main African towercos and operator groups. We are also providing more and more energy optimisation audits and services.

TowerXchange: Which kind of new valuable services or solutions are you planning to propose to the towercos in the near future?

Paulo Dias Da Graca, Managing Director, Systems & Networks Department, Sagemcom: We are more and more involved in integrating digital terrestrial television system in Africa, as we have recently done in Ivory Coast.

Furthermore, as a founder member of the LoRa alliance, Sagemcom has developed a complete "Internet of Things" offering compliant with the LoRa standard. We believe that this will pave the way to helping towercos both to address their

TowerXchange: Tell us more about your history and presence in Africa.

Paulo Dias Da Graca, Managing Director, Systems & Networks Department, Sagemcom: Sagemcom is a global company, with in house R&D and high tech manufacturing, providing the whole scope (turnkey construction, energy equipment, fiber connection, cell site monitoring, managed services et cetera) and therefore able to bear the whole responsibility from manufacture to maintenance. Adding a strong and established African presence makes Sagemcom quite unique.

TowerXchange: What differentiates Sagemcom from other energy/RMS equipment suppliers or site construction companies?

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internal needs and offer new services to their clients with a minimal initial investment.

TowerXchange: What are the main operational challenges you see towercos and MNOs facing in the African market at the moment? What is Sagemcom doing to address this?

Paulo Dias Da Graca, Managing Director, Systems & Networks Department, Sagemcom: In the very near future half of the cell sites will be towerco owned or managed. Some of them, with a built to suit origin, have multi-tenant capacity from the start, but many others, acquired from MNOs, need to be upgraded from single tenant towards multi-tenant capacity. This results in significant tower structure audits, rehabilitation and upgrade challenges as well as energy upgrade and optimisation needs. These audits and upgrades works have to be made at an affordable cost, by skilled teams. Sagemcom, through its local presence in 18 African countries, with skilled local technicians and engineers, has the ability to provide such services quickly and efficiently. We find MNOs can have the same type of needs, even when they do not sell their sites to towercos but still want to share them with competitors.

We also offer managed services to address those challenges.

TowerXchange: Tell us about your views on the growth of the African market? How will Africa grow? Which markets will be hottest and what kind of infrastructure upgrades will be needed to support this?

Paulo Dias Da Graca, Managing Director, Systems & Networks Department, Sagemcom: All reports show that Africa will remain the fastest growing market for mobile communications in the next ten years. It is expected that the number of mobile subscribers will exceed 500mn in 2020 (growing by 50% compared to 2014). It will overtake Europe and become the second largest mobile market after Asia Pacific.

There is a strong trend towards infrastructure sharing and therefore towards infrastructure upgrades. We should also mention the very special challenge of rural coverage expansion.

TowerXchange: How do your clients’ demands differ in rural versus urban regions?

Paulo Dias Da Graca, Managing Director, Systems & Networks Department, Sagemcom: The rural related demand has a number of specific characteristics. Due to a lower ARPU and a lower density, the MNOs require low cost sites and solutions. They are ready to accept coverage or technical constraints in order to make it economically viable.

The issue of rural electrification is also very much connected to rural mobile communications. Today there are approximately 260mn mobile customers in emerging countries without access to the electricity grid. Due to charging difficulties, their phones are switched on only when absolutely necessary, thus resulting in loss of revenue for the MNOs. We have developed energy management solutions which allow us to provide the excess energy from cell sites to the local population, through a local plug cabinet (or even through a distribution network). The energy management system warrants that the priority is, at any time, given to the cell site. It allows us to guarantee the site availability, with only the excess energy being distributed.

Many institutions, such as the World Bank, are promoting this concept of rural cell sites being used as anchor points for a first rural electrification.
Sagemcom is offering Siconia™, a solution that enables the connection with both deep indoor sensors and unpowered objects. Sagemcom builds the solution on LoRa™, according to the LoRaWAN specification designed by the LoRa Alliance in which Sagemcom is founding member.

Welcome to the IoT world!
Tarantula’s successful move to Southeast Asia

Leading site portfolio management software company’s expansion into the region and the drivers of its success

Tarantula, the leading telecom site portfolio management software company, relocated its global head office to Singapore a year ago and is expanding its product offering in Southern and Southeast Asia. Thanks to its highly focused telecom infrastructure management products, Tarantula already provides its solutions to manage information relating to portfolios covering more than 400,000 telecom towers worldwide. This includes tower businesses of Indus Towers, Viom Networks and American Tower in Southern Asia. In this interview, Udhay Mathialagan, CEO of the company, tells us about Tarantula’s successful first twelve months in the region.

Keywords: Tarantula, South Asia, Southeast Asia, India, Myanmar, Indonesia, Viom Networks, Indus Towers, American Tower, C-Level Perspective, Irrawaddy Green Towers, Komet Infra Nusantara, Malaysia, Thailand, Cambodia, Bangladesh, Sri Lanka, Site Management System

Udhay Mathialagan, Chairman and CEO, Tarantula

TowerXchange: Udhay, could you give us a brief history of the company? Which countries are driving Tarantula’s business in Asia? Who are your main clients?

Udhay Mathialagan, CEO, Tarantula: We commenced business in the UK in the late nineties by solving problems relating to site sharing and by creating an industry-wide data sharing platform. In 2004, we established our software development centre in Hyderabad, India. As India’s local tower industry began to expand in 2007, we worked hard to became the go-to software platform for a number of India-based tower companies including Viom Networks and American Tower. In the following years we continued to grow our business in Europe.

Last year, we decided to establish our new head office in Singapore to get closer to the opportunities emerging across the Asia Pacific region and to bring together an international team of tower industry and software product experts. We currently have staff available in multiple locations in the region and have expanded our customer presence across multiple countries in the region, including Irrawaddy Green Towers in Myanmar and Komet Infra Nusantara in Indonesia. We have also commenced work for major Southeast Asian telcos across a number of their regional assets.

TowerXchange: Which countries do you feel are driving business for Tarantula?

Udhay Mathialagan, CEO, Tarantula: Myanmar is going through a rapid expansion phase with...
multiple tower companies active and greenfield projects being developed. India, in contrast, has a well evolved tower market and represents opportunities for us to expand our offering as our customers focus on improving asset utilisation and management. Our offering is suited to both newly forming as well as mature markets and this is the interesting side of Asia for us as the region is host to very advanced as well as very young tower industries.

Although primarily working with towercos in Asia, we are now starting to bring to a new group of telcos the offerings we have in other regions into Asia where mobile operators are seeking to have a better understanding of their wireless assets. As Asian telcos seek to create options to spin-off their towers or to enter into new forms of sharing arrangements, they need to have a more comprehensive and detailed understanding of their towers. Tarantula has extensive experience in this process.

TowerXchange: What is the percentage of business that comes from MNOs compared to tower companies in the region?

Udhay Mathialagan, CEO, Tarantula: Internationally our business is split evenly between MNOs and tower companies. In Asia, it is more skewed towards tower companies rather than MNOs. However, as previously mentioned, this could change as MNOs are becoming an increasingly relevant client for us.

One of the underlying issues in the industry that drives our business is that the cost of wireless infrastructure keeps increasing – particularly the costs relating to passive infrastructure. It is very important for MNOs - and they are well aware of it now - that they find smarter models to manage the lifecycle costs of their passive and the property aspects of their wireless infrastructure.

MNOs with the intention to divest their portfolios can significantly improve their value by having high quality and well organised information on their portfolio of site assets. It is not unusual to see companies that have invested billions of dollars in their wireless infrastructure not having basic information around the property and physical utilisation aspect of these assets.

TowerXchange: Which specific challenges does Tarantula help address?

Udhay Mathialagan, CEO, Tarantula: We help asset owners improve the long-term economics of their business by automating business processes and
by concentrating asset data in a “single version of the truth”. We offer a data-hub for towercos to operate their end to end business in a seamless way. This “single version of asset data” connects with a number of other sub-systems covering downstream activities like remote sensors or energy management systems or higher-level business functions such as financial management. Importantly, our product helps tower operators track and implement the various aspects of customer and ground lease contracts ensuring revenue integrity.

TowerXchange: A lot of tower companies struggle to manage their data. Do you believe that there are circumstances when a data hub is not necessary for telecom tower companies?

Udhay Mathialagan, CEO, Tarantula: Some companies do try to manage their information without a single source of core data for example, by relying on department level data and consolidating them into spreadsheets. They sometimes even use this method for time-bound activities such as asset deployment projects but spreadsheets don’t offer any meaningful capability to make connections and comparisons across projects or asset types.

In addition, some towercos aim to build scale by using distributed spreadsheets which won’t support their growth beyond a certain point. Our platform offers significant payback in terms of revenue realisation. In fact, Tarantula tracks revenue streams and growth potential while also helping companies to make better investment decisions.

TowerXchange: How do you compare the Asian market for Tarantula with Africa and other regions where you operate?

Udhay Mathialagan, CEO, Tarantula: We see some similarities between Africa and Asia such as patchy energy infrastructure and challenges in securing the required human talent and skills.

Asia is host to a very diverse array of countries, including some of the world’s most and least developed nations. We have learned not to generalise and to focus on solving a specific market or customer problem using our products that have been tested in real-life conditions in more than thirteen countries.

TowerXchange: How would you judge the last 12 months of Tarantula, have they been successful?

Udhay Mathialagan, CEO, Tarantula: Over the past year, Tarantula has secured customer deals that cover seven new markets in the region so I’d definitely say establishing our base in Singapore and deploying resources in this region has been a good move.

I expect our business to continue growing as wireless penetration increases and new business models and ideas are deployed to manage the expected subscriber and data volume growth.
GET SET FOR GROWTH, GET READY FOR TRANSACTIONS

Tarantula is the global leader in tower lifecycle management products. Our software helps leading tower companies in Asia and across the world to grow their portfolio and operate their sites more effectively.

- Expand your tower portfolio with build-to-suit projects as well as acquisitions
- Reduce costs through optimized site operations
- Demonstrate the true value of your portfolio with real-time visibility of site assets

www.tarantula.net
contact@tarantula.net
How to combat fuel theft

Tamper protected sensors reveal fuel theft at sites while comparing fuel alerts with invoices deters fraud

Fuel theft is believed to add up to 30% to energy opex in Africa. In the battle with the diesel mafia, how can RMS tip the conflict in favour of the tower owner? TowerXchange wanted to learn more about fuel theft, and learn more about how to configure and filter RMS data to meet the needs of different users. So we spoke to Telemisis, who have an installed base of tens of thousands of RMS systems from small deployments at fifty sites to many thousands. In Africa, Telemisis’ SitePro RMS systems have been deployed in Egypt, Tanzania, Kenya, Ghana and Nigeria.

Keywords: RMS, Fuel Security, Installation, O&M, Capex, Batteries, Site Level Profitability, DG Runtime, Site Visits, Skilled Workforces, KPIs, Job Ticketing, Opex Reduction, Infrastructure Sharing, Africa, Telemisis

Read this article to learn:
- The importance of tamper-protected RMS in minimizing fuel theft within the supply chain
- How to prevent the damage caused by kerosene contamination
- The importance of remote upgrade and reprogramming of RMS to minimize site visits
- How self-configuring RMS reduces reliance on high skilled deployment technicians
- How data from RMS is filtered to support different users, from technicians monitoring local alarms to management comparing and selecting equipment and service providers

TowerXchange: Thanks for speaking to us Chris. Let’s be honest, a lot of fuel pilferage originates within the supply chain, so is there a risk of remote monitoring sensors being damaged by staff or subcontractors?

Chris Begent, Commercial Director, Telemisis: Unfortunately much of the fuel fraud or theft is internal, so interference with sensors is a common problem we pick up.

For example, one of our clients was aware of regular small amounts of diesel theft, enough to supply one or two vehicles, at one of their sites. The parties responsible tried to sabotage the sensors by disconnecting the power. They thought they’d disabled the system and started draining the fuel. Fortunately our devices are extremely resilient to tampering (our systems have independent power systems, internal disconnection sensors, tamper protection on fuel probes and fuel hatches), so the thief triggered an alarm and the client was able to dispatch someone to the site, where they discovered the security guard was pilfering fuel.

We can also combat fraud by cross-referencing fuel alerts against invoices. On one fairly large system we picked up invoices routinely 10% above what the subcontractor said had been delivered. We conducted an accuracy test on our system and found it was accurate within 1 litre. In that particular instance, we found that the metering on delivery vehicles was 10% high across the board, so the error was corrected.
In Tanzania we had a site where the client was burning 1,000 litres of diesel per month in two deliveries of 500 litres... yet the tank capacity was only 430 litres! After we deployed our RMS the system didn’t need refueling again all year, as the grid supply was reliable. So on a single site the operator was paying for 12,000 litres of diesel per year that they were not actually using! Multiply that kind of saving across many sites, and add in the savings from reduced truck rolls, and it pays for an RMS system in no time at all!

In another example, I remember one of our Caribbean customers had installed one of our main units into their gensets when they experienced the theft of one of their generators from a site. The system has GPS ring-fencing, so they dispatched someone to the site with local law enforcement, noticed on the way that the GPS said they’d just passed the generator, stopped, turned around and found the dumper truck the thieves had used to rip the generator off the site! Unfortunately theft of the actual generator itself is a common occurrence in Africa so GPS tracking provides the potential for the equipment to be tracked and recovered.

TowerXchange: Is watering down of diesel another common problem?

Chris Begent, Commercial Director, Telemisis: Yes, so fuel quality monitoring is also essential. Water in the fuel is actually relatively easy to detect. On the other hand, kerosene or biodiesel contamination is extremely difficult to detect. If you put kerosene into a diesel generator, it will keep on running, but the generator will run until it destroys itself, so it can be extremely harmful. We have a solution for monitoring kerosene and unexpected hydrcarbons contamination that costs a tenth of the price of the other solutions available on the market.

TowerXchange: How do you differentiate Telemisis from competitive RMS solutions?

Chris Begent, Commercial Director, Telemisis: Telemisis has a background in electricity monitoring, security and automation, using small format solid-state site equipment designed to work in harsh environmental conditions meaning that reliability and ease of deployment are designed in. Our rugged SiteNode telemetry device is capable of withstand operating temperatures from -30°C to +80°C.

A lot of competitors’ RMS systems come from a background of IT monitoring where environmental conditions are benign and communications are reliable which means that some struggle in the environments experienced in Africa. Our experience in power source management on cell sites, whether utilising green energy sources or maximising battery usage within operational limits before remotely starting the genset, means that we can provide a solution for the most important aspect of cell sites; the power source. Because Telemisis SitePro is designed as a remote telemetry system from the ground up, it largely self-configures, which reduces the need for highly skilled technicians to deploy the system.

Site owners can install all elements of the system supplied by Telemisis, or it can be designed to work with equipment and sensors already on site.

Our system ranges from small format, solid-state devices deployable for machine monitoring and GPS tracking on generators or off grid solar-powered sites, to larger switch sites.
Once we’ve established communications with the central server, the intelligence in that server enables a project manager in the NOC to rapidly apply the correct configuration. The system only presents options that are viable in terms of the equipment that is connected on site.

So we only need a skilled technician at the NOC, who configures and commissions the site with the person on site processing through physical tests by walking in front of sensors, closing breakers etc.

**TowerXchange:** How do your sensor devices in the field communicate with the NOC?

**Chris Begent, Commercial Director, Telemisis:**
The information collected on site is intelligently processed and transmitted to the NOC through the most applicable route such as Ethernet, GPRS or SMS. Multiple back-up communications options are available to ensure the information gets back, particularly when there are problems on site that may affect the primary transmission path.

Integration with the NOC systems is often implemented by Telemisis at an SNMP level but higher levels of integration provided by SitePro provide valuable insight into site condition allowing proactive site visits or reduced site visits by diagnosing the faults remotely and responding accordingly. The more detailed information is useful particularly where customers want integration with back-office systems. This makes business intelligence more powerful through the integration of live, real-time data.
Our ability to buffer data in the event of a communication problem is critical to the integrity of the system but fallback transmission means the data is available to the engineers when it is most needed, when normal site communications are down.

**TowerXchange:** Tell us where the Telemisis SitePro system fits within the systems and processes within the NOC.

Chris Begent, Commercial Director, Telemisis: It depends what systems the client already has and what information they want. Typically the NOC has basic alarms transmitted to it through BTS inputs which typically offer very little useful information on the site systems, or in some cases by SNMP which can generate a large amount of alarms which are too numerous to handle at the NOC.

The SitePro system collects a lot more than alarms, by providing readings that enable the user to have valuable additional information enabling them to act more efficiently. SitePro passes the clear cut alerts that the NOC operators want to the NOC screens but makes the extended information available to the engineers or managers providing them with the information they need so that they have a good idea what to expect before they go onsite and can respond efficiently, maximizing productivity and site availability.

For example, an operator might see a generator alarm from a remote site two and a half hours drive away. From the NOC he can see that the charger alternator has failed. He can then dispatch a maintenance person equipped with a replacement charger alternator to replace then and there, rather than having to make a five hour round trip for diagnostics and another to perform the actual repair.

**TowerXchange:** How do RMS support decision making processes?

Chris Begent, Commercial Director, Telemisis: We think it’s important that we provide genuine Remote Management not just Remote Monitoring. Our job doesn’t end with the installation of sensors; it’s critical to feed back management information into the decision making processes of site owners and operators to support their tendering with provable information on service patterns, fuel use, and fuel theft.

Our information helps identify patterns in faults and equipment degradation, informing battery replacement decision-making processes by assessing battery performance over time against specifications laid out by the client.

We provide accurate data on fuel delivered and fuel burned, which is critical when re-tendering for fuel supply and delivery.

**TowerXchange:** Why is RMS so critical for towercos?

Chris Begent, Commercial Director, Telemisis: The intelligence from RMS enables towercos to optimise their site operations, which is critical for improving site level profitability. The visibility of site condition is of prime importance because if you don’t know what is happening on site you can’t
remote monitoring alarms – at what point is the network too big for one person to manage alarms and manually integrate with job ticketing?

Chris Begent, Commercial Director, Telemisis: You need to set up a tree structure and group sites by area to keep supervision to perhaps a maximum of one hundred or so sites per region. It varies according to the requirements of the network concerned. Some operators might only be able to cope with ten or so sites, but automated processing and filtering of information is critical.

TowerXchange: Tell us about the scale of human intervention required to respond to remote monitoring alarms – at what point is the network too big for one person to manage alarms and manually integrate with job ticketing?

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TowerXchange: How does remote monitoring enhance and differentiate a towerco’s service proposition?

Chris Begent, Commercial Director, Telemisis: Remote monitoring provides the tools for the towerco to understand what is happening on the remote site and if there is any degradation in the passive equipment which enables them to keep to or improve on the SLAs agreed. Remote monitoring also provide the information to enable the Towercos to maximise efficiency of the site including upgrading to renewables or more efficient equipment and providing proof that the sites are environmentally friendly with a lower carbon footprint enabling multinational corporations to demonstrate their green credentials while also saving money.

TowerXchange: Why is remote monitoring of cell sites important in environments where grid power is generally more reliable, such as in CALA?

Chris Begent, Commercial Director, Telemisis: Power is the lifeblood of any site so even where the grid is reasonably reliable and generators are rare, there is often a need to monitor, power used by the site and by tenants to ensure the consumption is correct against expectations. Battery condition is also an important element to monitor to ensure it will be available when required and enables replacement when necessary rather than by a routine which will save significant sums of money. Renewable forms of energy are becoming more widely deployed and require monitoring to ensure the performance is as expected and does not degrade. Monitoring of site access and security is an important tool to track service and maintenance work and understanding if there is unauthorised access to site.

In the unlikely event of disputes, towerco’s can use SitePro to prove the achievement of SLAs.

Towercos also often install tracking devices on their fleet of vehicles. With SitePro this can be integrated within the same monitoring system, providing a more comprehensive enterprise solution. If fuel delivery vehicles are included on the system, the fuel supply chain information is condensed into a single point of interface.

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the information to just the information at the level of concentration that user needs to see. Auto reporting means that the users don’t need to login to the system for day to day information, it is in their inbox each day that they need it, for that region, for that person in the org-chart. Automation is important if you’re managing more than ten sites, and it’s critical if you’re managing thousands.

For example, a towerco they may want to make some fuel data available to a subcontractor, so that data can be filtered by geography and by subcontractor, and only the information important to that subcontractor is shared. Similarly, towercos can allow network managers and operator tenants to login and examine certain data across multiple regions, but only seeing sites on which they are tenants.

The central monitoring team in the NOC can use their normal screens, other users can use our web-based interface, while the field engineers use integrated mobile apps for industrial tools and smartphones. The management team typically uses business intelligence tools fed with information from our system. We can provide trouble-ticketing and service management alerts, or our data can be fed into existing systems if preferred.

Ours is a scalable system able to manage ten to twenty sites on a Telemisis hosted system, or up to tens of thousands of sites where operators typically host their own systems and often have data fed into their existing business intelligence systems.

TowerXchange: What is the estimated capital outlay per site to acquire and install your systems?

Chris Begent, Commercial Director, Telemisis: That really is a “how long is a piece of string” question as so much depends on the client’s objectives, and that may differ from site to site.

In general, you’re probably looking at an average capex of around £2-3,500, depending on which country you’re in. That’s the installed price including a reasonable base of sensors. Installation costs vary significantly and some countries you need to add £1,000 per site just for labour costs. So I’d estimate maybe £2,500 for the equipment in a well equipped system, plus £1,000 for installation since you don’t need technical guys on site.

TowerXchange: Please tell us an example of the Telemisis solution in action.

Chris Begent, Commercial Director, Telemisis: When Hurricane Dean struck Jamaica in 2007, the incident really illustrated the benefit of RMS. The network equipped with our telemetry was able to get up and running within 24 hours, while a competitor’s network took many days to get back into full operation... Vital information on site alarms allowed the prioritisation of visits to affected sites keeping active sites on air and enabling rapid repairs to be undertaken efficiently.
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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.


Read this article to learn:

- Total’s unique multiple energy source proposition, combining diesel, solar, and services
- Total and SunPower’s track record of success at over 3,000 cell sites worldwide
- How can you judge which sites should retain DG backup, which should be hybridised and which should run solar-only?
- Modular technology and flexible business models to make hybrid energy scalable to meet the changing needs of multi-tenant sites and community power

Claire Gauthier, Head of Energy Solutions Development, Total Marketing & Services: Total is not only one of the world’s leading oil and gas companies – we provide many more amazing capabilities across more than 150 countries.

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?**

Claire Gauthier, Head of Energy Solutions Development, Total Marketing & 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?

Claire Gauthier, Head of Energy Solutions Development, Total Marketing & 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?

Claire Gauthier, Head of Energy Solutions Development, Total Marketing & 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.

TowerXchange: What is the difference between
the cheapest solar panels on the market and “carrier grade” solutions in terms of energy density and longevity?

Claire Gauthier, Head of Energy Solutions Development, Total Marketing & 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 contraints 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?

Claire Gauthier, Head of Energy Solutions Development, Total Marketing & 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?

Claire Gauthier, Head of Energy Solutions Development, Total Marketing & 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?

Claire Gauthier, Head of Energy Solutions Development, Total Marketing & 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?

**Claire Gauthier, Head of Energy Solutions Development, Total Marketing & 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.

**Claire Gauthier, Head of Energy Solutions Development, Total Marketing & 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!
How to structure a joint venture towerco

Operational issues should be covered by the MLA, not the JVA

Vinson & Elkins have been advising on tower transactions for decades. Previously they represented American Tower, and more recently they represented Crown Castle during their push into Europe, when a flurry or potential tower transactions was triggered by MNOs’ need to raise capital for their 3G licenses. When the emerging market tower industry started to become active over the last decade, Vinson & Elkins drew on their relationship with Chuck Green from his time at Crown Castle, and some work they had done for Helios Investment Partners, becoming a natural choice to represent Helios Towers Africa in their pioneering transactions. Keen to become more active outside Europe, Africa and North America, Vinson & Elkins are sponsoring TowerXchange Meetups for the Americas and Asia.

Keywords: How to Guide, Lawyers & Advisors, Deal Structure, Rental Rates, MLA, Anchor Tenant, Joint Venture, Stakeholder Buy-In, Infrastructure Sharing, Africa, Tanzania, Helios Towers Africa, Vodacom, Millicom, Tigo, Vinson & Elkins

Read this article to learn:
- How to balance MNO’s need for control with the need for towercos to be independent to maximise co-location sales
- How to use the MLA to protect MNO’s operational needs, and use the JVA to protect MNO’s investment
- How to add a new party to a joint venture towerco: experiences in Tanzania
- How the management of competitively sensitive information is governed within a joint venture towerco

TowerXchange: Structuring joint ventures is a complex process, but what are the unique complexities of tower JVs?

Jeffrey Eldredge, Partner, Vinson & Elkins: The biggest concern is the tension between Mobile Network Operator’s (MNO) desire to maintain some form of control over what they view as critical assets to their business and operation, and the necessity to retain only a minority interest in the joint venture and make sure the towerco is independent from the MNO and can be marketed as such to potential co-locators.

There can be a tendency for the MNO’s operational control provisions to bleed into the Joint Venture Agreement (JVA), whereas I feel they belong in the Master Lease Agreement (MLA). We take the view that the MLA defines the commercial relationship between the mobile network operator and the towerco, so matters pertaining to the provision of tower space and rights belong in MLA not in the JVA.

If you start putting contractual and operational issues into the JVA, those matters become known when other operators participate in the joint venture, and it can also lead to issues about who controls the business and who is responsible for commercial decisions, such as leasing and pricing. For the independent tower company business model to work effectively, it is key that the towerco retains control, not the anchor tenant MNOs, otherwise competitive MNOs may be disinclined to co-locate.
If you allow operational matters to bleed into the JVA, you can muddle the business model, and it makes it tougher to sell the towerco as independent.

TowerXchange: What’s in it for the seller to structure a joint venture in this manner?

Jeffrey Eldredge, Partner, Vinson & Elkins: The legacy tower owners, or anchor tenants, can still secure certain rights that are superior to the rights of co-locators, but they need to relinquish control rights over the assets.

Given the rationale for MNOs to retain a stake and to participate in the growth and economic benefits of co-location on joint venture-owned towers, there are greater co-location opportunities if those towers are no longer seen as owned and controlled by the MNO.

TowerXchange: Vinson & Elkins recently advised Helios Towers Africa on the creation of a joint venture towerco in Tanzania, bringing together assets previously acquired from Millicom-Tigo, together with additional assets acquired from Vodacom Tanzania. What insights can you share from structuring that joint venture?

Jeffrey Eldredge, Partner, Vinson & Elkins: Structuring a joint venture towerco becomes more difficult as you bring additional operators into the joint venture, but that should not discourage MNOs from considering joint venture transaction structures when selling their towers.

Again, the priority has to be to balance the control rights of the parties coming together in the joint venture. If you give one MNO control rights, how do you balance that as subsequent MNOs participate in the joint venture? The joint venture has to be run by the towerco, which in most cases means the towerco needs to retain at least 51% equity.

So once again, the lesson learned is that if you agree on rights to do with the operation of towers, or even a limited right of veto, put it in MLA, don’t let it bleed into the governance of the joint venture company.

The reality is that when you bring in new party, they have a different world view and different priorities. You can’t just impose an existing JVA on them, so there were inevitably some intensive

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A reminder of the details of the Helios Towers Africa deals with Millicom and Vodacom Tanzania

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<td>Helios Towers Africa acquired an estimated 729 towers from Millicom Tigo for a purchase price of US$60mn. The transaction was structured as a joint venture with Helios Towers Africa receiving 60% equity and Millicom 40% equity in the joint venture towerco, Helios Towers Tanzania.</td>
<td>Helios Towers Africa acquired an estimated 1,149 towers from Vodacom Tanzania. The assets were rolled into the joint venture towerco Helios Towers Tanzania, in which Helios Towers Africa retained a controlling interest and 51% equity, with 24.5% equity each retained by Millicom-Tigo and Vodacom Tanzania.</td>
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Source: TowerXchange
three-way negotiations.

TowerXchange: What were the main transferrable lessons learned from that three-way negotiation?

Jeffrey Eldredge, Partner, Vinson & Elkins: The ease of completing joint venture tower transactions is largely defined by the extent to which you can keep the JVA and MLA separate. With the help of our towerco client, we were able to work each party's unique needs into their MLA. Structuring a JVA is tough enough without a bunch of operational clauses clouding the picture!

My advice to MNOs considering participating in joint venture towercos is to work hard to figure out what you need and how to protect yourself in the MLA. The MLA is your hook into the towers, through which you protect your operational needs. In contrast, consider the joint venture as an investment vehicle, and concentrate on protecting your investment in the JVA.

The MLA will be around for the full term of the leaseback, sometimes 20 years or more, while the joint venture company in many cases may substantially restructured during refinancing or during a strategic sale. So it doesn’t make sense to put operational clauses in the JVA when the MLA will likely outlast it.

TowerXchange: How is the management of competitively sensitive information governed by the joint venture structure?

Jeffrey Eldredge, Partner, Vinson & Elkins: The most competitively sensitive information is the lease rate paid by each party. Under ordinary circumstances, you would share such fundamental revenue information with board members, which may include competitive MNOs. So if towercos are renegotiating a contract and lease rate with one MNO tenant, there may be provisions to exclude the board members from other MNOs.

With many towercos securing build-to-suit programmes, sensitive information around network coverage maps and rollout plans are similarly dealt with.

TowerXchange: Finally, why should operators and towercos not be scared of structuring JVs?

Jeffrey Eldredge, Partner, Vinson & Elkins: If MNOs are comfortable entering into MLAs concerning co-locating on independent towercos sites or bi-lateral swaps with other MNOs, then there’s no reason to be afraid of participating in a more expansive joint venture towercos.

The economic benefits of selling towers are obvious – you take a non-core asset off your balance sheet and release cash and/or negotiate a good lease rate opex, and you remove the operational burden of owning and operating the passive network. If MNOs retain an interest by forming a joint venture, they can benefit from the enhanced value of the towers in the hands of someone who can benefit from the co-location opportunity. Forming a joint venture is a way of MNOs retaining an interest in the success of the towercos, which is in everybody’s interests.

Forming a joint venture towercos is complicated, and it takes a lot of work, but if you work with people who know how do it, then win-win-win deals can be agreed. But I would urge MNO’s to let go of control of the joint venture itself, and to protect their operational interests in the MLA. Separate the JVA from the MLA, otherwise it gets messy.
Zamil reduces TCO of telecom towers

Diversified tower designer, manufacturer, managed services and power solution provider helps clients accelerate time to market

US$8bn giant Zamil provides a range of tower design and manufacture, managed services and power solutions to the telecom industry. In this interview, CEO Vivek Gupta focuses on the tower design and manufacturing capabilities of Zamil, emphasising how they accelerate time to market and reduce TCO.

Keywords: Construction, Hybrid Power, Logistics, Managed Services, Masts & Towers, O&M, Shelters, Steelwork, Who's Who, Zamil Infra

Read this article to learn:
- Zamil’s credentials as a tower, power and managed service provider
- Zamil’s telecom tower production capacity
- Designing to optimise tower weights and economies of scale thereby reducing TCO
- Accelerating tower erection to accelerate time to market
- Zamil’s range of camouflage solutions

TowerXchange: Please introduce your company – where do you fit in the telecoms infrastructure ecosystem?

Vivek Gupta, CEO, Zamil Infra: Zamil is an 85 year old group from Saudi Arabia which has more than US$8bn group revenue with operations in 90 countries. Zamil has a comprehensive offering both for the build and management of infrastructure. In build face, not only do we supply world class towers and power solutions, but also render our turnkey services to optimise capex. Zamil is also one of the leading managed services companies and is capable of managing both passive infrastructure as well as telecom equipment all across the globe. In the renewable energy space, Zamil is both an EPC company as well as a power developer and can offer hybrid power solutions to our customers.

TowerXchange: What is your production capacity in tonnes of steel, and how does that convert into volume of, for example, 40m three legged telecom towers?

Vivek Gupta, CEO, Zamil Infra: Zamil has a fabrication capability spread cross the globe which fabricates more than 700,000 MT on a comprehensive basis which include towers, pre-engineered buildings and other steel structures. Purely for towers, Zamil is capable to supply more than 25,000 towers through its own manufacturing facilities and OEM’s.

TowerXchange: The first question our readers will want to know is ‘how proven are the structures in the field’ – please tell us about some example
clients and some example projects?

Vivek Gupta, CEO, Zamil Infra: Zamil design includes all the leading standards globally and is known for delivering world class quality. In the steel business, we have more than 35 years of experience in telecom and power transmission towers and leading telcos and power utilities globally are our esteemed customers.

TowerXchange: How should MNOs and towercos strike a balance between the cost and volume benefits of standardisation versus the needs to customise structures for different environments and wind loading?

Vivek Gupta, CEO, Zamil Infra: We appreciate that each customer has got different requirements including wind velocity and loadings. At Zamil our constant endeavor is to bring design marvel, optimisation of tower weights and pass on the advantages of economies of scale by reducing total cost of ownership. Needless to say that a lighter tower needs a lighter foundation.

TowerXchange: How do you ensure the deliverability and easy installation of your structures?

Vivek Gupta, CEO, Zamil Infra: Our towers are delivered well staged and packed in wooden boxes with a comprehensive packing list. This avoids ambiguity at the time of secondary transportation to the sites. Since each tower is fabricated only after exhaustive prototype approval process, the work of the field team is very comfortable when it comes to erecting the tower meeting aggressive timelines. We provide comprehensive guidelines through our erection manual to the field teams which in many of the cases are local companies hired by our esteemed customers directly for erection purposes.

TowerXchange: What innovations in foundation materials and design can be leveraged to accelerate time to market, reduce costs and improve the re-usability of towers?

Vivek Gupta, CEO, Zamil Infra: More than 30 years back Zamil revolutionised the construction industry by offering prefab buildings against conventional brick and mortar structures. In the same way Zamil in Saudi Arabia owns a manufacturing unit which builds precast blocks. Today when speed to market is key some rapid deployments can be made operational in less than 24 hours using precast blocks. Even for conventional foundations, Zamil designers keep in mind the concrete to steel ratios balance to optimise the overall foundation cost. As I said earlier, for us speed as well as total cost of ownership matters when we deliver our towers to our customers.

TowerXchange: When designing new sites, how do you balance the concerns of camouflage, cost and structural capacity?

Vivek Gupta, CEO, Zamil Infra: Due to constant pressures of civic bodies and neighborhood communities camouflaging is becoming a regular practice in majority of the countries. Zamil’s camouflage portfolio encompasses of not only a palm tree but also street light poles, rain-bus shelters, harmonic sites and all kinds of roof top camouflage structures which can match the glanzing of the building facade. Zamil is also offering customised minara structures even for religious spaces for worship.

TowerXchange: Please sum up how you would differentiate your solutions from your competitors’?

Vivek Gupta, CEO, Zamil Infra: While we all acknowledge that steel is a commoditised business, yet at Zamil we are committed to leverage our design innovation and economy of scale to deliver the best at the most economical prices. We carefully listen to the needs of our customers and want to sell them what they want rather than standard off the shelf product.
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See you at our future events!

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