

Demand forecasts for passive infrastructure equipment and services in Asia - 2018 update



TowerXchange checks in on demand across six different categories of equipment and services in the fifteen most active Asian tower markets



Asia remains the largest and fastest growing region in the world both for investment in telecom tower networks, and for the expansion of the independent towerco business model. Once again, TowerXchange is updating its annual country-by-country review, with a deeper analysis of the products and services required in each market.

Keywords: Access Control, Afghanistan, Asia, Asset Lifecycle Platform, Australia, Bangladesh, Batteries, Best of TowerXchange, Build-to-Suit, Cambodia, Capex, China, Construction, DAS, Decommissioning, Energy, Energy Storage, Fixed Price, Hybrid Power, IBS, India, Indonesia, Laos, Lawyers & Advisors, MNOs, Malaysia, Managed Services, Market Forecasts, Market Overview, Masts & Towers, Meetup Preview, Monitoring & Management, Myanmar, O&M, Off-Grid, On-Grid, Pakistan, Pass-Through, Passive Equipment, Philippines, Procurement, RMS, Sale & Leaseback, Singapore, Site Management System, Small Cells, Sri Lanka, Steelwork, Strategic Consultancy, Thailand, TowerXchange Research, Towercos, Unreliable Grid, Vietnam, Who's Who

Read this article to learn:

- In which Asian countries are a substantial volume of new towers being installed?
- What equipment is being installed on those towers in terms of energy, RMS and access control solutions?
- What has been the progress of small cell, microcell and DAS deployments?
- Who are the leading MNOs and towercos, and what are the prospects for transactions between them?

While gearing up for the fifth annual TowerXchange Meetup Asia, taking place in Singapore, 4-5 December 2018, we offer our readers invaluable insights into the key dynamics of the top Asian tower markets from India to Indonesia, encompassing China, Malaysia, Myanmar, Vietnam, Bangladesh and more. Additionally, TowerXchange takes a preliminary look at the Philippines - a market in the making which could soon attract substantial investment from international towercos.

We're keeping the categories we're reviewing the same as last year, so you can make a like-for-like comparison. We are rebranding one of the categories from its original focus on small cells, DAS and IBS to "Beyond towers" - expanding the scope to include edge computing, fibre, small cells, DAS and IBS.

- **Energy:** our focus in this category is on primary and backup power solutions, energy storage, hybrid and renewable energy solutions for unreliable grid and off grid.
- **RMS, ILM and access control:** is there need for remote monitoring and access control systems on most towers? Are they connecting to a NOC and to a Site Management or Infrastructure Lifecycle Management platform such as those provided by Accruent, Tarantula or nexsysone?

■ As a function of the volume of new build, is there significant requirement for towers and accessories? Or demand for the services of turnkey infrastructure providers in building new towers, decommissioning parallel infrastructure or upgrading existing sites?

■ How much demand is there to date for small cells, microcells, DAS and IBS? And what about fibre?

■ And finally, is there much prospect for sale and leaseback or towerco consolidation to keep the consultants, lawyers and other advisors busy?

TowerXchange examines the 15 most active Asian tower markets, predicts demand for passive infrastructure equipment and services, and lists the largest towercos and MNOs active in each country. The following matrix is compiled based on hundreds of research calls and meetings with Asia's leading towercos and MNOs in which we've diagnosed their procurement and capex priorities.

Meet the key stakeholders at this year's TowerXchange Meetup Asia, taking place on December 4 and 5 at the Marina Bay Sands, Singapore!

Brief commentary on Asia's less active tower markets:

East Timor: Too small to provide the necessary economies of scale to towercos, therefore TowerXchange has yet to study the market in detail.

Japan: Towers are still seen as strategic assets by mobile network operators, hence no tower sharing. Currently JTOWER is the only known infra-sharing entity serving Japan's MNOs, and its focus is on IBS. Until the market opens up, TowerXchange has no impetus to study the market in detail.

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

Nepal: Axiata's acquisition of Ncell from TeliaSonera may herald the entry of edotco into Nepal. The government is looking to implement a telecoms infrastructure provider regime, currently underway and drawing interest from international players. TowerXchange expects to study the market in detail in the coming months.

North Korea: Impenetrable to a Western research firm like TowerXchange, and probably impenetrable to foreign investors!

PNG: Digicel seem disinclined to share attractive urban locations, restricting sharing to rural sites in PNG. With no towercos present, there is no impetus for TowerXchange 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.



New Zealand: The country could hold interesting opportunities for towercos. Historically, the three New Zealand operators would not share their infrastructure but the government has changed its policy last year as they are very keen on driving infrastructure development in rural and remote areas. That could lead to some action in the local market.


The Philippines: The country could soon become one of the most exciting markets for Asian towercos. Earlier in 2018 the Department of Information and Communications Technology announced its plan to create a third telco in line with Rodrigo Duterte's intentions of challenging incumbents Globe and Smart's duopoly.


After several delays, DICT is set to release the final draft of the Terms of Reference (TOR) in the selection of the third telecommunications company, which should take place before the end of 2018. Viettel, AT&T and Telenor among many other have confirmed their interest in entering the Philippines and the irruption of a third player could also create a tower industry in the country, which will make the required tower roll out faster and reduce capex for the carriers. In fact, leading operator Globe has already announced the creation of an infraco that will manage all their infrastructure assets independently.


The government and both operators have identified a lack of sites in the country, where the two carries own approximately 18,000 sites. Meanwhile, Globe has set up the goal of building new 500 towers every year.


If you have passive infrastructure equipment or services, or small cell solutions, to sell to Asia, then don't miss the 'technology evaluation working groups' led by the region's leading towercos and MNOs and hosted at the 5th Annual TowerXchange Meetup Asia on December 4-5 at the Marina Bay Sands, Singapore!
www.towerxchange.com/meetup/meetup-asia/


Vendor opportunity matrix	Energy	RMS, ILM and access control	Tower manufacture	Turnkey infrastructure	Beyond towers (incl. Small cells, DAS, IBS, fibre)	Advisors	Towercos	MNOs
Afghanistan 	High	High	High	High	Low	Medium	None	AWCC Etisalat MTN Roshan Wasel Afghan Telecom
<p>Afghanistan's four principal MNOs continue to build around 500 towers per annum, with a total of 5,897 towers live in 2015. Local stakeholders report solid ongoing growth of the network; TowerXchange would estimate the total to be approaching 7,000 now. The vast majority of Afghanistan's rural towers are off-grid, with 50-75% of urban and suburban sites on unreliable grid connections, with DGs relied upon for backup. RMS and site security are widely used. We've seen very little small cell or DAS deployments, even in large landmark venues. While AWCC's carve out towerco Frontier Tower Solutions is no longer trading, Etisalat, MTN and Roshan have all been contemplating their own tower carve-out/monetisation strategies. Partnering with ESCOs is an increasingly compelling alternative for Afghanistan's MNOs.</p>								
Australia 	Low	Medium	Medium	Medium	High	Medium	Axicom Broadcast Australia Vertel Aird Towers InSite Wireless Group	Telstra Optus Vodafone TPG (entering)
<p>The biggest operator Telstra, which owns approximately 8,000 towers, has decided to carve-out all of its non-mobile related assets including data centres, fibre infrastructure, copper, poles and subsea cables into a separate infraco. Telstra's assets are not sufficient to cover clients requirements and the company needs to invest in its improvement.</p> <p>A fourth operator (TPG Telecom) has recently entered the market and competition has increased with the consequent pressure on MNOs to reduce operational expenditure. Operational efficiency is a must for the industry in this highly competitive market.</p> <p>The tower landscape remains relatively static with Axicom, Broadcast Australia and a handful of smaller independent towercos owning around 2,600 towers and a further 1,800 towers having been recently erected by nbn, the Government-owned new broadband network.</p> <p>The market is not growing as fast as expected. The country does not have enough tower stock available to meet coverage and capacity needs, and most towerco deals are small build-to-suits. Optus has created some buzz recently: they have recently built 37 new mobile sites across Tasmania and their CEO has confirmed its plan to spend an additional AU\$4.5mn on the construction of eight more sites across the region by March 2019.</p> <p>Most of the towercos are initially exploring small cells and getting ready for a future 5G transition. Data storage could also be a natural evolution for towercos in Australia. Rural coverage and the need for remote sites is a potential opportunity for towercos, who are patiently waiting for MNOs to move forward with their network extensions.</p> <p>Grid power remains available in most of the country and backup power sources are not often used, so Australia is not a big priority for tower power vendors. Power is typically a pass-through so MNOs retain responsibility for power.</p>								


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Bangladesh 	High	High	High	High	Unknown	High	edotco Bangladesh TASC Summit Towers ISON Tower Bangladesh AB Hightech Consortium	Grameenphone Banglalink Robi+Airtel Teletalk
<p>In August 2018, the telecom regulator BTRC announced it will grant four towerco licenses (pending ministerial approval) to edotco, TASC Summit Towers, iSON Tower Bangladesh and AB Hightech Consortium. All four companies are majority-owned by Bangladeshi organisations and will seek to rationalise the country's 30,000 towers, with the intent seemingly being to separate the telecom infrastructure from telecom retail businesses.</p> <p>4G has been introduced in the country in 2018 and MNOs are currently gearing up for considerable network investments. Therefore, towercos will play a key role in upgrading existing towers, extending network coverage and also rationalising the current portfolio of assets by decommissioning duplicate towers.</p> <p>To date, Grameenphone's network covers 99%+ of the population, with 12,000+ 2G sites and 10,000+ 3G sites, while Banglalink has a portfolio of 5,890 assets, excluding in- building solutions (IBS), which it may add to its planned tower sale process, bringing it up to about 6,000 total. edotco owns and manages a combined 9,800+ towers in the country.</p> <p>While 800-1,000 new towers are going up per year, making Bangladesh attractive for tower manufacturers and turnkey infrastructure firms, TowerXchange expects a considerable wave of M&A between MNOs and towercos to take place, calling for both advisory / legal expertise as well as solution providers for the post-sale site-refurbishing phase.</p> <p>In terms of energy requirements, the rainy season demands exceptional cell site autonomy which makes Bangladesh a key market for energy, particularly energy storage. edotco has connected over 2,000 of its Bangladeshi sites with its echo monitoring service.</p>								

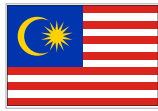
Vendor opportunity matrix	Energy	RMS, ILM and access control	Tower manufacture	Turnkey infrastructure	Beyond towers (incl. Small cells, DAS, IBS, fibre)	Advisors	Towercos	MNOs
Cambodia 	Medium	Medium	High	High	Medium	Low	edotco Cam Towerlink	Cellcard/ MobiTel Metfone (Viettel) Smart Axiata SEATEL Qb (CADCOMMS)
<p>Cambodia's two leading operators, CamGSM's Cellcard and Smart Axiata, have expanded the reach of their LTE services and both are set to keep extending their networks.</p> <p>RMS is not yet widely deployed in Cambodia, but in 2016 edotco invested in remote tower operations.</p> <p>Cam Towerlink entered the market in 2016 and is currently involved on its first project: to build towers in and around Angkor Wat in partnership with UNESCO. The towerco will build ten more sites this year and is currently including power as well as looking into GSM equipment.</p> <p>edotco owns 2,100 and manages a further 1,000 towers in Cambodia. The company is planning to deploy 600 towers over the next three years. CTL estimates that the country currently needs 10,000 more sites and the new telco law (2016) is driving the industry forward thanks to a more flexible regulatory environment.</p> <p>Access to grid electricity has expanded in Cambodia to 71.5% but electricity supply is still relatively unreliable. In addition, 20% of sites are still off-grid in the country. 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 typically installed on all sites, with DG on off-grid, MSC, BSC and hub sites. Power is a pass-through, so MNOs and not towercos remain the buyers of energy equipment.</p> <p>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, demand for tower manufacturers and TI firms will come primarily from edotco.</p>								


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China	High	Medium	High	High	High	High	CTC Guodong Miteno Sino Netstone Bright Financial Leasing Beijing RLZY Q Towers Astro Towers 200+ other independents	China Mobile China Unicom China Telecom China Broadcasting Network
 <p>In August China Tower Corporation (CTC) launched the world largest IPO in the last two years. As a State-owned company, CTC has 1,872,154 towers with 2,687,475 tenants and a tenancy ratio of 1.44. China Tower's market share in the domestic telecommunications tower infrastructure industry was 96.3% in terms of the number of sites. Its revenue has reached CNY68.6bn with CNY1.9bn gross profit for its tower business, where just 0.38% of revenues came from micro-sites as opposed to macro towers. CTC claims this represents 97.3% of total revenues in the Chinese tower industry, in which several hundred small private towercos also participate. CTC procures equipment through an online platform, requiring that all suppliers be registered in China (this doesn't preclude international suppliers striking local partnerships). CTC prefers to draw grid power only off-peak, making extensive use of batteries during peak hours. The company has been a pioneer of energy storage innovations, including recycling EV batteries, CTC has been deploying more green powered sites in China (wind and solar), but probably nowhere near the 30,000 the GSMA Green Power for Mobile once suggested were in the country. RMS is widely deployed in China, with ZNV Technology being the market leader. Small cells, DAS and IBS are increasingly used to supplement the macro network, especially as China races to be a leader in 5G.</p> <p>The creation of the China Independent Tower Alliance (CITA) over the summer of 2017 is helping to legitimise China's 200+ independent towercos, paving the way for consolidation and access to additional financing.</p> <p>In August, CTC announced its partnership with the Lao Government and Click Lao Marketing and Consultancy to create the Southeast Asia Tower Company. The towerco will be mainly focused in building and operating telecom towers as well as supplying power and other supporting facilities and deploying indoor distribution systems across Laos. CTC is the majority and controlling shareholder with a 70% stake and the other two entities will each own 15% of the towerco.</p>								


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India	High	High	High	High	High	High	Indus Towers Bharti Infratel Reliance Infratel American Tower GTL Infrastructure Tower Vision Ascend Saurava Towers	Vodafone+India Reliance Jio Airtel+Tata BSNL MTNL Several small players with <4%
 <p>India is in the midst of a deep market restructuring phase. Since the last update, Vodafone and Idea Cellular have progressed with their merger and sold their combined 20,000 towers to American Tower. The newly merged entity is now the #1 operator in India by number of subscribers. In the meantime, Reliance Communications has finally received the green light to divest its 43,000 towers, fibre and spectrum rights to Reliance Jio, with the latter strengthening its leading position in 4G. The merger between Bharti Infratel and Indus Towers is also underway and planned for Q119. The mega-towerco will run a portfolio of over 163,000 towers and will be controlled by Airtel and Vodafone. Lastly, BSNL and MTNL are both still considering strategic moves to monetise their infrastructure assets.</p> <p>Among the key projects being developed in the country, Indus Towers plans to deploy 30,000 smart small cells by 2020 and has already deployed over 1,000 NextGen Sites, multifunctional towers with 80-90% lower carbon footprint. In terms of its energy initiatives, since 2011, the towerco has converted 67,500 sites to green solutions by removing diesel generators and installing batteries (saving over 210mn litres of diesel since 2011).</p> <p>American Tower is also involved in reducing its carbon footprint and has installed solar panels on more than 450 sites across Bihar, Uttar Pradesh, Odisha and West Bengal with a current total installed capacity on solar over 2MWp (Mega Watt Panel capacity).</p> <p>Bharti Infratel is working on its Green Towers P7 programme which promotes energy efficiency by utilising renewable energy solutions and reducing equipment load on towers. Its focus is particularly on the deployment of solar-powered towers.</p> <p>Reliance Jio has considerably reduced the use of diesel generators and has installed Lithium-Ion batteries on 80% of its sites. The operator is also working on utilising either solar based solutions (with batteries) or methanol fuel cell systems for the remainder (20%) of its sites with long power outages or completely off grid.</p> <p>Small cells are widely in demand in India, especially thanks to Reliance Jio's large scale deployment (approx. 150,000 units) and Smart City projects being developed across the country.</p> <p>RMS is widely used in India, as are ILM systems.</p> <p>Seven different ESCOs (ACME Group, Applied Solar, Ardom, Bhaskar Solar, CCE, Pace and OMC) own the power systems at a total of 6,414 sites in India. ESCOs are typically heavy investors in hybrid and renewable energy.</p>								




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Indonesia	Medium	Medium	Medium	High	High	High	Protelindo Tower Bersama STP Mitratel IBS Tower Centratama Persada Sokka Tama Balitower PEKAPE Gihon Tower	Telkomsel Indosat XL (Axiata) Smartfren Hutchison Bolt
	<p>Indonesia remains one of the most mature tower markets in the world, with solid tenancy ratios, excellent organic growth, and strong market caps boasted by three major towercos; Protelindo (+16,000 towers), Tower Bersama (13,375) and STP (7,000).</p> <p>IBS Tower, Mitratel, Centratama, Akses Prima, Persada Sokka Tama and Balitower also have some scale in Indonesia. Towercos build 3,000-5,000 towers, rooftops and infill sites per year. Tenancy ratio growth compares favourably to many other global tower markets, with around 0.13 tenants added per tower per year.</p> <p>Both Protelindo (which recently acquired KIN) and STP are heavily investing in fibre and towercos in Indonesia are already exploring how to integrate fibre into their business model. Both fibre and small cells investments are better positioning Protelindo for 4G and 5G transition and the company is set to explore VSAT cellular backhaul and mini-data centres through its subsidiary iForte. Microcells and other street furniture are also a big focus for towercos.</p> <p>The reliability of the grid in dense urban areas means the opportunity for energy equipment vendors is finite, but there are remote sites requiring significant autonomy, especially on small islands. MNOs are responsible for energy at the macro sites, though end-to-end service is typically outsourced to the likes of Huawei and ZTE, who manage procurement, design, planning, implementation and servicing. We've spoken to RMS and access control vendors with substantial Indonesian contracts.</p>							


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Laos 	Medium	Unknown	Low	Medium	Low	Low	Southeast Asia Tower Company	LTC Unitel ETL Beeline
<p>In August, China Tower Corporation (CTC) announced its partnership with the Lao Government and Click Lao Marketing and Consultancy to create the Southeast Asia Tower Company, which represents the first overseas investment for CTC as well as the first towerco operating in Laos.</p> <p>The towerco will be mainly focused in building and operating telecom towers as well as supplying power and other supporting facilities and deploying indoor distribution systems across the country.</p> <p>As the controlling shareholder (with a 70% stake), CTC will appoint both the Chairman and General Manager of the towerco, as well as direct its operations.</p> <p>The creation of the towerco has been strongly supported by the national government which also owns stakes in three of the four MNOs in Laos. In fact, in addition to LTC and Unitel (of which the State owns 51% stakes), VEON has divested to the Government of the Lao People’s Democratic Republic its 78% stake in Beeline for US\$22mn.</p> <p>Since operators still own their tower portfolios, the government could decide to carve them out and transfer them to the Southeast Asia Tower Company, in an attempt to separate the infrastructure and telecom sectors as well as to optimise the MNOs’ resources and reduce Opex.</p> <p>#3 MNO ETL was planning an IPO which hasn’t taken place yet. LTC has announced infrastructure upgrades for US\$50mn in 2018, and its plans to take the number of Base Transceiver Stations (BTS) to more than 6,000 (from 5,711 as of Q118). In 2017, the operator invested US\$82.8mn to improve its networks but with 38% 3G and 10% 4G coverage, TowerXchange expects operators to keep investing in their networks over the next couple of years.</p> <p>Laos has a surplus of power generation which they export, so grid availability is good in the country, and new sites can be connected to the grid quickly and efficiently. There are still unannounced outages, so backbone sites have DG and battery backup: 4-6 hours battery backup is standard.</p>								

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Malaysia 	Medium	Medium	High	High	High	Medium	edotco OCK Omnix Naza Communications YTL Sacofa Touch Matrix D'harmoni KJS Common Tower Infra Quest Yikedbina Perak Asia Space Desabina Others	Celcom (Axiata) DiGi Maxis U Mobile Yes 4G Webe ALTEL Redtone
<p>Towercos own 64% of Malaysia's towers, led by edotco's portfolio of 4,000 towers, 3,500 of which were carved out from from Celcom. A further 3,200 towers are owned by 14 different State-backed and other independent towercos. OCK Group, which owns ~200 sites, plans to build an estimated 70 to 100 more sites in the country. Naza Communications and Omnix Malaysia are also active. There are an estimated 22,682 towers now in Malaysia, representing almost 2,000 mobile subscribers per tower. A new ground based tower in Malaysia costs around RM300,000 (US\$69K).</p> <p>A few of the previously dormant State-backed towercos are now expanding, including through over 2,000 rural sites supported by Malaysia's Universal Service Provision Fund. It has been estimated that an additional 8,000 structures may be needed in Malaysia for 4G, although much of that demand will be met by microcells, lamp-poles, DAS and IBS. There is plenty of demand for new structures for 4G, but much of the regional work is undertaken by the aforementioned State-backed towercos who have a dominant position in terms of permitting in half the States, so turnkey infrastructure 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 the exploitation of street furniture, with DAS and IBS starting to be deployed by edotco and MNOs. edotco has already selected its RMS and site management system, consolidated in their echo service, which is provided to over 3,000 of their Malaysian sites.</p>								

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Myanmar	High	High	High	High	Medium	High	IGT Apollo + PAMEL edotco EFT MNTI KPR ATM Towers OCK NTD Myanmar Technology Gateway (MTG) MNTH DLRE CommBiz ITMB MAPCO KBZ (rooftop only)	MPT Telenor Ooredoo Mytel
 <p>Myanmar is one of the most dynamic and interesting markets in Asia, with 62% of the assets owned by towercos.</p> <p>Last year, operators Ooredoo, Telenor and MPT secured 1800MHz spectrum for 4G rollout and the entrance of 4th player MyTel has prompted several local new towercos to launch. MyTel has recently sealed a BTS deal with new towerco MNTI and has already invested more than US\$1bn in infrastructure, including the rollout of 30,000km of fibre-optic cable as well as deploying 5,000 base transceiver stations. Market leader IGT is deploying 300 more towers before the end of the year.</p> <p>Myanmar has one of the lowest electrification rates in Asia. There are around 15,827 towers in the country and almost 75% of them are off grid, with towercos expending between US\$800-1200/month to provide energy in remote locations, where robust primary / backup power systems are needed. Energy storage is therefore an operational priority and the use of lithium-ion batteries is expanding in the country. New operator Mytel is installing lithium-ion batteries in all their remote sites as they guarantee a longer life cycle. Most towercos are exploring renewables, with solar appearing as the most reliable alternative. edotco has recently taken over the provision of energy services for 1,250 Ooredoo including power in its offer for the first time, a trend that other towercos might follow. The Malaysian towerco is actively exploring infrastructure innovations across Asia, and has installed the very first carbon fibre tower in Myanmar, while evaluating the possibility of installing a few bamboo towers using local materials as part of their innovation and sustainability policy.</p> <p>ESCOs play an increasing role in Myanmar, where IPT PowerTech operates the power systems at 2,200 Ooredoo and PAMEL sites, while Voltalia secured an initial 171 site contract with MNTI.</p> <p>Moreover, the huge data boom is also pushing towercos and MNOs to explore small cells, rooftops, street furniture and any kind of urban solutions, most of which will have to be supported by fibre.</p>								

Vendor opportunity matrix	Energy	RMS, ILM and access control	Tower manufacture	Turnkey infrastructure	Beyond towers (incl. Small cells, DAS, IBS, fibre)	Advisors	Towercos	MNOs
Pakistan	High	High	Medium	High	Medium	Medium	edotco AWAL Telecom	Jazz Telenor Zong Ufone
	<p>Most of the 36,000 towers in Pakistan are in the hands of MNOs. In fact, edotco owns approximately 700 sites following the acquisition of Tanzanite Towers. Back in 2017, edotco announced the acquisition of PMCL's (Jazz) 13,000 towers but the deal was scrapped this past September.</p> <p>With over 10,000 co-locations on Pakistan's ~36,300 towers, tenancy ratios are around 1.3, and growing at around 0.06 per year, driven by 3G and more recently 4G rollout. While #2 and #3 MNOs Telenor Pakistan and Zong (CMPak) have been pioneers in RANsharing, neither is under pressure to divest their towers. However, Telenor has co-locations on over 1,500 towers. #4 MNO Ufone may be more inclined to monetise their 6,100 sites.</p> <p>In spite of the need for more sites (around double the current inventory to meet data demand), the potential for rationalisation and decommissioning of parallel infrastructure is quite considerable, since over 60% of sites across the country have been built in close proximity.</p> <p>Pakistani MNOs are very involved in fiberising their networks. Notably, Jazz is currently deploying fibre to 294 sites and will connect the rest of its portfolio by 2019. Telenor is utilising PTCL's fibre network (35,000km) while Zong is both leasing and contracting PTCL to deploy, operate and maintain its 789km of fibre network.</p> <p>In August this year, Pakistan and China launched an 820km long fibre cable that connects Rawalpindi with Khunjerab, on the Pakistan-China border. There are plans to extend the project to Gwadar in the near future.</p>							

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Thailand 	Medium	Medium	Medium	Medium	Medium	Medium	DIF	AIS DTAC (Telenor) True MY(CAT) TOT
<p>With five operators and over 50,000 towers, Thailand could be the perfect tower market but to date, only one company (DIF) acts in the infrastructure industry as a fund with around 13,000 towers and over 1mn km of fibre.</p> <p>In August 2018, an auction of spectrum in the 4G-suitable 1800MHz band took place. However, in spite of much buzz around it, only two operators bid and were awarded just one block each.</p> <p>#1 and #2 MNOs AIS and DTAC took part in the auction and only two of the nine available blocks were sold. Telecom regulator NBTC is planning an auction for the unsold blocks later this year with some critical amends to the auction's terms.</p> <p>While grid power is widely available, electricity continues to become more expensive, fueling appetite for renewables and energy efficiency.</p>								
Singapore 	Low	Unknown	Low	Medium	High	Medium	None	SingTel StaHub M1 TPG Telecom
<p>There are no towercos and there is hardly any infrastructure sharing in the mature Singaporean mobile market, but the imminent entry of a fourth MNO may change that and create opportunities for some, although not all, vendor segments. Grid power is reliable in Singapore so energy equipment is limited to simple battery backups. Most of the new sites in Singapore will be IBS, DAS and small cells for infill and indoor coverage. If the fourth MNO is not permitted to share the incumbents' ~1,000 GBTs and ~5,750 rooftop and lamppost sites, then expect some new build, but more likely the new entrant will stimulate infrastructure sharing, and perhaps an opportunity for an independent infraco.</p>								
Sri Lanka 	Medium	Medium	Low	Medium	Medium	Low	edotco	Airtel Dialog (Axiata) Etisalat Hutchison Mobitel
<p>edotco owns and manages a combined 3,400 towers, representing 40+% of the country's 7,500 to 8,000 towers. edotco monitors selected Sri Lankan sites with its echo RMS service. Sri Lanka is reaching the saturation point for the number of towers required to provide coverage. 4G spectrum is available only to Dialog and Mobitel; the remaining operators will need to engage in RANsharing to provide these services. An estimated 1,500 to 2,000 towers or special structures will be required for infill. Grid is at acceptable levels and improving.</p>								

Vendor opportunity matrix	Energy	RMS, ILM and access control	Tower manufacture	Turnkey infrastructure	Small cells, microcells, DAS and IBS	Advisors	Towercos	MNOs
Vietnam	Low	Medium	Medium	High	Medium	Medium	OCK Group Golden Towers Dozens of small local towercos	Viettel MobiFone VinaPhone Vietnamobile Gmobile
	<p>Market leader Viettel owns and operates around 40,000 sites in the country. Efficiency is now Viettel's operational priority and the company wants to progressively modernise its network towards automation to take advantage of data and ultimately reduce cost. However, their network was built 15 years ago and integrating new monitoring systems, sensors and data analytics tools into their old equipment is presenting a huge challenge</p> <p>On the towerco front, SEATH owns 2,000 sites and its main shareholder OCK has allocated US\$5-8mn for its expansion, with plans to build 200 to 250 sites per year in the country. OCK may seek to consolidate other members of a fragmented group of around 30 local towercos who between them own ~10,000 towers.</p> <p>Golden Towers' has around 340 across the country, with a big presence in rural areas, where tenancy ratios are lower, which is compensated by cheap land cost. The company is set for a big expansion as they aim to build 2,500 sites in the next two to three years and has recently closed a BTS deal with MobiFone for 100 towers.</p> <p>The Vietnamese telecom infrastructure industry might not grow much in terms of numbers, but there is room for modernisation and the deployment of new site typology infill sites in urban areas.</p> <p>MNOs run the whole operation on their towers, from energy management to fibre deployment. Most of the towers are now made in Vietnam and operators do not require sophisticated energy systems nor hybrid solutions since the grid is very accessible and reliable, but the unstable climate forces MNO to heavily invest in batteries and generators for back up. Viettel relies on gensets and lithium batteries for backup - they do not buy acid lead systems anymore - and modern air conditioning and cooling systems are extensively used to reduce energy consumption. Although numbers are not huge, Viettel has worked with a couple local partners and deployed some solar systems in remote locations to overcome grid inaccessibility. In urban areas, in building solutions and camouflage antennas can bring opportunities to infrastructure providers in the country.</p> <p>JTOWER, an in-building solution (IBS) specialist recently expanded beyond its home market in Japan to Vietnam as it acquired the IBS portion of SEATH for US\$10.2mn. This is said to be the largest IBS portfolio in the country, which included over 120 systems.</p> <p>Organic growth is limited by the degree of parallel infrastructure, but 4G and 5G rollouts will require some new sites as well as a push in small cells and new urban typologies. Ultimately, vendors can also play a substantial role in this modernisation process by providing more sophisticated monitoring systems and helping both towercos and operators in optimising their assets.</p>							