

China Tower Corporation Limited [0788.HK]

Towering strength. Initiate with BUY

China Tower Corporation Limited (China Tower) is the world's largest telecommunications tower infrastructure service provider. According to an F&S Report, as at 31 Dec 2017, China Tower ranked first among global telecommunications tower infrastructure service providers in terms of the number of sites, the number of tenants, and revenue; and China Tower's market share in the telecommunications tower infrastructure industry in China was 96.3% in terms of the number of sites and 97.3% in terms of revenue as at 31 Dec 2017. China Tower will benefit from steady growth in the telecom business and fast growth in non-telecom-related business. We forecast revenue CAGR of 6.2%, EBITDA CAGR of 5.3%, and net profit CAGR of 27.9% in 2017-2020E. Telco revenue will maintain gradual growth with a CAGR of 4.4% in 2017-2020E. We believe that the major growth drivers of China Tower are: a) 4G network expansion, b) 5G roll-out, c) usage of towers by non-telecommunications users, d) a high sharing ratio, and e) M&A. News flow on 5G development and increasing marketing activity are share price catalysts. Despite recent share price underperformance, we believe the current valuation of 6.1x 2018E EV/EBITDA offers a good entry point. Initiate with **BUY** with a target price of HK\$1.46 (based on 7.2x 2018E EV/EBITDA, lower than that of its global peers).

- Proxy for rising data traffic.** According to the F&S Report, from 2017 to 2022, the size of the telecommunications tower infrastructure market China is expected to increase steadily from RMB70.6b to RMB109.1bn, representing a CAGR of 9.1%. In addition, the number of tenants in the telecommunications tower infrastructure market in China is expected to increase from 2.8m in 2017 to 4.9m in 2022, representing a CAGR of 11.9%. The number of TSP tenants is expected to increase from 2.8m in 2017 to 4.5m in 2022, representing a CAGR of 10.2%. China Tower is one of the major beneficiaries the rising data traffic flow.
- Non-telecom business expected to drive growth.** China Tower is expanding its customer base to reduce reliance on telecommunications services providers, so we expect to see wider application of its towers, given the development of new technologies such as IoT and IoT. China Tower is actively pursuing DAS projects in commercial buildings, large venues, subways and high-speed railways, covering a cumulative length of more than 13,000km of high-speed railways and 1,900km of subways, as well as large venues with an aggregate area of more than one billion square meters. We expect revenue from non-telco customers to grow rapidly, at a CAGR of 545% in FY17-20E. Non-telco customers will contribute 2.2% of total revenue by FY20E, up from 0.2% in FY17.
- Manageable risk of industry restructuring.** We share the view that news flow on industry restructuring at the telecom operator level might create concerns about China Tower. However, at this stage, there is no confirmation of the news flow. If this is the case, it will take time for the deal to be completed, and China Tower should have enough time to mitigate the impact.
- Not expensive compared with its overseas peers.** China Tower is valued at 6.1x 2018 EV/EBITDA, which doesn't look particular expensive compared to that of its global peers. The Chinese government is taking the lead in 5G development, and China Tower will be one of the main 5G development names in the global tower industry. After listing, China Tower is a sizable telecommunications name with a growth angle, trading at a discount to its global peers. We share the view that investors might take a wait-and-see approach to China Tower, given the current market environment. China Tower's unexciting post-IPO share price performance offers a good opportunity for patient investors.

Key Financials (in RMBm)	2016	2017	2018E	2019E	2020E
Revenue	55,997.0	68,665.0	72,441.3	77,090.7	82,146.2
Change (YoY %)	536.2	22.6	5.5	6.4	6.6
EBITDA	32,743.8	40,567.8	42,717.6	44,556.2	47,344.5
EBITDA Margin %	58.5	59.1	59.0	57.8	57.6
Net Profit	76.0	1,943.0	2,336.9	3,226.9	4,059.0
Net Margin %	0.1	2.8	3.2	4.2	4.9
EPS (Basic)	0.00	0.01	0.01	0.02	0.02
Change (YoY %)	(102.1)	2,456.6	20.3	36.2	25.8
DPS	\$0.000	\$0.000	\$0.000	\$0.007	\$0.009
ROE (%)	0.1	1.5	1.5	1.8	2.2
Dividend Yield (%)	-	-	-	0.74	0.93
PER (x)	2,265.2	88.6	73.7	54.1	43.0
PBR (x)	1.4	1.3	1.0	1.0	0.9
FCF Yield (%)	-21.16%	-5.73%	-3.53%	1.21%	3.44%
Capex (m)	(70,156.0)	(46,364.0)	(41,961.2)	(34,180.6)	(31,940.3)
Free cash flow per share	(0.25)	(0.07)	(0.04)	0.01	0.04
Net Gearing (%)	25.7	102.9	48.1	46.6	42.8

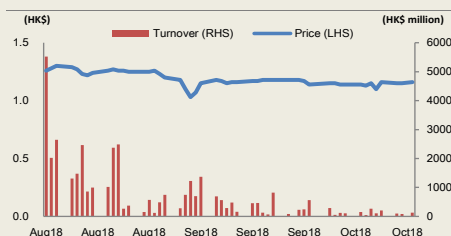
Sources: Company, CGIS Research estimates

TMT Sector
 Hardware
BUY

Close: HK\$1.16 (Oct 18, 2018)

Target Price: HK\$1.46 (+25.5%)

Share Price Performance



Source: Bloomberg, CGIS Research

Market Cap	US\$26,043m
Shares Outstanding	176,008m
Auditor	PwC
H-Free Float	80.9%
52W range	HK\$1.03-1.30
3M average daily T/O	US\$61.7m
Major Shareholding	China Mobile (27.9%), China Unicom (20.7%), China Telecom (20.5%)

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Investment positives

1) A leading player with a visible business model

China Tower is the world's largest telecommunications tower infrastructure service provider

China Tower operates in China and faces no competition from foreign telecommunications tower infrastructure companies. China Tower competes only in the telecommunications tower infrastructure industry in China. According to an F&S Report, China Tower is in the leading position in China's telecommunications tower infrastructure industry. As at 31 Dec 2017, China Tower's market share in the telecommunications tower infrastructure industry in China was 96.3% in terms of the number of sites. The Company's major businesses, namely macro cell, small cell and DAS, face different competitive landscapes in the China market. As at 30 Sep 2018, the Company operated and managed 1.9m sites and served about 2.9m tenants. China Tower is the leader in the macro-cell business in China's telecommunications tower infrastructure industry. According to the F&S Report, as at 31 Dec 2017, more than 200 small telecommunications tower infrastructure companies were actively participating in the China market. These companies are engaged mainly in regional business, serving part of the local subsidiaries and branches of the big three Telecommunications Services Providers (TSPs). As at 31 Dec 2017, the largest of the smaller tower companies had about 17,260 sites and had established branches in a number of provinces.

Visible business model

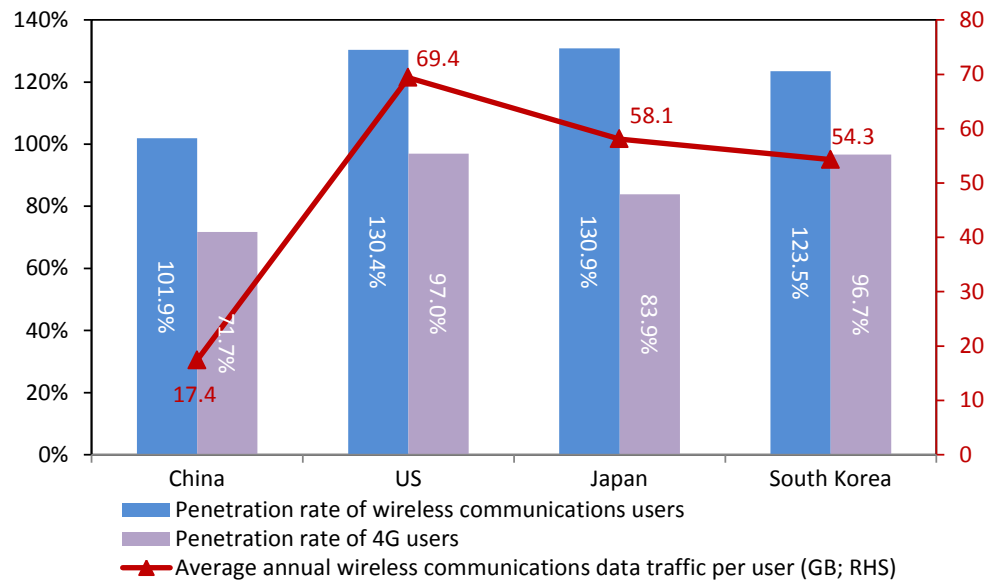
Like other utilities, tower companies in the telecom industry operate a simple business model, leasing tower assets (macro cell and small cell) to services providers (telecom and non-telecom). Compared with their customers, tower companies face fewer operating risks, such as network management, technology upgrades (such as 4G to 5G) and monetization of services. The visibility of tower companies' business is much higher than that of their customers. We also believe that China Tower's position in the China market allows the Company to minimize contract renewal risks, and the costs of replacing a tower infrastructure service provider is higher for TSPs, which also face the risk of affecting network coverage after a change in tower infrastructure services providers. China Tower's quality customers provide solid assurance of predictable and stable sources of revenue and cash flow. After the price cut in early 2018, China Tower's pricing of macro cells is expected to remain stable in the next 3-4 years, giving China Tower time to improve profitability through higher efficiency and exploiting new business opportunities. We share the view that news flow on industry restructuring at the telecom operator level might create concerns about China Tower. But at this stage, there is no confirmation of the news flow. If this is the case, it will take time for the deal to be completed, and China Tower should have enough time to mitigate the impact.

Overcoming the impact of pricing pressure

We believe that China Tower's Jan-Sep 2018 results were solid, showing that the Company overcame the impact of price cuts in early 2018 and reported turnover growth. Despite its small size, the DAS and TASSI business is a growth driver for China Tower. The Company's Jan-Sep 2018 YoY turnover growth was 6.1%, higher than our original expectations for 2018, and the EBITDA margin of 59.1% in Jan-Sep 2018 was higher than our full-year forecast of 58.1%. The Company's Jan-Sep 2018 net profit growth of 16.7% was also higher than our YoY net profit growth forecast of 3.5% for 2018. China Tower was formed only four years ago, and its efficiency and profitability is comparable with that of its overseas peers. China Tower is highly efficient, with over 120 towers managed by one technician, since the Company has a good IT and sensor system, far ahead of that of its overseas peers.

Figure 1: China wireless communications market vs. selected major global wireless communications markets in 2017

China still has room to grow despite high penetration rate



Sources: F&S Report, CGIS Research

2) Next stage of the telecommunications industry cycle

China Tower will benefit from opportunities arising from the sustainable and rapid development of China's wireless communications industry, as well as favorable policy support from the government. Given the growth prospects of the telecommunications tower infrastructure service industry, China Tower's compelling market position, the increasing demand from TSPs, in line with the further enhancement of the 4G network and the future roll-out of the 5G network, China Tower's durable and reliable relationships with TSPs, support from government policy, and new business opportunities and growth areas in the TSSAI business, we believe China Tower will continue to grow in, and benefit from, this sustainable and favorable environment.

Sharing-oriented business model: This allows China Tower to enhance its profitability by increasing its tenancy ratio and marginal profit.

Stable and predictable sources of operating revenue and cash flow: China Tower's major customers are globally leading TSPs, with whom China Tower has signed long-term agreements.

Outstanding capability to provide comprehensive services: China Tower has a broad service scope in China, offering integrated services, which strengthens its market leading position and expands its customer base across sectors.

Great potential for business with customers from different industries: Based on its unparalleled site resources and outstanding capability in providing integrated services, China Tower is exploring new business growth areas.

Leading operational efficiency: An efficient, innovative and sophisticated management model allows China Tower to achieve operational efficiency and optimize operating costs.

China Tower is promoting its non-telco business to diversify its revenue sources by providing site resources services, such as infrastructure, maintenance services and site-based information services for data collection, backhaul, aggregation, analysis and application, to meet demand from clients in government and different industries. China's national strategies of "Cyber Power", "Digital China", and "Smart Society" promote the rapid development of IoT, big data, and artificial intelligence, leading to the rapid growth of informatization demand in a number of vertical industries. This provides China Tower with compelling opportunities to grow its non-telco business. According to the Notice on Promoting Mobile Internet of Things (NB-IoT) Construction and Development, issued by the MIIT in Jun 2017, the Chinese government's target is to have 1.5m NB-IoT BTS and 600m NB-IoT connections by 2020. According to the Development Plan of Big Data Industry, issued by the MIIT in Jan 2017, China's target is to have over RMB1trn big data industry sales by 2020, representing a CAGR of 30%. China's target is for the information consumption scale to reach RMB6tr by 2020, representing a CAGR of over 11%, according to The Three-Year Action Plan to Expand and Upgrade Information Consumption (2018-2020), jointly released by the MIIT and the National Development and Reform Commission in Aug 2018.

Partly because of government policies, wireless data traffic has increased significantly in China, tripling YoY, from 5.1m TB in 2H16 to 15.5m TB in 2H17. This growth in data volume is translating into higher demand for network capacity, which results in more demand for tower infrastructure, either through the installation of new towers or co-sharing of existing macro tower sites. We still expect China Tower to benefit from improvement in coverage of China Telecom and Unicom, which lag behind China Mobile. We also expect China Tower to benefit from the increasing tenancy ratio, given demand from China Telecom and China Unicom.

Non-telco businesses will drive future growth

Increasing data traffic will create demand for tower infrastructure

Through a more proactive approach to the sharing of existing and new site resources, China Tower has effectively met market demand, while achieving reasonable savings in construction costs. By the end of June 2018, 71% of the new leases from the big three TSPs were based on co-location, which had a significant positive impact on overall performance. The Company is actively pursuing DAS projects in commercial buildings, large venues, subways and high-speed railways, covering a cumulative length of more than 13,000km of high-speed railways and 1,900km of subways, as well as large venues with an aggregate area of more than one billion square meters. In Jan-Sep 2018, China Tower's DAS business recorded revenue of RMB1,325m, representing a YoY increase of 79.3%, and accounting for 2.5% of the Company's total turnover, up from 1.5% the previous year.

Penetration of other industries

China Tower started to engage in TSSAI business in 2016 to diversify its business lines and revenue sources by providing site resources services, such as infrastructure, maintenance services and power services, and site-based information services for data collection, back-haul, aggregation, analysis and application to meet the diverse needs of customers from different industries for information technology build-up. China Tower's service offerings cover more than 16 industry applications, including environmental monitoring, maritime surveillance, seismic monitoring and satellite ground signal enhancement. At the end of June 2018, the Company had 57,000 TSSAI tenants, up from 19,000 at the end of 2017. The Company's TSSAI business recorded revenue of RMB675m in Jan-Sep 2018, significantly higher the revenue in FY2017.

In its TSSAI business, China Tower has customers from different industries, such as environmental protection, broadcasting and digital television, satellite positioning, energy, marine and agriculture. To develop its TSSAI business, China Tower plans to explore the growth potential for serving the informatization demands of customers from various industries. In the next two to three years, China Tower will focus on the government and enterprise private communications network market, video surveillance market, and data collection market. The aggregate number of non-telco customers increased from 281 in 2016 to 1,758 in 1Q18, and the number of non-telco tenants increased from 2,169 in 2016 to 45,674 in 1Q18.

Developing high-profile customers and partners

China Tower signed a strategic cooperation agreement with Alibaba on 17 Aug 2018, according to Sina.com. According to news reports, China Tower and Alibaba will have deep cooperation in areas such as cloud computing, edge computing, and big data. China Tower will provide site resources for Alibaba to deploy its IoT network. In Apr 2018, China Tower also signed agreements with China's two major power grid operators, State Grid Corp of China and China Southern Power Grid Co Ltd, to share their power transmission towers for the deployment of macro cells. This network sharing could improve China Tower's investment returns in the 5G era.

China Tower signed a strategic cooperation agreement with China Post on 20 Aug 2018. According to news flow, China Tower will consolidate China Post's public service facilities, such as offices and business premises, into site resources. China Tower will provide services such as video surveillance, smart IoT, multi-domain data information and advertising to China Post. The two parties will also explore cooperation in new business areas, such as smart societies, digital China, and e-commerce.

Comparable to peers

3) Reasonable asset structure compared to that of its peers

The tower industry is capital intensive, requiring a large investment and usually a lot of financial leverage. Compared to its international peers, China Tower has a relatively low liability-to-asset ratio. China Tower's high gearing ratio is due to the fact that the Company acquired its tower assets from the telecom operators, mainly China Mobile, China Telecom and China Unicom. However, China Tower's net gearing ratio is still lower than that of its global peers. The high ROE achieved by China Tower's global peers, in our view, is partly due to their high net gearing level. China Tower achieved an EBITDA margin of 58.8% in 2018, which is comparable to the range of 36.2%-63.8% of its globally listed peers.

China Tower raised HK\$58,796.46m in Aug 2018 by issuing 43,114,800,000 H-shares in an IPO and 3,549,056,000 H Shares as an over-allotment shares, at HK\$1.26 per H share. According to the prospectus, approximately 60% is expected to be used to fund capital expenditure: a) 51% to 54% is expected to be used for new site construction and augmentation; and b) 6% to 9% is expected to be used for ancillary facilities replacement and improvement; approximately 30% is expected to be used to repay bank loans; and approximately 10% is expected to be used for working capital and other general corporate purposes.

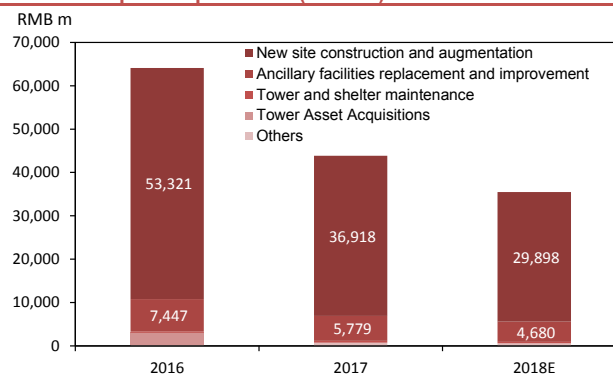
The gearing ratio will be improved because China Tower will use nearly 30% of the funds from the IPO to pay off bank loans. After the IPO, China Tower's gearing will be reduced from over 100% in 2017 over 48% in 2018. The improvement in gearing ratio offers China Tower the capacity to raise CAPEX for the 5G era, which is coming in the next two years.

Figure 2: China Tower's repayment schedule for interest-bearing liabilities

	2015	2016	2017
Within 1 year	23,866	127,752	112,512
Between 1 and 2 years	84,463	1,377	11,276
Between 2 and 5 years	3,562	4,415	29,608
Over 5 years	6,292	6,488	2,909
Total	118,183	140,032	156,305

Source: Company Data, CGIS Research

Figure 3: China Tower's Capital Expenditure (CAPEX)



Source: Company Data, CGIS Research

Business

1) Tower business

Using its sites, China Tower carries out macro-cell and small-cell business with telecommunications service providers (TSPs).

(i) Macro-cell business: China Tower provides site space, including towers and shelters or cabinets, to TSPs and hosts their antennas and other macro-cell equipment. Through its macro-cell business, China Tower supports TSPs by providing extensive coverage of their wireless communications networks in China.

(ii) Small-cell business: China Tower provides site space, including towers, poles, and other infrastructure resources and cabinets, to TSPs and hosts their small-cell equipment. Through its small-cell business, China Tower supports TSPs to densify the coverage and increase the capacity of the wireless communications networks built up by macro-cell equipment, particularly in urban areas with a high density of people and buildings, and in certain non-urban areas.

In 2015, 2016, 2017, 1Q18 and 1H18, China Tower's revenue from its macro-cell business accounted for 99.5%, 99.2%, 97.3%, 96.5% and 95.5% of total revenue, respectively. China Tower commenced its small-cell business in 2017. In 2017, 1Q18 and 1H18, revenue derived from its small-cell business was RMB257m, RMB84m and RMB176m, respectively. As at 30 Jun 2018, China Tower had 21,045 TSP tenants for its small-cell business. In Jan-Sep 2018, revenue derived from tower business was RMB51,535m, up 3.7% YoY.

China Tower aims to strengthen its leading position in the tower business industry. Development goals for macro-cell business: China Tower aims to grow together with the TSPs and reinforce its leading position in macro-cell business. China Tower will: a) leverage its strength in coordinating site planning with the TSPs' network planning, and fully consolidate demand to **improve its site co-location**; b) **lower its capital expenditure**, satisfy its customers' demands more quickly and help lower their costs in network deployment by fully utilizing the resources of the public utility towers and poles and shortening the time for site construction; and c) **extend the scope of its site co-location** to more comprehensive sharing by providing TSPs with integrated solutions. **Development goals for small-cell business:** China Tower seeks **more small-cell orders** from TSPs and to enhance its market competitiveness by providing quality services in a more cost-efficient manner with competitive service charges. In order to achieve this, China Tower plans to: a) **lower construction costs** and enhance delivery efficiency by using public utility towers and poles for small-cell installation; b) enrich its small-cell service offerings by providing self-built sites or public utility towers and poles, or procuring customers to share its power access, maintenance, site acquisition and property coordination services without site construction; c) offer quality facility maintenance and site operations through its experienced and dedicated professionals, and its comprehensive power supply assurance system and real-time monitoring services; and d) develop its small-cell business by providing integrated service solutions for indoor and outdoor wireless communications coverage through a mix of macro-cell and small-cell business.

China Tower is a leading player

2) Indoor DAS (Distributed Antenna System) business

China Tower provides indoor DASs to TSPs and to attach their telecommunications equipment. Through its DAS business, China Tower supports TSPs in providing in-depth coverage of wireless communications networks in buildings and tunnels.

China Tower has established a track record in its DAS business, with increasing revenue and number of tenants. In 2015, 2016, 2017 and 1H18, revenue from its DAS business amounted to RMB45m, RMB42m, RMB1,284m and RMB824m, respectively. As at 31 Dec, 2015, 2016 and 2017 and 30 Jun, 2018, the number of TSP tenants in China Tower's DAS business was 3,532, 13,646, 23,615 and 26,972, respectively. In Jan-Sep 2018, revenue derived from its DAS business was RMB1,325m, up 79.3% YoY.

China Tower will improve its ability to satisfy its DAS customers' demands. According to its Development Goals for its DAS business, China Tower seeks to strategically expand the coverage of its DAS sites in key venues and promote co-location at its DAS sites with TSPs. In order to achieve this, China Tower plans to: a) coordinate demand in subways, expressways, high-speed railways, transportation hubs, large venues and other key venues to promote its DAS business; b) develop more advanced DAS products and technological solutions to address customers' needs for coverage in different scenarios and their network deployment; c) explore and develop DAS solutions to adapt to the 5G network; and d) develop DAS business through integrated service solutions for wireless communications coverage through a mix of towers and DAS sites.

Also gaining market share in the DAS segment

China Tower builds relationships with TSPs through Tower and DAS business.

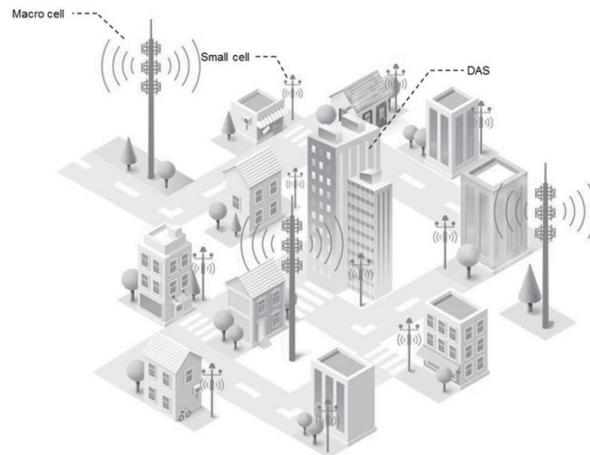
TSPs require sites to host telecommunications equipment and build up their wireless communications networks. TSPs have historically acquired, constructed and maintained the sites by themselves. To alleviate the burden of capital expenditure and to systematically improving their cost position, TSPs are increasingly opting to use sites and services provided by telecommunications tower infrastructure service providers, which allow the TSPs to share sites and achieve network coverage and expansion through their consolidated site resources.

China Tower conducts tower and DAS business with TSPs using its extensive site resources and provides site space, ancillary equipment and various services to TSPs to ensure the smooth operation of infrastructure and power, and support the continuous functioning of TSP equipment.

- a. **Site space.** China Tower provides towers, shelters or cabinets, and ancillary equipment to its TSP tenants for them to install their telecommunications equipment.
- b. **Maintenance services.** The maintenance services include monitoring equipment operations, routine inspection, breakdown handling, property upkeep, working environment protection and operations analysis. Through its maintenance services, China Tower helps its tenants maintain the continuous functioning of their equipment.
- c. **Power services.** China Tower provides power access, batteries or backup power generation for its tenants' telecommunications equipment. Utility electricity can be provided to its tenants through its power access. In the event of a disruption in utility electricity, China Tower offers backup power assurance from its batteries. In addition, China Tower generates power using gasoline or diesel generators for the telecommunications equipment of its tenants in case both utility electricity is disrupted and its batteries are exhausted.

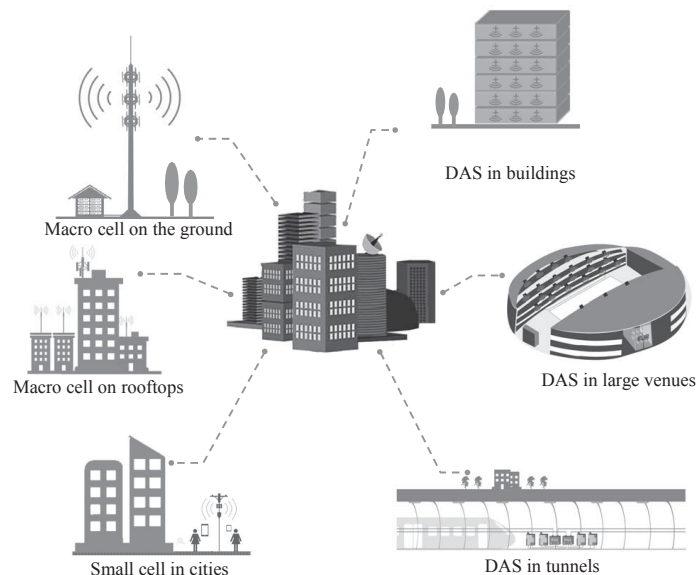
The long-term relationships between China Tower and the Big Three TSPs are mutually beneficial and complementary. China Tower consolidates the demand from TSPs for their wireless communications coverage and matches the demands with its site resources. Based on the matching results, China Tower can satisfy the demand either by augmenting its existing sites or identifying and building new sites. China Tower also offers TSPs integrated solutions for wireless communications coverage. As China Tower combines and coordinates its macro-cell, small-cell and DAS businesses in a specific area, it can support TSPs to broaden their wireless communications coverage and increase their wireless communications network quality, at relatively low cost. China Tower supports the Big Three TSPs in China to operate the world's largest wireless communications network in terms of the number of base stations, and also benefits from the rapid development of the wireless communications industry.

Figure 4: Illustration of China Tower's Tower and DAS businesses with TSPs



Source: Company Data, CGIS Research

Figure 5: Illustration of China Tower's Tower and DAS businesses with TSPs



Source: Company Data, CGIS Research

3) Trans-sector site application and information (TSSAI) business

Technologies such as IoT, big data and artificial intelligence have been developing rapidly in China and are driving the rapid growth in demand for informatization in all industries. In response to this trend and by expanding the scope of its services, improving the value proposition of its services and addressing the needs of customers from different industries, China Tower uses its TSSAI business to increase marginal profit and develop diverse business. Using its sites dispersed nationwide, China Tower provides site resource services, including infrastructure, maintenance and power services, to host different types of devices for its customers from different industries and help them to build different types of national or regional networks.

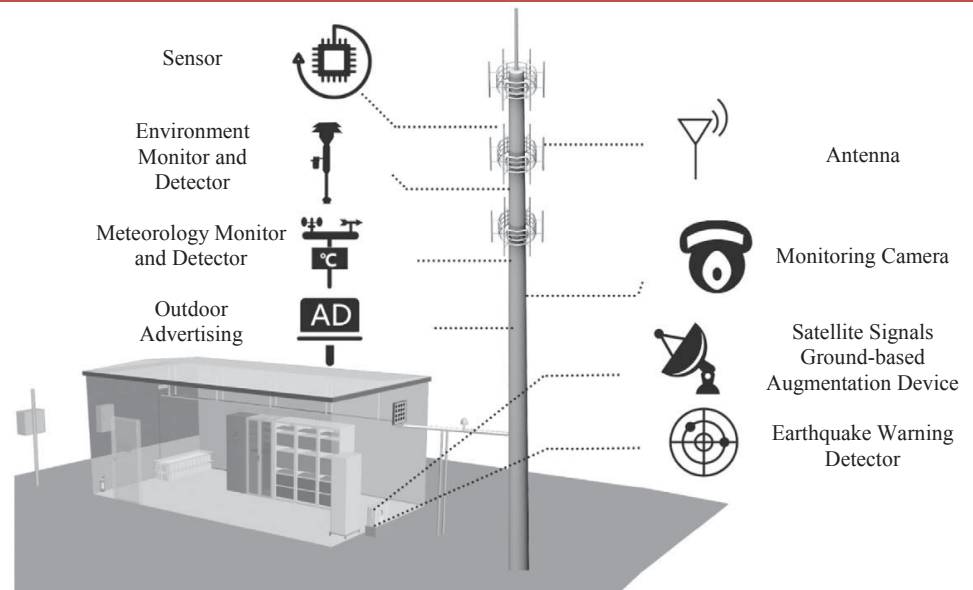
Furthermore, by integrating data-collection devices, transmission networks, data platforms and other resources, China Tower provides site resources services and site-based information services, including data collection, transmission, analysis and applications.

Non-telco business looks promising.

- a. **Site resources services:** China Tower provides site resources for customers to install certain equipment and maintain the smooth operation of the equipment by providing maintenance and power services. Its site resources services primarily address the need for private communications networks for government and enterprises, and data collection. It involves mainly (i) private communications networks for government and enterprises in the broadcasting and digital television, power, energy, civil aviation and other sectors; and (ii) data collection for the ground-based augmentation system of satellite systems, and surveillance for air quality, meteorology, seismology, drones, land, marine, expressways, railways and prevention of forest fires.
- b. **Site-based information service:** China Tower integrates its site resources, dedicated transmission lines, data platform, third-party equipment and other resources to provide its customers with information services for data collection, backhaul, aggregation, analysis and applications.

China Tower also provides other services, including outdoor advertising, equipment and facility custody, and construction and maintenance of facilities held by its customers.

Figure 6: Illustration of China Tower's TSSAI business



Source: Company Data, CGIS Research

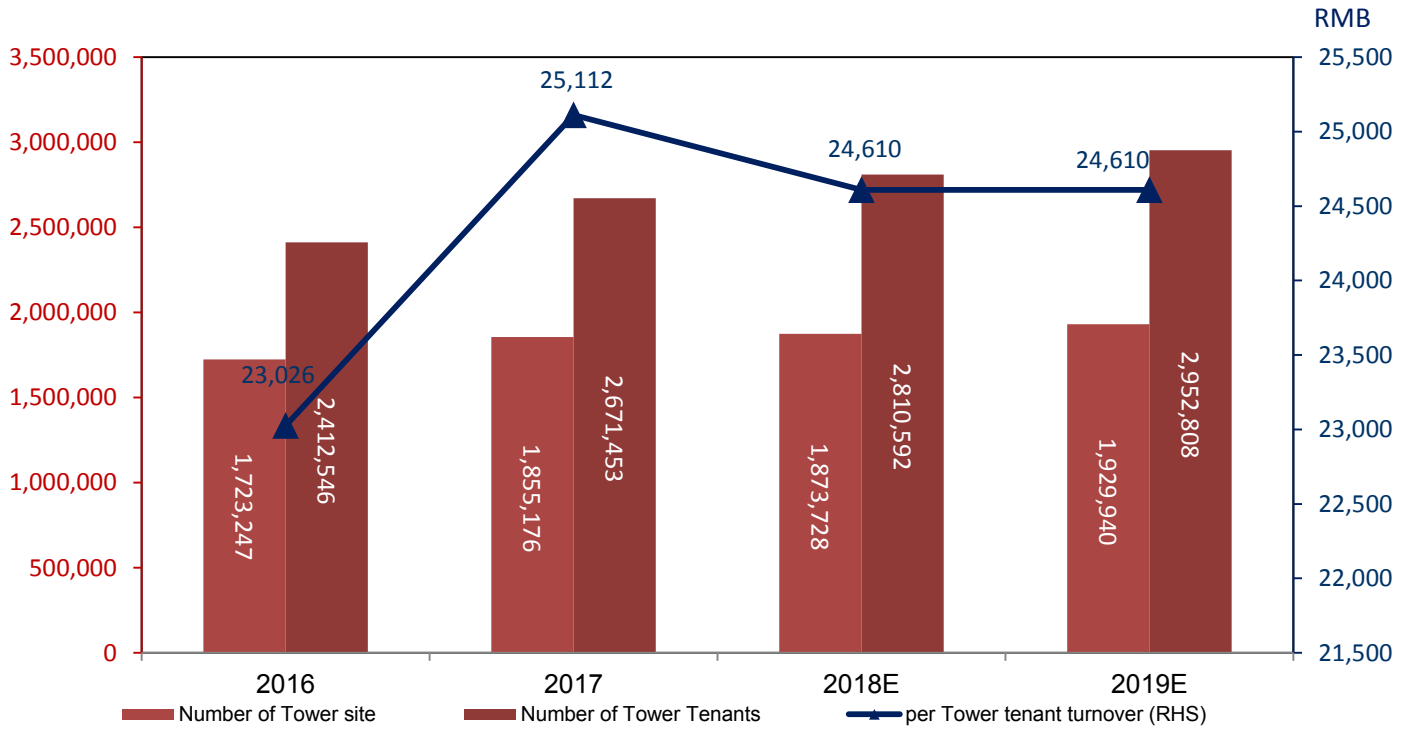
China Tower has reported rapid growth in revenue in its TSSAI business since January 2016. In 2016, 2017 and 1H18, China Tower's revenue from its TSSAI business was RMB19m, RMB169m and RMB374m, respectively. In Jan-Sep 2018, revenue derived from its TSSAI business was RMB675m, up 971.4% YoY.

China Tower will explore the growth potential of serving the informatization demands of customers in various industries. Development Goals of TSSAI business: China Tower will explore new business growth areas by (i) further maximizing the value of its site resources and providing its site resources service to more customers from different industries; and (ii) offering integrated information service solutions by improving its capability to provide comprehensive services, consolidate public resources, and establish an open and collaborative industry ecosystem. China Tower will continue to expand its TSSAI business in the China market. In the next two to three years, China Tower plans to explore potential primarily in the government and enterprise private communications network market, video surveillance market and data collection market. In particular, China Tower intends to expand its offering of site-based information services to customers in these markets. In addition, China Tower will closely monitor market trends, continuously expand its customer base and explore growth potential in various markets.

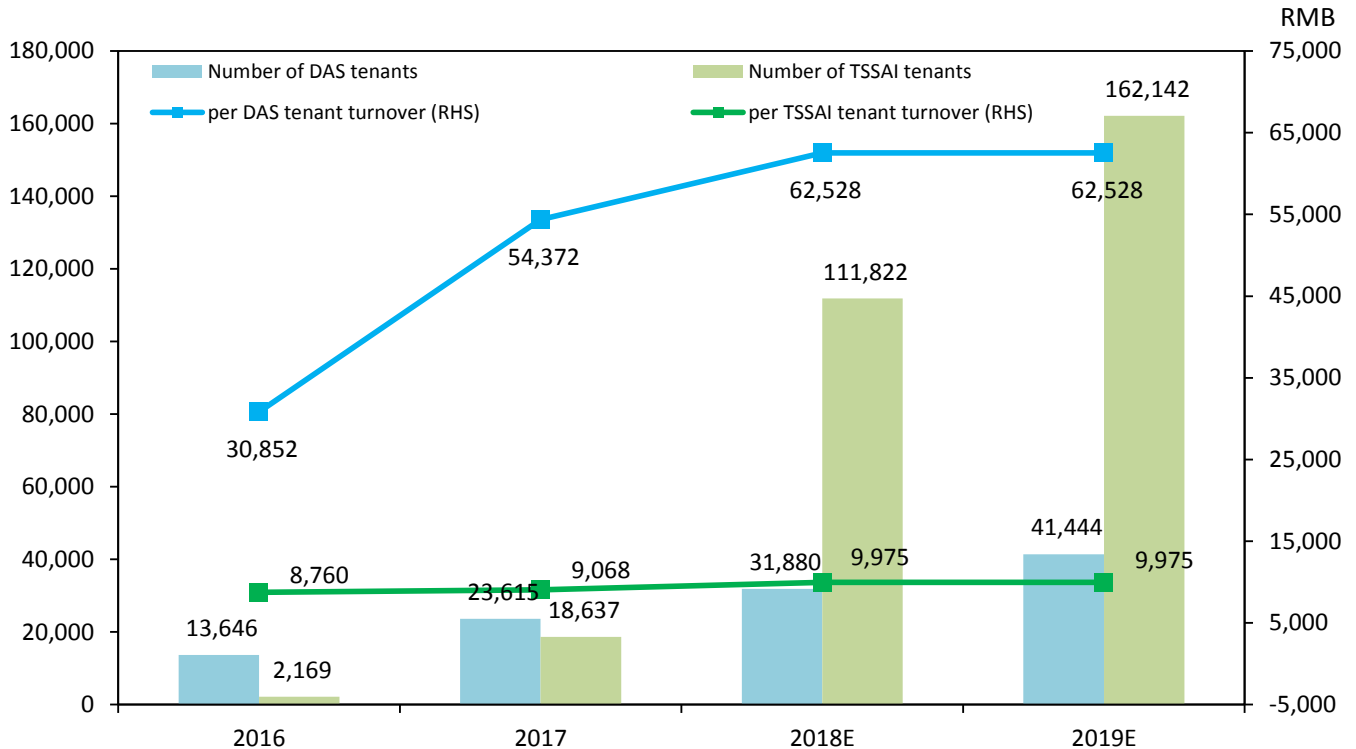
4) Other business

Other business includes revenue generated from transmission services, commissions for paying electric power charges on behalf of customers, and income from leasing some of its properties. Through its transmission services, China Tower provides short interval tubes, poles and other facilities to its tenants.

China Tower intends to promote green energy applications. It will proactively recycle retired electric vehicle batteries to replace lead-acid batteries. China Tower aims to benefit and create value for society by utilizing retired electric vehicle batteries, solar power and wind power through a systematic approach.

Figure 7: Tower business projection


Source: Company Data, CGIS Research

Figure 8: DAS and TSSAI business projection


Source: Company Data, CGIS Research

Operation

1) Marketing

Generally, China Tower constructs sites and offers services to the Big Three TSPs by meeting their coverage demands. So China Tower's marketing activities involve mainly participating in exhibitions, advertising campaigns and precision marketing activities for its customers in the TSSAI business.

2) Sites

Site Sharing and Co-Location. China Tower encourages TSPs to share sites through co-location. To facilitate site co-location, China Tower offers attractive co-location discounts to the Big Three TSPs and encourages them to co-locate at the sites. Co-location by TSPs also allows China Tower to enhance profitability. Adding an additional tenant at a site normally requires lower capital expenditure for augmentation than building a new site. In contrast to serving a single tenant, serving multiple tenants at a site increases China Tower's marginal profit, even after the co-location discounts. To increase site sharing, China Tower also provides site resources services and site-based information services to accommodate the diverse needs of its customers in different industries. This also helps to expand the functionality of sites from serving only as telecommunications towers to serving as multi-use towers with a greater base for sharing. By being proactive to government policy which supports China Tower's access to infrastructure resources, China Tower will be able to further diversify its site sources by sharing and expanding the functionality of public utility towers and poles.

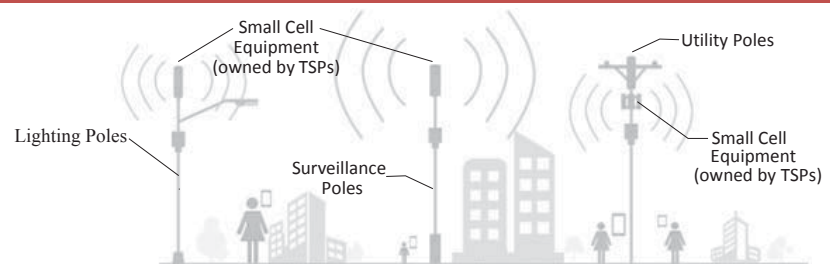
Given the vast territory with complex geographical features and various wireless communications coverage requirements, China Tower uses different solutions to provide infrastructure and services under different scenarios to address the coverage needs of TSPs. China Tower also provides TSSAI services for customers from different industries to meet their needs and enhance profitability.

Figure 9: Classification of sites

Tower sites	Ground tower site	General ground tower	Monopole
			Lattice
		Angle-steel tower	
	Landscaped tower	General landscaped tower	
		Camouflage tower	
	Pole	Lamp pole	
Guyed pole			
Rooftop tower site	General rooftop tower	Rack	
		Stealth	
DAS sites	Building DAS site		
	Tunnel DAS site		

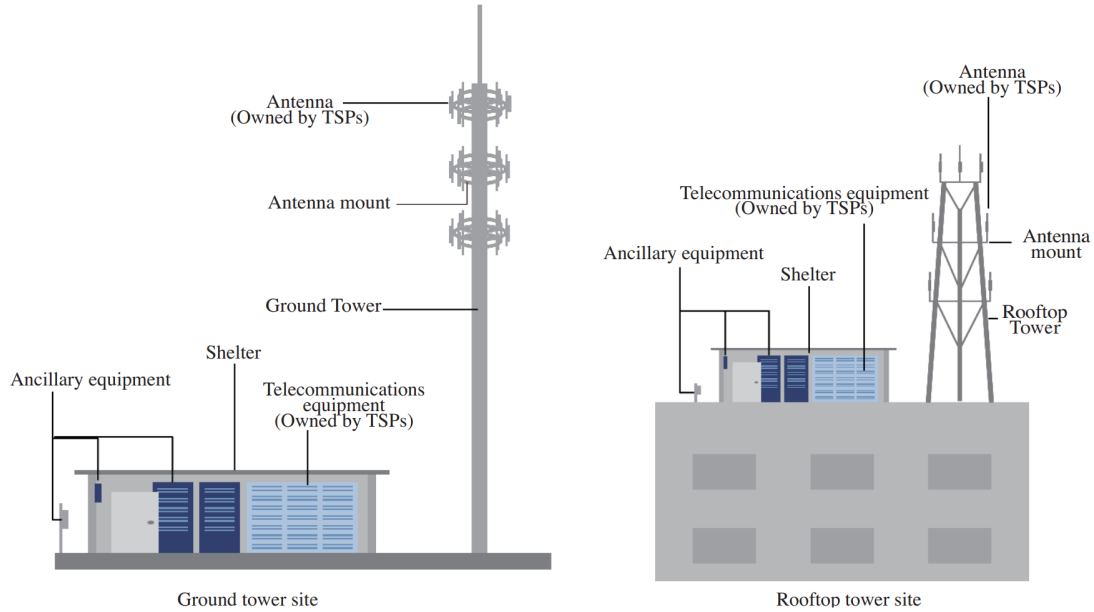
Source: Company Data, CGIS Research

Figure 10: Illustration of the structure of Tower sites



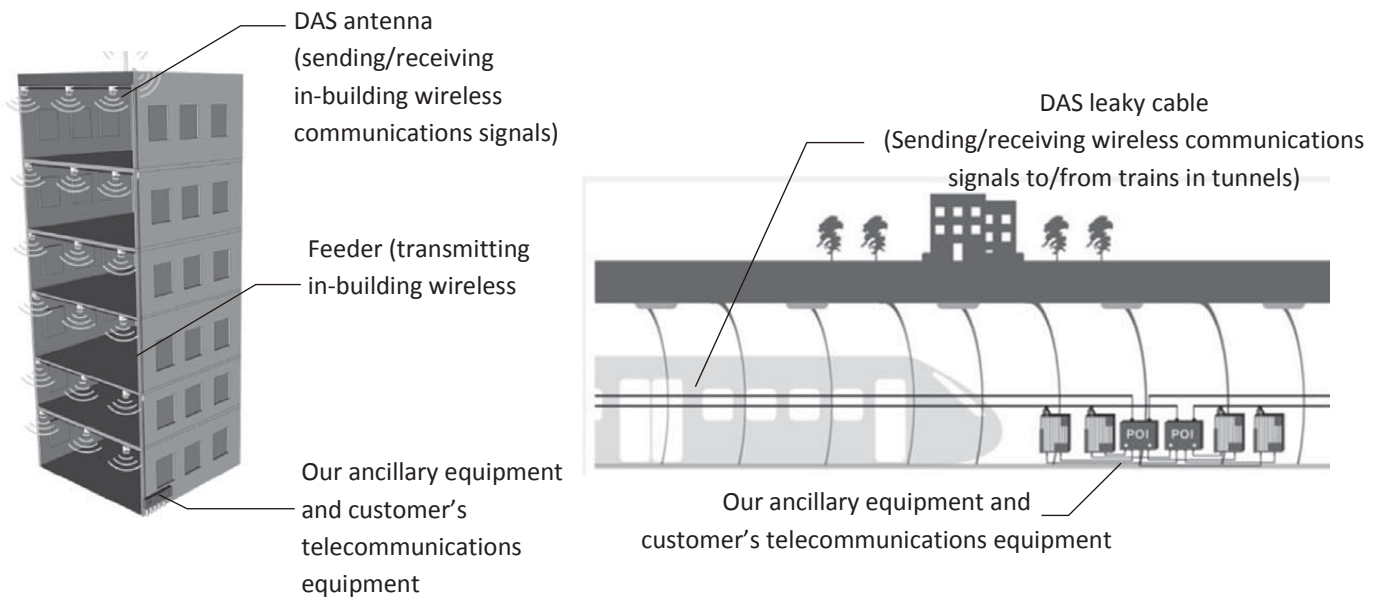
Source: Company Data, CGIS Research

Figure 11: Illustration of the structure of Tower sites



Source: Company Data, CGIS Research

Figure 12: Illustration of the structure of DAS sites



Source: Company Data, CGIS Research

3) Key Operation Workflow

China Tower's operation workflow include mainly demand undertaking, site acquisition, site construction and site maintenance. China Tower's business operations are driven primarily by demand. China Tower undertakes wireless communications coverage demand from its customers and matches this demand with its site resources. Based on the matching results, it satisfies the demand by either augmenting its existing sites or identifying and building new sites. After delivering its sites to customers to host their equipment, China Tower carries out site maintenance work to assist its customers in maintaining the smooth functioning of their equipment.

Figure 13: China Tower's business operation workflow



Source: Company Data, CGIS Research

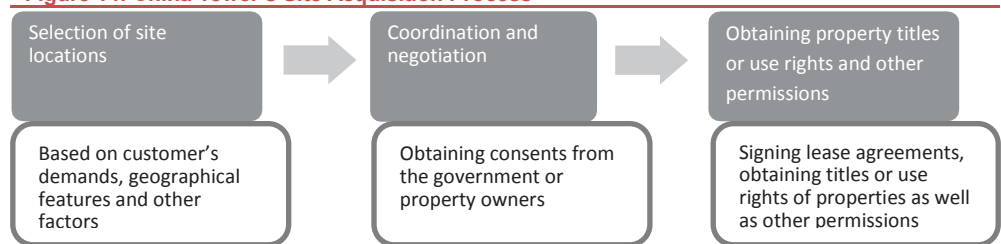
(a) Demand Undertaking

China Tower commences its operations by responding to the wireless communications coverage demand from the TSPs. China Tower has a well-established mechanism for analyzing customer demand and matching site resources via its integrated management platform. Through this mechanism, China Tower can identify the demand which can be addressed by co-locating at its existing sites and augmenting the sites to host more equipment. Otherwise, China Tower acquires and builds new sites for its customers.

(b) Site Acquisition

Site acquisition is an important competitive advantage in its daily operations, which distinguishes China Tower from other telecommunications tower infrastructure companies. For demand that cannot be addressed using its existing sites, China Tower identifies locations for new sites, obtains title or usage rights for the properties and the necessary permissions for site construction, and ensures the services are provided to customers through these sites. Therefore, its site acquisition includes mainly the selection of site locations, coordinating and negotiating, and obtaining title or usage rights of properties and other permissions.

Figure 14: China Tower's Site Acquisition Process



Source: Company Data, CGIS Research

China Tower has built site acquisition teams throughout the China and engages third-party service providers to assist it in site acquisition. Moreover, its site acquisition efforts have been supported by government, enterprises and public institutions. China Tower has entered into strategic cooperation agreements with 28 provincial governments in China, under which it received various policy support for site planning and construction, site resources protection, and the sharing of infrastructure resources. In addition, China Tower cooperates with public and private entities in the China to share towers and poles.

While possessing capabilities essential to site maintenance, China Tower outsources on-site maintenance to third parties to maintain its operating capability and achieve better cost-effectiveness. China Tower has a number of criteria for selecting third-party maintenance service providers and enters into outsourcing maintenance service agreements with them.

(c) Site Construction

China Tower's site construction comprises the augmentation of existing sites and construction of new sites. China Tower undertakes augmentation at its existing sites by increasing site capacity, including height extension, foundation strengthening and the extension of ground space, to accommodate additional tenants and host more equipment. China Tower also constructs new sites for its tenants to host their equipment.

China Tower engages third party service providers to design, construct and supervise construction. It conducts site construction quality control through the following ways: (i) Management of construction procedures, which is carried out mainly by developing standardized construction techniques and procedures. China Tower has a number of databases for techniques and procedures and has explicit requirements for the techniques and procedures for the construction of towers and DAS. It incorporates these databases into its IT system to achieve centralized management. Its staff in charge of projects in local branches are responsible for supervising and inspecting the construction projects in accordance with these techniques and procedures. Meanwhile, its headquarters and provincial branches conduct online monitoring or regular on-site spot checks of the projects. (ii) Acceptance specifications. Based on the requirements of its acceptance standards under the service framework agreements and its requirements for project quality, China Tower issues acceptance specifications against material procured and construction projects, which mainly cover towers, DAS, shelters, and cabinet and power supply equipment.

(d) Site Maintenance

China Tower's maintenance work includes mainly handling breakdowns. It has built an IT system for handling breakdowns to streamline procedures and increase its maintenance efficiency. The IT system allows China Tower collect alarms from smart FSUs installed at its sites, send maintenance orders to nationwide field maintenance teams, oversee maintenance work, and collect replies of maintenance orders through mobile applications. China Tower also provides emergency handling for its customers. It has set up emergency handling departments and adopted a number of measures to assist its customers in natural disasters, emergencies and significant public events. As at March 31, 2018, China Tower had 29,735 emergency vehicles and 178,233 gasoline or diesel generators to handle breakdowns and emergencies. As at the Latest Practicable Date, there were no emergency events that had a significant impact on its overall operations in relation to its sites.

In addition to its own capabilities essential to site maintenance, China Tower outsources on-site maintenance to third parties to maintain its operating capabilities and achieve better cost-effectiveness. China Tower has established a number of criteria for selecting third-party maintenance service providers and enters into outsourcing maintenance service agreements with them.

In addition to the above on-site maintenance work, China Tower's maintenance staff upkeep site resources and manage property costs using IT systems. Supported by its IT systems, China Tower is capable of (i) upkeeping relationships with property owners, responding to their feedback and resolving issues; (ii) managing property lease contacts, ground lease charges and electric power charges; (iii) strictly supervising site demolition and relocation; and (iv) collecting and trimming property data from over two million properties across China. During the Track Record Period, China Tower increased the renewal rate of its property contracts and accuracy of property data, while complaints from property owners and site disputes both dropped.

To support site maintenance, China Tower built its own maintenance monitoring platform and installs smart FSUs and various types of sensors at its sites to collect data reflecting power and environmental changes. Transmitting this data through its smart FSUs to its maintenance monitoring platform allows China Tower to centralize the monitoring of its sites in real time. China Tower's maintenance monitoring platform can manage over one million sites, equipping the Company with visible, manageable and controllable maintenance.

China Tower started setting up monitored sites in April 2016. As at December 31, 2016 and 2017 and March 31, 2018, there were 1,145,490, 1,498,577 and 1,563,618 monitored sites installed with smart FSUs and sensors, respectively. As at March 31, 2018, China Tower had installed smart FSUs and sensors in almost all sites suitable for remote monitoring. For the small number of sites in which smart FSUs and sensors cannot be installed, China Tower enhances its on-site inspection to ensure the smooth operation of its facilities.

4) Integrated Management Platform

China Tower's integrated management platform covers the key workflow of its business operations and provides efficient and accurate business data analysis. China Tower can extract and filter data, based on its quality, from each sub-system and database regarding sites, orders, projects, investment cost, revenue, cost, property and expenses in completing construction, subsequently equipping it with reliable operation analysis. Key workflows and indicators of substantially all of its sites can be obtained through this operation analysis and displayed on the home page of intranet interface. These indicators include mainly order signing, site delivery, and commencement of site operations, as well as indicators mainly involving business developments, project construction and maintenance services. China Tower's integrated management platform generates not only statements targeting different processes, but also annual, monthly and weekly reports relating to the business operations of local branches. Meanwhile, China Tower feeds its data analysis down to each of its sites through the platform to check in detail on their operation status and subsequently to achieve precise accounting of individual sites.

China Tower's integrated management platform can conduct preliminary big data analysis and income analysis, which can be applied to building income forecast data models, building data cubes, developing an analyses-criteria library, and conducting case studies. China Tower plans to combine the data collected by its smart FSUs with big data from entities in different industries to conduct big data analysis for operations through its intelligent analysis model, which will help it build customer evaluation models and conduct risk management and precision marketing.

Customer and Supplier

1) Customer

China Tower's customers are all based in China. The three major TSPs are its most important customers. Regarding the TSSAI business, China Tower has customers in different industries, such as environmental protection, broadcasting and digital television, satellite positioning, energy, marine and agriculture. China Tower entered into strategic cooperation framework agreements with the two power grid operators, State Grid Corporation of China and China Southern Power Grid Co., Ltd., to share their power transmission towers for telecom base station deployment.

- a. **TSP Customers.** China Tower provides services to the Big Three TSPs. China Tower entered into relevant agreements in respect of China Tower's services provided to the Big Three TSPs, including Commercial Pricing Agreements, Supplemental Agreements to the Commercial Pricing Agreements and Service Agreements.
- b. **Customers from different industries.** China Tower is engaged in the TSSAI business with customers from different industries. The total number of customers increased from 281 as at December 31, 2016 to 1,758 as at March 31, 2018, while the number of tenants increased from 2,169 as at December 31, 2016 to 45,674 as at March 31, 2018.

2) Suppliers and Procurement

China Tower's suppliers cooperate with China Tower mainly through its E-procurement platform (<http://www.tower.com.cn>), which covers some materials and services required in China Tower's construction, operation and management. The materials China Tower procures through the E-procurement platform include mainly:

- a. construction materials for towers and shelters, ancillary equipment, power supply equipment, air conditioners and distributed antenna systems; and
- b. construction design and field services, including on-site inspection, survey, supervision, construction and maintenance.

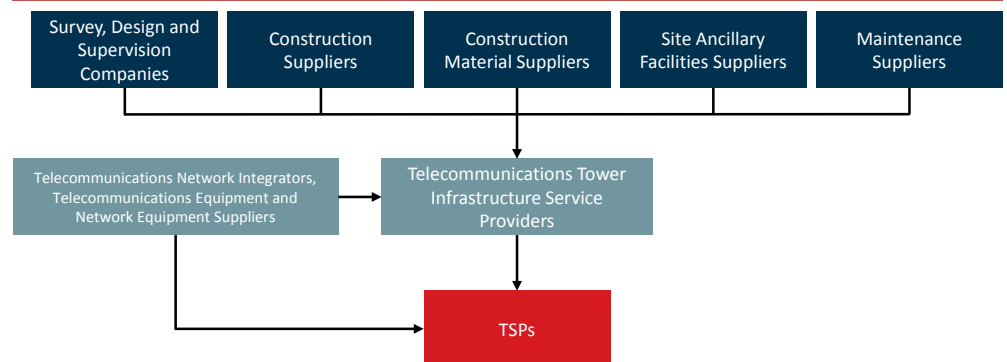
The selection of E-procurement platform suppliers must go through three steps: (1) certification by headquarters, (2) selection by provincial branches, and (3) selection by municipal branches. China Tower uses a transparent online tender procedure to select suppliers, based on a variety of factors, including their business scale, product quality and certification, sales and customer service quality, technical capability, and compliance with national standards and requirements. China Tower enters into procurement framework agreements with suppliers, which normally last a year, and cooperates with them by issuing procurement orders on a regular basis. China Tower's suppliers provide a quality guarantee for their materials and keep business secrets strictly confidential. When the framework agreement expires, China Tower evaluates the suppliers and determines whether to continue cooperating with them according to the evaluation results. Therefore, China Tower has not signed any long-term strategic cooperation agreement with suppliers. China Tower settles with suppliers after receipt of invoices, and is granted a credit period on a case-by-case basis, which normally varies from three to six months.

For materials and services that are not suitable for purchasing through the E-procurement platform and for large-scale construction projects for which the procurement procedures are stipulated under China laws and regulations, China Tower conducts procurement through a conventional bidding and quoting procedure and manages it through its IT system.

Procurements from China Tower's five largest suppliers accounted for approximately 12.9%, 14.5%, 18.2% and 21.4% of its total procurement expenditure and expenses in 2015, 2016 and 2017 and Q1 2018, respectively. Purchases from its largest supplier accounted for approximately 9.4%, 8.3%, 12.4% and 13.7% of its total procurement expenditures and expenses in 2015, 2016 and 2017 and Q1 2018, respectively. Procurement expenditure and expenses represent (i) the addition of property, plant and equipment, land use rights and software in the balance sheet statements on an accrual basis; and (ii) site operating lease charges, repairs and maintenance and other operating expenses, which are expensed as incurred and recorded in the comprehensive income statements on an accrual basis. Among its suppliers, the Telecom Group Companies and their respective associates provided materials, property leasing, telecommunications services, and design, supervision, construction, maintenance and power generation services to China Tower and were among the five largest suppliers, respectively, in 2015, 2016 and 2017 and Q1 2018. China Tower purchased batteries and telecommunications equipment mainly from other suppliers during the Track Record Period. The telecommunications equipment China Tower purchases from other suppliers are mainly smart FSUs. China Tower does not purchase any telecommunications equipment on behalf of the TSPs.

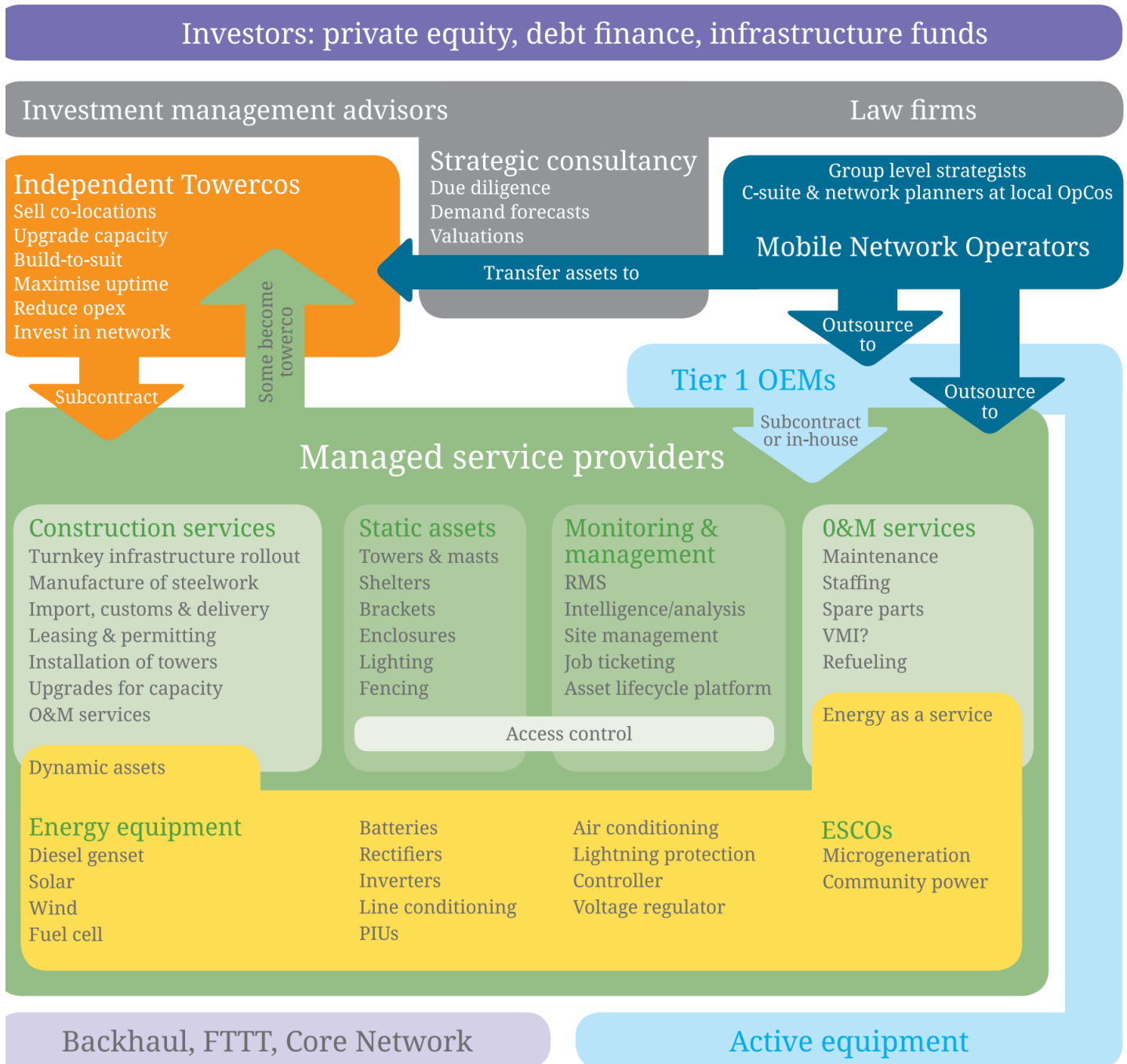
Procurements from the Telecom Group Companies and their respective associates accounted for approximately 11.4%, 11.1%, 15.3% and 17.5% of total procurement expenditure and expenses in 2015, 2016 and 2017 and Q1 2018, respectively.

Figure 15: Value chain of the telecommunications tower infrastructure industry



Source: Company Data, CGIS Research

Figure 16: Value chain of the telecommunications tower infrastructure industry



Source: TowerXchange, CGIS Research

China Tower is the clear no.1 in China

Industry Overview

The China wireless communications market has seen sustainable and rapid development in recent years. According to the F&S Report, China has the world's largest wireless communications user base, which continues to grow and is expected to reach 1.56 billion in 2022. Wireless communications data traffic per capita in China increased at a high growth rate from 0.8 GB per year in 2012 to 17.4 GB per year in 2017, representing a CAGR of 85.5%, and is expected to maintain relatively high growth from 2017 to 80.5 GB per year in 2022, representing a CAGR of 35.9%.

According to Chinese law, the TSPs in principle must not build ancillary facilities for base stations and indoor distributed antenna systems at key venues. China Tower must coordinate the co-location of telecommunications towers.

Industry landscape: China Tower operates in China and faces no competition from foreign telecommunications tower infrastructure companies. China Tower competes only in the telecommunications tower infrastructure industry in China. According to the F&S Report, China Tower is the leader in China's telecommunications tower infrastructure industry. As at 31 Dec 2017, China Tower's market share in the telecommunications tower infrastructure industry in China was 96.3% in terms of the number of sites. The Company's major businesses, namely macro cell, small cell and DAS, face different competitive landscapes in the China market.

China Tower is the leader in the macro-cell business in China's telecommunications tower infrastructure industry. According to the F&S Report, as at 31 Dec 2017, more than 200 small telecommunications tower infrastructure companies were actively participating in the China market. These companies are engaged mainly in regional business, serving part of the local subsidiaries and branches of the big three TSPs. As at 31 Dec 2017, the largest of these companies had about 17,260 sites and had established branches in a number of provinces.

Figure 17: Top 10 Tower companies worldwide ranked by tower count

Rank	Tower company	Count	Countries	Updated
1	China Tower	1,870,000	China	1Q18
2	American Tower	159,772	Argentina, Brazil, Chile,...	1Q18
3	Indus Towers	123,639	India	1Q18
4	Reliance Infratel	43,000	India	4Q17
5	edotco	40,481	Bangladesh, Cambodia, Malaysia,...	1Q18
6	Crown Castle	40,053	USA	1Q18
7	Bharti Infratel	39,523	India	1Q18
8	SBA Communications	28,309	Argentina, Brazil, Canada,...	1Q18
9	Deutsche Funkturm	28,000	Germany	3Q18
10	GTL Infrastructure	27,759	India	2Q17

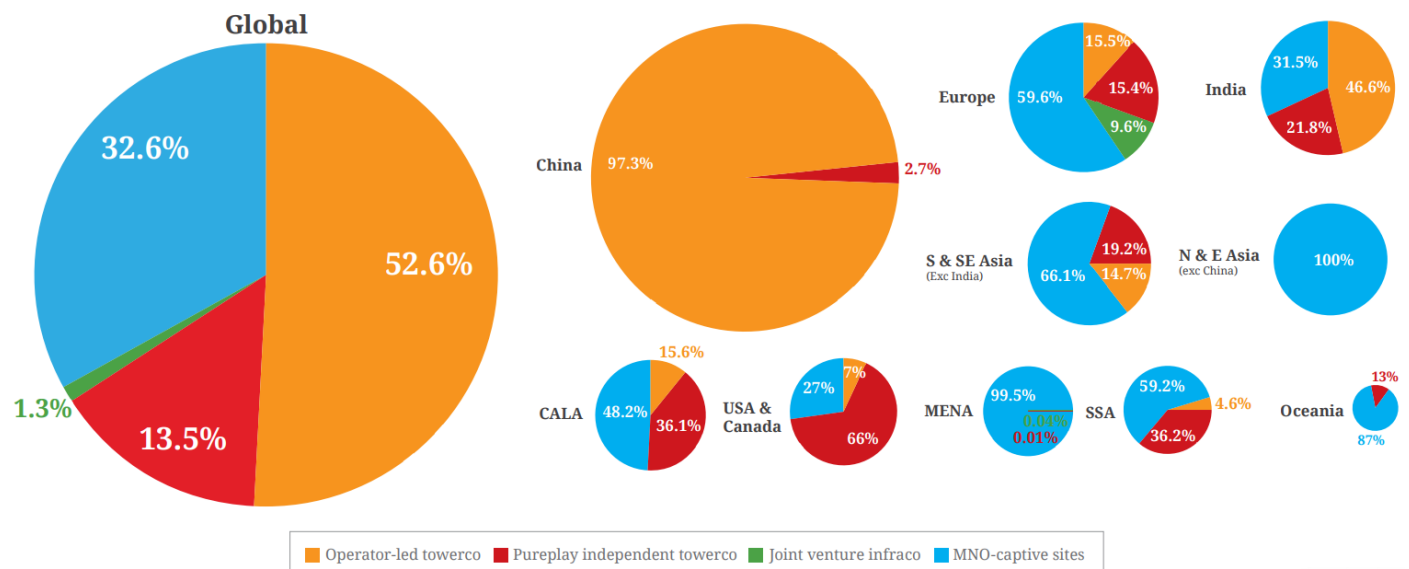
Source: TowerXchange, CGIS Research

Figure 18: Policies in China related to China Tower

Time	Organization	Law/Policy	Main Points	
2008-10	MIIT and SASAC	The Emergency Notice on the Facilitating of the Joint Construction and Sharing Telecommunications Infrastructure	The state establishes a nationwide telecommunication infrastructure joint construction and sharing leading group, which is responsible for guiding the co-ordination of the joint construction and sharing of nationwide telecommunication infrastructure and deciding the relevant material matters.	
2009-07	former SERC and MIIT	The Implementation Opinions on Issues Concerning Power Supply During Joint Construction and Sharing of Telecommunications Infrastructure	Grid enterprises at all levels shall actively create conditions for supporting joint construction and sharing of telecommunications infrastructure and protecting the power supply of telecommunications facilities, as well as providing convenience as far as possible for power supply service in relation to co-construction and sharing of telecommunications infrastructure.	
2014-12	MIIT and SASAC	The Implementation Opinions on the Promotion of Joint Construction and Sharing of Telecommunications Infrastructure in	2015	China Tower Corporation Limited shall be included in the leading group and office of nationwide telecommunications infrastructure joint construction and sharing, and the provincial tower companies shall be included in the provincial joint construction and sharing coordination authority.
2016-04			2016	Required further cooperation between the tower company and telecommunications service providers.
2017-04			2017	Provincial (regional and municipal) telecommunications management departments are encouraged to include construction entities such as third-party tower operating enterprises and broadband access network pilot enterprises in the corresponding joint construction and sharing coordination institution.
2017-04	MIIT	The Guiding Opinions Concerning Strengthening the Energy-Saving and Emission Reduction of Information Telecommunications Industry under the 13th Five-year Plan	Efforts shall be made to deepen the sharing construction and utilization of infrastructure resources, well formulate the special plans for urban communication infrastructures, strengthen sharing construction and utilization of telecommunications pipelines, poles, towers, base station shelters, optic cables and telecommunications facilities of residential community and realize intensive construction of telecommunications infrastructure.	
2015-09	MOHURD and MIIT	The notice on Strengthening the Planning of Urban Communication Infrastructure	Competent departments of the communications industry in all places in conjunction with the urban and rural planning departments are required to commence formulation of special plans for communication infrastructure.	
2017-09	MIIT, MLR and MOHURD	The Notice on Strengthen Wireless Communication Tower Site Land and Planning and Management	To accelerate the "Speedy, Wireless, Safety, Ubiquitous" new-generation information infrastructure, and legally advances the construction of public infrastructure of wireless communication tower sites; improve the existing wireless communication tower site lands and planning procedures; optimize and simplify work processes, create convenience conditions, support and regulate construction of newly-built tower sites	
2017-06	MEP	The Environmental Impact Assessment Classification Management Catalogue of Construction Project	The environmental impact assessment classification of wireless telecommunications construction project is adjusted to environmental impact registration table from the environmental impact report table.	

MIIT: Ministry of Industry and Information Technology; SASAC: State-owned Assets Supervision and Administration Commission of the State Council; former SERC: former State Electricity Regulatory Commission; MOHURD: Ministry of Housing and Urban-Rural Development; MLR: Ministry of Land and Resources (now known as the Ministry of Natural Resources); MEP: Ministry of Environmental Protection (now known as the Ministry of Ecology and Environment)

Source: Company Data, CGIS Research

Figure 19: Tower ownership by category
Figure Two: Tower ownership by category


Source: TowerXchange, CGIS Research

From outdoor to indoor

China Tower's development of its small cell and DAS business is dependent mainly on changes in external demand from the big three TSPs, which may construct and operate small cell and DAS by themselves or entrust telecommunications tower infrastructure companies to provide these services. Small cell and DAS infrastructure in China has been built, owned and used mainly by the big three TSPs, while a small proportion have been entrusted to telecommunications tower infrastructure companies for construction and operation. According to the F&S report, infrastructure sharing, with the separation of wireless communications network operations and infrastructure service provisioning on the rise, is regarded as an imperative for sustained telecom growth. TSPs seek to achieve infrastructure synergies that will result in lower costs and better service. This drives an increase in their external demand for small cell and DAS from China Tower. By consolidating customer demand through co-location and providing integrated service solutions, China Tower has strong capability in site planning and acquisition and can offer TSPs small cell and DAS infrastructure in a more cost-efficient and timely manner, particularly in the areas where the Company has extensive existing site resources, such as subways, high-speed railways, expressways and transportation hubs. The three telecom operators will not compete with China Tower's small cell and DAS business since the three telecom operators do not operate small cell and DAS infrastructure to generate revenue.

Tower infrastructure market in China expected to grow steadily in the coming years

China's telecommunications tower infrastructure market forecast to grow at CAGR of 9.1%. China Tower management believes that because of its maintenance team, management system, integrated management platform and service experience, the Company is very competitive in the telecommunications tower infrastructure industry. According to the F&S Report, from 2017 to 2022, the size of the telecommunications tower infrastructure market China is expected to increase steadily from RMB70.6b to RMB109.1bn, representing a CAGR of 9.1%. In addition, the number of tenants in the telecommunications tower infrastructure market in China is expected to increase from 2.8m in 2017 to 4.9m in 2022, representing a CAGR of 11.9%. The number of TSP tenants is expected to increase from 2.8m in 2017 to 4.5m in 2022, representing a CAGR of 10.2%. The major drivers of future growth of the telecommunications tower infrastructure market in China include: a) growth in the number of users and data traffic for wireless communications; b) further enhancement of the coverage range and density of the 4G network, c) the development of new technologies such as 5G, and d) accelerated network deployment of TSPs due to site co-location. According to the F&S Report, economic growth in China and national strategies have driven the rapid growth in both consumption and investment in the wireless communications market. This growth has also been driven by growth in demand for mobile applications and wireless communications data traffic. In recent years, demand for mobile applications, particularly for e-commerce, online games and video streaming services, has grown exponentially in China, resulting in substantial growth in wireless communications data traffic. According to the F&S Report, given the expected future growth in the coverage size of the wireless communications market in China, TSPs need to improve the range and density of their base stations, which is expected to boost demand for telecommunications tower infrastructure services.

5G will be a major industry theme in the coming years

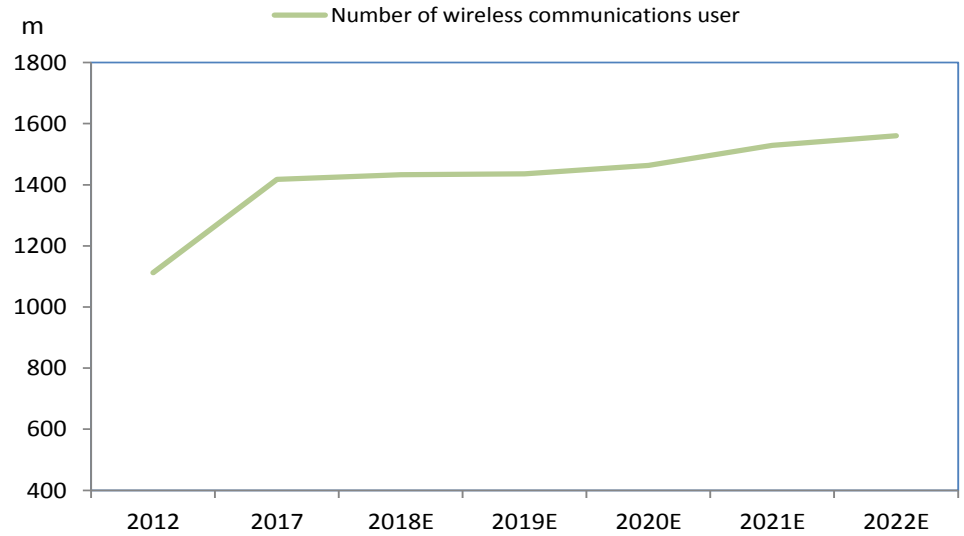
Sharing to create value

4G base stations forecast to grow at a CAGR of 6.7%. Since the 4G network started commercial operations, it has gradually become the mainstream telecommunications network in China. Currently, the Chinese government is encouraging the expansion of 4G network coverage, particularly in rural areas. In December 2016, the NDRC and the MIIT issued the Three-Year Action Plan for Construction of Substantial Information Infrastructure, which promotes the comprehensive, in-depth coverage of the 4G network in towns and densely populated administrative villages. In addition, the density of 4G base stations in China can be further enhanced. According to the F&S Report, even though the big three TSPs have largely completed the extensive coverage of their 4G network, they still need to optimize their coverage in areas with high demand for wireless communications services or weak signals. According to the F&S Report, from 2014 to 2017, the number of 4G base stations in the China market increased from approximately 843,000 units to approximately 3,280,000 units, representing a CAGR of 57.3%. The number of 4G base stations is expected to further increase to approximately 4,529,000 units in 2022, representing a CAGR of 6.7% from 2017 to 2022.

China to invest RMB1.2trn in 5G network build-out in 5-10 years. The 5G network is expected to be put into commercial operation in China in 2020, which will create new demand for large-scale network build-out by TSPs. According to the F&S Report, in the early stage of commercial operation of the 5G network, the 4G network and the 5G network will co-exist. TSPs may prefer to utilize tower sites which currently host macro cells for the installation of 5G base stations to provide basic coverage. As both the rate and frequency increase, the transmission distance for 5G signals will decrease compared with 4G signals. It is expected that the coverage radius for a single 5G base station will be substantially smaller than that for a 4G base station with the same power in the same environment. Therefore, TSPs will need a denser deployment of 5G base stations. In addition to improving the density of 5G macro cells, TSPs may utilize small cells and DAS as supplements. According to the F&S Report, China is expected to invest RMB1.2trn in 5G network build-out in the next 5 to 10 years. By 31 Dec 2022, there are expected to be 2,432,000 5G base stations in the China market.

Room to increase the TSP tenancy ratio. In China, TSPs are capable of achieving network coverage and conducting business in a desired region in a cost-efficient and timely manner through co-location of existing sites by taking advantage of co-location discounts. Therefore, as the network coverage and base station density of the 4G network can be further enhanced and the commercial application of the 5G network will create a new round of large-scale network build-out, site co-location will help TSPs deploy more base stations faster at the same level of expenditure, which in turn, will drive the growth in the size of the telecommunications tower infrastructure market. According to the F&S Report, the TSP tenancy ratio (calculated by dividing the number of TSP tenants by the number of sites occupied by these tenants) in the telecommunications tower infrastructure market increased from 1.23 as at 31 Dec 2015 to 1.42 as at 31 Dec 2017, and is expected to further increase to 1.62 by 31 Dec 2022.

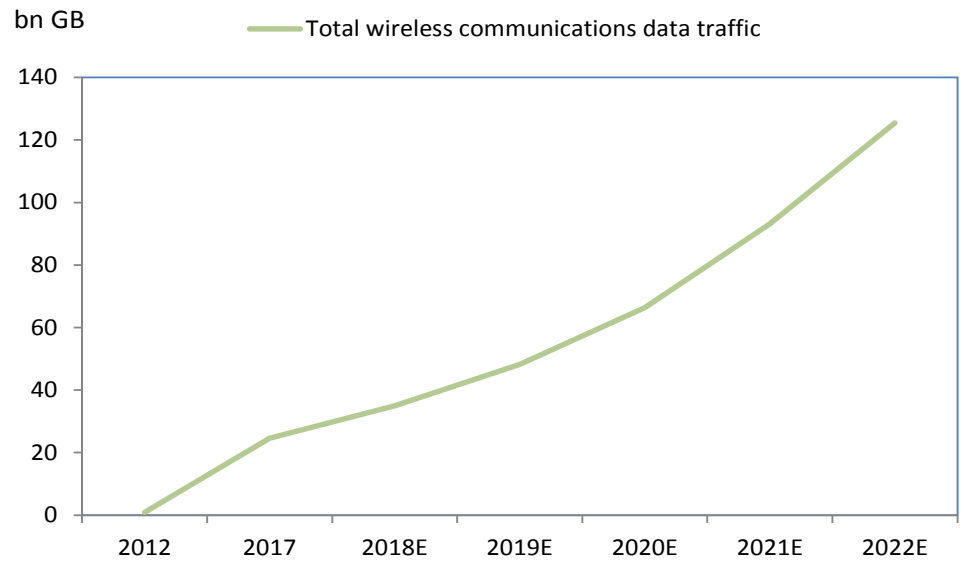
Figure 20: Number of wireless communications users in China



China wireless communications users forecast to grow at a CAGR of 1.9% in 2017-2022

Source: F&S Reports, CGIS Research

Figure 21: Total wireless communications data traffic in China

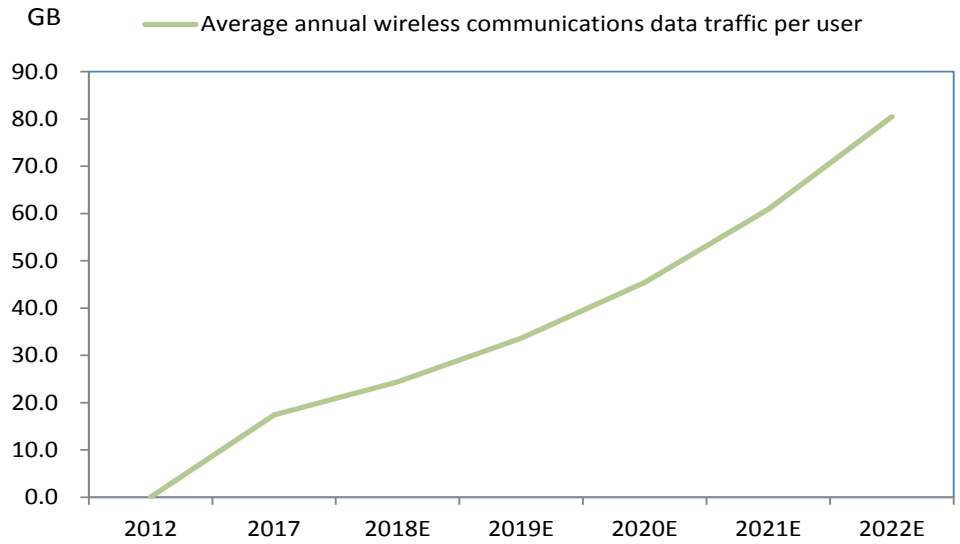


China wireless communications data traffic forecast to grow at a CAGR of 38.5% in 2017-2022

Source: F&S Reports, CGIS Research

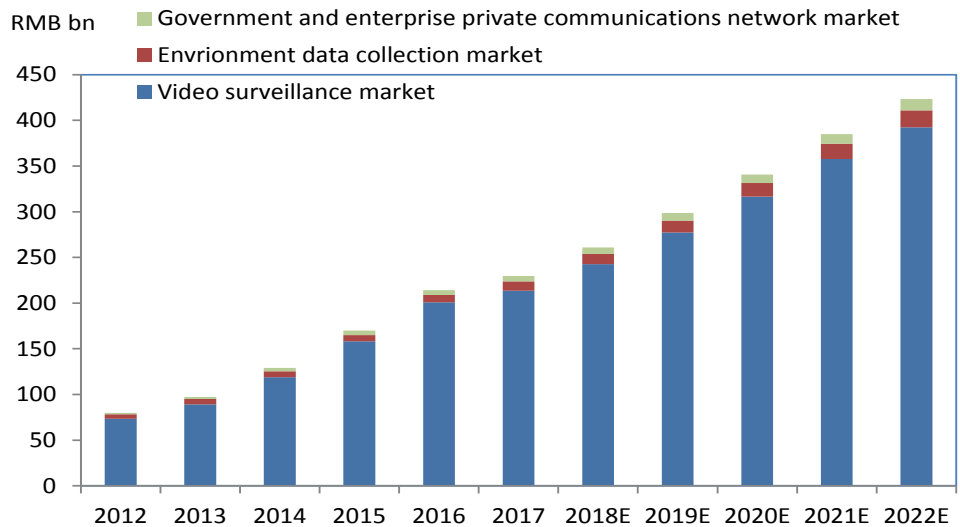
Figure 22: Average annual wireless communications data traffic per user

China's average annual wireless communications data traffic per user forecast to grow at a CAGR of 35.9% in 2017-2022



Source: F&S Reports, CGIS Research

Figure 23: Market size of the government and enterprise private communications network market



Source: F&S Reports, CGIS Research

Earnings forecast

Steady turnover growth in 2018E-2020E

- **China Tower is projected to deliver net profit growth of 20.3%/38.1%/25.9% in 2018E/2019E/2020E, supported by steady turnover growth and margin improvement.**
- **China Tower's tower business comprises macro-cell and small-cell business. We expect revenue from its tower business to grow at a CAGR of 4.4% from 2017 to 2020E.** In 2015, 2016, 2017, and 1H18, revenue from the macro-cell business accounted for 99.5%, 99.2%, 97.3%, and 95.9% of total revenue, respectively. We expect revenue from the macro-cell business to grow moderately at a CAGR of 4.2% in 2017-2020E. We expect the EBITDA margin to fall gradually from 59.1% in 2017 to 57.6% in 2020.
- **We expect revenue from non-telco customers to grow rapidly at a CAGR of 54.5% in 2017-2020E, driven by strong growth in the TSSAI business. Non-telco customers are forecast to contribute a higher portion of the Company's turnover in 2020.**
- China Tower's net margins has been dragged down by financing costs due to its debt burden. We expect China Tower to improve profitability after paying down debt with IPO proceeds, leading to fast net margin expansion and earnings growth.
- Tenancy ratio is an important metric to measure the utilization and profitability of sites. The tenancy ratio for all sites was 1.28, 1.4 and 1.44 in 2015-2017, and we expect it to be 1.50, 1.53 and 1.56 in 2018E-2020E. According to F&S, the TSP tenancy ratio is expected to further increase to 1.72 by 31 Dec 2022. The increase in tenancy ratio will reduce the short-term impact of entering into Supplemental Agreements to the Commercial Pricing Agreements and increase long-term turnover growth.
- There were 1.5177m, 1.7232m and 1.8552m Tower sites in 2015-2017. We expect this to increase to 1.8737m, 1.9299m and 1.9878m in 2018E-2020E. We believe there will be much stronger growth in the coming 5G era. There were 1.9427m, 2.4125m and 2.6714m Tenants in 2015-2017, and we expect this to increase to 2.8106m, 2.9528m and 3.1010m in 2018E-2020E.
- China Tower had large net debt amounting to RMB151.9bn at the end of 1H18. We expect China Tower to see a significant decline in net debt with the IPO proceeds used to repay bank loans. From 2015 to 2017, China Tower funded its CAPEX mainly through operating cash flow, loans from banks and other financial institutions and capital contributions from shareholders. China Tower's capex budget for 2018 is RMB34bn. But given the 1H 2018 figures, we expect China Tower to underspend its CAPEX budget by about RMB3bn in 2018. We expect capex to continue to decline in the next two years, with capex decreases in new site construction and augmentation.

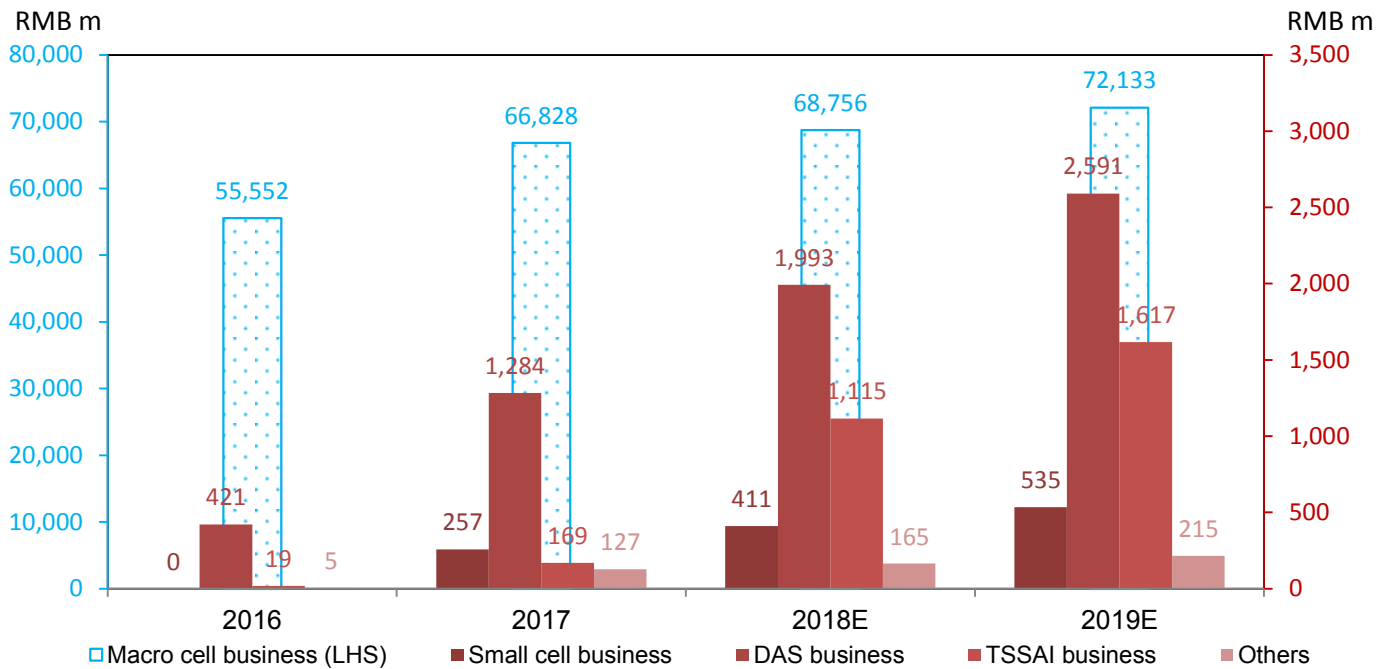
More sharing to drive business growth

Gearing expected to come down gradually

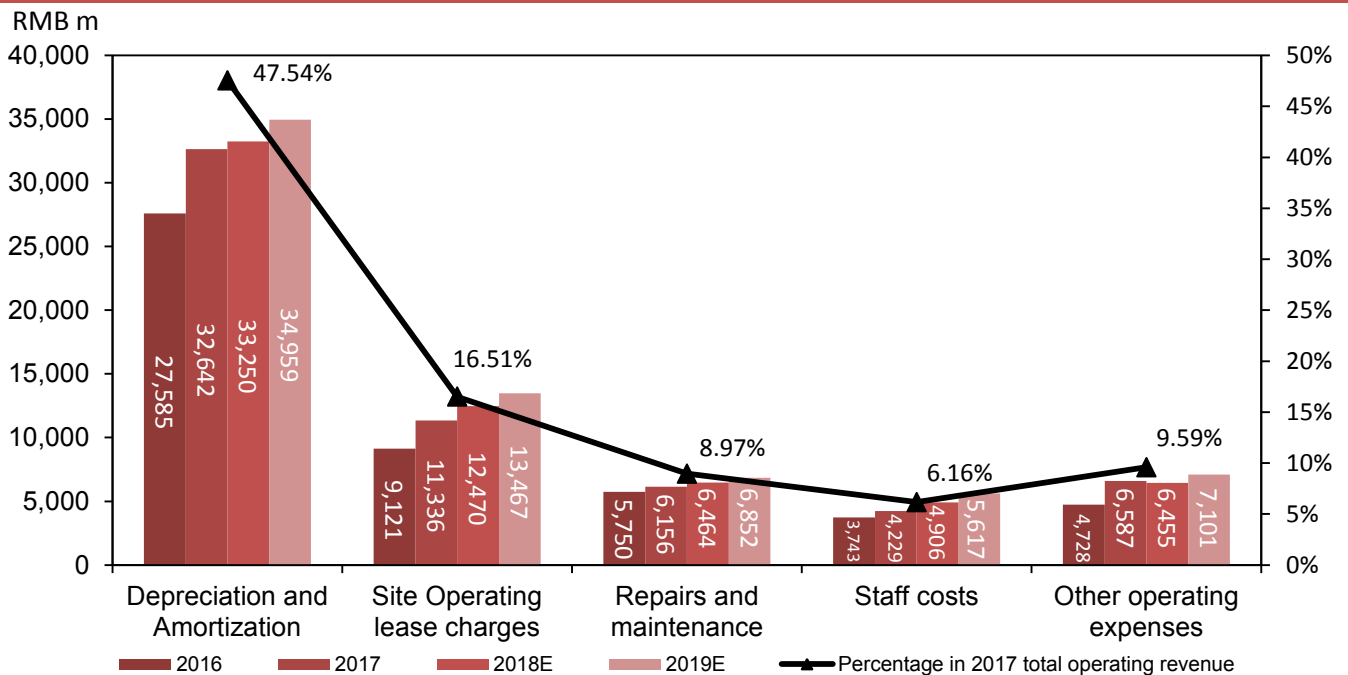
Figure 24: Key Assumptions for China Tower

	2015	2016	2017	2018F	2019F	2020F
Turnover (RMBm)						
Macro cell business	8,756.0	55,552.0	66,828.0	68,756.2	72,132.7	75,620.0
Small cell business	0	0	257.0	411.2	534.6	694.9
DAS business	45.0	421.0	1,284.0	1,993.4	2,591.4	3,368.9
Trans-sector site application and information business	0	19.0	169.0	1,115.4	1,617.3	2,183.4
Others	1.0	5.0	127.0	165.1	214.6	279.0
Total	8,802.0	55,997.0	68,665.0	72,441.3	77,090.7	82,146.2
YoY Change (%)						
Macro cell business		534.4	20.3	2.9	4.9	4.8
Small cell business		n.a.	n.a.	60.0	30.0	30.0
DAS business		835.6	205.0	55.3	30.0	30.0
Trans-sector site application and information business		n.a.	789.5	560.0	45.0	35.0
Others		400.0	2,440.0	30.0	30.0	30.0
Total		536.2	22.6	5.5	6.4	6.6
Net margin (%)	(40.9)	0.1	2.8	3.2	4.2	4.9
Costs (RMBm)						
Depreciation and amortization	(5,138.0)	(27,585.0)	(32,642.0)	(33,250.0)	(34,959.0)	(36,556.0)
Site Operating lease charges	(1,856.0)	(9,121.0)	(11,336.0)	(12,435.6)	(13,430.4)	(14,236.3)
Repairs and maintenance	(1,387.0)	(5,750.0)	(6,156.0)	(6,463.8)	(6,851.6)	(7,262.7)
Employee benefits and expenses	(2,840.0)	(3,743.0)	(4,229.0)	(4,905.6)	(5,617.0)	(6,431.4)
Other operating expenses	(1,742.0)	(4,728.0)	(6,587.0)	(6,455.3)	(7,100.8)	(7,384.8)
Financial expenses	(747.0)	(5,077.0)	(5,283.0)	(6,365.1)	(5,313.8)	(5,401.0)
YoY Change (%)						
Depreciation and amortization		436.9%	18.3%	1.9%	5.1%	4.6%
Site Operating lease charges		391.4%	24.3%	9.7%	8.0%	6.0%
Repairs and maintenance		314.6%	7.1%	5.0%	6.0%	6.0%
Employee benefits and expenses		31.8%	13.0%	16.0%	14.5%	14.5%
Other operating expenses		171.4%	39.3%	-2.0%	10.0%	4.0%
Financial expenses		579.7%	4.1%	20.5%	-16.5%	1.6%
CAPEX (RMBm)	208,807.0	70,156.0	46,364.0	41,961.2	34,180.6	31,940.3
Tower site	1,517,710	1,723,247	1,855,176	1,873,728	1,929,940	1,987,838
Tenancy ratio	1.28	1.40	1.44	1.50	1.53	1.56
Monthly Tower site price (RMB)	375.6	1,918.9	2,092.6	2,050.8	2,050.8	2,050.8
No. of DAS tenants	3,532.0	13,646.0	23,615.0	31,880.3	41,444.3	53,877.6
DAS pricing (RMB)	12,740.7	30,851.5	54,372.2	62,528.1	62,528.1	62,528.1
No. of TSSAI tenants	0	2,169.0	18,637.0	111,822.0	162,141.9	218,891.6
TSSAI Pricing (RMB)	n.a.	8,759.8	9,068.0	9,974.8	9,974.8	9,974.8

Source: Company Data, CGIS Research

Figure 25: Operating revenue projection by business type


Source: Company Data, CGIS Research

Figure 26: Operating expense projection breakdown


Source: Company Data, CGIS Research

Figure 27: Earnings projection

Income Statement (RMBm)						Cash Flow Statement (RMBm)					
	FY2016	FY2017	FY2018F	FY2019F	FY2020F		FY2016	FY2017	FY2018F	FY2019F	FY2020F
Revenue	55,997	68,665	72,441	77,091	82,146	Net Income	5,118	7,864	9,244	9,460	10,620
Growth yoy%	536.2%	22.6%	5.5%	6.4%	6.6%	Depreciation & Amort.	27,559	32,598	33,250	34,959	36,556
Operating Profit	5,070	7,715	8,931	9,132	10,275	Change in Working Capital	(5,148)	(5,631)	(7,638)	(7,769)	(8,216)
Growth yoy%	n.a.	52.2%	15.8%	2.2%	12.5%	Cash from Ops.	27,529	34,831	34,856	36,650	38,960
Selling General & Admin Exp.	0	0	0	0	(0)	Capital Expenditure	(70,156)	(46,364)	(41,961)	(34,181)	(31,940)
Others Operating Expenses/Items	96	246	391	399	408	Sale of Property, Plant, and Equipment	-	-	-	-	-
Operating Income	5,166	7,961	9,322	9,530	10,683	Change in Investing Activities	24,133	(5,551)	5,767	4,478	5,545
Growth yoy%	n.a.	54.1%	17.1%	2.2%	12.1%	Cash from Investing	(46,023)	(51,915)	(36,194)	(29,703)	(26,396)
Interest Expense	(5,077)	(5,283)	(6,365)	(5,314)	(5,401)	Net increase in bank borrowings	25,725	88,556	4,006	(23,629)	1,960
Interest and Invest. Income	16.6	7.3	144.0	65.0	104.0	Issuance of Common Stock	0	0	51,467	0	0
Income/(Loss) from Affiliates	0	0	0	0	0	Common Dividends Paid	0	0	0	0	(1,291)
Other Non-Operating Inc. (Exp.)	0	0	0	0	0	Special Dividend Paid	-	-	-	-	-
Impairment of Goodwill	-	-	-	-	-	Other Financing Activities	36,663	126,300	(6,143)	(5,179)	(5,234)
Gain (Loss) On Sale Of Invest.	-	-	-	-	-	Cash from Financing	62,388	214,856	49,329	(28,808)	(4,565)
Gain (Loss) On Sale Of Assets	-	-	-	-	-	Net Change in Cash	43,894	197,772	47,991	(21,861)	8,000
Income Tax Expense	(30)	(742)	(764)	(1,055)	(1,327)						
Minority Int. in Earnings	0	0	0	0	0						
Net Income	76	1,943	2,337	3,227	4,059						
Growth yoy%	n.a.	2,457%	20.3%	38.1%	25.8%						

Balance Sheet (RMBm)						Ratios					
	FY2016	FY2017	FY2018F	FY2019F	FY2020F		FY2016	FY2017	FY2018F	FY2019F	FY2020F
ASSETS						Profitability					
Cash And Equivalents	17,249	7,852	55,843	33,982	41,982	Return on Assets %	0.0%	0.6%	0.7%	0.9%	1.1%
Receivables	22,313	22,637	23,882	25,415	27,081	Return on Capital %	3.2%	3.3%	2.9%	2.7%	3.1%
Inventory	3	28	30	31	33	Return on Equity %	0.1%	1.5%	1.5%	1.8%	2.2%
Other Current Assets	0	0	0	0	0	Margin Analysis					
Total Current Assets	39,565	30,517	79,755	59,429	69,097	Gross Margin %	9.1%	11.2%	12.3%	11.8%	12.5%
Net Property, Plant & Equipment	245,788	258,138	266,849	266,071	261,455	SG&A Margin %	0.0%	0.0%	0.0%	0.0%	0.0%
Long-term Investments	-	-	-	-	-	EBIT Margin %	9.3%	11.6%	13.1%	12.4%	13.1%
Other Intangibles	-	-	-	-	-	EBITDA Margin %	58.5%	59.1%	59.0%	57.8%	57.6%
Deferred Tax Assets, LT	-	-	-	-	-	Net Income Margin %	0.1%	2.8%	3.2%	4.2%	4.9%
Other Long-Term Assets	26,315	33,988	36,651	39,529	42,640	Asset Turnover					
Goodwill	-	-	-	-	-	Total Asset Turnover	0.2x	0.2x	0.2x	0.2x	0.2x
Accounts Receivable Long-Term	-	-	-	-	-	Fixed Asset Turnover	0.2x	0.2x	0.2x	0.3x	0.3x
Total Long Term Assets	272,103	292,126	303,500	305,600	304,095	Accounts Receivable Turnover	2.4x	3.1x	3.1x	3.1x	3.1x
Total Assets	311,668	322,643	383,255	365,028	373,193	Inventory Turnover	18,665.7x	2,452.3x	2,452.3x	2,452.3x	2,452.3x
LIABILITIES & EQUITY						Liquidity					
Accounts Payable	130,339	49,158	51,862	55,190	58,809	Current Ratio	4.6x	8.7x	0.8x	0.2x	0.2x
Accrued Exp.	-	-	-	-	-	Quick Ratio	3.8x	8.6x	0.7x	0.2x	0.2x
Short-term Borrowings	37,253	95,260	99,266	75,637	77,597	Avg. Days Sales Out.	145.4	120.3	120.3	120.3	120.3
Curr. Port. of LT Debt	-	-	-	-	-	Avg. Days Inventory Out.	0.0	0.1	0.1	0.1	0.1
Curr. Income Taxes Payable	-	-	-	-	-	Avg. Days Payable Out.	583.8	537.5	290.3	287.5	289.5
Unearned Revenue, Current	-	-	-	-	-	Avg. Cash Conversion Cycle	-704.1	-140.8	-140.8	-140.8	-140.8
Other Current Liabilities	3,976	5,623	5,616	5,641	5,668	Net Debt to Equity	26%	103%	48%	47%	43%
Total Current Liabilities	171,568	150,041	156,744	136,468	142,074	Growth Over Prior Year					
Long-Term Debt	12,280	43,793	43,793	43,793	43,793	Total Revenue	536.2%	22.6%	5.5%	6.4%	6.6%
Def. Tax Liability, Non-Curr.	0	0	0	0	0	Net Income	(102%)	2,457%	20.3%	38.1%	25.8%
Other Non-Current Liabilities	2,268	1,314	1,419	1,533	1,655	Payout Ratio %	0.0%	0.0%	0.0%	40.0%	40.0%
Total Liabilities	186,116	195,148	201,956	181,793	187,523						
Common Stock	129,345	129,345	176,008	176,008	176,008						
Additional Paid In Capital	-	-	-	-	-						
Retained Earnings	(3,793)	(1,850)	5,290	7,226	9,662						
Treasury Stock	-	-	-	-	-						
Comprehensive Inc. and Other	-	-	-	-	-						
Minority Interest	0	0	0	0	0						
Total Equity	125,552	127,495	181,299	183,235	185,670						
Total Liabilities And Equity	311,668	322,643	383,255	365,028	373,193						

Source: Company Data, CGIS Research

Trading at a discount to its listed global peers

Valuation

China Tower is valued at 6.1x 2018 EV/EBITDA, which doesn't look particular expensive compared to its global peers. The Chinese government is taking the lead in 5G development, and China Tower will be one of the main 5G development names in terms of the global tower industry. After listing, China Tower is a sizable telecommunications name with a growth angle, trading at a discount to its global peers. We share the view that investors might take a wait-and-see approach to China Tower, given the current market environment. China Tower's unexciting post IPO share price performance offers a good opportunity for patient investors.

We believe that the major growth drivers of China Tower are: a) 4G network expansion, b) 5G roll-out, c) usage of towers by non-telecommunications users, d) a high sharing ratio, and e) M&A. News flow on 5G development, and increasing marketing activity are share price catalysts. Despite recent share price underperformance, we believe the current valuation of 6.1x 2018E EV/EBITDA offers a good entry point. We initiate coverage with a BUY and a target price of HK\$1.46 (based on 7.2x 2018E EV/EBITDA, lower than its global peers' 16.6x).

Figure 28: Peer Comparison

Ticker	Company	Price Ccy	Market Cap US\$m	EBITDA Margin			Net Gearing Ratio			PE			EV/EBITDA			PIB			ROE			ROA			Div yield			Share Price Performance				
				2017	2018F	2019F	2017	2018F	2019F	2017	2018F	2019F	2017	2018F	2019F	2017	2018F	2019F	2017	2018F	2019F	2017	2018F	2019F	2017	2018F	1M	3M	6M	12M	YTD	1D
788 HK	China Tower Corp Ltd-H	1.16	26,043	58.8			103			73.7	54.1	43.0	6.1	5.8	5.35	1.3	1.0	1.5	1.5	0.6	0.7	n.a.	0.6	-0.9	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.9	
AMT US	American Tower Corp	146.68	64,662	55.7			244			48.3	39.8	34.2	20.1	19.0	17.9	11.7	11.7	20.9	20.3	3.5	4.5	2.0	2.1	-0.5	3.7	4.9	6.7	2.8	0.7			
CCI US	Crown Castle Intl Corp	106.79	44,318	52.5			128			87.5	60.1	49.7	19.4	18.3	17.0	4.1	3.7	4.2	4.3	1.8	1.6	3.9	4.0	4.8	-3.3	0.2	5.8	-3.8	-0.1			
SBAC US	Sba Communications Corp	152.34	17,495	63.8			n.a.			536.4	99.3	72.6	21.0	19.4	18.0	n.a.	n.a.	n.a.	-2.6	0.4	2.1	0.0	0.0	-5.3	-6.2	-9.2	3.4	-6.7	-0.4			
BHARTI IN	Bharti Airtel Ltd	288.50	15,664	36.2			125			n.a.	73.5	23.0	8.1	6.9	5.8	1.7	1.6	5.7	-0.1	0.3	0.6	n.a.	0.9	-22.8	-14.3	-24.9	-37.5	-45.5	-1.9			
CLNX SM	Cellnex Telecom Saeu	21.67	5,785	42.7			353			146.4	61.6	43.8	19.0	16.8	15.0	10.6	9.4	6.8	7.0	-0.4	0.2	n.a.	0.5	-4.5	-5.6	-6.9	7.5	1.7	-0.1			
TBIG UJ	Tower Bersama Infrastructure	5050.0	1,507	86.9			627			22.8	18.9	16.8	11.8	10.9	10.0	7.6	7.1	99.8	31.5	8.4	5.7	n.a.	3.0	-1.9	3.9	-8.2	-20.5	-21.4	-1.9			
NWTFM S1	Infrastruture Wireless Ital	6.34	4,385	53.8			3			27.2	24.7	23.0	18.0	16.4	15.1	n.a.	2.5	8.4	9.2	7.6	7.6	n.a.	3.3	-8.6	-6.2	-3.2	10.7	1.5	0.1			
TSLSF US	Telesites Sabo De Cv	0.69	2,261	59.5			226			4311.6	117.6	46.0	15.8	13.8	12.3	n.a.	4.7	-7.1	1.9	-1.6	2.5	n.a.	0.0	-4.2	-8.1	-11.6	-6.2	-4.9	0.0			
941 HK	China Mobile Ltd	78.15	204,107	36.6			-47			12.3	12.1	11.6	3.4	3.3	3.2	1.4	1.4	11.6	11.4	7.5	7.3	4.1	4.0	2.4	15.0	7.7	-1.3	-1.4	0.6			
762 HK	China Unicom Hong Kong Ltd	8.83	34,463	29.6			11			28.9	18.4	13.4	2.8	2.7	2.5	0.8	0.7	0.7	2.4	0.9	1.5	0.7	1.3	-5.6	-5.0	-13.9	-22.1	-16.4	-0.5			
728 HK	China Telecom Corp Ltd-H	3.98	41,067	27.9			25			14.1	13.0	12.1	3.3	3.2	3.1	0.9	0.8	5.8	6.1	3.0	3.2	2.6	2.9	5.6	10.9	11.5	-2.2	7.0	2.1			
552 HK	China Communications Servi-H	6.60	5,831	4.0			-49			13.5	11.8	10.0	6.4	5.7	5.3	1.3	1.3	9.9	10.2	3.9	4.2	2.0	2.6	-5.2	35.5	44.5	42.6	26.6	2.2			
763 HK	Zte Corp-H	11.40	8,877	9.3			-10.5			n.a.	10.1	7.6	26.0	8.3	6.7	1.9	1.2	15.7	-13.0	-3.8	-3.2	3.3	0.0	-18.1	-26.3	-55.5	-61.4	-61.2	0.2			
6869 HK	Yangtze Optical Fibre And-H	20.20	2,943	15.2			-8.3			7.6	6.6	5.7	9.9	8.5	7.3	2.0	1.8	26.9	25.8	n.a.	18.1	n.a.	4.0	-15.7	-40.1	-37.1	-30.6	-43.7	0.0			
877 HK	O-Net Technologies Group Ltd	3.21	328	18.9			16.2			9.2	7.3	6.0	n.a.	n.a.	n.a.	1.2	1.1	12.1	13.0	8.2	8.8	0.0	0.8	-27.2	-32.3	-42.1	-46.1	-35.8	-2.7			
1617 HK	Nanfeng Communication Holdin	5.07	724	14.8			-37.3			18.7	14.5	12.5	17.8	15.0	13.9	6.4	n.a.	17.9	31.5	10.1	n.a.	1.7	2.7	15.2	8.1	16.8	16.6	-8.3	-3.4			
1720 HK	Pulian Communication Group L	2.34	328	15.3			1.5			n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	7.0	n.a.	21.1	n.a.	14.3	n.a.	n.a.	n.a.	-4.5	-17.9	4.9	n.a.	51.9	0.0			
1300 HK	Trigant Group Ltd	0.98	224	13.8			34.6			4.3	4.1	n.a.	n.a.	n.a.	n.a.	0.5	n.a.	9.9	n.a.	6.6	n.a.	5.0	5.0	-7.5	-18.3	-27.9	-9.3	-7.5	1.0			
2342 HK	Comba Telecom Systems Holdin	1.06	327	6.0			17.1			30.3	20.0	13.4	11.9	11.8	9.7	0.7	0.7	0.8	3.1	-0.5	1.4	0.0	0.8	-16.5	-0.9	1.9	-28.4	-29.3	1.9			
947 HK	Mobi Development Co Ltd	0.79	83	-0.4			8.2			n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.5	n.a.	-4.0	n.a.	-2.2	n.a.	4.6	n.a.	-6.0	-14.1	-3.7	-49.0	-47.0	3.9			
Average				32.1			87.8			332.4	34.1	23.6	13.4	11.3	10.2	3.5	3.3	14.1	9.5	3.6	4.1	2.3	2.1	-6.8	-6.1	-7.6	-11.6	-12.1	0.1			

Source: Bloomberg, Company Data, CGIS Research estimates for covered stocks

Major risk factors

Potential risks from structure changes in major customers and shareholders. China Tower's business relies heavily on the Big Three TSPs as its customers. If the Big Three TSPs are restructured (for example, there have been market rumors in recent years about the potential merger of China Telecom [0728.HK] and China Unicom [0762.HK]), China Tower's business would be affected due to customer consolidation. Consolidation among TSPs may reduce competition between TSPs, which would weaken China Tower's bargaining power as a supplier, and China Tower may not be able to obtain and maintain suitable pricing for its services. It could also result in early termination or failure to renew some existing leases or a reduction in its customers' future capital expenditure in the aggregate because their existing networks and expansion plans may overlap or be very similar. The news flow on industry restructuring at the telecom operator level might create concerns about China Tower. But at this stage, there is no confirmation of the news flow. If this is the case, it will take time for such deals to be completed, and China Tower should have enough time to mitigate the impact.

5G developments may be slower than expected. If demand for telecommunications tower infrastructure services does not achieve the anticipated growth or even decreases, China Tower's business and results of operations would be materially and adversely affected.

China Tower may face challenges in developing its small cell and DAS business from the following three factors.

(a) Customer demand. China Tower's current and potential small-cell and DAS customers may decide to develop their own networks rather than outsource to service providers like China Tower, which would lead to decreased customer demand. According to official guidance, TSPs in principle will no longer construct their own telecommunications towers and DAS at key venues, such as subways, high-speed railways, expressways and transportation hubs, but currently there is no prohibition on China Tower's customers' constructing small cell and DAS sites in places not specified in the Implementation Opinions. However, so far, we can see a clear view that the Chinese government wants to intensify the core position of China Tower in developing small-cell sites by promoting cooperation between China Tower and local governments. And China Tower has already acquired an unparalleled number of resources, in terms of public utility towers and poles.

(b) Site acquisition and maintenance. In addition to acquiring or leasing the underlying land or premises, China Tower may find other ways to acquire sites for small-cell and DAS business. For example, the premises owner may ask only for an one-time entrance fee, or China Tower may simply use the public right-of-way without additional expense as long as prior approval has been obtained. China Tower cannot guarantee that it will be able to acquire and/or maintain the right to use suitable places or that its right will not be otherwise interfered with.

(c) Talent and technology reserves. China Tower has relatively limited talent and technology reserves and experience in small-cell and DAS operations compared to traditional macro-cell operations. In addition, the implications of 5G wireless communications network deployment on small cell and DAS are still unclear. Therefore, China Tower needs adequate talent and technology reserves to succeed in developing its small-cell and DAS business.

China Tower's business development may require a relatively high level of capital expenditure, and China Tower may not be able to obtain financing for this. China Tower may face challenges in managing and consolidating its telecommunications tower infrastructure assets.

Company background and history

The Company provides telecommunications tower infrastructure services in mainland China. The principal activities of the Company are the construction and operation of telecommunications towers; the provision of telecommunications tower site space; the provision of maintenance services and power services; the provision of indoor distributed antenna systems; and other site application and information services. The provision of site space, maintenance services and power services for tower sites are collectively referred to as its Tower business. The Company's headquarters are in Beijing, and it has 31 provincial branches in mainland China.

In 2014, the Company was established under the name "China Communications Facilities Services Corporation Limited". The Telecom Shareholders (China Mobile, China Unicom and China Telecom) were the three promoters of the Company. Later, the Company adopted its current name "China Tower Corporation Limited". China Tower had established the current 31 provincial level branches by the end of the year.

On October 14, 2015, China Tower entered into a series of agreements for the Tower Asset Acquisitions. Pursuant to the agreements, China Tower acquired certain existing telecommunications towers and related assets from each of the Telecom Group Companies (i.e. the ultimate controlling shareholders of each of the Telecom Shareholders), Telecom Shareholders and their respective subsidiaries, as shown in Figures 29 and 30.

Figure 29: Agreements for Tower Asset Acquisitions

Seller		Consideration (RMB m)		Settlement	Settlement Time for Cash Consideration
China Mobile	China Mobile Communications Group Co., Ltd. and its 24 subsidiaries	115,697	12,961	all in cash	Extended to Dec 2018
	China Mobile Company and its 31 subsidiaries		102,736	RMB57,585m in cash 45,151m Shares	Dec 2017
China Unicom	China United Network Communications Group Co., Ltd. and its 7 subsidiaries	54,690	32	all in cash	Dec 2017
	China Unicom Corporation and its 1 subsidiary		54,658	RMB21,322m in cash 33,336m Shares	Dec 2017
China Telecom	China Telecommunications Corporation and its 11 subsidiaries	33,097	2,966	all in cash	Dec 2017
	China Telecom		30,131	30,131 million Shares	N/A

Source: Company data, CGIS Research

Figure 30: Payment schedule and timeline for Cash Consideration

Time	Outstanding Cash Consideration (RMB m)	Interest Rate	
		Starting from	at
Oct 2015	94,866	Nov 1, 2015	90% of the financial institution's one-year benchmark lending rate announced by the PBOC prevailing on Oct 31, 2015
Feb 2016	83,900		
Dec 2017	12,961	Dec 2017	Financial institution's one-year benchmark lending rate announced by the PBOC
Dec 2018 (Expected)	0	N/A	N/A

Source: Company data, CGIS Research

In 2015, China Tower issued new shares to each of China Telecom and China Reform, as shown in Figure 31. In the same year, China Tower obtained the Basic Telecommunications Business Operation License (domestic telecommunications facilities service business) and the Value-added Telecommunications Business Operation License (web hosting) issued by the MIIT.

Figure 31: Agreements for the Tower Asset Acquisitions

Subscriber	Shares Subscribed	Consideration (RMB m)
China Telecom	2,966 m	2,966
China Reform	7,761 m	7,761

Source: Company data, CGIS Research

In 2016, China Tower entered into Commercial Pricing Agreements with each of China Mobile Company, China Unicom Corporation and China Telecom; China Tower also completed the issuance of asset-backed notes worth RMB4.95 billion via the China Interbank Bond Market.

In 2017, China Tower became a member of the International Telecommunication Union.

In 2018, (1) China Tower entered into the Supplemental Agreements to the Commercial Pricing Agreements, and the Service Agreements with big three TSPs, which have a term of five years and expire on December 31, 2022. The key amendments, effective in 2018, are a reduction in cost margins and an increase in co-location discount rates for the tower business, which are used in the pricing for the macro-cell business, as shown in Figure 32. If these pricing term changes had been made in 2017, the operating revenue of the tower business would have decreased from RMB67,085 million to RMB62,986 million for 2017. (2) Meanwhile, taking into account technological improvements, China Tower has changed the estimated useful life of its Self-built Towers (excluding acquired towers) from 10 years to 20 years since 1 January 2018. If this had been changed in 2017, the depreciation expenses of the Company's Self-built Towers would have decreased from RMB3,878m to RMB1,865m for 2017. The effect will become stronger in the future, but it is very limited in the near term. (3) Also, China Tower entered into strategic cooperation framework agreements with State Grid Corporation of China and China Southern Power Grid Co., Ltd.

On 8 Aug 2018, China Tower was listed on the HKEX with an IPO price of HK\$1.26.

Figure 32: Co-location Discount Adjustment

	Since 2018	Before 2018
cost margin for tower business	10%	15%
Co-location Discounts of the Base Price to tenants from the Big Three TSPs	Discount for the second tenant when co-located by two tenants	20%
	Discount for the second and third tenants when co-located by three tenants	30%
	Discount for the anchor tenant when co-located by two tenants	25%
	Discount for the anchor tenant when co-located by three tenants	35%

Source: Company data, CGIS Research

Appendix 1: Pricing

China Tower has entered into long-term agreements with the Big Three TSPs, including Commercial Pricing Agreements, Supplemental Agreements to the Commercial Pricing Agreements, and Service Agreements. Under these agreements, the Big Three TSPs agree to pay China Tower total fees according to payment schedules and compensation as a result of early termination of the services for their own reasons.

The prices of the services are determined with reference to costs, the pricing mechanism agreed between China Tower and its major customers, and market prices.

As operating revenue derived from the macro-cell business accounts for a substantial part of China Tower's total operating revenue, its pricing policy for services in this business ensures that its operating revenue covers the costs of construction and operation in the course of its business. This allows China Tower to maintain adequate cash flow and a desirable profit to support the long-term operations of its business.

China Tower's pricing mechanism for services in the tower and DAS businesses was determined after arm's length negotiations with the relevant parties during the ordinary and usual course of business of the Company with reference to construction costs, maintenance costs, site fees, management costs, operating costs, labor costs and an appropriate profit margin, as applicable, for each service it provides. When applying the pricing mechanism of services in its small-cell and DAS businesses stipulated in the Commercial Pricing Agreements and the Supplemental Agreements to the Commercial Pricing Agreements, China Tower also takes into consideration market prices and negotiates accordingly with the Big Three TSPs.

China Tower's tower rental prices are lower than those of its global peers, and lower than the current market prices if the big three TSPs jointly constructed and shared a tower. The tower rental price for each Chinese telecom operator is determined using the cost-plus method.

1) Pricing for services in the tower business

The product prices for tower products are the total of the base price, site fee and power access fee (as applicable) after applying certain fixed co-location discounts, which vary based on the number of tenants and whether a tenant is an anchor tenant or not. The base price is calculated based on the costs of a certain tower product (including the standard construction costs for the product, which vary according to certain factors (e.g. type of products and the geographical location), years of depreciation, and the annual maintenance cost as agreed in each case), plus a cost mark-up calculated with reference to a fixed cost margin.

2) Pricing for services in the DAS business

The product price for DAS products is the total of the base price and site fee after applying certain fixed co-location discounts, which vary based on the number of tenants. The base price is calculated according to the costs of certain distribution antenna systems (including the standard construction costs for the product, which vary according to certain factors, years of depreciation, and the annual maintenance cost as agreed in each case), plus a cost mark-up calculated with reference to a fixed cost margin.

3) Pricing for services in the TSSAI business

For services in TSSAI business, the prices are determined with reference to market prices and through negotiations with customers. In determining the prices for such services, China Tower generally takes into account: (i) the cost incurred to provide such services; and (ii) an internal benchmark.

Notes for Figure 33 : Type ① refers to "Self-built Towers"; Type ② refers to "Acquired Towers".

Figure 33: China Tower's Pricing Method for Towers

Product price	①	$(1 - R_{CoDiscount}^1) \times \text{Base price} + (1 - R_{CoDiscount}^2) \times (\text{site fee} + \text{power access fee})$																		
	②	$(1 - R_{CoDiscount}^1) \times \text{Base price} + (1 - R_{CoDiscount}^2) \times \text{site fee}$																		
Base price	①	$(1 + R_{Cost}) \times \left[C_{maintenance} + \sum \frac{C_{construction}}{Y_{Depreciation}} \times (1 + R_{Impair}) \right]$																		
	②	$(1 + R_{Cost}) \times \left[C_{maintenance} + \sum \frac{C_{construction}}{Y_{Depreciation}} \times (1 + R_{Impair}) \times R_{Discount} \right]$																		
C _{maintenance} means Maintenance Cost	①	Including the cost for outsourcing maintenance, repair and consumable materials, to be determined according to the bidding price, the maintenance contents and quality indicators agreed by the relevant provincial branches/subsidiaries of the parties to the agreements.																		
	②	Including the cost for outsourcing maintenance, repair and consumable items and to be determined according to prices set out in existing contracts or the market-oriented bidding and procurement results.																		
Pricing for additional antennas or systems	①	Three sets of antennas (as one system) serve as one basic product unit. The number of systems shall be rounded up to the nearest whole number if the number of antennas is not the integrate multiples of three. If there is more than one basic product unit, additional charges will be applied based on certain standards.																		
	②	Prior to the December 31, 2015, all products built by the Telecom Shareholders and their branches/subsidiaries shall be deemed as a whole and priced at the base price of the product unit with the highest antenna mounting height on the relevant acquired towers. The newly added product unit of the acquired towers (including the product units constructed and added by the Company prior to the aforementioned date) shall be priced the base price of the corresponding product unit of the acquired towers. Every additional three antennas (one system) shall be charged at 30% of the price for a product unit and every one additional system (excluding the antennas) which expands the facility space shall be charged at 10% of the price for a newly added product unit.																		
$R_{CoDiscount}^1$ means "co-location discount rate 1", about the discount of base price $R_{CoDiscount}^2$ means "co-location discount rate 2", about the discount of site fee and/or power access fee <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>shared by</th> <th>normal tenant</th> <th>anchor tenant</th> </tr> </thead> <tbody> <tr> <td rowspan="2">$R_{CoDiscount}^1$</td> <td>2 tenants</td> <td>30%</td> <td>35%</td> </tr> <tr> <td>3 tenants</td> <td>40%</td> <td>45%</td> </tr> <tr> <td rowspan="2">$R_{CoDiscount}^2$</td> <td>2 tenants</td> <td>40%</td> <td>45%</td> </tr> <tr> <td>3 tenants</td> <td>50%</td> <td>55%</td> </tr> </tbody> </table>				shared by	normal tenant	anchor tenant	$R_{CoDiscount}^1$	2 tenants	30%	35%	3 tenants	40%	45%	$R_{CoDiscount}^2$	2 tenants	40%	45%	3 tenants	50%	55%
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$C_{construction}$ means "Standard Construction Cost", which shall include the costs for materials, construction, design, supervision, crop compensation and other things in relation to towers, shelters and ancillary facilities but exclude the cost for environmental evaluation. (i) The standard construction cost shall be determined through the replacement cost method with reference to the wind pressure, antenna mounting height, types of the ancillary facilities and types of towers. (ii) The standard construction cost applied to different provinces shall be the adjusted national standard construction cost according to certain geographical coefficients.																				
$Y_{Depreciation}$ means "Years of depreciation": The rounded-up average years of depreciation of the corresponding assets previously owned by the Telecom Shareholders, which are: <table border="1" style="margin-left: 20px;"> <tbody> <tr> <td>towers</td> <td>10 years</td> </tr> <tr> <td>self-owned shelters attached to ground towers</td> <td>20 years</td> </tr> <tr> <td>each of self-owned shelters attached to rooftop towers, rented shelters and integrated cabinet and ancillary facilities</td> <td>6 years</td> </tr> </tbody> </table>			towers	10 years	self-owned shelters attached to ground towers	20 years	each of self-owned shelters attached to rooftop towers, rented shelters and integrated cabinet and ancillary facilities	6 years												
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R_{Impair} means "Impairment rate" = 2% (covering relocation, overhaul and damages)																				
R_{Cost} means "Cost margin" = 10%																				
Site fee: For each site, a lump sum or on an itemised basis, to be determined by the provincial branches/subsidiaries of the parties to the agreement (after taking into account factors including the site rents, one-time slotting fees and coordination cost).																				

Source: Company, CGIS Research

Figure 34: Supplement for self-built tower pricing

Power access fee which is applicable to power access by means of solar energy, wind power or wind-solar hybrid).
 Power access fee = construction cost/years of depreciation × (1 + 5%)
 Construction cost of power access is priced on a lump sum or priced on an itemized basis based on the actual construction cost
 Years of depreciation = 10 years (determined with reference to average years of depreciation of the assets of the Telecom Shareholders and their branches/subsidiaries which require power access)
 The maintenance cost of the power access facilities are included in the maintenance cost of the tower products and shall be determined according to the bidding price.

Other thing: Constructions in response to the demands of sites on the mountains or islands, camouflage towers and small cells shall be carried out in a customized manner. The provincial branches/subsidiaries of the parties to the agreements shall estimate the construction cost through consultation prior to the construction of the sites, and apply such cost to the pricing formula for tower products.
 The pricing for the towers with certain different conditions (e.g. the products of which the compositions differ from the standard compositions) may differ from the price listed above.

Source: Company, CGIS Research

Figure 35: Supplement for acquired tower pricing

$R_{Discount}$ means “Discount rate”

$$R_{Discount} = \frac{\sum \frac{\text{appraised value}}{Y_{Depreciation}}}{\left(\sum \frac{C_{construction}}{Y_{Depreciation}} \times \text{percentage of similar products} \right) \times \text{numbers of towers}}$$

The years of depreciation of batteries and other ancillary facilities shall be determined with reference to their remaining years of depreciation, and the years of depreciation of the towers, shelters, air-conditioners, power access and other assets shall be determined with reference to the years of depreciation of similar self-built towers.
 The agreements set out different fixed discount rates for different provinces. The wind pressure coefficient and the geographical coefficient for self-built towers do not apply to the acquired towers.
 No separate power access fee will be charged for the acquired towers. Before the commencement date when power services are charged on a lump-sum basis, if the Telecom Shareholders or their branches/subsidiaries request an alteration in the method of power supply, for the acquired towers, the power access fee shall be simultaneously adjusted to the one applicable to the corresponding self-built towers and charged separately.

Pricing method for new tenants: The base price and site fee for the new tenants shall be based on the prices of the acquired towers located at the same site and the co-location discount shall apply. No power access fee shall be charged separately.
 The power access switching expenses which incur during adding new product unit or new tenant shall be calculated according to the power access pricing formula for the self-built towers and paid separately by the new tenants.

Pricing method for existing sharing party: Up to 2020:
 the prices for the existing sharing parties shall be 30% of the product price (including base price and site fee).
 (iii) the prices for the existing sharing parties shall be 30% of the product price (including base price and site fee).
 (ii) the original property owner shall enjoy the follow discounts:
 • 30% off the base price if shared by 2 tenants, 40% off the base price if shared by 3 tenants; and
 • 30% off the site fee if shared by 2 tenants, 60% off the site fee if shared by 3 tenants.
 (iii) with an additional third tenant sharing, the original property owner shall enjoy the follow discounts:
 • 40% off the base price; and
 • 55% off the site fee.

Source: Company, CGIS Research

Notes for Figure 36: Type ① refers to “commercial buildings”; Type ② refers to “large venue structures, subway tunnels (including subway platforms) and railway tunnels”. Pricing may differ for DAS products with compositions different from the standard composition.

Figure 36: China Tower’s Pricing method for DAS

Product price (on an itemised basis) = $(1 - R_{CoDiscount}) \times (\text{Base price} + \text{site fee})$									
$\text{Base price} = (1 + R_{Cost}) \times \left[C_{\text{maintenance}} + \sum \frac{C_{\text{construction}}}{Y_{\text{Depreciation}}} \times (1 + R_{\text{Impair}}) \right]$									
For Type①, Due to the variations in construction standards, the price calculated based on the actual construction cost is usually less than the agreed price above during the implementation by the relevant provincial branches/subsidiaries of the parties.									
R_{Impair} means "Impairment rate" = 2% (covering overhaul and damages)									
R_{Cost} means "Cost margin" = 10%									
$R_{\text{CoDiscount}}$ means "co-location discount rate"									
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$R_{\text{CoDiscount}}$	2 tenants	40%							
	3 tenants	50%							
Basic product unit: two systems, including systems for buildings and for tunnels, as one basic product unit, and 10% of the unit price of a basic product unit will be charged for any additional system.									
$C_{\text{construction}}$ means Standard Construction Cost	①	RMB16.24/m ² (covering cost of distribution systems, ancillary facilities, power access and others), subject to adjustment under certain circumstances (e.g. using different materials or the actual construction cost substantially vary from the standard construction cost)							
	②	To be determined according to the actual construction cost incurred in the relevant projects, covering distribution systems, ancillary facilities, power access and other items							
$Y_{\text{Depreciation}}$ means Years of depreciation	①	7 years							
	②	<ul style="list-style-type: none"> • To be determined with reference to average years of depreciation of similar assets of the Telecom Shareholders and their branches/subsidiaries • 7 years for distribution systems 							
$C_{\text{maintenance}}$ means Maintenance cost	①	Including the fees for outsourcing maintenance, repair and consumable items, to be determined in accordance with the actual bidding price							
	②	Including the fees for outsourcing maintenance, repair and consumable materials, to be determined according to the maintenance contents and quality indicators agreed by the relevant provincial branches/subsidiaries of the parties and the bidding prices.							
Site fee	①	Currently on a lump sum or an itemised basis (after taking into account factors covering the site rents, one-time slotting fees and coordination cost) to be determined by the provincial branches/subsidiaries of the parties.							
	②	Determined on an itemised basis based on actual cost (including site rental, one-time slotting fees and coordination fee)							

Source: Company, CGIS Research

Appendix 2: Selected Management Profile

Figure 37: China Tower's Key Management Profiles

Role	Previous Company	Description
	China Unicom	Mr. Tong Jilu, <u>Chairman of the Board, Executive Director, and General Manager</u> . Mr. Tong served in several positions with China Unicom Corporation Group , Liaoning Posts and Telecommunications, and Liaoning Posts Bureau. He is taking charge of the overall affairs of the Board, participating in the formulation and implementation of the business and operation strategies of the Company and making significant business and operational decisions of the Company through the Board, Taking charge of the overall management and operation of the Company.
Directors	China Mobile	Mr. Dong Xin, Non-executive Director, member of the Strategy Committee, member of the Nomination Committee. Mr. Dong served in several positions with China Mobile Communications Corporation Group and former Ministry of Information. He is participating in the formulation of business plans, strategies and major decisions of the Company with his extensive experience in the telecommunications industry.
	China Unicom	Mr. Shao Guanglu, Non-executive Director, member of the Strategy Committee, and member of the Remuneration and Appraisal Committee. Mr. Shao served in several positions with China Unicom Corporation Group . Now, he also is Non-executive Director of PCCW Limited [0008.HK], and Non-executive Director of China Communications Services Corporation Limited . He is participating in the formulation of business plans, strategies and major decisions of the Company with his extensive experience in the telecommunications industry.
	China Telecom	Mr. Zhang Zhiyong, Non-executive Director, member of the Strategy Committee, and member of the Audit Committee. Mr. Zhang served in several positions with China Telecom Corporation Group . Now, he also is vice President of China Telecom Corporation , Chairman of the Board and Executive Director of Directors of China Communications Services Corporation Limited and Executive Vice President of China Telecom . He is participating in the formulation of business plans, strategies and major decisions of the Company with his extensive experience in the telecommunications industry.
Supervisors	N/A	Mr. Li Wenmin, Chairman of the Supervisory, vice Chairman of the Labor Union of the Company and Director of CPC working group. Mr. Li served in several positions with China Post Group Corporation before. He is directing the activities of the Supervisory Committee and arranging for the Supervisors to supervise the operating and financial activities of the Company on a collective basis.
	China Mobile	Ms. Gao Lingling, Shareholder representative Supervisor, from China Mobile Communications Corporation Group .
	China Unicom	Ms. Guo Xiaolin, Shareholder representative Supervisor, from China Unicom Corporation Group .
	China Telecom	Mr. Sui Yixun, Shareholder representative Supervisor, from China Telecom Corporation Group .
	N/A	Mr. Wang Zhixue, Shareholder representative Supervisor, from China Reform .
Senior Management	China Mobile	Mr. Gao Buwen, deputy General Manager. Mr. Gao served in several positions with China Mobile Communications Corporation Group before. He is assisting in operation of the Company, presiding over the Company's construction and maintenance work.
	China Unicom	Mr. Gu Xiaomin, deputy General Manager and Chairman of the Labor Union of the. Mr. Gu served in several positions with China Unicom Corporation Group before. He is assisting in operation of the Company, presiding over the Company's marketing and communications technology research.
	China Telecom	Mr. Gao Chunlei, Chief Accountant. Mr. Gao served in several positions with China Telecom Corporation Group before. He is assisting in operation of the Company, presiding over the Company's finance, human resources and training.
	N/A	Mr. Sun Baotian, Secretary of the Discipline Committee. He is responsible for the disciplinary supervision work of the Company.

Source: Company, CGIS Research

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- SELL : share price will decrease by >20% within 12 months in absolute terms
- HOLD : no clear catalyst, and downgraded from BUY pending clearer signal to reinstate BUY or further downgrade to outright SELL

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