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American Tower Equity Research Report:
The Landlord of the Mobile Economy

NICOLAS GOMEZ ILABACA & 49052

A Project carried out on the Master in Finance Program, under the supervision of:

Nuno Quartin Bastos de Vasconcelos

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Abstract

This individual report details this author's contributions to the on the American Tower Equity Research Report. First, it dives into the business fundamentals of American Tower and what allows the company to generate such attractive returns on capital. It then discusses the secular tailwinds supporting the future growth of the business. Next, it provides a brief description on the quality of management and capital allocation. It then explains how the qualitative drivers of the business translate into quantitative drivers of the company's valuation. Finally, it provides brief contextual description regarding the business' key markets in the US, Asia Pacific, and Latin American.

Keywords (Business Fundamentals, Barriers to Entry, Secular Tailwinds, Valuation)

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This report is part of the Equity Research report (annexed), developed by XINGZHEN MEN and NICOLAS GOMEZ ILABACA and should be read as an integral part of it.

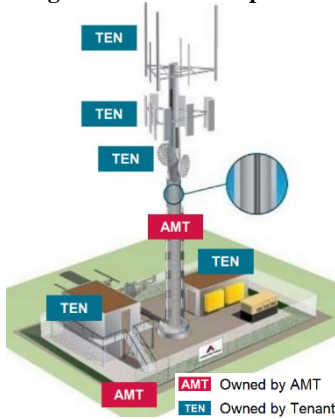
Table of Contents

OVERVIEW OF AMERICAN TOWER	5
COMPANY DESCRIPTION	5
VALUE PROPOSITION OF AN INDEPENDENT TOWERCO	5
SOURCES OF REVENUES AND COSTS.....	6
UNIT ECONOMICS ON MULTI-TENANT TOWERS	7
COMPETITIVE LANDSCAPE	8
BARRIERS TO ENTRY: EACH TOWER ITS OWN LOCAL MONOPOLY.....	8
KEY CELL TOWER COMPETITORS	8
CUSTOMER CONCENTRATION	9
SECULAR GROWTH OPPORTUNITIES	10
LONG-TERM DEMAND DRIVERS	10
IMPLICATIONS OF 5G FOR THE DEMAND FOR TOWERS	10
MANAGEMENT & CAPITAL ALLOCATION FRAMEWORK	12
VALUATION.....	12
REVENUE GROWTH.....	12
PROFIT MARGINS	15
PUBLIC AND PRIVATE MARKET VALUATIONS	15
DEEP DIVES INTO KEY REGIONS.....	17
UNITED STATES	17
ASIA PACIFIC – INDIA	19
LATIN AMERICA – BRAZIL & MEXICO	20
APPENDIX	23
DISCLOSURES AND DISCLAIMERS.....	54

Overview of American Tower

Company Description

Figure 1: Tower Components



Source: Company Filings

AMT is the largest **independent owner, operator, and developer of multitenant communications towers** (also referred to as a “Towerco”). The company leases space on its towers to mobile network operators (MNOs), who use them to install their antennas, coaxial cables, and other equipment used to provide mobile services to their customers.

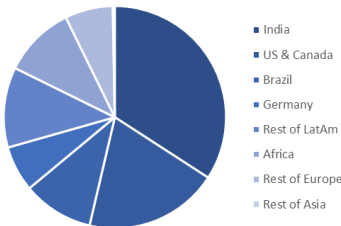
The company was **founded by Steven B. Dodge in 1995** as a subsidiary of Boston-based American Radio Systems Corporation and was subsequently spun-off and listed as a stand-alone company in 1998.

AMT’s **portfolio consists of approximately 221,132 sites globally**, including 42,836 towers in the US & Canada, 76,296 in Asia-Pacific, 23,377 in Africa, 30,377 in Europe, and 48,246 in Latin America.

It leases space on its towers using **long-term, non-cancellable agreements**, which typically involve **5-10 years initial terms**, followed by 5-year renewal periods, and include **annual price escalators** to protect against inflation.

Rental charges are typically based on the property location, the leased vertical square footage on the tower, and the weight placed on the tower from transmission equipment and backhaul solutions.

Figure 2: FY21 Towers by Region



Source: Company Filings

Value Proposition of an Independent Towerco

Wireless towers usually have the **capacity to support up to 4 or 5 tenants**. MNOs have **significant economic incentives to favour a colocation model** (sharing the tower infrastructure) over building their own sites.

First of all, **Towecos incur significant levels of capex when building towers, but minimal incremental capex when adding additional tenants**. By sharing tower infrastructure, mobile carriers can spread these fixed costs over their combined network activity. See Figure 3 for an illustration of the present value of savings for MNOs in leasing versus building their own towers.

Second, the roll-out of 4G and 5G technology requires mobile carriers to invest large sums of money on the installation of next-gen mobile equipment across their networks. This can create significant pressure on their financial positions

Figure 3: PV of Carrier Alternatives (in US\$000’s)

Term	Build	Lease	Savings
5 yrs	\$340	\$89	\$251
10 yrs	\$385	\$156	\$229
15 yrs	\$420	\$206	\$214
20 yrs	\$445	\$244	\$201

Carrier Build Scenario Assumptions
 \$275 construction cost; \$1.25 monthly opex with 3% annual escalator; 9% WACC

Tower Lease Scenario Assumptions
 \$1.8 monthly lease with 3% annual escalator; 9% WACC

Source: Company Filings

“Investors around the world have put pressure on Mobile Carriers to monetize their towers in order to unlock shareholder value”

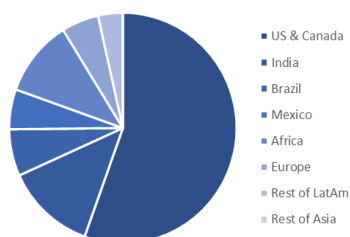
and has led mobile carriers around the world to **monetize their towers as a way of financing investments in their networks.**

Third, investors typically assign higher EV/EBITDA multiples on Tower companies than Mobile Carriers. Therefore, investors have put pressure on Mobile Carriers around the world to monetize their towers in order to **unlock shareholder value.**

Finally, the process of building a tower can take years given the need to secure the necessary ground interests and zoning approvals. By leasing existing towers, carriers can **reduce their time to market** when rolling out new technologies (3G/4G/5G). The increased speed at which carriers roll out improvements to their offerings can prove **crucial when competing for mobile subscribers on network quality and coverage.**

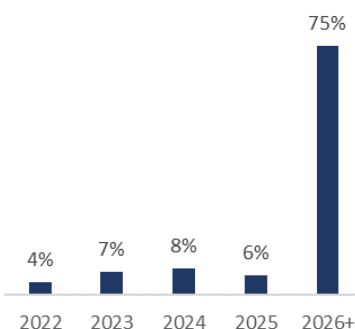
Sources of Revenues and Costs

Figure 4: FY21 Revenue by Region



Source: Company Filings

Figure 5: Global Ground Lease Renewal Schedule



Source: Company Filings

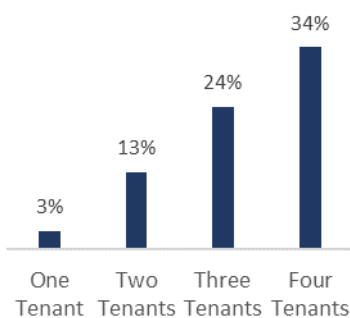
AMT’s **revenue streams** are split among the following segments:

- **Property Revenue** (98% of LTM revenue): Includes (1) revenues related to the leasing of space on multitenant cellular towers (92% of LTM revenue) and (2) revenues related to its carrier-neutral data centres portfolio in the US (6% of LTM revenue). Revenue from the company’s tower business can be further segmented geographically as follows:
 - **United States & Canada:** 47% of LTM revenue
 - **Asia Pacific:** 11% of LTM revenue
 - **Africa:** 11% of LTM revenue
 - **Europe:** 7% of LTM revenue
 - **Latin America:** 16% of LTM revenue
- **Services Revenue** (2% of LTM revenue): Includes tower-related services provided to AMT’s tenants in the US, including site application, zoning, permitting, and structural analysis.

AMT’s **operating expenses** arise from the following sources:

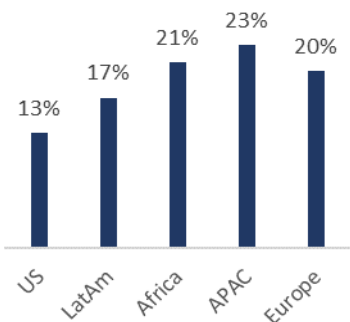
- **Direct operating expenses** (41% of LTM operating expenses): Consist primarily of ground rent, power and fuel costs, property taxes, and repairs and maintenance expenses. **A tower company’s largest direct cost is the ground rent, which often comprises c.70% of the total.** In the United States, ground rent is primarily fixed under long-term renewable lease agreements, with annual cost escalators of c.3%. **AMT owns or has a ground lease with at least 20 years until renewal on land covering more than 75% of its sites.** In addition, AMT’s landlord

Figure 6: US Sample NOI Yield by # of Tenants



Source: Company Filings

Figure 7: Sample International NOI Yield by Region for 2 Tenant Tower



Source: Company Filings

base is highly fragmented with 90% of ground leases held by landlords who own a single land parcel. Internationally, ground leases are often linked to inflation, recognizing a portion of the previous year’s inflation.

- **Depreciation, amortization, and accretion** (40% of LTM operating expenses): Includes depreciation of towers, equipment, land, and buildings; amortization of intangibles arising from the acquisition of tower assets, such as tenant contracts and relationships; and accretion of asset retirement liabilities.
- **Selling, general and administrative expense** (13% of LTM operating expenses): Consist of overhead expenses related to corporate overhead costs and development expense related to the company’s acquisition efforts, costs associated with new business initiatives, and project cancellation costs.
- **Other operating expenses** (5% of LTM operating expenses): Primarily consist of impairment charges, net losses on sales or disposals of assets and other operating.

Unit Economics on Multi-Tenant Towers

The cell tower business has a significant degree of operating leverage. For instance, it costs about **\$275,000 to build a tower in the United States**, about **\$1,500 per year in maintenance capex**, and **\$10,000 per year in operating costs** (property rent, taxes, and insurance). The first tenant pays \$20,000 per year on rent, and each additional tenant pays \$30,000 per year.

With costs largely fixed, and 90%+ incremental gross margins, increases in the number of tenants per tower generate significant economies of scale and improve the return profile of a site. Specifically, **AMT’s NOI yield (gross profit divided by invested capital) increases from 3% on a single-tenant tower to 34% on a 4-tenant tower.**

Returns are even more attractive in international markets, largely given lower costs to build a new site. AMT will **generate a 13% return** on a new tower build with 2 tenants in the United States, but generates **17% in Latin America, 21% in Africa, and 23% in Asia Pacific.**

Competitive Landscape

Barriers to Entry: Each Tower its Own Local Monopoly

The mobile tower business is able to generate such attractive returns on capital due to competitive advantages related to **zoning restrictions, switching costs, and economies of scale.**

City ordinances and local municipalities around the world typically limit the building of new towers via **onerous zoning restrictions**, particularly in residential areas where **aesthetics is a concern**. In fact, many cities will prohibit the building of new towers unless it can be **demonstrated that no existing towers can accommodate the wireless carrier's network needs.**

Even if a company were to be given the authorization to build a cell tower near an existing cell tower site, mobile carriers would be unlikely to relocate their equipment to the new site given **high switching costs** in the form of potential **network disruption and high installation costs**. According to Jay A. Brown, President and CEO of Crown and Castle (one of American Tower's US competitors), antenna installation costs typically range between \$35,000 and \$40,000, equivalent to almost 1.5 years of tower leasing rent.

Finally, the returns on single-tenant towers are often mediocre given the fixed costs involved in building towers and **significant economies of scale** of adding incremental tenancies. As a result, an entrant interested in offering attractive enough rates to woo the mobile carriers **would need to commit capital at rates that would be far below their cost of capital**, particularly when competing against a multi-tenant tower with twice the revenue and only slightly higher costs.

As a result of such strong barriers to entry, existing **tower assets essentially own local monopolies over their coverage zones**, allowing them to generate very attractive returns on capital as tenancy ratios rise.

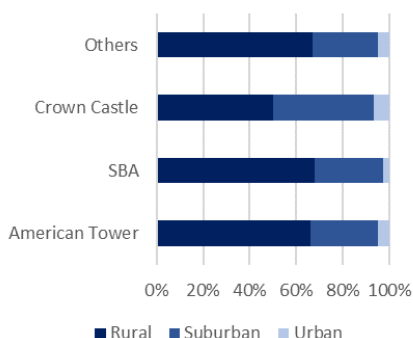
Key Cell Tower Competitors

AMT's main competitors are the other two main tower companies in the US, Crown Castle and SBA Communications. **AMT and Crown Castle** are the largest players in the US, with **42,836 and 40,128 towers**, respectively, whereas **SBA Communications** has **only 16,495 towers**.

The wireless tower business is able to generate these attractive returns on capital due to competitive advantages related to zoning restrictions, switching costs, and economies of scale.

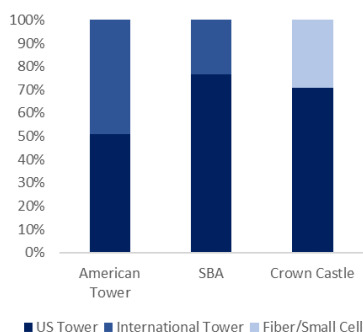
As a result of such strong barriers to entry, existing tower assets essentially own local monopolies over their

Figure 8: US Tower Players Morphology Distribution



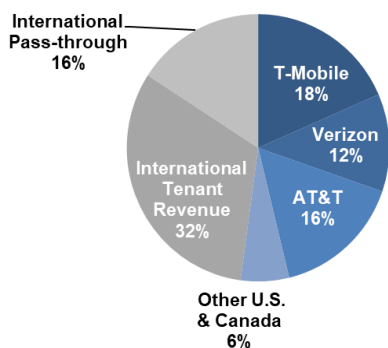
Source: Elliott Management

Figure 9: Revenue Breakdown by Segment for US Towercos



Source: Company Filings

Figure 10: Revenue Breakdown by Key Customers



Source: Company Filings

In terms of the geographic distribution, Crown Castle’s tower portfolio is significantly more **concentrated into cities and dense urban areas**. 50% of its towers are within the top 50 Metropolitan Statistical Areas (MSAs) and only **50% are located in rural areas**. In comparison, AMT only has 34% of its towers in the top 50 MSAs and has **66% of its tower portfolio in rural areas**. SBA Communication has 32% in the top 50 MSAs and **68% of its portfolio in rural areas**. This potentially leaves Crown Castle more exposed to the roll-out of small-cells in dense urban areas (see Implications of 5G for the Demand for Towers).

AMT is the tower company with by far the most international exposure, **with 80% of its tower portfolio outside of the United States**, mainly in India, Brazil, Mexico, Nigeria, and Germany. SBA Communications also has a sizeable international footprint with 52% of its towers located internationally, primarily in Brazil and South Africa. By contrast, Crown Castle is fully focused on the US market.

Finally, AMT also competes with infrastructure funds and private equity firms such as Macquarie, Brookfield, KKR, and Blackstone for the acquisition of tower assets. The growing, predictable, and inflation-protected nature of the cash flows of the tower business have attracted such investors as they look to deploy capital in a world of low real interest rates and high inflation. This, to some degree, **drives up the prices of tower assets**, and **limits** the degree to which AMT has been able to expand via acquisitions.

Customer Concentration

AMT leases to a limited number of mobile network carriers across its geographies. The customer concentration for each of these regions is as follows:

U.S. & Canada: AT&T, T-Mobile, and Verizon Wireless accounted for an aggregate of 88% of U.S. & Canada property segment revenue. Specifically, AT&T, T-Mobile, and Verizon accounted for 16%, 18%, and 12% of Total Property Revenue as of 4Q 2021.

Asia-Pacific: Vodafone Idea Limited; Bharti Airtel Limited (“Airtel”); and Reliance Jio accounted for an aggregate of 89% of Asia-Pacific property segment revenue.

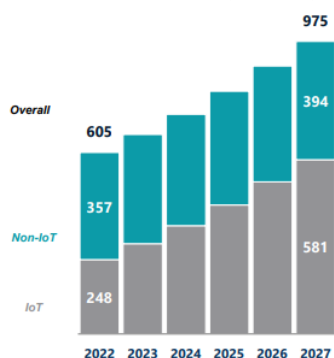
Africa: Airtel; and MTN Group Limited (“MTN”) accounted for an aggregate of 73% of Africa property segment revenue.

Europe: Telefónica S.A. (“Telefónica”); and Bouygues accounted for an aggregate of 74% of Europe property segment revenue.

Latin America: AT&T; Telefónica; and América Móvil accounted for an aggregate of 60% of Latin America property segment revenue

Secular Growth Opportunities

Figure 11: US Total Mobile Connected Devices (millions)



Source: Company Filings

As the owner of the key infrastructure on which mobile carriers must deploy their antennas, AMT is ideally situated to be the beneficiary of the large, global, secular growth in mobile data consumption across multiple industries and geographies.

Long-term Demand Drivers

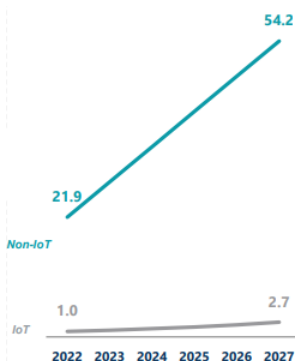
The growth in mobile data consumption results in greater demands on the capacity of mobile carriers’ networks, requiring them to install more equipment across AMT’s Portfolio. In particular, the growth in mobile data consumption can be segmented into:

Higher mobile device penetration. The number of total mobile-connected devices in the US is expected to continue to rise, growing at a **10% CAGR from 2022 to 2027**, according to the Ericsson Mobility Report. This is expected to be mainly driven by a growth in the number of Internet of Things (IoT) devices (**19% CAGR from 2022 to 2027**). This growth is expected to be higher in emerging markets due to lower non-IOT device penetration.

Average Data Usage per Device. In the US, the average data consumption for non-IoT devices is **expected to grow by 20%**, while it is expected to growth by a CAGR of 22% for IoT devices. This is expected to be driven by new VR and video-based apps, which demand higher video resolutions, increased uplink traffic, and a greater share of data off-loaded to cloud compute resources.

Given AMT’s position as the critical backbone infrastructure supporting the growth in this mobile data consumption, as well as its attractive unit economics protected by strong entry barriers, we view it as a “toll-road” collecting a tax on the growth in mobile data consumption.

Figure 12: US Monthly Traffic per Mobile Connection (GB)

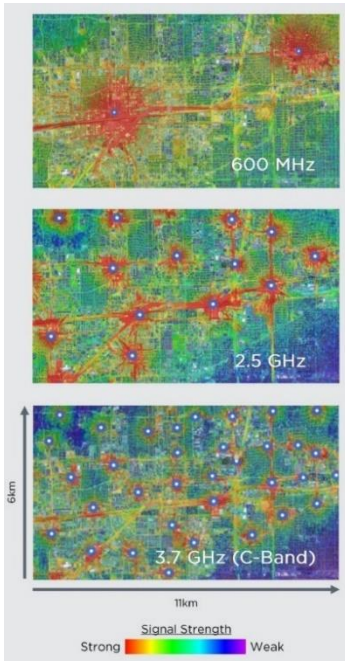


Source: Company Filings

Implications of 5G for the Demand for Towers

5G is the 5th generation technology standard for mobile networks, and follows 1G, 2G, 3G, and 4G LTE. 5G promises to deliver **faster download speeds** (up to 20x faster than median speeds of 4G LTE), **higher bandwidth**, and **lower**

Figure 13: Cell Tower Coverage Maps by Frequency Used



Source: Crown Castle Filings

“If you go back to the consumer’s interest and desire for having really true broadband mobile handsets and the kind of software and application that go with that, there’s been a revenue growth for the carriers associated with that. [...] if the conditions are the same, the carriers continue to expand their revenues, they invest at these levels, the physics -- there is no kind of way out of deploying sites, adding more equipment to get the higher broadband speeds.” – Jim Taiclet (Former CEO of AMT)

latency (i.e., response time). The technology standard helps support the secular growth in mobile data consumption by enabling a greater number of devices to connect to mobile networks, and meeting the requirements of new data-intensive, low-latency mobile applications.

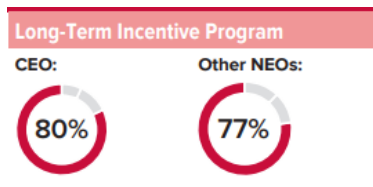
To better understand the implications of 5G on the tower industry, it is important to consider how it works. Rather than being a single technology, 5G is a collection of various improvements in the mobile network architecture, including the use of a wider set of radio spectrum, cell tower improvements, and improvements in antenna design:

Wider radio spectrum. There are 3 main bands of spectrum: **low-band** frequency (600 MHz, 700 MHz, 800 MHz), **mid-band** frequencies (2.0 GHz, 2.5 GHz, and 3.7 GHz), and **high-band** frequencies (mmWave). While 5G is a mobile network architecture, and is therefore independent of any specific frequency band, it allows for the deployment of mobile networks on higher frequency bands than was possible under the previous generations. This is particularly useful given that these frequencies support a higher amount of data transmission. On the other hand, higher frequency radio waves also have weaker propagation characteristics – they do not travel as far and can be more blocked by interfering objects. Specifically, the range of a 4G LTE cell tower transmitting low- and mid-band spectrum is **approximately 3 to 6.5 km**, whereas the range of a 5G cell tower transmitting low- and mid-band spectrum is 1.6 to 5km. This means that, to roll out 5G, mobile carriers will increasingly need to rent space on more existing or new cell towers in order to densify their networks.

Cell tower improvements. Traditionally, mobile carriers have relied on towers to install larger antennas that help provide long-distance, “blanket coverage”. However, they are increasingly adding clusters of small, low-powered antennas called small cells to augment their capacity in high population density areas where network demands are higher. Small cells are attached to city infrastructures like streetlights, utility poles, and light poles in a way that is less intrusive than towers. Therefore, they are particularly well-suited to support mobile carrier deployment of high-band (millimeter wave) frequencies. While small cells are likely to decrease tower demand in dense urban and urban areas with a population density **greater than 2,900 people per square km**, towers are still the preferred solution in suburban and rural environments as they provide the most technologically efficient and cost-effective option for coverage and capacity requirements.

Antenna design. Mobile network operators are installing new 5G antennas which incorporate a technology known as massive MIMO (multiple input, multiple

Figure 14: Management Long-Term Compensation Program

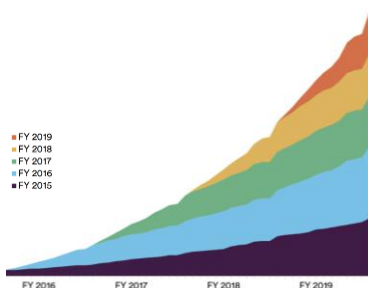


- Provides at-risk, variable, equity-based pay opportunity for sustained operating performance
- Long-term retention tool that provides both time-based and performance-based restricted stock units
- Focuses executives on the creation of long-term stockholder value

For PSUs, we use **Consolidated AFFO per Share⁽²⁾** and **ROIC⁽²⁾** as the two quantitative performance measures in our long-term incentive program. Consolidated AFFO is widely used in the telecommunications real estate sector to adjust Nareit FFO (common stockholders)⁽²⁾ for items that may otherwise cause material fluctuations in Nareit FFO (common stockholders) growth from period to period, which would not be representative of the underlying performance of property assets in those periods. Utilizing the Consolidated AFFO per Share metric encourages management to reserve the use of Company stock as a funding mechanism only for those opportunities where it is strategically warranted and accretive over the long term for existing stockholders. ROIC encourages management to focus on earning adequate returns on invested capital over a sustained period.

Source: Company Filings

Figure 18: Illustrative ARR by Annual Cohort



Source: BuildGroup

outputs). These antennas contain a very large number of elements to send and receive more data and allow more people to simultaneously connect to a network and maintain high throughput.

Management & Capital Allocation Framework

American Tower has a history of disciplined and rational capital allocation. According to the company, the objective of its capital allocation policy is to “simultaneously increase adjusted funds from operations **per share** and [its] return on invested capital over the long term”. Perhaps this is not surprising as 80% of the CEO, and 77% of the other key executive officers’, compensation is based on these two performance measures.

In addition, the CEO and President, Thomas A. Bartlett, owns c.\$47.9 million worth of American Tower common stock, which is c.48x his annual base salary and likely represents a significant portion of his net worth. We believe these factors create management-shareholder alignment and are therefore noteworthy positives to our thesis.

In practice, the American Tower’s capital allocation takes the form of a pecking order. After meeting certain requirements, such as its target dividend per share growth of 12.5%+ and a net leverage ratio of between 3x and 5x, it is free to deploy capital among its best alternatives. As CEO Tom Barlett explained in their 2Q 2020 earnings call, "All of [their] investments are evaluated using a 10-year unlevered DCF model, with varying IRR hurdles due to the inclusion of appropriate risk adjustments to account for the specific local country risk, the type of asset, counterparty, and a host of other factors.

Valuation

Revenue Growth

AMT’s revenue growth is determined by the (1) growth in revenue from existing towers (also referred to as organic tenant billings growth) and (2) growth in revenues from the addition of new towers. Much like in the case of a high-quality SaaS (software as a service) business, the combination of these two drivers working in tandem can be quite powerful, as is illustrated in Figure 18.

Figure 19: Base Case Revenue Growth from Colocations & Amendments

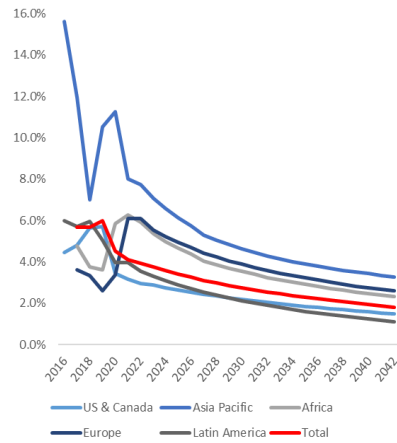
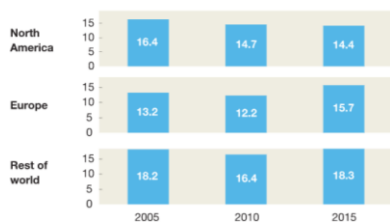
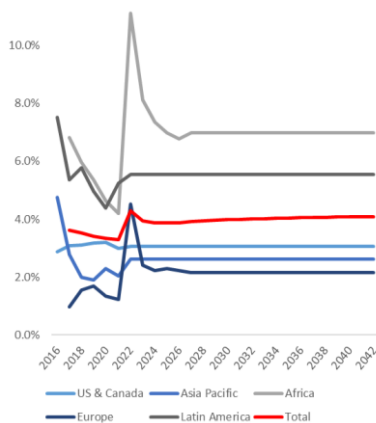


Figure 20: Capex/Revenue for Top Telecom Companies (%)



Source: McKinsey

Figure 21: Base Case Revenue Growth from Price Escalators



The growth in revenue from existing towers can be further sub-divided into growth from (a) colocations on existing towers, (b) lease amendments, (c) price escalators and (d) ‘negative’ growth from customer churn.

(1.a.) Colocations on existing towers. To satisfy the growing demand for mobile data, carriers must install additional antennas across their networks. As previously explained, the cheapest way to do so is to install antennas on already existing towers. When carriers do so, this translates to more tenants, and therefore more revenue, on a per tower basis.

(1.b) Lease amendments. Besides installing additional antennas, carriers may also replace older antennas with newer and better ones. Upgrades typically mean heavier and bulkier equipment, which leads to amendment revenues for AMT given that part of the rent is calculated based on the weight of equipment on the tower.

Therefore, **AMT’s revenue growth from colocations and amendments is driven by the amount of capex that MNOs invest in the improvement and densification of their networks.** For instance, from 2017-2021, MNOs in the US spent \$31 billion of capex on average per year. This translated into an incremental \$162 million in revenue on average each year for AMT, or 4% to 5% revenue growth.

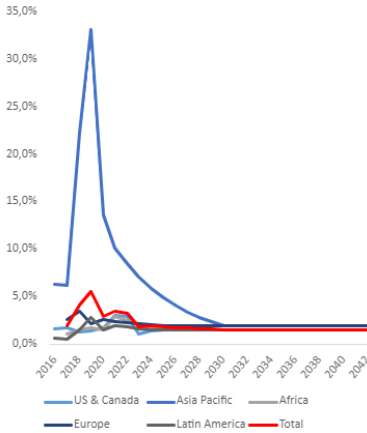
In our base case, we assume that MNO capex in each of AMT’s markets remains constant over the explicit forecast period. This translates to a constant level of incremental revenues from amendments/colocations on a per tower basis.

Implicit in this assumption are a few underlying drivers. First, **the level of MNO capex is a function of the revenues that mobile carriers generate from their customers.** Capex as a percentage of revenues for MNOs tends to be stable over time, as can be seen in Figure 20. We are, therefore, also implicitly assuming that MNO revenues remain constant.

Second, **the level of MNO revenues generated is a function of the number of mobile users and the average revenue per user (ARPU).** While revenues increased in line with mobile subscribers until about 2011, in more recent years, MNO revenues in most parts of the world have been falling or flat as ARPUs have declined. The decline in ARPU reflects several factors, including increased commoditization and price competition among mobile carriers, improvements to—and falling costs of—mobile technologies, and decreased willingness on the part of consumers to pay for ever-increasing mobile speeds and capacity.

In our base case, any decreases in ARPU will be offset by continued increases in mobile subscribers. This will require new mobile applications that increase

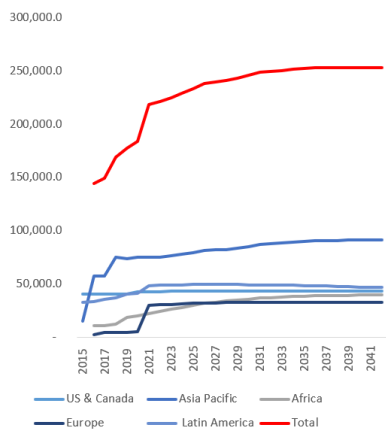
Figure 23: Base Case Revenue Decline from Customer Churn



consumers’ willingness to pay for capacity, speed, and low latency of data and a rise in subscribers, driven by IoT devices in AMT’s developed markets and mobile penetration in AMT’s developing markets.

(1.c) Price escalators. As previously mentioned, AMT has in place price escalators into their leasing contracts to protect against inflation. **Contract price escalators are typically c.3% in the US, 2% to 3% in India, and CPI-linked in the rest of its markets.** In our base case, we assume revenue growth from price escalators equal to inflation in each market (as per IMF forecasts). Price escalators in AMT’s foreign markets are offset by foreign exchange depreciation based on inflation differentials between these markets and the US.

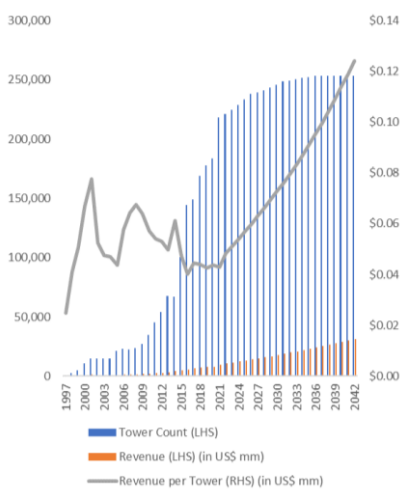
Figure 24: Base Case Tower Count Progression



(1.d) Customer Churn. Customer churn arises from the decommissioning of equipment by MNOs on existing sites and works to reduce **AMT's revenues.** **Historically, churn has tended to be in the range of 1% to 2% per year.** However, churn averaged 3.7% from 2017 to 2021 due to consolidation amongst carriers in AMT’s key markets, which caused redundancies in the remaining players’ networks. In our base case, see this metric trending back to 1.6% by 2029 as most markets now host only 3 MNOs meaning there is less scope for consolidation.

(2) Addition of new towers. AMT has grown its tower count significantly over the past 20 years. In fact, **tower count grew at a 27% CAGR from 1997 to 2021, accounting for most of AMT’s 30% revenue CAGR over that period.** A large part of this has been driven by global acquisitions of MNO-captive tower portfolios and smaller Towercos. However, with many of the towers now owned by established players, we believe AMT’s growth on this front will be much more limited going forward. **We do not incorporate any growth contribution from M&A in our valuation.**

Figure 25: Historical Revenue and Tower Count

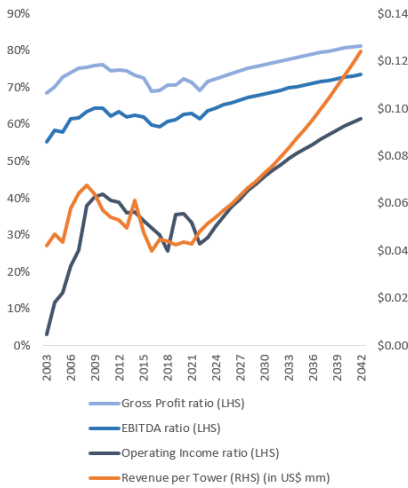


On the other hand, AMT has been increasingly focusing on building out its tower portfolio organically. In 1Q22, management indicated that it had a long-term goal of building **40,000 to 50,000 towers from 2022-2029** (c.9,000 per year). Of this amount, 4,000 will come from Asia Pacific (mostly India), 1,900 from Africa, and 500 each from Europe and Latin America. Beyond this, we model the pace of **build out halving every 5 years to reflect the saturation** of tower in AMT’s markets.

In our base case, we expect these factors combined to produce a **revenue CAGR of 4.6% from 2022 to 2042.** Importantly, while **revenue per tower** contributed to only c.10% of AMT’s historical growth, **we expect it to drive 85% of growth (or a 3.9% CAGR) from 2022-2042.**

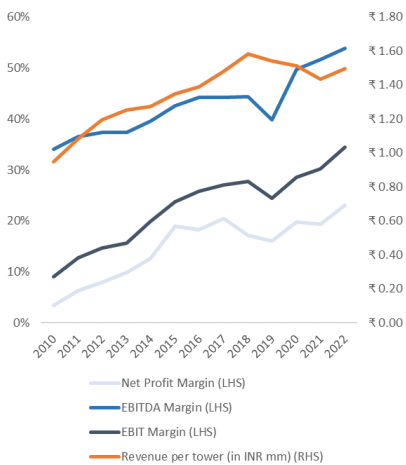
Source: Company Filings

Figure 27: Revenue per Tower and Profit Margins



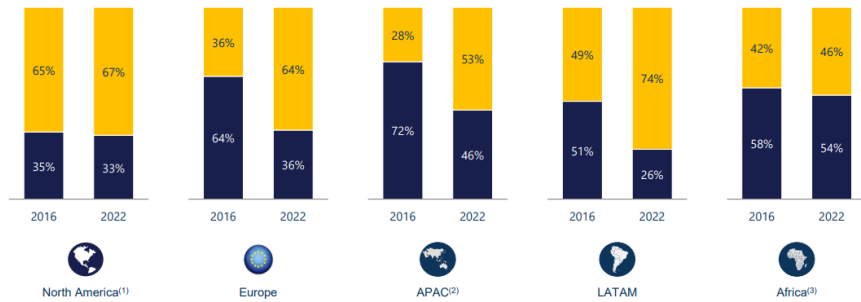
Source: Company Filings

Figure 28: Indus Towers Revenue per Tower and Profit Margins



Source: Indus Tower Filings
 Note: Revenue, EBITDA, and EBIT are excluding other income.

Figure 26: Tower Ownership by Region
 (% towers owned by different operator types)



Profit Margins

As discussed in the introduction, **42% of AMT's operating costs** are related to direct operating expenses (mostly ground rent) and **40% are related to depreciation and amortization** of towers and tower-related assets. These costs are **largely fixed** on a per tower basis as revenues increase from colocations and amendments. As a result, increases in revenues generated per tower translate to significant operating leverage and margin expansion.

In our base case, we expect revenue per tower to increase by **2.1x over our forecast period (2022-2042)** and to drive increases in AMT's gross margin from **c.71% to c.79%**, its **EBITDA margin from c.63% to c.71%**, and its operating income margin from **c.28% to c.55%**.

We appreciate that such a significant degree of margin expansion may sound too optimistic, particularly given AMT's operating margins have been on a downward trend for the last 15 years. However, we believe that margins have been artificially depressed **due to AMT's rapid tower count increase**.

As a sanity check, we point out that there are several examples of Towercos that have experienced significant margin expansion as revenues per tower increased. The most compelling evidence of this being the case is from the experience of Indus Towers, which achieved **EBITDA and EBIT margin expansions of 20% and 26%**, respectively, on the back of an expansion in its **revenue per tower of 55% from 2010 to 2022**.

Public and Private Market Valuations

In addition to carrying out a DCF valuation, we chose to conduct public and private market valuations in order to triangulate our own valuation with those being set in the public and private markets. Given that valuations for Towercos

vary significantly across regions, we chose to value each of AMT's regions/segments separately on a sum-of-the-parts basis.

In our private market valuation, we considered all **private transactions of Towercos within the last 10 years** (December 2012 to December 2022) with publicly disclosed valuations. Towercos are typically purchased based on their tower cash flows (TCF), which is defined as recurring revenue minus tower-specific operating costs and approximate annual maintenance capex. Given that maintenance capex is typically low for Towercos (c.2%-4% of revenues), we used EBITDA as a proxy where the TCF was not available. Furthermore, as AMT does not disclose EBITDA separately for each of its regions, we estimated EBITDA by allocating SG&A to the geography segments' gross profits based on revenue mix. Finally, we valued the Data Centre segment, which is mostly composed of CoreSite (a business that AMT acquired in 2021) based on the EV/EBITDA multiple that AMT paid to acquire the asset in 2021.

The results of our private market valuation suggest that AMT's **enterprise value is \$135.6 billion** (20.6x EV/EBITDA), its **equity value is \$85.0 billion**, and its **equity value per share is \$184.2**.

Figure 30: AMT Private Market Valuation Summary Table (in US\$ mm, except per share figures)

Segment	FY22E Revenue	FY22E Gross Profit	FY22E SG&A	FY22E EBITDA	Avg. EBITDA/TCF Multiple	Value
US & Canada	5,065.6	4,179.6	470.8	3,708.8	24.9	92,490.1
Asia Pacific	1,351.0	600.6	125.6	475.1	9.9	4,703.2
Africa	1,191.0	796.2	110.7	685.5	11.4	7,838.3
Europe	552.2	345.3	51.3	294.0	15.8	4,639.9
Latin America	1,571.4	1,087.1	146.0	941.1	13.9	13,094.1
Data Center	758.7	439.9	70.5	369.4	29.0	10,712.1
Services	241.2	128.5	22.4	106.1	19.6	2,082.9
Total AMT	10,731.1	7,577.2	997.3	6,579.9	20.6	135,560.8
Net Debt & Minority Interest						-50,576.8
Equity Value						84,984.0
Common shares outstanding						461.4
Equity Value per Share						184.2

In our public market valuation, we considered 2 peers in the US (Crown Castle and SBA Communications), 3 peers in Asia (Protelindo, TBIG, and Indus Towers), 4 peers in Europe (Inwit, Cellnex, RAI Way, and Vantage Towers), 2 peers in Africa (Helios Towers and IHS Holding), and 1 peer in Latin America (Opsimex). We took the **average implied value of AMT's different regions based on 3 valuation multiples—P/S, EV/EBITDA, and EV/EBIT—and across 3 time periods (FY2022E, FY2023E, and FY2024E)**.

Given that AMT does not report EBITs across its segments, we estimated them by allocating D&A across each segment by invested capital in each segment. In the case of the data centre and services segments, we used the same valuations arrived at in the private market valuations analysis.

The results of our public market valuation suggest that AMT's **enterprise value is \$132.5 billion**, its **equity value is \$90.0 billion**, and its **equity value per share is \$177.6**.

Figure 31: AMT Public Market Valuation Summary Table (in US\$ mm, except per share figures)

Segment	FY22E P/S	FY23E P/S	FY24E P/S	FY22E EV/EBITDA	FY23E EV/EBITDA	FY24E EV/EBITDA	FY22E EV/EBIT	FY23E EV/EBIT	FY24E EV/EBIT	Average
US & Canada	52,400.5	52,889.1	53,888.2	85,941.4	86,379.5	87,461.7	87,150.5	92,922.2	98,197.0	77,470.0
Asia Pacific	6,571.3	6,926.9	7,212.1	4,547.1	5,440.9	6,024.5	2,387.3	3,732.5	4,745.7	5,287.6
Africa	2,308.8	2,221.1	2,326.4	5,072.4	4,933.1	5,080.7	7,119.7	6,616.4	6,861.9	4,726.7
Europe	5,339.8	5,476.3	5,522.5	4,883.3	5,165.6	5,237.7	n/a	n/a	n/a	5,270.9
Latin America	10,088.9	9,787.7	9,611.2	12,149.0	11,931.6	11,325.6	15,476.2	12,940.0	13,247.8	11,839.8
Data Center	10,712.1	10,712.1	10,712.1	10,712.1	10,712.1	10,712.1	10,712.1	10,712.1	10,712.1	10,712.1
Services	2,082.9	2,082.9	2,082.9	2,082.9	2,082.9	2,082.9	2,082.9	2,082.9	2,082.9	2,082.9
Total AMT	140,081.1	140,672.9	141,932.2	125,388.3	126,645.8	127,925.0	124,928.8	129,006.2	135,847.4	132,492.0
Net Debt & Minority Interest	-50,576.8	-50,576.8	-50,576.8	-50,576.8	-50,576.8	-50,576.8	-50,576.8	-50,576.8	-50,576.8	-50,576.8
Equity Value	89,504.3	90,096.1	91,355.4	74,811.5	76,069.0	77,348.2	74,352.0	78,429.4	85,270.6	81,915.2
Common shares outstanding	461.4	461.4	461.4	461.4	461.4	461.4	461.4	461.4	461.4	461.4
Equity Value per Share	194.0	195.3	198.0	162.2	164.9	167.7	161.2	170.0	184.8	177.6

Deep Dives into Key Regions¹

United States

The number of cell towers in the US has grown from **c.110,000 in 2010 to c.145,000 as of 2021** (c.3% CAGR). At the same time, the number of cell sites on towers increased from just over **250,000 to 330,000** (c.2.7% CAGR). This was mostly driven by a shift from 3G to 4G to support the proliferation of smartphones and related increases in mobile data usage.

Given the tower count has increased at a similar rate to cell site count, the tenancy ratio has remained relatively flat. For instance, it only **grew from 1.91 to**

¹ Source: American Tower investor presentation, <https://www.americantower.com/investor-relations/investor-presentations/>
TowerXchange Guide, <https://www.towerxchange.com/regional-guides?page=1>

1.99 from 2015 to 2021. Organic revenue growth for the tower companies has mainly been driven by amendment activity related to the augmentation of 4G networks to prepare for the roll-out of 5G. The amount of colocation activity has been fairly muted as of yet. This has meant that the **more attractive high margin revenue** driven by colocation has been relatively absent on aggregate across the industry. Going forward, we believe that a greater proportion of the revenue growth will be driven by colocation driven by the need for carriers to densify their networks in a cost-efficient manner, particularly in more rural areas.

We also expect inorganic growth in tower count for AMT to come mostly from acquisitions of smaller players. This would mark a continuation in a trend that has seen the share of towers held among the top 3 players to increase **from 50% in 2012 to c.70% as of 2021**.

On the mobile carrier side, as of 2020, the industry in the US was dominated by four players: AT&T, Verizon, T-Mobile, and Sprint. However, in 2020, T-Mobile merged with Sprint, taking the wireless industry from 4 to 3 players and providing T-Mobile with a significant amount of excess spectrum on which to roll out 5G.

At the same time, this led T-Mobile to announce the decommissioning of **35,000 cell sites**, which has since caused a massive amount of churn for AMT and the rest of the US tower industry. While some of this will be offset by the recent entrance of Dish, which promised to build a 15,000-site 5G network that will **cover 70% of the US population** by June 2023, it is likely to remain a drag on cell towers revenue growth for the next few years. In fact, AMT CFO, Rod Smith, noted on the 3Q 2021 earnings call that Sprint churn would lead to \$195 million in annual Sprint revenue roll off in 2021, followed by **\$60 million in 2022, \$50 million in 2023, and \$70 million in 2024**.

AT&T and Verizon have been focused on rolling out ultra-low latency, high speed 5G networks in metropolitan areas. T-Mobile has, instead, chosen to also address customers in rural areas given its mid-band focused network enables it to build on its usage of the 600MHz frequency band. The company's approach has been self-described as a three-tiered cake, with a mixed spectrum offering of 600MHz, 2.5GHz, and mmWave. Given the relatively poor reception for the offerings of AT&T and Verizon, they have ramped up their initiatives in rolling out nation-wide coverage through the more cost-efficient, mid-frequency C-band.

AT&T has been in a weak position to roll out 5G given its limited ownership of spectrum. In early 2021, the company was therefore compelled to **borrow \$14.7 billion in debt to fund its more than \$20 billion** purchase of spectrum in the c-band (3.7 GHz) auction.

Going forward, we expect rural expansion from AT&T and Verizon, as they look to catch up with T-Mobile, to be a strong driver of new cell site and colocation across AMT's portfolio.

Asia Pacific – India

In recent years, the Indian telecommunications industry has seen a wave of consolidations triggered by the aggressive entry of Reliance Jio, a subsidiary of the large Indian conglomerate Reliance Industries. The company sought to take market share by undercutting its competitors, offering unlimited LTE data and national voice, video and messaging services. This resulted in a pricing war, which pressured balance sheets and forced weak players out of the market.

The consolidation among mobile carriers in India resulted in significant churn across tower companies in the country. AMT was not spared, with the average tenancy ratio across its Indian tower portfolio falling **from 2.17x in 2017 to 1.51x in 2021**. Given the operating leverage inherent in the business, its operating margin fell from **37% to 33%** during that time period. In response, the Towercos followed the mobile carriers towards consolidation, with the top 3 companies now owning **70% of the towers in 2021, up from just 57% in 2018**.

Looking forward, the industry seems to be on a more solid footing. The more affordable data plans brought about an explosion in data consumption, with the number of wireless internet subscribers increasing **from 370 million in 2016 to 770 in 2020** and the data usage per subscriber per month increasing from 0.9 gigabytes to **8.7 gigabytes in 2020**. In addition, given that India is further along in the technology adoption cycle, a quicker roll-out will be facilitated by the availability of more affordable 5G-enabled smartphones.

Additionally, internet delivery in India is **80% to 90% through mobile devices**, with less than 10% of the population connected via a wireline connection. To put this in perspective, in the US, **more than 50%** of internet delivery occurs over wired connections. This should provide a longer runway for the growth in mobile data consumption in India.

The two largest mobile carriers, Reliance Jio and Bharti Airtel, are in strong fiscal positions, **with credit ratings of AAA and AA+**, which should enable them to continue to invest in across their networks. However, the third largest player, Vodafone Idea, is suffering from a dangerously high debt burden and a lack of profitability. While the government is likely to ensure the company remains a going concern, **given its 30% equity stake**, Vodafone Idea will be significantly less constrained in its ability to invest in network infrastructure.

The latest spectrum auction was completed on August 1st, 2022. The auction was a success with **more than 70GHz of 700-3,300 MHz and 26GHz spectrum** auctioned, **raising almost \$19bn** from the big three commercial mobile carriers. Reliance Jio and Bharti Airtel have announced their intentions to reach national 5G coverage by 2023 and are earmarking an estimated \$9bn each in capex to do so. Such ambitious plans are expected to bode well for AMT's prospects in the country over the next few years.

AMT's portfolio in India was formed through an aggregation of network grids of multiple new entrants and smaller Towercos. The portfolio of 78,000 towers has a rural tilt, **with 40,000 sites located in rural areas, 11,000 in suburbs, and 27,000 in urban and dense urban areas.**

The towers were mostly formed on a grid of 1800MHz and have available site locations for new tenancies. Capitel believes that ATC can address some demand on 2300MHz in urban and semi-urban areas, and a larger share of colocation sharing demand on 5G as the ATC site locations in urban areas still have available slots.

Latin America – Brazil & Mexico²

Latin American is AMT's second largest region outside of the US & Canada, accounting for c.16.3% of the company's revenues and c.22.2% it's tower count. Within Latin America, Brazil and Mexico are AMT's most important markets, accounting for 7.2% and 5.6% of the company's revenues. AMT is also the largest player in the region, accounting for approximately 30% of the towers in the region, ahead of SITES (19%), Telesites (12%), SBA Communications (12%), and Phoenix Tower (7%).

Over the past decade, Brazil has faced a difficult economic environment due to a severe recession and the effects of the COVID-19 pandemic. From 2014 to 2021, real GDP per capita PPP declined annually at a CAGR of 1%, and as of 2021 had fallen to \$14,710. Going forward, the economy therefore has potential for improvement, and is expected to grow real GDP per capita PPP by 1% annually from 2022 to 2027, as per IMF forecasts.

Brazil is the sixth most populous country in the world, and the 9th largest country by GDP, according to the world bank. Brazil also has attractive demographics and is expected to have 1% annual population growth from 2022 to 2027, according to the IMF. Furthermore, 44% of the population is under the age of 30,

² <https://dgtlinfra.com/mexico-telecom-partners-mtp-towers/>
<https://siteslatam.com/wp-content/uploads/2022/11/PPT-3Q22.pdf>

according to the UN, which is a positive for demand for mobile services. In addition, Brazil's urban population is 86% of the population, according to Euromonitor. While this is expected to have a positive impact on the demand for mobile services, it may also expose AMT to disruptive technologies such as small cells that are only viable in high-density areas.

As of 2021, there were 3 main MNOs operating in Brazil: Vivo (74% owned by Telefonica), TIM (67% owned by Telecom Italia), Claro (98% owned by America Movil). Vivo, TIM, and Claro control 38%, 29%, and 32% of the market, respectively. In 2021, a consortium of Vivo, TIM, and Claro agreed to acquire the mobile assets of the previously 4th largest MNO, Oi, which has been undergoing bankruptcy proceedings since 2016. AMT's churn in the region has been elevated in the last few years due to the bankruptcy of Oi. The market collocation rate in Brazil as of 2020 is estimated to be 1.51x, which provides ample room for additional collocation.

In November 2021, Brazil held a spectrum auction in which Vivo, TIM, and Claro won spectrum in 2.3GHz, 3.5GHz, and 26GHz. Such licenses require the companies to deploy 5G in the state capitals by July 2022, which should be a positive tailwind for tower demand.

Mexico has experience depressed economic activity over the past several years. From 2021 to 2018, real GDP per capita PPP in Mexico declined by 1.7% annually, as a result of sluggish industrial output, falling business investment, and a slowdown in services and employment in 2019, as well as the COVID-19 pandemic in 2020. However, from 2022 to 2027, the IMF forecasts Mexico's real GDP per PPP to return to a growth rate of 1% annually.

Mexico is the 10th most populous country in the world, with a population of 130 million, according to the World Bank. In addition, the IMF forecasts its population to grow by 0.8%. With 51% of its population under the age of 30, according to the UN, mobile services activity is expected to be a strong tailwind for tower demand.

As of 2021, there were 3 main MNOs operating in Mexico: Telcel (100% owned by America Movil), Movistar (100% owned by Telefonica), AT&T. Telcel, Movistar, and AT&T control 62%, 18%, and 16% of the market, respectively. Intense competition from Telcel has led to Movistar and AT&T generating significant operating losses recently. For example, in 2020, Movistar and AT&T's Mexico divisions generated operating losses of \$744 million and \$587.

As a result, in November 2019, Telefonica entered into a minimum 8-year wholesale agreement with AT&T in Mexico, whereby it will migrate its wireless traffic to AT&T. This could result in elevated churn on AMT's sites in the country

due to duplication of sites. However, over the long-term the additional traffic will likely require AT&T to invest in its network to increase capacity.

Given the market dynamics in Mexico's MNO market, Telcel remains the only operator building out meaningful numbers of sites. In addition, most of its sites are given to its captive tower company, Telesites. This partially explains the fact that the Mexican tower market has one of the lowest tenancy ratios globally, at only 1.2x.

In February 2022, the Federal Telecommunications Institute (IFT) authorized Telcel to introduce 5G using 3.5 GHz. This will allow it to compete with AT&T, which is the other 3.5 GHz spectrum holder and whose license was renewed in January 2020 for 20 years.

Appendix

Financial Statements Appendix 1: Income Statement

Account & Presentation	Historical										Pro Forma										
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
Revenue	\$1,114.2	\$1,177.7	\$1,241.2	\$1,304.7	\$1,368.2	\$1,431.7	\$1,495.2	\$1,558.7	\$1,622.2	\$1,685.7	\$1,114.2	\$1,177.7	\$1,241.2	\$1,304.7	\$1,368.2	\$1,431.7	\$1,495.2	\$1,558.7	\$1,622.2	\$1,685.7	\$1,749.2
Operating Expenses	\$272.8	\$288.3	\$303.8	\$319.3	\$334.8	\$350.3	\$365.8	\$381.3	\$396.8	\$412.3	\$272.8	\$288.3	\$303.8	\$319.3	\$334.8	\$350.3	\$365.8	\$381.3	\$396.8	\$412.3	\$427.8
Operating Income	\$841.4	\$889.4	\$937.4	\$985.4	\$1,033.4	\$1,081.4	\$1,129.4	\$1,177.4	\$1,225.4	\$1,273.4	\$841.4	\$889.4	\$937.4	\$985.4	\$1,033.4	\$1,081.4	\$1,129.4	\$1,177.4	\$1,225.4	\$1,273.4	\$1,321.4
Other Income (Expense)	\$1.2	\$2.7	\$4.2	\$5.7	\$7.2	\$8.7	\$10.2	\$11.7	\$13.2	\$14.7	\$1.2	\$2.7	\$4.2	\$5.7	\$7.2	\$8.7	\$10.2	\$11.7	\$13.2	\$14.7	\$16.2
Income Before Tax	\$842.6	\$892.1	\$941.6	\$991.1	\$1,040.6	\$1,090.1	\$1,139.6	\$1,188.1	\$1,236.6	\$1,285.1	\$842.6	\$892.1	\$941.6	\$991.1	\$1,040.6	\$1,090.1	\$1,139.6	\$1,188.1	\$1,236.6	\$1,285.1	\$1,333.6
Income Tax Expense	\$168.5	\$178.4	\$188.3	\$198.2	\$208.1	\$218.0	\$227.9	\$237.8	\$247.7	\$257.6	\$168.5	\$178.4	\$188.3	\$198.2	\$208.1	\$218.0	\$227.9	\$237.8	\$247.7	\$257.6	\$267.5
Net Income	\$674.1	\$713.7	\$753.3	\$792.9	\$832.5	\$871.1	\$909.7	\$950.3	\$988.9	\$1,027.5	\$674.1	\$713.7	\$753.3	\$792.9	\$832.5	\$871.1	\$909.7	\$950.3	\$988.9	\$1,027.5	\$1,067.1
Other Comprehensive Income (Expense)	\$0.1	\$0.2	\$0.3	\$0.4	\$0.5	\$0.6	\$0.7	\$0.8	\$0.9	\$1.0	\$0.1	\$0.2	\$0.3	\$0.4	\$0.5	\$0.6	\$0.7	\$0.8	\$0.9	\$1.0	\$1.1
Comprehensive Income	\$674.2	\$713.9	\$753.6	\$793.3	\$833.0	\$871.7	\$910.4	\$951.1	\$990.8	\$1,030.5	\$674.2	\$713.9	\$753.6	\$793.3	\$833.0	\$871.7	\$910.4	\$951.1	\$990.8	\$1,030.5	\$1,068.2

Appendix 2: Balance sheet

Account & Presentation	Historical										Pro Forma										
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
Assets	\$1,114.2	\$1,177.7	\$1,241.2	\$1,304.7	\$1,368.2	\$1,431.7	\$1,495.2	\$1,558.7	\$1,622.2	\$1,685.7	\$1,114.2	\$1,177.7	\$1,241.2	\$1,304.7	\$1,368.2	\$1,431.7	\$1,495.2	\$1,558.7	\$1,622.2	\$1,685.7	\$1,749.2
Liabilities	\$450.0	\$465.0	\$480.0	\$495.0	\$510.0	\$525.0	\$540.0	\$555.0	\$570.0	\$585.0	\$450.0	\$465.0	\$480.0	\$495.0	\$510.0	\$525.0	\$540.0	\$555.0	\$570.0	\$585.0	\$600.0
Equity	\$664.2	\$712.7	\$761.2	\$809.7	\$858.2	\$906.7	\$956.7	\$1,003.7	\$1,052.2	\$1,100.7	\$664.2	\$712.7	\$761.2	\$809.7	\$858.2	\$906.7	\$956.7	\$1,003.7	\$1,052.2	\$1,100.7	\$1,149.2

AMERICAN TOWER CORP

“COMM & TRANSMISSION CONST”

XINGZHEN MEN

NICOLAS GOMEZ ILABACA

COMPANY REPORT

16 December 2022

48954@novasbe.pt

49052@novasbe.pt

American Tower

The Landlord of the Mobile Economy

- The cell tower business is a fantastic business given high visibility cashflows, low maintenance capex, and attractive incremental gross margins as tenancy ratios rise
- American Tower is protected by very high barriers to entry, which enable it to earn high rates or return on invested capital
- We believe that the company is situated to capture a significant value arising from the secular growth in mobile data consumption given the physics of radio wave propagation
- While we believe the attractive characteristics of the business are broadly understood, our view is that the market is underappreciating the long-term international growth potential
- We expect American Tower’s stock to reach its fair value of \$288.3 (weighted average of our cases) by the end of 2023, which would result in a 33.56% expected return
- Given the above, we rate American Tower as a BUY at the price of \$215.87

Company description

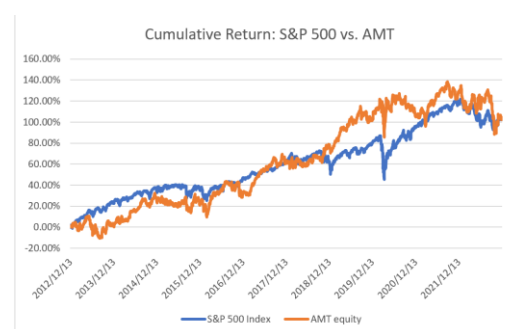
American Tower Corporation (Hereinafter referred to as AMT) is one of the world's largest real estate investment trusts (REITs) and is a premier owner, operator, and developer of multitenant communications real estate, with a portfolio of 221,132 communications sites.

Recommendation: BUY

Price Target FY23: \$288.3

Price (as of 12-Dec-2022) \$215.87

52-week range (\$)	178.17-294.40
Market Cap (\$b)	100.5
Outstanding Shares (m)	461.4



Source: Bloomberg

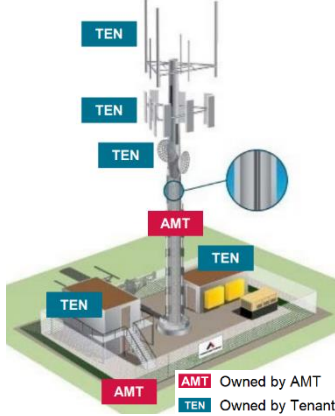
(Values in \$ millions)	2021	2022E	2023F
Revenues	9,357	10,681	11,509
EBITDA	5,982	6,575	7,354
Net Profit	2,568	2,900	2,259
EPS (in \$)	5.66	6.40	4.98

Source: Annual Report; Analysts Estimates

Overview of American Tower

Company Description

Figure 1: Tower Components



Source: Company Filings

AMT is the largest **independent owner, operator, and developer of multitenant communications towers** (also referred to as a “Towerco”). The company leases space on its towers to mobile network operators (MNOs), who use them to install their antennas, coaxial cables, and other equipment used to provide mobile services to their customers.

The company was **founded by Steven B. Dodge in 1995** as a subsidiary of Boston-based American Radio Systems Corporation and was subsequently spun-off and listed as a stand-alone company in 1998.

AMT’s **portfolio consists of approximately 221,132 sites globally**, including 42,836 towers in the US & Canada, 76,296 in Asia-Pacific, 23,377 in Africa, 30,377 in Europe, and 48,246 in Latin America.

It leases space on its towers using **long-term, non-cancellable agreements**, which typically involve **5-10 years initial terms**, followed by 5-year renewal periods, and include **annual price escalators** to protect against inflation.

Rental charges are typically based on the property location, the leased vertical square footage on the tower, and the weight placed on the tower from transmission equipment and backhaul solutions.

Value Proposition of an Independent

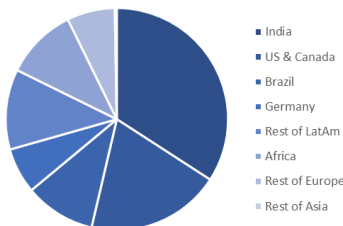
Towerco

Wireless towers usually have the **capacity to support up to 4 or 5 tenants**. MNOs have **significant economic incentives to favour a colocation model** (sharing the tower infrastructure) over building their own sites.

First of all, **Towecos incur significant levels of capex when building towers, but minimal incremental capex when adding additional tenants**. By sharing tower infrastructure, mobile carriers can spread these fixed costs over their combined network activity. See Figure 3 for an illustration of the present value of savings for MNOs in leasing versus building their own towers.

Second, the roll-out of 4G and 5G technology requires mobile carriers to invest large sums of money on the installation of next-gen mobile equipment across their networks. This can create significant pressure on their financial positions and has led mobile carriers around the world to **monetize their towers as a way of financing investments in their networks**.

Figure 2: FY21 Towers by Region



Source: Company Filings

Figure 3: PV of Carrier Alternatives (in US\$000’s)

Term	Build	Lease	Savings
5 yrs	\$340	\$89	\$251
10 yrs	\$385	\$156	\$229
15 yrs	\$420	\$206	\$214
20 yrs	\$445	\$244	\$201

Carrier Build Scenario Assumptions
 \$275 construction cost; \$1.25 monthly opex with 3% annual escalator; 9% WACC

Tower Lease Scenario Assumptions
 \$1.8 monthly lease with 3% annual escalator; 9% WACC

Source: Company Filings

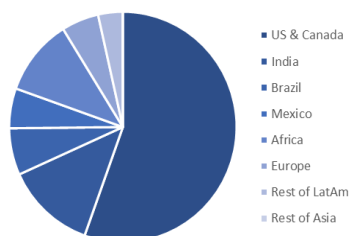
“Investors around the world have put pressure on Mobile Carriers to monetize their towers in order to unlock shareholder value”

Third, investors typically assign higher EV/EBITDA multiples on Tower companies than Mobile Carriers. Therefore, investors have put pressure on Mobile Carriers around the world to monetize their towers in order to **unlock shareholder value**.

Finally, the process of building a tower can take years given the need to secure the necessary ground interests and zoning approvals. By leasing existing towers, carriers can **reduce their time to market** when rolling out new technologies (3G/4G/5G). The increased speed at which carriers roll out improvements to their offerings can prove **crucial when competing for mobile subscribers on network quality and coverage**.

Sources of Revenues and Costs

Figure 4: FY21 Revenue by Region

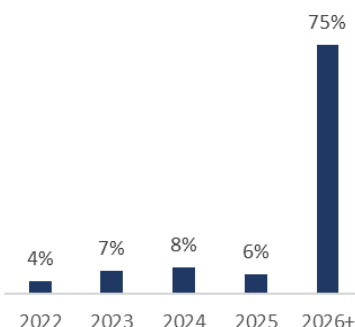


Source: Company Filings

AMT’s **revenue streams** are split among the following segments:

- **Property Revenue** (98% of LTM revenue): Includes (1) revenues related to the leasing of space on multitenant cellular towers (92% of LTM revenue) and (2) revenues related to its carrier-neutral data centres portfolio in the US (6% of LTM revenue). Revenue from the company’s tower business can be further segmented geographically as follows:
 - **United States & Canada:** 47% of LTM revenue
 - **Asia Pacific:** 11% of LTM revenue
 - **Africa:** 11% of LTM revenue
 - **Europe:** 7% of LTM revenue
 - **Latin America:** 16% of LTM revenue
- **Services Revenue** (2% of LTM revenue): Includes tower-related services provided to AMT’s tenants in the US, including site application, zoning, permitting, and structural analysis.

Figure 5: Global Ground Lease Renewal Schedule

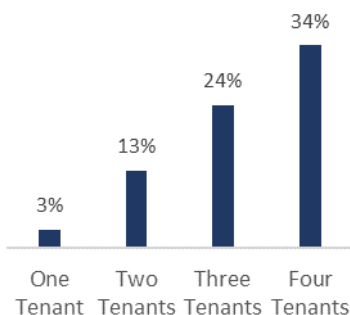


Source: Company Filings

AMT’s **operating expenses** arise from the following sources:

- **Direct operating expenses** (41% of LTM operating expenses): Consist primarily of ground rent, power and fuel costs, property taxes, and repairs and maintenance expenses. **A tower company’s largest direct cost is the ground rent, which often comprises c.70% of the total.** In the United States, ground rent is primarily fixed under long-term renewable lease agreements, with annual cost escalators of c.3%. **AMT owns or has a ground lease with at least 20 years until renewal on land covering more than 75% of its sites.** In addition, AMT’s landlord base is highly fragmented with 90% of ground leases held by landlords who own a single land parcel. Internationally, ground leases are often linked to inflation, recognizing a portion of the previous year’s inflation.

Figure 6: US Sample NOI Yield by # of Tenants



Source: Company Filings

- **Depreciation, amortization, and accretion** (40% of LTM operating expenses): Includes depreciation of towers, equipment, land, and buildings; amortization of intangibles arising from the acquisition of tower assets, such as tenant contracts and relationships; and accretion of asset retirement liabilities.
- **Selling, general and administrative expense** (13% of LTM operating expenses): Consist of overhead expenses related to corporate overhead costs and development expense related to the company’s acquisition efforts, costs associated with new business initiatives, and project cancellation costs.
- **Other operating expenses** (5% of LTM operating expenses): Primarily consist of impairment charges, net losses on sales or disposals of assets and other operating.

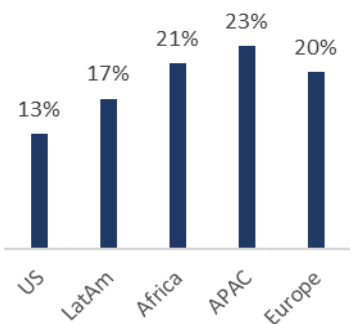
Unit Economics on Multi-Tenant Towers

The cell tower business has a significant degree of operating leverage. For instance, it costs about **\$275,000 to build a tower in the United States**, about **\$1,500 per year in maintenance capex**, and **\$10,000 per year in operating costs** (property rent, taxes, and insurance). The first tenant pays \$20,000 per year on rent, and each additional tenant pays \$30,000 per year.

With costs largely fixed, and 90%+ incremental gross margins, increases in the number of tenants per tower generate significant economies of scale and improve the return profile of a site. Specifically, **AMT’s NOI yield (gross profit divided by invested capital) increases from 3% on a single-tenant tower to 34% on a 4-tenant tower.**

Returns are even more attractive in international markets, largely given lower costs to build a new site. AMT will **generate a 13% return** on a new tower build with 2 tenants in the United States, but generates **17% in Latin America, 21% in Africa, and 23% in Asia Pacific.**

Figure 7: Sample International NOI Yield by Region for 2 Tenant Tower



Source: Company Filings

Competitive Landscape

Barriers to Entry: Each Tower its Own Local Monopoly

The mobile tower business is able to generate such attractive returns on capital due to competitive advantages related to **zoning restrictions, switching costs, and economies of scale.**

City ordinances and local municipalities around the world typically limit the building of new towers via **onerous zoning restrictions**, particularly in residential areas where **aesthetics is a concern**. In fact, many cities will prohibit the building of new towers unless it can be **demonstrated that no existing towers can accommodate the wireless carrier's network needs.**

Even if a company were to be given the authorization to build a cell tower near an existing cell tower site, mobile carriers would be unlikely to relocate their equipment to the new site given **high switching costs** in the form of potential **network disruption and high installation costs**. According to Jay A. Brown, President and CEO of Crown and Castle (one of American Tower's US competitors), antenna installation costs typically range between \$35,000 and \$40,000, equivalent to almost 1.5 years of tower leasing rent.

Finally, the returns on single-tenant towers are often mediocre given the fixed costs involved in building towers and **significant economies of scale** of adding incremental tenancies. As a result, an entrant interested in offering attractive enough rates to woo the mobile carriers **would need to commit capital at rates that would be far below their cost of capital**, particularly when competing against a multi-tenant tower with twice the revenue and only slightly higher costs.

As a result of such strong barriers to entry, existing **tower assets essentially own local monopolies over their coverage zones**, allowing them to generate very attractive returns on capital as tenancy ratios rise.

Key Cell Tower Competitors

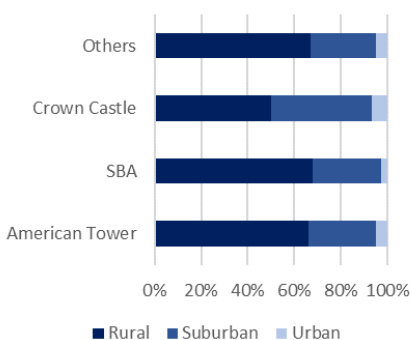
AMT's main competitors are the other two main tower companies in the US, Crown Castle and SBA Communications. **AMT and Crown Castle** are the largest players in the US, with **42,836 and 40,128 towers**, respectively, whereas **SBA Communications** has **only 16,495 towers**.

In terms of the geographic distribution, Crown Castle's tower portfolio is significantly more **concentrated into cities and dense urban areas**. 50% of its

The wireless tower business is able to generate these attractive returns on capital due to competitive advantages related to zoning restrictions, switching costs, and economies of scale.

As a result of such strong barriers to entry, existing tower assets essentially own local monopolies over their

Figure 8: US Tower Players Morphology Distribution



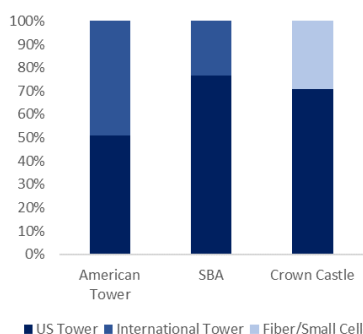
Source: Elliott Management

towers are within the top 50 Metropolitan Statistical Areas (MSAs) and only **50% are located in rural areas**. In comparison, AMT only has 34% of its towers in the top 50 MSAs and has **66% of its tower portfolio in rural areas**. SBA Communication has 32% in the top 50 MSAs and **68% of its portfolio in rural areas**. This potentially leaves Crown Castle more exposed to the roll-out of small-cells in dense urban areas (see Implications of 5G for the Demand for Towers).

AMT is the tower company with by far the most international exposure, **with 80% of its tower portfolio outside of the United States**, mainly in India, Brazil, Mexico, Nigeria, and Germany. SBA Communications also has a sizeable international footprint with 52% of its towers located internationally, primarily in Brazil and South Africa. By contrast, Crown Castle is fully focused on the US market.

Finally, AMT also competes with infrastructure funds and private equity firms such as Macquarie, Brookfield, KKR, and Blackstone for the acquisition of tower assets. The growing, predictable, and inflation-protected nature of the cash flows of the tower business have attracted such investors as they look to deploy capital in a world of low real interest rates and high inflation. This, to some degree, **drives up the prices of tower assets**, and **limits** the degree to which AMT has been able to expand via acquisitions.

Figure 9: Revenue Breakdown by Segment for US Towercos



Source: Company Filings

Customer Concentration

AMT leases to a limited number of mobile network carriers across its geographies. The customer concentration for each of these regions is as follows:

U.S. & Canada: AT&T, T-Mobile, and Verizon Wireless accounted for an aggregate of 88% of U.S. & Canada property segment revenue. Specifically, AT&T, T-Mobile, and Verizon accounted for 16%, 18%, and 12% of Total Property Revenue as of 4Q 2021.

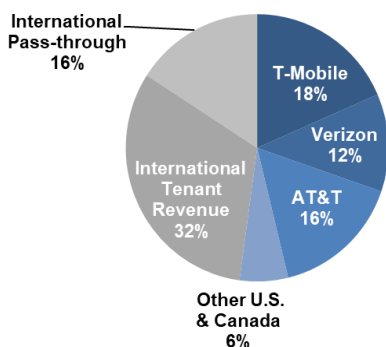
Asia-Pacific: Vodafone Idea Limited; Bharti Airtel Limited (“Airtel”); and Reliance Jio accounted for an aggregate of 89% of Asia-Pacific property segment revenue.

Africa: Airtel; and MTN Group Limited (“MTN”) accounted for an aggregate of 73% of Africa property segment revenue.

Europe: Telefónica S.A. (“Telefónica”); and Bouygues accounted for an aggregate of 74% of Europe property segment revenue.

Latin America: AT&T; Telefónica; and América Móvil accounted for an aggregate of 60% of Latin America property segment revenue

Figure 10: Revenue Breakdown by Key Customers

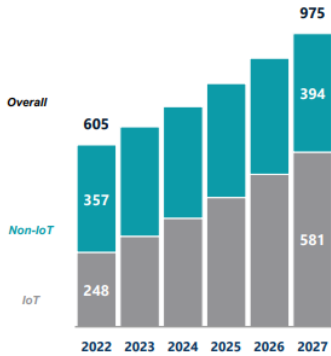


Source: Company Filings

Secular Growth Opportunities

As the owner of the key infrastructure on which mobile carriers must deploy their antennas, AMT is ideally situated to be the beneficiary of the large, global, secular growth in mobile data consumption across multiple industries and geographies.

Figure 11: US Total Mobile Connected Devices (millions)



Source: Company Filings

Long-term Demand Drivers

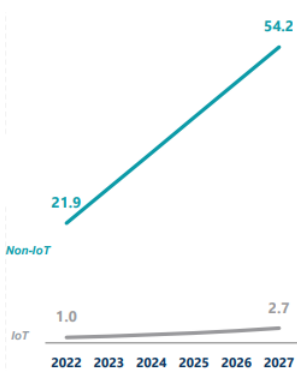
The growth in mobile data consumption results in greater demands on the capacity of mobile carriers' networks, requiring them to install more equipment across AMT's Portfolio. In particular, the growth in mobile data consumption can be segmented into:

Higher mobile device penetration. The number of total mobile-connected devices in the US is expected to continue to rise, growing at a **10% CAGR from 2022 to 2027**, according to the Ericsson Mobility Report. This is expected to be mainly driven by a growth in the number of Internet of Things (IoT) devices (**19% CAGR from 2022 to 2027**). This growth is expected to be higher in emerging markets due to lower non-IOT device penetration.

Average Data Usage per Device. In the US, the average data consumption for non-IoT devices is **expected to grow by 20%**, while it is expected to grow by a CAGR of 22% for IoT devices. This is expected to be driven by new VR and video-based apps, which demand higher video resolutions, increased uplink traffic, and a greater share of data off-loaded to cloud compute resources.

Given AMT's position as the critical backbone infrastructure supporting the growth in this mobile data consumption, as well as its attractive unit economics protected by strong entry barriers, we view it as a "toll-road" collecting a tax on the growth in mobile data consumption.

Figure 12: US Monthly Traffic per Mobile Connection (GB)

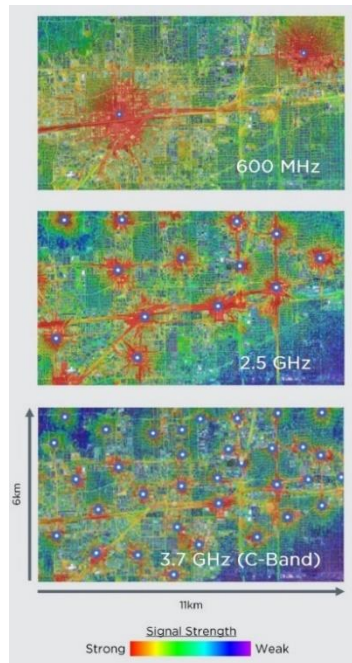


Source: Company Filings

Implications of 5G for the Demand for Towers

5G is the 5th generation technology standard for mobile networks, and follows 1G, 2G, 3G, and 4G LTE. 5G promises to deliver **faster download speeds** (up to 20x faster than median speeds of 4G LTE), **higher bandwidth, and lower latency (i.e., response time)**. The technology standard helps support the secular growth in mobile data consumption by enabling a greater number of

Figure 13: Cell Tower Coverage Maps by Frequency Used



Source: Crown Castle Filings

“If you go back to the consumer’s interest and desire for having really true broadband mobile handsets and the kind of software and application that go with that, there’s been a revenue growth for the carriers associated with that. [...] if the conditions are the same, the carriers continue to expand their revenues, they invest at these levels, the physics -- there is no kind of way out of deploying sites, adding more equipment to get the higher broadband speeds.” – Jim Taiclet (Former CEO of AMT)

devices to connect to mobile networks, and meeting the requirements of new data-intensive, low-latency mobile applications.

To better understand the implications of 5G on the tower industry, it is important to consider how it works. Rather than being a single technology, 5G is a collection of various improvements in the mobile network architecture, including the use of a wider set of radio spectrum, cell tower improvements, and improvements in antenna design:

Wider radio spectrum. There are 3 main bands of spectrum: **low-band** frequency (600 MHz, 700 MHz, 800 MHz), **mid-band** frequencies (2.0 GHz, 2.5 GHz, and 3.7 GHz), and **high-band** frequencies (mmWave). While 5G is a mobile network architecture, and is therefore independent of any specific frequency band, it allows for the deployment of mobile networks on higher frequency bands than was possible under the previous generations. This is particularly useful given that these frequencies support a higher amount of data transmission. On the other hand, higher frequency radio waves also have weaker propagation characteristics – they do not travel as far and can be more blocked by interfering objects. Specifically, the range of a 4G LTE cell tower transmitting low- and mid-band spectrum is **approximately 3 to 6.5 km**, whereas the range of a 5G cell tower transmitting low- and mid-band spectrum is 1.6 to 5km. This means that, to roll out 5G, mobile carriers will increasingly need to rent space on more existing or new cell towers in order to densify their networks.

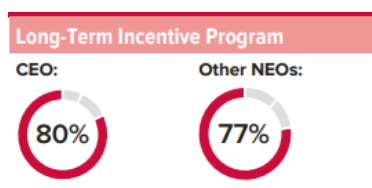
Cell tower improvements. Traditionally, mobile carriers have relied on towers to install larger antennas that help provide long-distance, “blanket coverage”. However, they are increasingly adding clusters of small, low-powered antennas called small cells to augment their capacity in high population density areas where network demands are higher. Small cells are attached to city infrastructures like streetlights, utility poles, and light poles in a way that is less intrusive than towers. Therefore, they are particularly well-suited to support mobile carrier deployment of high-band (millimeter wave) frequencies. While small cells are likely to decrease tower demand in dense urban and urban areas with a population density **greater than 2,900 people per square km**, towers are still the preferred solution in suburban and rural environments as they provide the most technologically efficient and cost-effective option for coverage and capacity requirements.

Antenna design. Mobile network operators are installing new 5G antennas which incorporate a technology known as massive MIMO (multiple input, multiple outputs). These antennas contain a very large number of elements to send and

receive more data and allow more people to simultaneously connect to a network and maintain high throughput.

Management & Capital Allocation Framework

Figure 14: Management Long-Term Compensation Program



- Provides at-risk, variable, equity-based pay opportunity for sustained operating performance
- Long-term retention tool that provides both time-based and performance-based restricted stock units
- Focuses executives on the creation of long-term stockholder value

For PSUs, we use **Consolidated AFFO per Share**⁽²⁾ and **ROIC**⁽²⁾ as the two quantitative performance measures in our long-term incentive program. Consolidated AFFO is widely used in the telecommunications real estate sector to adjust Nareit FFO (common stockholders)⁽²⁾ for items that may otherwise cause material fluctuations in Nareit FFO (common stockholders) growth from period to period, which would not be representative of the underlying performance of property assets in those periods. Utilizing the Consolidated AFFO per Share metric encourages management to reserve the use of Company stock as a funding mechanism only for those opportunities where it is strategically warranted and accretive over the long term for existing stockholders. ROIC encourages management to focus on earning adequate returns on invested capital over a sustained period.

Source: Company Filings

American Tower has a history of disciplined and rational capital allocation. According to the company, the objective of its capital allocation policy is to “simultaneously increase adjusted funds from operations **per share** and [its] return on invested capital over the long term”. Perhaps this is not surprising as 80% of the CEO, and 77% of the other key executive officers’, compensation is based on these two performance measures.

In addition, the CEO and President, Thomas A. Bartlett, owns c.\$47.9 million worth of American Tower common stock, which is c.48x his annual base salary and likely represents a significant portion of his net worth. We believe these factors create management-shareholder alignment and are therefore noteworthy positives to our thesis.

In practice, the American Tower’s capital allocation takes the form of a pecking order. After meeting certain requirements, such as its target dividend per share growth of 12.5%+ and a net leverage ratio of between 3x and 5x, it is free to deploy capital among its best alternatives. As CEO Tom Barlett explained in their 2Q 2020 earnings call, “All of [their] investments are evaluated using a 10-year unlevered DCF model, with varying IRR hurdles due to the inclusion of appropriate risk adjustments to account for the specific local country risk, the type of asset, counterparty, and a host of other factors.

Valuation

Discounted Cash Flow Valuation

In our research report, we use a **discounted cash flow (DCF) model** to estimate the equity value per share of America Tower. Due to the international nature of American Tower’s business, and the unique factors affecting each of these regions, we **forecast tower numbers, property revenue and expense individually for each of its market segments**. We also considered a new segment called **data centre** which has become a more significant part of AMT’s

business since its acquisition of CoreSite Realty in 2021. We forecast cash flows on a nominal basis and discount these back to the present using a **nominal weighted average cost of capital (WACC)**.

Based on our research, we developed certain expectations for the future of each of AMT’s market. Therefore, we have made detailed assumptions about the future development of AMT in those markets, which we discuss in detail in this section. However, we recognize that the factors on which we base our assumptions are subject to a certain degree of uncertainty, so we carry out a scenario analysis to see how changes to these affect the valuation.

At the end of our explicit forecast period, which is 10 years, we assume the **growth rate of the terminal value is equal to 3%**, as we would expect AMT to reach maturity at this point and grow at approximately the **GDP growth rate of the global economy**³. Given that American tower faces a range of potential opportunities and uncertainties, we consider different growth rates, explicit forecast periods, and WACCs in the sensitivity analysis.⁴

Weighted Average Cost of Capital

In order to compute the Weighted Average Cost of Capital (WACC) for AMT, we **fixed the Market Debt-to-Equity ratio** for valuation purposes. So, we use net debt to market capitalization as fixed debt to equity ratio. The **current market capitalization is \$100.51 billion** and **current net debt is equal to \$44,540 million**, which indicates the **net debt to equity ratio is 0.44**.

Cost of equity

We used CAPM (Capital Asset Pricing Model) to calculate the cost of equity. We assume the **current yield of the US Government 10Y Treasury Bond (USGG10YR)** as risk free rate which is **3.61%** on 12th November 2022 in base case. Although the yields have fluctuated considerably over the past year, it still reflects the **high interest rate situation** in the US.

In terms of beta, we calculate the raw beta of AMT from the last ten years’ historical stock price by regressing against S&P

500. **The raw beta is 0.81** with a 95% confidence

$$Unlevered\ beta = \frac{levered\ beta}{1 + ((1 - tax\ rate) \times \frac{D}{E})}$$

interval **[0.77,0.85]**, which is not safe enough for our estimation. Thus, we calculate the adjusted beta from the average adjusted unlevered beta of AMT and its comparable peers in the US market. Finally, we get re-levered beta of

	Raw beta	Confidence Interval 95%	
		lower interval	high interval
AMT US Equity	0.81	0.77	0.85
SBAC US Equity	0.79	0.74	0.83
CCI US Equity	0.75	0.70	0.79
Median	0.79		
Average	0.78		

Figure 15 Raw beta and 95% confidence

³ <https://www.oecd.org/economy/lookingto2060long-termglobalgrowthprospects.htm>

⁴ For more details, please look at sensitivity analysis

0.85. The reason why we use adjusted beta is in the long run, companies tend to get beta equal to 1.

	Raw beta	Adjusted Beta	Unlevered raw beta	Unlevered adjusted beta	levered raw beta	Levered adjusted Beta
AMT US Equity	0.81	0.87	0.57	0.62	0.81	0.87
SBAC US Equity	0.79	0.86	0.54	0.59	0.79	0.86
CCI US Equity	0.75	0.83	0.51	0.57	0.75	0.83
	0.00	0.33				
Median	0.77		0.54	0.59	0.79	0.86
Average	0.59		0.54	0.59	0.78	0.85

Figure 16 Industry levered adjusted beta calculation

Because AMT is a REITs (real estate investment trust) company, it is **normally not obliged to pay U.S. federal income taxes** on its REIT operations revenue. However, it must continue to pay U.S. federal income taxes on its domestic taxable REIT subsidiaries ("TRSs"). and except tax in US, AMT still **meet taxation in other counties.**

Thus, it is hard for us to forecast a fixed tax rate. We decided to use the current **effective tax rate of 4.22%** and assume it keeps constant for valuation purpose.

Implied Market Risk Premium

In terms of Market Risk Premium, we choose SPX Index as the benchmark since the main revenue and profit come from the US market.

we use **Dividend Discounted Model (DDM)** to estimate the intrinsic value of SPX Index. In this case, we assume the current level of index is the real intrinsic value of S&P 500 index, thus we can get the market risk premium easily⁵

For the intrinsic value of the index, we assume the based year earning is estimated based on year earnings from the **most recent year with \$208.53** and grow this cash flows at the expected growth rate from Top-down forecasted growth rate of **6.81% for 5 years.** After year 5, we regard the risk-free rate of **3.61%** as the **expected growth rate** in the long term as the perpetual growth rate.

Finally, our expected **implied market risk premium is equal to 5.65%.**

Besides, we also consider **the effect of the international market.** Thus, we based on weight of gross margin in different countries and countries spread in each country to estimate weighted average **country risk premium which is equal to 1.05%.** In this case, the **expected market risk premium (plus expected country risk premium) is 6.70%.**

⁵ This model is from Dr. Aswath Damodaran, website: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/home.htm

Cost of debt

Figure 17 Default spread sheet

If interest coverage ratio is	Rating is	Spread is
greater than -100000	≤ to D2/D	14.34%
0.5	C2/C	10.76%
0.8	Ca2/CC	8.80%
1.25	Caa/CCC	7.78%
1.5	B3/B-	4.62%
2	B2/B	3.78%
2.5	B1/B+	3.15%
3	Ba2/BB	2.15%
3.5	Ba1/BB+	1.93%
4	Baa2/BBB	1.59%
4.5	A3/A-	1.29%
6	A2/A	1.14%
7.5	A1/A+	1.03%
9.5	Aa2/AA	0.82%
12.5	Aaa/AAA	0.67%

To compute the cost of debt by using the **Debt Rating Approach**.

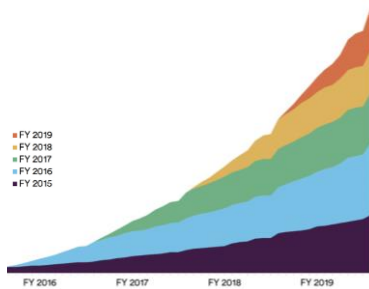
$$\text{Cost of Debt} = (\text{Risk free rate} + \text{Default spread}) \times (1 - t)$$

The Default Spread of BBB Rating is **1.59%**⁶. Because all debt securities of AMT are rated as the **BBB** securities, we directly get the cost of debt which is equal to **4.98%**.

We suppose the **WACC is equal to 7.93% in all scenarios**.

Revenue Growth

Figure 18: Illustrative ARR by Annual Cohort



Source: BuildGroup

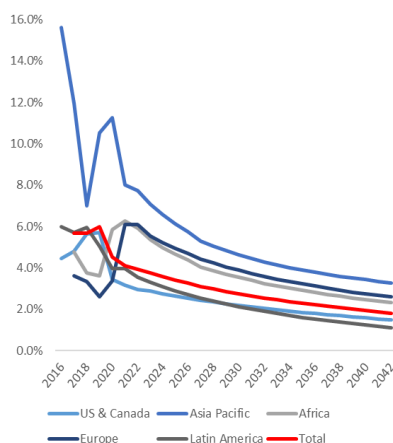
AMT's revenue growth is determined by the (1) growth in revenue from existing towers (also referred to as organic tenant billings growth) and **(2) growth in revenues from the addition of new towers**. Much like in the case of a high-quality SaaS (software as a service) business, the combination of these two drivers working in tandem can be quite powerful, as is illustrated in Figure 18. **The growth in revenue from existing towers can be further sub-divided into growth from (a) colocations on existing towers, (b) lease amendments, (c) price escalators and (d) 'negative' growth from customer churn.**

(1.a.) Colocations on existing towers. To satisfy the growing demand for mobile data, carriers must install additional antennas across their networks. As previously explained, the cheapest way to do so is to install antennas on already existing towers. When carriers do so, this translates to more tenants, and therefore more revenue, on a per tower basis.

(1.b) Lease amendments. Besides installing additional antennas, carriers may also replace older antennas with newer and better ones. Upgrades typically mean heavier and bulkier equipment, which leads to amendment revenues for AMT given that part of the rent is calculated based on the weight of equipment on the tower.

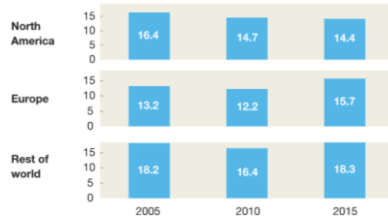
Therefore, **AMT's revenue growth from colocations and amendments is driven by the amount of capex that MNOs invest in the improvement and densification of their networks**. For instance, from 2017-2021, MNOs in the US spent \$31 billion of capex on average per year. This translated into an incremental \$162 million in revenue on average each year for AMT, or 4% to 5% revenue growth.

Figure 19: Base Case Revenue Growth from Colocations & Amendments



⁶ https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ratings.html

Figure 20: Capex/Revenue for Top Telecom Companies (%)



Source: McKinsey

In our base case, we assume that MNO capex in each of AMT’s markets remains constant over the explicit forecast period. This translates to a constant level of incremental revenues from amendments/colocations on a per tower basis.

Implicit in this assumption are a few underlying drivers. First, **the level of MNO capex is a function of the revenues that mobile carriers generate from their customers.** Capex as a percentage of revenues for MNOs tends to be stable over time, as can be seen in Figure 20. We are, therefore, also implicitly assuming that MNO revenues remain constant.

Second, **the level of MNO revenues generated is a function of the number of mobile users and the average revenue per user (ARPU).** While revenues increased in line with mobile subscribers until about 2011, in more recent years, MNO revenues in most parts of the world have been falling or flat as ARPUs have declined. The decline in ARPU reflects several factors, including increased commoditization and price competition among mobile carriers, improvements to—and falling costs of—mobile technologies, and decreased willingness on the part of consumers to pay for ever-increasing mobile speeds and capacity.

In our base case, any decreases in ARPU will be offset by continued increases in mobile subscribers. This will require new mobile applications that increase consumers’ willingness to pay for capacity, speed, and low latency of data and a rise in subscribers, driven by IoT devices in AMT’s developed markets and mobile penetration in AMT’s developing markets.

(1.c) Price escalators. As previously mentioned, AMT has in place price escalators into their leasing contracts to protect against inflation. **Contract price escalators are typically c.3% in the US, 2% to 3% in India, and CPI-linked in the rest of its markets.** In our base case, we assume revenue growth from price escalators equal to inflation in each market (as per IMF forecasts). Price escalators in AMT’s foreign markets are offset by foreign exchange depreciation based on inflation differentials between these markets and the US.

(1.d) Customer Churn. Customer churn arises from the decommissioning of equipment by MNOs on existing sites and works to reduce **AMT’s revenues.** **Historically, churn has tended to be in the range of 1% to 2% per year.** However, churn averaged 3.7% from 2017 to 2021 due to consolidation amongst carriers in AMT’s key markets, which caused redundancies in the remaining players’ networks. In our base case, see this metric trending back to 1.6% by 2029 as most markets now host only 3 MNOs meaning there is less scope for consolidation.

Figure 21: Base Case Revenue Growth from Price Escalators

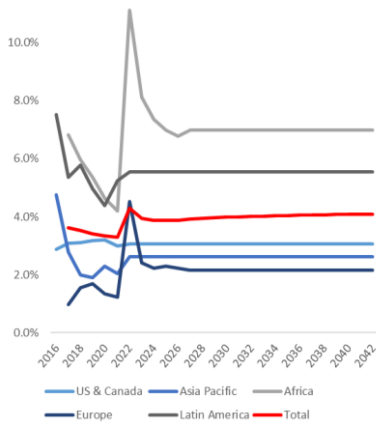
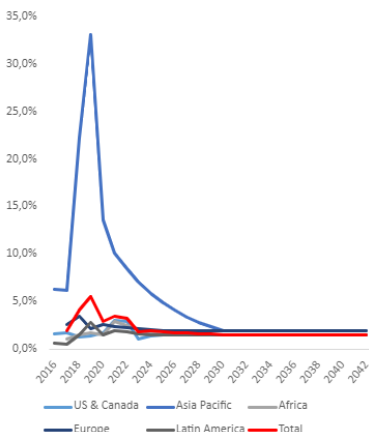


Figure 23: Base Case Revenue Decline from Customer Churn

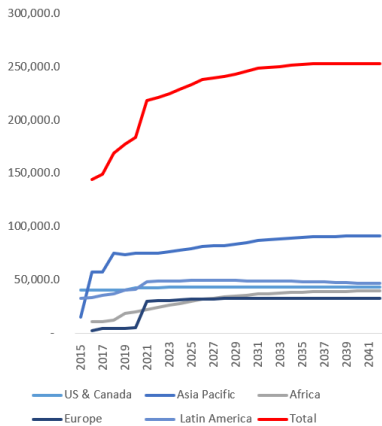


(2) Addition of new towers. AMT has grown its tower count significantly over the past 20 years. In fact, **tower count grew at a 27% CAGR from 1997 to 2021, accounting for most of AMT’s 30% revenue CAGR over that period.** A large part of this has been driven by global acquisitions of MNO-captive tower portfolios and smaller Towercos. However, with many of the towers now owned by established players, we believe AMT’s growth on this front will be much more limited going forward. **We do not incorporate any growth contribution from M&A in our valuation.**

On the other hand, AMT has been increasingly focusing on building out its tower portfolio organically. In 1Q22, management indicated that it had a long-term goal of building **40,000 to 50,000 towers from 2022-2029** (c.9,000 per year). Of this amount, 4,000 will come from Asia Pacific (mostly India), 1,900 from Africa, and 500 each from Europe and Latin America. Beyond this, we model the pace of **build out halving every 5 years to reflect the saturation** of tower in AMT’s markets.

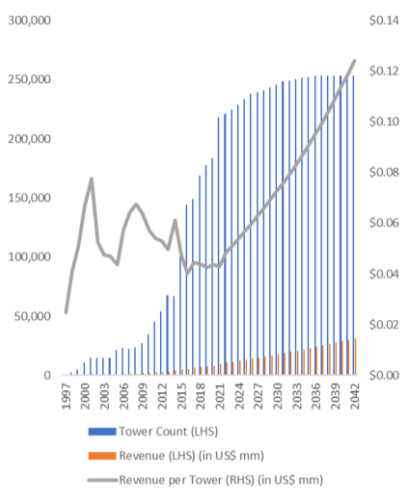
In our base case, we expect these factors combined to produce a **revenue CAGR of 4.6% from 2022 to 2042.** Importantly, while **revenue per tower** contributed to only c.10% of AMT’s historical growth, **we expect it to drive 85% of growth (or a 3.9% CAGR) from 2022-2042.**

Figure 24: Base Case Tower Count Progression



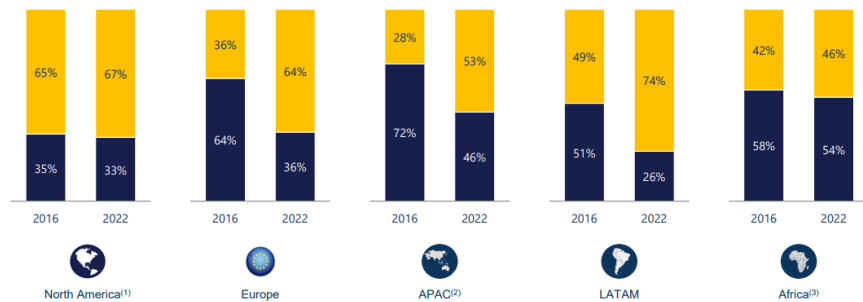
US & Canada Asia Pacific Africa
Europe Latin America Total

Figure 25: Historical Revenue and Tower Count



Source: Company Filings

Figure 26: Tower Ownership by Region
(%, towers owned by different operator types)



Profit Margins

As discussed in the introduction, **42% of AMT’s operating costs** are related to direct operating expenses (mostly ground rent) and **40% are related to depreciation and amortization** of towers and tower-related assets. These costs are **largely fixed** on a per tower basis as revenues increase from colocations and amendments. As a result, increases in revenues generated per tower translate to significant operating leverage and margin expansion.

In our base case, we expect revenue per tower to increase by **2.1x over our forecast period (2022-2042)** and to drive increases in AMT’s gross margin from

c.71% to c.79%, its **EBITDA margin from c.63% to c.71%**, and its operating income margin from **c.28% to c.55%**.

We appreciate that such a significant degree of margin expansion may sound too optimistic, particularly given AMT’s operating margins have been on a downward trend for the last 15 years. However, we believe that margins have been artificially depressed **due to AMT’s rapid tower count increase**.

As a sanity check, we point out that there are several examples of Towercos that have experienced significant margin expansion as revenues per tower increased. The most compelling evidence of this being the case is from the experience of Indus Towers, which achieved **EBITDA and EBIT margin expansions of 20% and 26%**, respectively, on the back of an expansion in its **revenue per tower of 55% from 2010 to 2022**.

Scenario Analysis

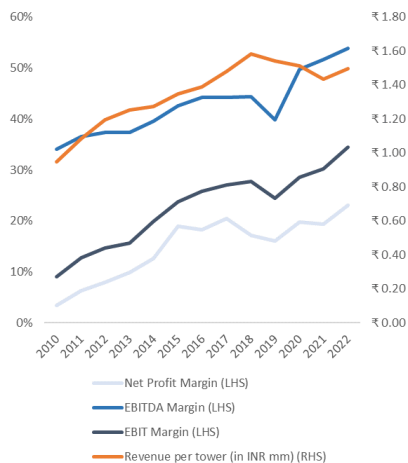
We believe that most of AMT’s underlying growth drivers, economic fundamentals, and competitive position are uniquely sustainable and predictable. However, there are certain elements of uncertainty with respect to the **revenue growth drivers** which could have a significant effect on the valuation. We also recognize that there are always **uncertainties and risks** involved in making long-range business forecasts. Therefore, we have decided to **use probability-weighted scenarios** to analyse the effect that changing our assumptions has on the value of American Tower.

Specifically, we constructed **3 cases**—a base case, a bear case, and a bull case—in which we put forward different assumptions regarding AMT’s revenue growth pertaining to **amendments/colocations and declines due to churn**. We chose not to vary our assumptions with regards to revenue growth from price escalators since doing so has little to not impact on valuation. Price escalators are fixed in the US and India and any changes in price escalators due to changes in inflation in AMT’s other markets are offset by exchange rate depreciation/appreciation over time.

Scenario 1: Base Case (Constant MNO Capex)

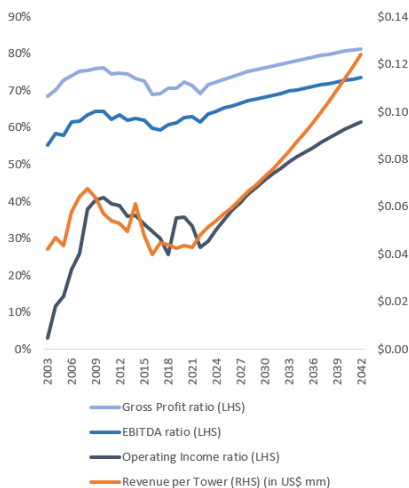
Our estimated stock price is \$289.0 with the expected return of 33.86% in the base case. So, we suggest BUYING this stock.

Figure 28: Indus Towers Revenue per Tower and Profit Margins



Source: Indus Tower Filings
Note: Revenue, EBITDA, and EBIT are excluding other income.

Figure 27: Revenue per Tower and Profit Margins



Source: Company Filings

Colocations/Amendments. As we mentioned in the Revenue Growth section, we assume for our base case that yearly incremental revenues from colocations and amendments remain constant over our forecast period, driven by the assumption that MNO capex and revenues remain constant. Specifically, based on Ericsson forecasts⁷, we assume **mobile subscriber growth of 2.0%, 1.8%, 3.3%, 0.2%, and 1.6%** in the US & Canada, Asia Pacific, Africa, Europe, and Latin America, respectively (2.4% on average across AMT's markets). **This would be offset by equivalent declines in mobile ARPU.**

Churn. As discussed in the Revenue Growth section, AMT has experienced a marked increase in churn over the past several years, driven in large part by consolidation among mobile carriers in its key markets. In our base case, we are assuming that the long-term sustainable churn rate for AMT is 1.6%, which is within AMT's historical range of churn rates of between 1% and 2%. We further assume that churn gradually normalizes to this level by 2029.

Tower count. In our base case, we assume that tower count increases at a CAGR of 0.7% over our forecast period, resulting in an increase from c.221,000 towers in 2022 to c.253,000 towers in 2042. This includes a **CAGR in tower count of 0.0%, 1.0%, 2.6%, 0.3%, and -0.2%** in the US & Canada, Asia Pacific, Africa, Europe, and Latin America, respectively. As explained in the Revenue Growth section, this reflects new build activity in line with management's guidance from 2022 to 2029, and a **subsequent halving of activity every five years thereafter**. This is offset by Tower count decreases in each region due to decommissioning of towers due to wear and tear or obsolesce.

Weighting. We believe that the base case is the most likely scenario and attach it a **70% likelihood of occurrence.**

Scenario 2: Bear Case (Declining MNO Capex)

Our estimated stock price is \$260.2 with the expected return of 20.54% in the bear case. So, we suggest BUYING this stock.

Colocations/Amendments. In our bear case, we assume that AMT's yearly incremental revenues from colocations and amendments **decline by a CAGR of 1.6%** over the forecast period. In this case, we are assuming an equivalent increase in mobile subscriber growth as in the base case. However, we assume a higher mobile **ARPU decline of 4%**, which is more in line with the rates of

⁷ Source : <https://www.ericsson.com/en/reports-and-papers/mobility-report/mobility-visualizer?f=1&ft=2&tr=4,3,5,13,9&t=8&s=4&u=1&y=2021,2027&c=3>

decline that have been seen over the past decade. Such a decline in ARPU would follow should we see a continuation in the trends in price competition among mobile carriers, developments and efficiencies in mobile technologies, and a lack of compelling applications that increase consumers' willingness to pay up for better mobile service.

Churn. In terms of churn, our bear case assumes that the **long-term sustainable churn rate for AMT is 2.1%**. This would reflect the potential that AMT's historical churn rate of between 1% and 2% is no longer appropriate as AMT has since expanded into new markets. While we see no clear evidence that international markets should have inherently higher churn rates (for example, churn was just 0.7% in Latin American in 2016), there is always the risk that AMT's newly acquired towers are of a different quality to its legacy portfolio. We also assume in our bear case that AMT's churn rate takes longer to normalize back to 2.1% and only **reaches this level by 2031**.

Tower count. In our bear case we assume that tower count increases at a CAGR of 0.2% over our forecast period, resulting in an increase **from c.221,000 towers in 2022 to c.229,000 towers in 2042**. This includes a CAGR in tower count of -0.5%, 0.5%, 2.1%, -0.2%, and -0.7% in the US & Canada, Asia Pacific, Africa, Europe, and Latin America, respectively. Our forecast reflects **a growth rate in tower count of 0.5% less than the base case** in each region over the forecast period.

Weighting. We believe that the base case has a low likelihood of occurrence relative to the base case and attach it to a **probability weighting of just 20%**.

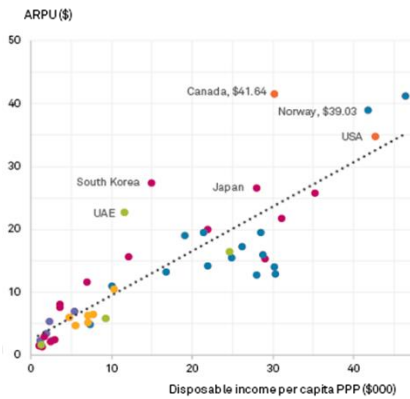
Scenario 3: Bull Case (Increasing MNO Capex)

Our estimated stock price is \$340.0 with the expected return of 57.50% in the bull case. So, we suggest BUYING this stock.

Colocations/Amendments. In our bull case we envision a growth in the yearly incremental revenues from colocations and amendments, supported by growth in capex and revenue on the part of MNOs globally. In this case, we forecast that MNO revenues and capex increases benefit from the tailwind of growth in both mobile subscribers and mobile ARPUs.

We believe that there is a reasonable chance that ARPUs will have to increase going forward in order to support continued network investments that will be needed to meet the requirements of new data-intensive, low-latency mobile applications. Specifically, we estimate that consumers will be willing to continue

Figure 29: ARPU vs. Disposable Income per Capita by Country



Source: S&P Global

to spend a fixed portion of their incomes on mobile services. In other words, **we see a path for ARPUs to increase in line with incomes on a real basis.** This potential outcome is supported by the fact that mobile ARPUs tend to be highly correlated to the real GDP per capita in PPP terms across countries. In addition to this, our bull case uses **the same mobile subscriber growth rates** as in the base case.

As a result, in our bull case, we forecast MNO capex, and by extension AMT’s yearly incremental revenues from colocations and amendments, increasing in each region at a rate equal to the **growth in real GDP per capita in PPP terms** (as forecasted by the IMF⁸) plus the **growth in mobile subscriber count** (as forecasted by Ericsson).

Churn. We assume in our bull case that AMT’s long-term **normalized churn rate is just 1.1%**, which is on the lower end of AMT’s historical churn rate range of between 1% and 2%. This reflects the reality that, following several rounds of consolidation, there are now only 3 mobile major MNOs in most of AMT’s key markets. This means that there may be less room for consolidation going forward, which would entail a reduced rate of the decommissioning of redundant cell sites that typically occurs when carriers consolidate. Our bull case also reflects an optimistic view with respect to the rate at which churn reaches this normalized churn rate. **We assume that churn falls to its sustainable rate of 1.1% by 2026.**

Tower count. In our bull case we assume that tower count increases at a CAGR of 1.2% over our forecast period, resulting in an increase from **c.221,000 towers in 2022 to c.280,000 towers in 2042.** This includes a **CAGR in tower count of 0.5%, 1.5%, 3.0%, 0.8%, and 0.2%** in the US & Canada, Asia Pacific, Africa, Europe, and Latin America, respectively. Our forecast reflects a growth rate in tower count of 0.5% more than the base case in each region over the forecast period.

Weighting. We believe that the bull case has the lowest likelihood of occurrence, and therefore attach it to a **probability weighting of only 10%.**

In the end, after considering all **expected price and probability** of happening of each scenario, our final estimated **stock price of the weighted-probability scenario is \$288.3** which is the sum of the expected values of **\$34.0, \$202.3 and \$52.0** from our bull case, base case and bear case, respectively.

⁸ [https://www.imf.org/en/Publications/WEO/weo-database/2022/April#:~:text=The%20World%20Economic%20Outlook%20\(WEO,and%20in%20many%20individual%20countries](https://www.imf.org/en/Publications/WEO/weo-database/2022/April#:~:text=The%20World%20Economic%20Outlook%20(WEO,and%20in%20many%20individual%20countries)

Public and Private Market Valuations

In addition to carrying out a DCF valuation, we chose to conduct public and private market valuations in order to triangulate our own valuation with those being set in the public and private markets. Given that valuations for Towercos vary significantly across regions, we chose to value each of AMT’s regions/segments separately on a sum-of-the-parts basis.

In our private market valuation, we considered all **private transactions of Towercos within the last 10 years** (December 2012 to December 2022) with publicly disclosed valuations. Towercos are typically purchased based on their tower cash flows (TCF), which is defined as recurring revenue minus tower-specific operating costs and approximate annual maintenance capex. Given that maintenance capex is typically low for Towercos (c.2%-4% of revenues), we used EBITDA as a proxy where the TCF was not available. Furthermore, as AMT does not disclose EBITDA separately for each of its regions, we estimated EBITDA by allocating SG&A to the geography segments’ gross profits based on revenue mix. Finally, we valued the Data Centre segment, which is mostly composed of CoreSite (a business that AMT acquired in 2021) based on the EV/EBITDA multiple that AMT paid to acquire the asset in 2021.

The results of our private market valuation suggest that AMT’s **enterprise value is \$135.6 billion** (20.6x EV/EBITDA), its **equity value is \$85.0 billion**, and its **equity value per share is \$184.2**.

Figure 30: AMT Private Market Valuation Summary Table (in US\$ mm, except per share figures)

Segment	FY22E Revenue	FY22E Gross Profit	FY22E SG&A	FY22E EBITDA	Avg. EBITDA/TCF Multiple	Value
US & Canada	5,065.6	4,179.6	470.8	3,708.8	24.9	92,490.1
Asia Pacific	1,351.0	600.6	125.6	475.1	9.9	4,703.2
Africa	1,191.0	796.2	110.7	685.5	11.4	7,838.3
Europe	552.2	345.3	51.3	294.0	15.8	4,639.9
Latin America	1,571.4	1,087.1	146.0	941.1	13.9	13,094.1
Data Center	758.7	439.9	70.5	369.4	29.0	10,712.1
Services	241.2	128.5	22.4	106.1	19.6	2,082.9
Total AMT	10,731.1	7,577.2	997.3	6,579.9	20.6	135,560.8
Net Debt & Minority Interest						-50,576.8
Equity Value						84,984.0
Common shares outstanding						461.4
Equity Value per Share						184.2

In our public market valuation, we considered 2 peers in the US (Crown Castle and SBA Communications), 3 peers in Asia (Protelindo, TBIG, and Indus Towers), 4 peers in Europe (Inwit, Cellnex, RAI Way, and Vantage Towers), 2

peers in Africa (Helios Towers and IHS Holding), and 1 peer in Latin America (Opsimex). We took the **average implied value of AMT’s different regions based on 3 valuation multiples—P/S, EV/EBITDA, and EV/EBIT—and across 3 time periods (FY2022E, FY2023E, and FY2024E).**

Given that AMT does not report EBITs across its segments, we estimated them by allocating D&A across each segment by invested capital in each segment. In the case of the data centre and services segments, we used the same valuations arrived at in the private market valuations analysis.

The results of our public market valuation suggest that AMT’s **enterprise value is \$132.5 billion**, its **equity value is \$90.0 billion**, and its **equity value per share is \$177.6**.

Figure 31: AMT Public Market Valuation Summary Table (in US\$ mm, except per share figures)

Segment	FY22E P/S	FY23E P/S	FY24E P/S	FY22E EV/EBITDA	FY23E EV/EBITDA	FY24E EV/EBITDA	FY22E EV/EBIT	FY23E EV/EBIT	FY24E EV/EBIT	Average
US & Canada	52,400.5	52,889.1	53,888.2	85,941.4	86,379.5	87,461.7	87,150.5	92,922.2	98,197.0	77,470.0
Asia Pacific	6,571.3	6,926.9	7,212.1	4,547.1	5,440.9	6,024.5	2,387.3	3,732.5	4,745.7	5,287.6
Africa	2,308.8	2,221.1	2,326.4	5,072.4	4,933.1	5,080.7	7,119.7	6,616.4	6,861.9	4,726.7
Europe	5,339.8	5,476.3	5,522.5	4,883.3	5,165.6	5,237.7	n/a	n/a	n/a	5,270.9
Latin America	10,088.9	9,787.7	9,611.2	12,149.0	11,931.6	11,325.6	15,476.2	12,940.0	13,247.8	11,839.8
Data Center	10,712.1	10,712.1	10,712.1	10,712.1	10,712.1	10,712.1	10,712.1	10,712.1	10,712.1	10,712.1
Services	2,082.9	2,082.9	2,082.9	2,082.9	2,082.9	2,082.9	2,082.9	2,082.9	2,082.9	2,082.9
Total AMT	140,081.1	140,672.9	141,932.2	125,388.3	126,645.8	127,925.0	124,928.8	129,006.2	135,847.4	132,492.0
Net Debt & Minority Interest	-50,576.8	-50,576.8	-50,576.8	-50,576.8	-50,576.8	-50,576.8	-50,576.8	-50,576.8	-50,576.8	-50,576.8
Equity Value	89,504.3	90,096.1	91,355.4	74,811.5	76,069.0	77,348.2	74,352.0	78,429.4	85,270.6	81,915.2
Common shares outstanding	461.4	461.4	461.4	461.4	461.4	461.4	461.4	461.4	461.4	461.4
Equity Value per Share	194.0	195.3	198.0	162.2	164.9	167.7	161.2	170.0	184.8	177.6

Key Risks⁹

Increasing competition

Due to the **intense competition** in the sector, customers have many options when leasing communications infrastructure assets. Lease rates could be

⁹ Source: American Tower annual report, Analysts Estimates

significantly and negatively impacted by **competition brought on by pricing or alternative contractual arrangements** from competitors. American Tower might **not be able to renew** current customer leases or enter into new customer leases, or if it can, they might be at lower rates or with less favourable terms than its current rates, which would have a **negative effect** on operating results and growth rate of American Tower. As explained in the Competitive Landscape section, we believe that AMT is largely protected from this risk based on its high barriers to entry.

Customers strategy adjustment

American Tower's revenue comes from a **limited number of consumers**, thus it's sensitive to **creditworthiness and financial strength** changes. AMT's financial performance could **be materially harmed** if certain clients don't satisfy their obligations. Growth, revenue, and ability of AMT to generate positive cash flows could potentially be **negatively affected** if clients merge activities, close enterprises, or share site infrastructure.

Extensive lease activity may slow **if carriers use shared equipment** rather than deploy new equipment, or it may lead to the decommissioning of equipment on certain existing sites because portions of wireless service providers' infrastructure are shared widely through roaming or resale agreements, including due to advances in 5G network technology.

Leverage and debt service obligations

American Tower's capacity to obtain more money to pay for capital expenditures, future development and expansion plans, and to meet its distribution needs could be considerably and negatively impacted by its **debt service obligations and leverage**. It might make it **more difficult** for American Tower to secure additional debt or equity funding, which could put it at a **competitive disadvantage** against rivals who are less indebted and who might have better access to capital resources, notably when acquiring assets and reduce its ability to adapt quickly to developments in the industry and the markets. This is particularly a risk given its higher than historical debt levels owing to its recent purchase of Telxius.

Rising inflation

Inflation would **raise** the cost of land, supplies, labour, and other expenditures necessary to operate and develop AMT. In locations where AMT leases have fixed escalators, returns might be severely impacted **if inflation rates exceed the specified escalation percentages**. This could be the case in the US and India, where AMT's leases contain fixed, rather than CPI-linked price escalators.

Depending on the terms of its contracts and other economic considerations, American Tower **may not be able to raise prices substantially** enough to keep up with the rate of inflation in the present inflationary economy, which would **reduce its profit margins and returns**. If American Tower is unable to increase prices to offset the impacts of inflation, its company, operating performance, and financial position might be significantly impaired. That being said, the majority of AMT’s direct operating expenses are related to land rents, which themselves are tied to AMT’s price escalators, and AMT’s maintenance capex is less than 5% of revenues, which somewhat insulates it from this risk.

Additionally, inflation is frequently **accompanied by an increase in interest rates**. Due to the possibility of high inflation and a prolonged economic downturn, as well as the potential impact of COVID-19, American Tower may find it more difficult to borrow money or gain access to capital, which could have a **negative impact on its operational and financial results** even after conditions begin to improve.

Substitute Mobile Infrastructure

As discussed in the Secular Growth Opportunities section, MNOs may use small cell technology to increase their coverage in dense urban areas when supporting ultra-high-frequency mobile transmission services. Of course, such an alternate method of mobile communications infrastructure presents the risk that AMT’s towers become obsolete. However, small cells are non-economical in low-density areas due to the very high cost of deployment, a fact which we believe ensures that AMT’s rural-focused tower portfolio is largely protected for the foreseeable future.

Figure 32: Sensitivity analysis of Weighted Probability Scenario

Weighted Probability Scenario		Target Price: 288.32						
Value per share		Growth Rate						
		1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
W A C C	5.93%	357.38	387.59	424.00	472.91	537.71	626.18	768.24
	6.93%	281.30	299.47	321.10	347.60	380.83	423.80	481.40
	7.93%	228.10	239.88	255.19	285.12	288.52	311.89	341.59
	9.93%	186.75	196.48	205.93	215.96	227.51	241.46	258.68
Expected Return		Growth Rate						
		1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
W A C C	5.93%	65.55%	70.32%	80.69%	110.07%	149.28%	191.46%	257.76%
	6.93%	30.40%	38.73%	48.75%	62.02%	76.43%	96.32%	123.00%
	7.93%	5.69%	11.03%	17.27%	24.67%	33.98%	44.86%	58.14%
	9.93%	-12.64%	-8.98%	-6.40%	-4.1%	-2.89%	-1.93%	19.85%
Recommendation		Growth Rate						
		1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
W A C C	5.93%	BUY	BUY	BUY	BUY	BUY	BUY	BUY
	6.93%	BUY	BUY	BUY	BUY	BUY	BUY	BUY
	7.93%	BUY	BUY	BUY	BUY	BUY	BUY	BUY
	9.93%	SELL	SELL	SELL	SELL	SELL	SELL	SELL

Sensitivity Analysis

Given the risks that we have outlined, we believed that it would be useful to create a sensitivity analysis with the various parameters that could affect our valuation. In particular, our sensitivity analysis aims to see the effect of the **WACC, the terminal growth rate, and the explicit forecast period** on the valuation of AMT.

In the base case, with a 3% growth rate, the price increases from **\$185.07** with WACC of **9.93%** and **10 year** explicit forecast period to **\$588.53** with WACC of **5.93%** and **20 year** explicit forecast period. Under the same growth rate, the price range of bear case and bull case are **[166.90, 490.55]** and **[217.17, 815.93]**, respectively.

Figure 33 Sensitivity analysis with WACC & Explicit Period in base case

Base case (With 3% terminal growth rate)		The end year of explicit period										
Value per share		2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
W A C C	5.93%	538.91	546.47	553.29	559.42	564.90	573.71	577.55	580.92	583.85	586.37	588.53
	6.93%	381.70	386.25	390.33	393.98	397.23	402.71	404.95	406.91	408.60	410.04	411.27
	7.93%	288.97	291.83	294.40	296.69	298.72	302.35	303.73	304.93	305.96	306.84	307.58
	8.93%	228.02	229.85	231.50	232.97	234.27	236.77	237.64	238.40	239.04	239.59	240.05
	9.93%	185.07	186.23	187.28	188.22	189.06	190.83	191.38	191.85	192.26	192.61	192.90

We also conduct **sensitivity analysis for Weighted Probability Scenario**. In this case, we suggest **SELLING** stock of AMT when WACC is **9.93%** and **BUY** AMT shares if WACC is **lower** than it. We also find our estimated share value is **more sensitive with the change of Growth rate** than WACC when they change with the identical percentage of 1%. **Figure 32** indicates we will get return with **68.57%** possibility if we **BUY** stock now and hold it until the end of 2023.

Deep Dives into Key Regions¹⁰

United States

The number of cell towers in the US has grown from **c.110,000 in 2010 to c.145,000 as of 2021** (c.3% CAGR). At the same time, the number of cell sites on towers increased from just over **250,000 to 330,000** (c.2.7% CAGR). This was mostly driven by a shift from 3G to 4G to support the proliferation of smartphones and related increases in mobile data usage.

Given the tower count has increased at a similar rate to cell site count, the tenancy ratio has remained relatively flat. For instance, it only **grew from 1.91 to 1.99 from 2015 to 2021**. Organic revenue growth for the tower companies has mainly been driven by amendment activity related to the augmentation of 4G networks to prepare for the roll-out of 5G. The amount of colocation activity has been fairly muted as of yet. This has meant that the **more attractive high margin revenue** driven by colocation has been relatively absent on aggregate across the industry. Going forward, we believe that a greater proportion of the revenue growth will be driven by colocation driven by the need for carriers to densify their networks in a cost-efficient manner, particularly in more rural areas.

We also expect inorganic growth in tower count for AMT to come mostly from acquisitions of smaller players. This would mark a continuation in a trend that has

¹⁰ Source: American Tower investor presentation, <https://www.americantower.com/investor-relations/investor-presentations/> TowerXchange Guide, <https://www.towerxchange.com/regional-guides?page=1>

seen the share of towers held among the top 3 players to increase **from 50% in 2012 to c.70% as of 2021.**

On the mobile carrier side, as of 2020, the industry in the US was dominated by four players: AT&T, Verizon, T-Mobile, and Sprint. However, in 2020, T-Mobile merged with Sprint, taking the wireless industry from 4 to 3 players and providing T-Mobile with a significant amount of excess spectrum on which to roll out 5G.

At the same time, this led T-Mobile to announce the decommissioning of **35,000 cell sites**, which has since caused a massive amount of churn for AMT and the rest of the US tower industry. While some of this will be offset by the recent entrance of Dish, which promised to build a 15,000-site 5G network that will **cover 70% of the US population** by June 2023, it is likely to remain a drag on cell towers revenue growth for the next few years. In fact, AMT CFO, Rod Smith, noted on the 3Q 2021 earnings call that Sprint churn would lead to \$195 million in annual Sprint revenue roll off in 2021, followed by **\$60 million in 2022, \$50 million in 2023, and \$70 million in 2024.**

AT&T and Verizon have been focused on rolling out ultra-low latency, high speed 5G networks in metropolitan areas. T-Mobile has, instead, chosen to also address customers in rural areas given its mid-band focused network enables it to build on its usage of the 600MHz frequency band. The company's approach has been self-described as a three-tiered cake, with a mixed spectrum offering of 600MHz, 2.5GHz, and mmWave. Given the relatively poor reception for the offerings of AT&T and Verizon, they have ramped up their initiatives in rolling out nation-wide coverage through the more cost-efficient, mid-frequency C-band.

AT&T has been in a weak position to roll out 5G given its limited ownership of spectrum. In early 2021, the company was therefore compelled to **borrow \$14.7 billion in debt to fund its more than \$20 billion** purchase of spectrum in the c-band (3.7 GHz) auction.

Going forward, we expect rural expansion from AT&T and Verizon, as they look to catch up with T-Mobile, to be a strong driver of new cell site and colocation across AMT's portfolio.

Asia Pacific – India

In recent years, the Indian telecommunications industry has seen a wave of consolidations triggered by the aggressive entry of Reliance Jio, a subsidiary of the large Indian conglomerate Reliance Industries. The company sought to take market share by undercutting its competitors, offering unlimited LTE data and

national voice, video and messaging services. This resulted in a pricing war, which pressured balance sheets and forced weak players out of the market.

The consolidation among mobile carriers in India resulted in significant churn across tower companies in the country. AMT was not spared, with the average tenancy ratio across its Indian tower portfolio falling **from 2.17x in 2017 to 1.51x in 2021**. Given the operating leverage inherent in the business, its operating margin fell from **37% to 33%** during that time period. In response, the Towercos followed the mobile carriers towards consolidation, with the top 3 companies now owning **70% of the towers in 2021, up from just 57% in 2018**.

Looking forward, the industry seems to be on a more solid footing. The more affordable data plans brought about an explosion in data consumption, with the number of wireless internet subscribers increasing **from 370 million in 2016 to 770 in 2020** and the data usage per subscriber per month increasing from 0.9 gigabytes to **8.7 gigabytes in 2020**. In addition, given that India is further along in the technology adoption cycle, a quicker roll-out will be facilitated by the availability of more affordable 5G-enabled smartphones.

Additionally, internet delivery in India is **80% to 90% through mobile devices**, with less than 10% of the population connected via a wireline connection. To put this in perspective, in the US, **more than 50%** of internet delivery occurs over wired connections. This should provide a longer runway for the growth in mobile data consumption in India.

The two largest mobile carriers, Reliance Jio and Bharti Airtel, are in strong fiscal positions, **with credit ratings of AAA and AA+**, which should enable them to continue to invest in across their networks. However, the third largest player, Vodafone Idea, is suffering from a dangerously high debt burden and a lack of profitability. While the government is likely to ensure the company remains a going concern, **given its 30% equity stake**, Vodafone Idea will be significantly less constrained in its ability to invest in network infrastructure.

The latest spectrum auction was completed on August 1st, 2022. The auction was a success with **more than 70GHz of 700-3,300 MHz and 26GHz spectrum** auctioned, **raising almost \$19bn** from the big three commercial mobile carriers. Reliance Jio and Bharti Airtel have announced their intentions to reach national 5G coverage by 2023 and are earmarking an estimated \$9bn each in capex to do so. Such ambitious plans are expected to bode well for AMT's prospects in the country over the next few years.

AMT's portfolio in India was formed through an aggregation of network grids of multiple new entrants and smaller Towercos. The portfolio of 78,000 towers has a

rural tilt, with 40,000 sites located in rural areas, 11,000 in suburbs, and 27,000 in urban and dense urban areas.

The towers were mostly formed on a grid of 1800MHz and have available site locations for new tenancies. Capitel believes that ATC can address some demand on 2300MHz in urban and semi-urban areas, and a larger share of colocation sharing demand on 5G as the ATC site locations in urban areas still have available slots.

Europe – Germany & Spain

AMT expands its business mainly in **Germany and Spain in the Europe market. AMT acquired Telxius** in January 2021, including 11,200 sites and 12,500 sites in Spain and Germany, respectively.

In 2020, As part of the COVID-19 stimulus package, the ruling coalition parties agreed to set aside **5 billion EUR** to help **MNOs build their 5G network infrastructure** nationwide by 2025. In addition, the federal government and the federal states are making attempts to simplify the onerous process of obtaining planning permissions **to deploy new Sites**. GSMA’s report predicts that by 2025, the average adoption of 5G across Europe will hit 44%, with Germany expected to have the highest 5G adoption rates in Europe at 59%. At the end of 2021, **wireless penetration is more than 156% in Germany**. Wireless carriers are expanding their wireless coverage from 2022.

Normally, the **tenancy ratio of ground-based tower is 1.8x to 2.3x** in Germany, which means that AMT can get more margin profit from it. However, a large number of towers are built on rooftop and German landlords agree with leasing on a ‘per operator’ basis rather than ‘per site’ basis, leading to the **tenancy ratio on rooftop site is only 1x**. If AMT negotiates with landlords that allow it to lease site on per site basis, the revenue from Germany would jump to a high level.

Spain is a developed telecommunications market. **The current wireless penetration ratio is 107%**, while monthly data per usage per subscriber is **20.1 GB** which is the third largest data usage in AMT’s market. Unlimited data offerings are expected to drive demand for mobile data services, with data usage forecast to see **30% growth from 2019 to 2024**. There are four main carriers in Spain, which have launched 5G since 2020 and plan to expand coverage until achieving high coverage rate.

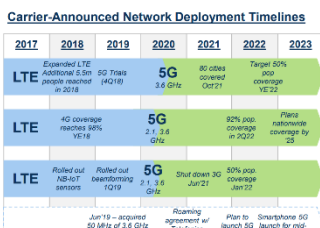


Figure 34: Carrier-Announced Network Deployment Timelines (Germany)

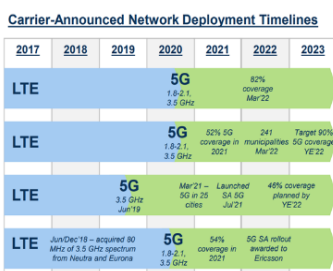


Figure 35: Carrier-Announced Network Deployment Timelines (Spain)

Latin America – Brazil & Mexico¹¹

Latin American is AMT’s second largest region outside of the US & Canada, accounting for c.16.3% of the company’s revenues and c.22.2% it’s tower count. Within Latin America, Brazil and Mexico are AMT’s most important markets, accounting for 7.2% and 5.6% of the company’s revenues. AMT is also the largest player in the region, accounting for approximately 30% of the towers in the region, ahead of SITES (19%), Telesites (12%), SBA Communications (12%), and Phoenix Tower (7%).

Over the past decade, Brazil has faced a difficult economic environment due to a severe recession and the effects of the COVID-19 pandemic. From 2014 to 2021, real GDP per capita PPP declined annually at a CAGR of 1%, and as of 2021 had fallen to \$14,710. Going forward, the economy therefore has potential for improvement, and is expected to grow real GDP per capita PPP by 1% annually from 2022 to 2027, as per IMF forecasts.

Brazil is the sixth most populous country in the world, and the 9th largest country by GDP, according to the world bank. Brazil also has attractive demographics and is expected to have 1% annual population growth from 2022 to 2027, according to the IMF. Furthermore, 44% of the population is under the age of 30, according to the UN, which is a positive for demand for mobile services. In addition, Brazil’s urban population is 86% of the population, according to Euromonitor. While this is expected to have a positive impact on the demand for mobile services, it may also expose AMT to disruptive technologies such as small cells that are only viable in high-density areas.

As of 2021, there were 3 main MNOs operating in Brazil: Vivo (74% owned by Telefonica), TIM (67% owned by Telecom Italia), Claro (98% owned by America Movil). Vivo, TIM, and Claro control 38%, 29%, and 32% of the market, respectively. In 2021, a consortium of Vivo, TIM, and Claro agreed to acquire the mobile assets of the previously 4th largest MNO, Oi, which has been undergoing bankruptcy proceedings since 2016. AMT’s churn in the region has been elevated in the last few years due to the bankruptcy of Oi. The market collocation rate in Brazil as of 2020 is estimated to be 1.51x, which provides ample room for additional collocation.

In November 2021, Brazil held a spectrum auction in which Vivo, TIM, and Claro won spectrum in 2.3GHz, 3.5GHz, and 26GHz. Such licenses require the

¹¹ <https://dgtlinfra.com/mexico-telecom-partners-mtp-towers/>
<https://siteslatam.com/wp-content/uploads/2022/11/PPT-3Q22.pdf>

companies to deploy 5G in the state capitals by July 2022, which should be a positive tailwind for tower demand.

Mexico has experience depressed economic activity over the past several years. From 2021 to 2018, real GDP per capita PPP in Mexico declined by 1.7% annually, as a result of sluggish industrial output, falling business investment, and a slowdown in services and employment in 2019, as well as the COVID-19 pandemic in 2020. However, from 2022 to 2027, the IMF forecasts Mexico's real GDP per PPP to return to a growth rate of 1% annually.

Mexico is the 10th most populous country in the world, with a population of 130 million, according to the World Bank. In addition, the IMF forecasts its population to grow by 0.8%. With 51% of its population under the age of 30, according to the UN, mobile services activity is expected to be a strong tailwind for tower demand.

As of 2021, there were 3 main MNOs operating in Mexico: Telcel (100% owned by America Movil), Movistar (100% owned by Telefonica), AT&T. Telcel, Movistar, and AT&T control 62%, 18%, and 16% of the market, respectively. Intense competition from Telcel has led to Movistar and AT&T generating significant operating losses recently. For example, in 2020, Movistar and AT&T's Mexico divisions generated operating losses of \$744 million and \$587.

As a result, in November 2019, Telefonica entered into a minimum 8-year wholesale agreement with AT&T in Mexico, whereby it will migrate its wireless traffic to AT&T. This could result in elevated churn on AMT's sites in the country due to duplication of sites. However, over the long-term the additional traffic will likely require AT&T to invest in its network to increase capacity.

Given the market dynamics in Mexico's MNO market, Telcel remains the only operator building out meaningful numbers of sites. In addition, most of its sites are given to its captive tower company, Telesites. This partially explains the fact that the Mexican tower market has one of the lowest tenancy ratios globally, at only 1.2x.

In February 2022, the Federal Telecommunications Institute (IFT) authorized Telcel to introduce 5G using 3.5 GHz. This will allow it to compete with AT&T, which is the other 3.5 GHz spectrum holder and whose license was renewed in January 2020 for 20 years.

Africa – Nigeria

Africa is another important market for AMT. Its **profit margin is 53%** in 2Q2022, only lower than US & Canada market and Latin America market. At the same

Mobile subscription is significantly affected by population growth in Africa.

time, AMT is the tower company with the **widest distribution in the African market**, with operations in 7 African countries.

Africa is a popular location for telecom investment because of its **robust macroeconomic performance** and **quick population growth**. Africa’s population is anticipated to increase by 2.5%, its GDP by 3.5%, and **mobile subscription growth by 3.1%** over the following five years. When compared to the developed world, this compares extremely favourably. Africa has had a remarkable growth record this century despite experiencing lost decades, and its youthful economies have shown surprising resilience to the COVID-shock. These elements are behind the revival of sale and leaseback transactions as well as the influx of fresh funding and teams aiming to serve the African telecom tower sector.

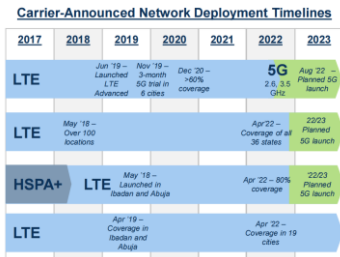


Figure 36: Carrier-Announced Network Deployment Timelines (Nigeria)

Nigeria is **the largest mobile market in SSA** (Sub Saharan Africa). Nigeria is the most populous nation in Africa, with the majority of its citizens living along its southern coast. According to Euromonitor’s data, Nigeria’s population as of 2020 was **209 million**, and from 2020 to 2025, it is projected to rise at a 2.5% CAGR to **reach 236 million**. Nigeria is predicted to be the **third most populous nation** in the world by 2050, according to the World Population Prospects report from the UN (United Nations). Nigeria’s economy has started to diversify in recent years, shifting its emphasis from the oil sector to manufacturing, agriculture, and **telecommunications**.

The **demand for telecommunications infrastructure** is anticipated to be supported by factors like population expansion, a sizable young population, and rising levels of urbanization.

There are 4 main carriers in Nigeria, 3 of them are tenants of AMT, they have **71% subscriber market share** in total. In addition, carriers are in the stage of technological transformation and plans to **launch 5G in late 2022**.

By the end of 2020, there were **32 thousand towers** in Nigeria. By 2030, that number is predicted to rise by 25.2 thousand to **62.8 thousand**. Nigeria’s market colocation rate was predicted to be **1.17x in 2020** and is projected to rise to **1.31x by 2030**, driven by an increase of about 38.3 thousand MNO (Mobile Network Operator) PoPs (Point of presence).

	AMT Tenant?	Subscriber Mkt. Share	Spectrum Holdings*	Current Technology
MTN Group	✓	36%	~ 270 MHz Holdings in 700, 800, 900, 1800, 2100, 2500 MHz, 2.6 and 10.5GHz bands	2G/3G /4G
Globacom		29%	~ 120 MHz Holdings in 700, 900, 1800, and 2100 MHz bands	2G/3G /4G
Airtel Nigeria	✓	28%	~ 80 MHz Holdings in 900, 1800, 2100, 2600 MHz and 10.5GHz bands	2G/3G /4G
9 Mobile	✓	7%	~ 60 MHz Holdings in 900, 1800, and 2100 MHz bands	2G/3G /4G

Figure 37: Top 4 Carrier Characteristics in Nigeria

Recommendation

AMT has experienced spectacular operating results over the past two decades, which has helped it deliver remarkable returns to its shareholders. The stock has delivered a 10.7% annually compounded return since its IPO in 1998. It is, therefore, easy to say that the best is behind it.

However, we believe that the company is protected by extremely high barriers to entry in the form of zoning restrictions, switching costs, and economies of scale that allow it to earn very high returns on invested capital. We also believe that the company has a very long run-way for growth given that it is riding the secular growth in mobile data consumption, which it expected to drive higher tower demand given the physics of radio wave propagation. Going forward we believe this will manifest itself in high margin incremental revenues from colocations and amendments. Finally, see management as highly capable and aligned stewards of capital for shareholders, which ensures that operating results translate to per share value for shareholders.

While perhaps many of these characteristics are well-understood in the market, we believe that the investors are likely viewing this opportunity from too short a time horizon. We believe that by extending their time horizon to consider the long-term potential of AMT, investors can continue to achieve highly attractive results. As a result, we see AMT as being **undervalued** based on its 12-Dec-2022 share price of **\$215.87** and set a **price target of \$288.3**.

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Report Recommendations

Buy	Expected total return (including expected capital gains and expected dividend yield) of more than 10% over a 12-month period.
Hold	Expected total return (including expected capital gains and expected dividend yield) between 0% and 10% over a 12-month period.
Sell	Expected negative total return (including expected capital gains and expected dividend yield) over a 12-month period.

This report was prepared by *XINGZHEN MEN* and *NICOLAS GOMEZ ILABACA*, Master in Finance students of Nova School of Business and Economics (“Nova SBE”), within the context of the Field Lab – Equity Research.

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