

Key takeaways

- Macro cell towers are large structures that lease space to businesses for wireless communications equipment. They are crucial for transmitting data over large distances and differ from small cell towers used in densely populated areas.
- Towers may be owned by the large Mobile Network Operators (“MNOs”) or independent companies who lease tower space to the MNOs (collectively “operators”). Tower owners can often increase yields and the value of their assets by leasing space on each tower to multiple tenants.
- The demand for macro cell towers is expected to grow, driven by the increasing number of global users, adoption of 5G technology, and the Internet of Things. However, the sector faces risks like industry consolidation, market concentration, and inflation.
- Investors can access tower investments through public or private markets. Each type has its own risk and return drivers, with private markets serving as more of a pure play.

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Introduction

Digital infrastructure refers to the robust communications system—locally and globally—of assets that connect, transmit, process, and store what can seem like unfathomable volumes of data (see Figure 1). This infrastructure falls into three primary subsectors: wireless (macro cell towers, small cells, and spectrum), wired fiber networks (metro, wirelines, or subsea cables), and data centers (hyper-scale or enterprise centers).¹ In this research note, we focus on the wireless sector, specifically the macro cell tower subsector, of the digital infrastructure environment.

¹ For more information on the Digital Infrastructure asset class and its sectors, refer to [Meketa's Digital Infrastructure Whitepaper](#).

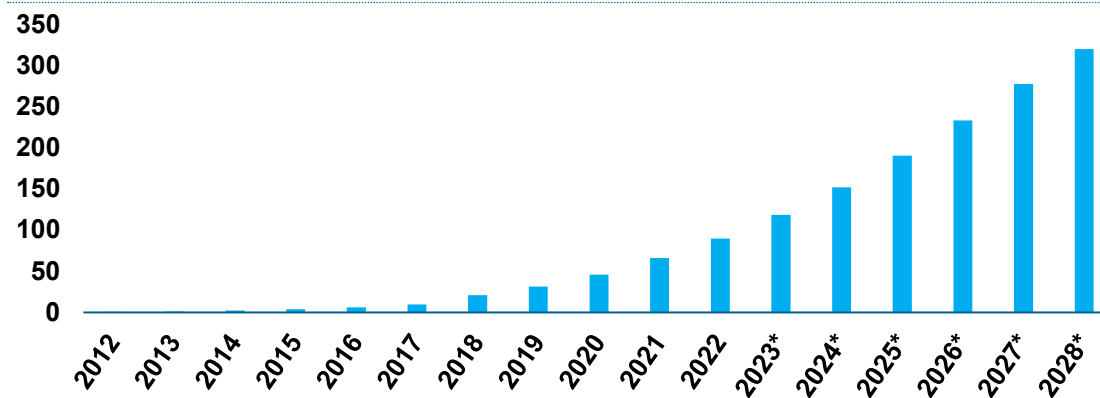


FIGURE 1
Average Monthly Global Smartphone Traffic (in exabytes)

Source: Statista, as of June 30, 2023. Years marked with an Asterisk (*) indicate a forecast. An exabyte is equal to one billion gigabytes.

What are macro cell towers?

Macro cell towers are large vertical structures typically found in rural areas and along roads in urban areas that lease space to businesses to attach their wireless communications equipment. The businesses that attach their respective equipment to the cell towers are referred to as “tenants.” For the larger cell towers, there can be up to four or five tenants on a single cell tower. However, the average tenancy rate is approximately two tenants per tower.²

These large macro cell towers, which hold equipment that typically transmits across large distances, are different from the “small cell towers” that help boost coverage in densely populated areas, represented in Figure 2.³ The typical macro cell tower structure is either a monopole (i.e., a single vertical pole) or a lattice tower (with multiple legs and cross bracing), depending on the height and location of the tower. The towers can be “naked,” or camouflaged, for example with attachments to make it resemble a tree rather than a metal scaffold.

² Based on Meketa analysis of four large public tower companies: American Tower, SBA Communications, Cellnex, and INWIT.

³ Small cell networks are low-powered antennas installed in dense locations that are difficult to service with macro towers. These locations are often high-usage areas that require improved signal and speed. Small cell equipment is typically situated in areas like large office towers, on streetlights and utility poles, stadiums, or transportation hubs.

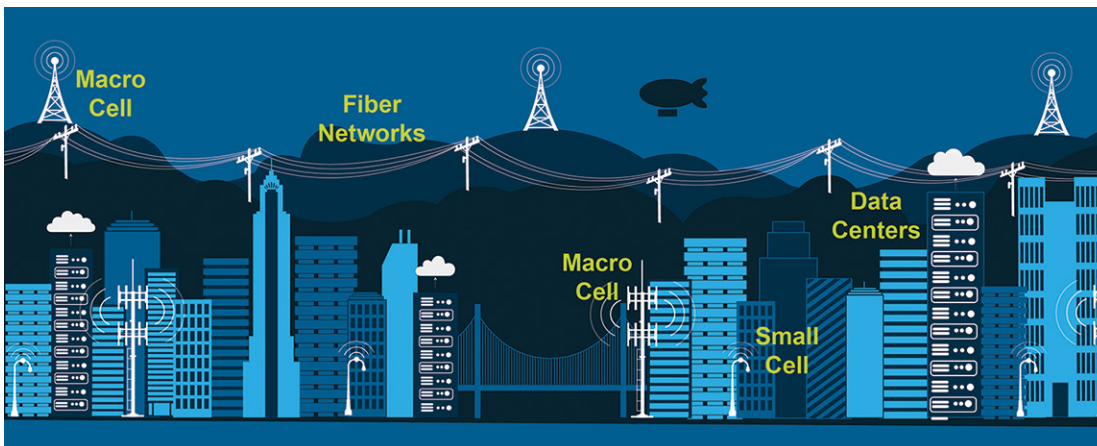


FIGURE 2
Small Cell Tower versus Macro Cell Tower Example

Source: Meketa Investment Group, 2024.

Operational evolution

Historically, telecommunications service providers such as Verizon, T-Mobile, and AT&T, referred to as Mobile Network Operators (“MNOs”), primarily owned and operated cell towers for their own networks. However, this has changed in recent times as the number of towers required to provide enough network capacity in an area continues to increase. Building, maintaining, and repairing cell towers is expensive. With increased demand driving the need for densification of towers, some MNOs sell their towers to remove them from their balance sheets while entering leases to keep their equipment on the tower.

Independent cell tower companies increasingly represent a larger share of the market as they are leasing tower space to the MNOs who have decided to outsource the expense. Because a tower company can lease space to a maximum of four or five tenants per tower, they can often generate multiple sources of income from each tower site. Increasing the number of revenue streams for a tower can also

positively impact that tower's valuation, as valuations are typically calculated as a multiple of its cash flow stream. Therefore, leasing a tower to multiple tenants can generate additional cash flow streams that have a compounding effect on its value with little incremental cost.

American Tower, SBA Communications, and Cellnex are examples of publicly traded tower companies. Privately held tower companies include Vertical Bridge and Diamond Communications. Some key statistics for the public tower companies are presented in Figure 3 below to provide context and color around the size and scale of such businesses.

Company	Countries	Employees	Communications Assets	Market Cap	EBITDA	EV
American Tower	25	~5,700	~224,000	\$86.4 billion	6.3 billion	144.0 billion
Cellnex Telecom	12	~2,900	~138,000	\$25.9 billion	3.1 billion	48.6 billion
SBA Communications	15	~1,800	~48,000	\$20.1 billion	1.6 billion	37.7 billion

FIGURE 3
Key Metrics of Public Tower Companies

Sources: Data for number of countries, employees, and communication assets is from the respective company websites of American Tower, Cellnex Telecom, and SBA Communications as of May 2024. Data source for Market Cap is Pitchbook, as of May 28, 2024. Data source for EBITDA and EV is Pitchbook, as of March 31, 2024.

Types of lease contracts

There are two different types of leases related to cell towers. The first type is the lease to use the tower itself. This lease is between the company that owns the tower and the company looking to attach their equipment and use the tower (usually MNOs). Once the towers are built and the contracts are secured, these leases typically create a steady and reliable revenue stream that typically spans anywhere from five to ten years (or longer depending on the contract).

The second type of lease is the lease for the physical tower location. Tower companies typically do not own the land beneath their towers. Instead, they rely on leases that are between them and the landowners. This type of lease is often for a substantially longer amount of time, usually between 40 and 99 years. These leases for tower locations generally include a right-of-first-refusal, which allows the tenant the right to purchase the land if the current landowner seeks to transfer (i.e., sell) the rights of the land.

Tower developer and owner revenue models

A tower's valuation is typically calculated as a multiple of the cash flow stream, so leasing up a tower to include additional cash flow streams will have a compounding effect on the value with little incremental costs. Tower Cash Flow ("TCF") is considered rental revenue less expenses related directly to tower sites, the largest of which is ground lease expense. Other expenses included in the calculation of TCF are utilities, taxes, insurance, monitoring, and maintenance. TCF does not take into account other

expenses such as corporate overhead, back-office expenses, or interest expense. Generally, expenses do not increase meaningfully with the addition of tenants, so revenue from co-location tenants typically translates directly into increased TCF and increased value. A developer will typically build a tower with an anchor tenant with the intention of adding additional tenants and thus adding incremental value to the asset.

Demand for macro cell towers

Technological evolution, such as the transition to 5G and the Internet of Things,⁴ has driven the growth of total data consumption and led to the need for additional infrastructure to keep up with demand. Measuring the amount of mobile data traffic, a way to quantify this data consumption, shows that it has been consistently increasing and is expected to continue to increase over the next five years, as shown in Figure 4.⁵

⁴ The Internet of Things refers to computing and connected devices that have the ability to send and receive data, such as smart thermostats, fitness trackers, and smart cars.

⁵ Source: Ericsson Mobility Report, "Business Review 2024," data as of November 2023. Ericsson is a Swedish company centered around sectors of telecommunications equipment and related services to mobile and fixed network operators.

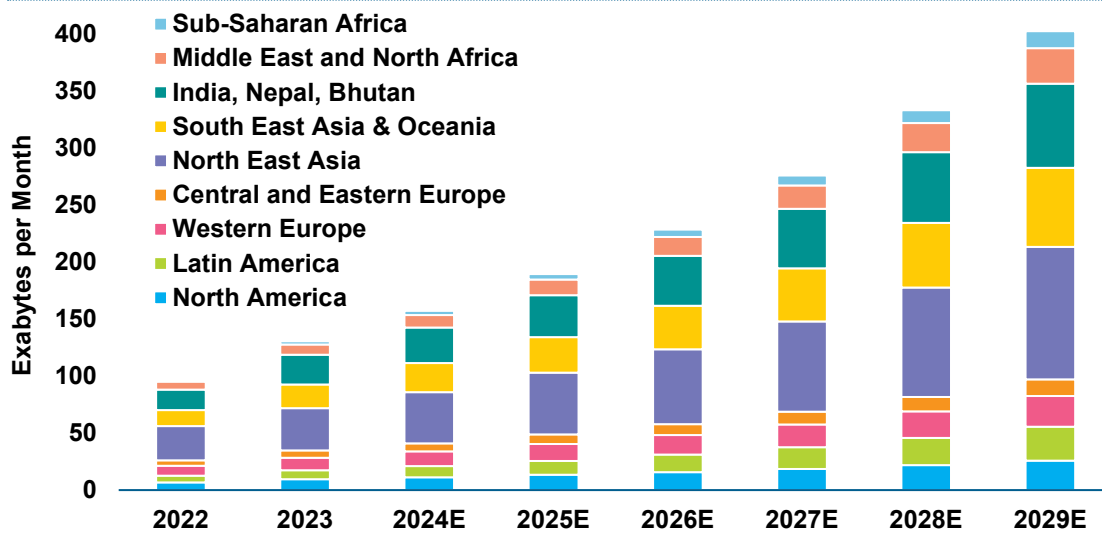


FIGURE 4
Projected Mobile Network Traffic by Region

Source: Ericsson Mobility Report, "Business Review 2024," data as of November 2023.

The macro cell tower subsector of digital infrastructure is expected to continue to grow for a number of reasons. An increasing number of global users, each with an increasing amount of expected mobile network traffic, as well as the continued adoption of 5G and its new capabilities are primarily driving the heightened demand for cell towers. Although Asia has the largest data traffic consumption, North America and Western Europe accounted for combined 16% of total 2023 data traffic. With projected growth rates of 18% in North America and 16% in western Europe over the next five years, this presents an attractive investment opportunity.

The continued adoption of fifth generation mobile network technology ("5G") is projected to further increase data infrastructure needs. 5G offers the ability to move larger amounts of data faster than previous generations by using a higher bandwidth spectrum. However, while it has a higher transfer speed, it cannot travel as far, thus creating the additional need for higher density of towers.

As of year-end 2022, there were just under 1 billion subscriptions to 5G networks and just over 5 billion subscriptions to 4G LTE networks. Nearly a year later in November 2023, the number of 5G network subscriptions had jumped to 1.5 billion while 4G LTE subscriptions dropped slightly. This trend is expected to continue as 2029 forecasts predict 5G subscriptions will increase to over 5 billion while 4G LTE drops to roughly 3 billion.⁶ As of January 2024, it is estimated that 261 operators in 101 countries globally had launched commercial 5G mobile services, with more expected to follow as 90 operators from 64 markets have made a commitment to launch in the coming years.⁷ This shift from 4G to 5G is shown in Figure 5 below.

⁶ Source: Ericsson Mobility Report, "Business Review 2024," data as of November 2023.

⁷ Source: GSMA, "The Mobile Economy 2024."

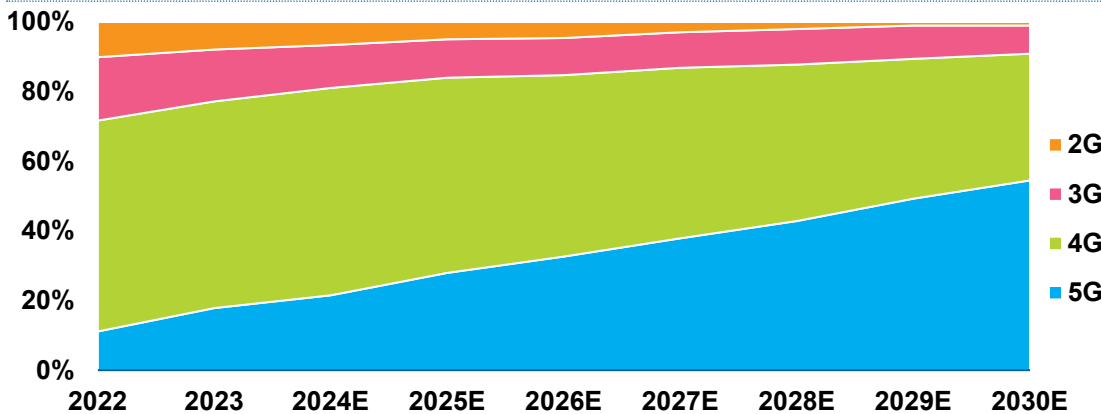


FIGURE 5
Mobile Adoption by Network

Source: GSMA, "The Mobile Economy 2023" and Ericsson, "June 2023 Mobility Report."

Increasing the bandwidth for 5G networks helps facilitate the continued adoption of the Internet of Things ("IoT"). IoT refers to computing and connected devices that have the ability to send and receive data. Typically, the devices are embedded with sensors, processing capabilities, software, and other technologies. Examples of IoT technologies are smart thermostats, fitness trackers, and smart cars. These IoT connections will require additional bandwidth. While cellular networks currently handle roughly 15% of total IoT connections, this is forecasted to grow in the future, as shown in Figure 6.⁸ These new functionalities and heightened technological interconnectedness also require an increased number of cell towers to run smoothly. Thus, global 5G adoption and growing mobile network traffic trends are helping drive the current and forecasted future demand for macro cell towers.

⁸ Source: GSMA, "The Mobile Economy 2024."

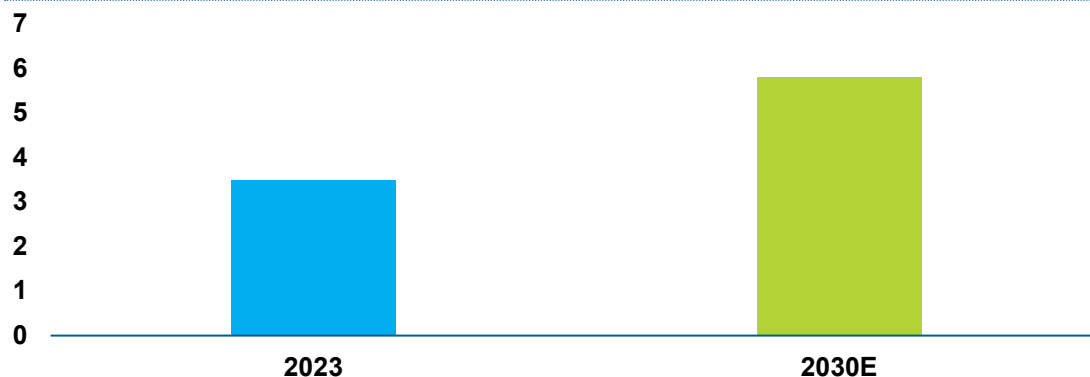


FIGURE 6
Number of Licensed Cellular Internet of Things Connections (B)

Source: GSMA, "The Mobile Economy 2024."

What are the risks?

There are a number of risks related to investing in macro cell towers. Some are specific to each tower/location and must be monitored as such, while others are more broadly related to the sector and/or assets. Listed below are some risks that are generally applicable to investing in macro cell towers.⁹

⁹ The risks listed below are non-exhaustive.

Consolidation within the telecommunications carrier industry, as well as the sharing networks, may lead to a lower number of tenants competing for tower space, decreasing the overall lease revenue per tower. Sharing networks is when an MNO has access to a larger MNO's equipment and can use the network if there is excess data capacity not being used by the larger MNO's subscribers.

Because towers are essentially an extension of MNOs, any impact to the MNOs or their market will inherently affect tower companies as well. This concentration risk is heightened due to the limited number of MNOs in the space and the high barriers to entry for new MNOs.

The expansion of small cell towers may diminish some of the demand for large towers. However, these small cell towers may not be in direct competition with large cell towers, as small cell towers are mostly being implemented in cities, stadiums, and other areas that are difficult for large cell towers to service.

The long-term macro cell tower leases negotiated with MNOs in the US are primarily at a fixed price, which may expose tower companies to inflation risk. Meanwhile, MNOs in Europe typically negotiate variable rates which can help to mitigate inflation risk.

Avenues to invest

Investors can access both public and private markets to gain exposure to tower investments, but it is critical to understand the true drivers of risk and return within each investment type and how this relates to an investor's time horizon, risk tolerance, capital availability, and liquidity constraints. Depending on these considerations, public, private, or a combination of these exposures may be suitable.

Investors with shorter time horizons and/or requiring near-term liquidity may benefit from publicly traded equity in tower companies. While liquid, these companies are often subject to much of the same volatility as the broad stock market, and therefore represent less of a pure play. The performance of the underlying companies in a stock portfolio can often be influenced more by how the operating company is managed

and less by the underlying assets, and their stock prices can be heavily influenced by the overall market environment, trends, and investor sentiment.

Investors with significant capital, longer time horizons, and sufficient ability to tolerate illiquidity would likely benefit from allocating to these assets via private market investments. Infrastructure funds, direct investments, co-investments, and separately managed accounts can provide capital to directly own the macro cell towers. These investments typically exhibit less volatility and represent a more pure play than their public market counterparts.

Conclusion

Macro cell towers are key assets within the digital infrastructure universe. The owners of these towers lease space to mobile network operators and often host multiple tenants at a time. The more tenants a tower has, the higher its expected cash flow and valuations.

Demand for macro cell towers is expected to continue to grow in the future, particularly over the next five years. This growth is primarily driven by an increasing number of global users, each with an increasing amount of expected mobile network traffic, the continued adoption of 5G and its new capabilities, as well as the expanding universe of the Internet of Things. However, macro cell towers also carry unique risks, including consolidation risk within the industry, concentration risk, and inflation risk due to fixed price leases.

Investors can gain exposure to macro cell towers via public or private markets, depending on their preferences and constraints. Public market investors can often benefit from the shorter time horizon and increased liquidity, but their returns will be more heavily influenced by market volatility and represent a less pure macro cell tower investment. Private market investors can benefit from the (typically) lower volatility, but they also need significant capital, longer time horizons, and a tolerance for illiquidity.

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