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COMMUNICATION INFRASTRUCTURE

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PRIVATE MARKETS INVESTMENT IN COMMUNICATIONS INFRASTRUCTURE

What is Communications Infrastructure?

Communications systems and technology support exchanging information over distance using electronic pulses, electromagnetic waves, or optical pulses. The information transmitted can be in the form of voice, video, or data. The key to creating and expanding a communications system locally or globally is the infrastructure that connects, transmits, and processes the data. Infrastructure can be classified into three primary subsectors: wireless infrastructure (including macro cell towers, small cells, and spectrum); wired fiber networks (metro, wirelines, or subsea cables); and data centers (hyper-scale or enterprise centers). With the projected continued growth in demand for internet and wireless data capacity, additional infrastructure supporting all three subsectors is necessary, and continuing opportunities to invest in the space will exist for the foreseeable future.

How does Communications fit in with other Infrastructure Sectors?

As the need for infrastructure within communications increases, so does the demand for capital investment in the sector. In 2015, there was approximately $5.4 billion in private market communications deals closed globally, which accounted for just 1% of the overall private infrastructure deal flow. The communication infrastructure deal volume has steadily increased since that time, with the first three quarters of 2018 producing $8.5 billion in transactions, or 3% of the market. The capital invested for the full year ending 2018 is on pace to double the 2015 volume.[1]

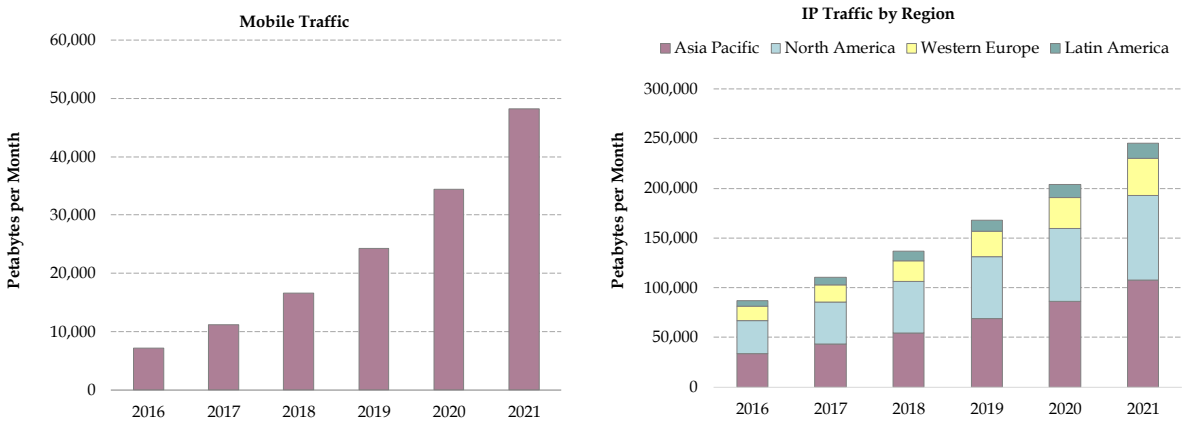
In order to target higher than core risk-adjusted returns in this sector, an investment manager must focus on identifying geographies with expansion needs and/or excess capacity and an existing or securable customer base to ensure long-term stable cash flow for the assets. As transaction volume and competition increases, purchase price multiples will likely increase, creating the need to understand the growth potential and customer base stability to mitigate investment risks.

The Growing Need for Communications Infrastructure Globally

Communications (or digital) infrastructure is becoming an important sector for future growth with significant capital needs. According to the Cisco Visual Networking Index, global Internet Protocol ("IP") traffic is expected to increase by 24% annually from 2016 to 2021.[2] If mobile data is isolated in this projection (see the following chart), Cisco estimates mobile data will increase 46% during that timeframe. The increasing need for more infrastructure to accommodate demands is consistent across Europe, North America, Asia Pacific, and Latin America; each of these geographies is expected to increase in IP traffic by just over 20% annually. However, as the chart below showing IP traffic by region illustrates, Asia Pacific and North America account for more than 75% of the anticipated total IP demand. There will be investment opportunities in all geographies based on increasing demand by percentage, but the largest markets will continue to be the United States and Asia.

[1] Source: Preqin Infrastructure Deals, 3Q 2018.
[2] Source: Cisco Visual Networking Index: Forecast and Methodology 2016-2021.

Projected Mobile and IP Growth[3]



In addition to projected demands in the mobile and IP traffic, the transition to 5G networks from 4G Long-Term Evolution ("LTE") will increase data infrastructure needs. 5G technology will utilize a millimeter wave, which is a higher-frequency band of the wireless spectrum. The millimeter wave has a higher transfer speed, but cannot travel as far, creating the need for higher density infrastructure. 5G will not only increase download speeds and capacity, but will enable new functionality and technologies that were not possible on 4G such as self-driving cars. Self-driving cars, if widely adopted, will create a need for significant investment in order to meet the additional short-range data required to operate the cars and could increase total data needs by over 10%. All of these factors will lead to an enormous need for additional infrastructure that is not yet built.

There will also be growth opportunities as businesses transfer more capacity to cloud-based applications. An increasing need for data centers and fiber networks will be required to accommodate the increasing amount of data being outsourced by enterprises.

The demand will create the opportunity to invest in expanding communication networks and increasing the density of infrastructure in areas already connected. Investments can be made through the acquisition or development of assets, or through a company whose assets include communications infrastructure. For those looking ahead to their exit strategy, the key is to create a diversified portfolio with sustainable cash flow growth that will make the portfolio desirable for acquisition by a strategic buyer or potential initial public offering.

[3] Source: Cisco Visual Networking Index: Forecast and Methodology 2016-2021.

INVESTMENT OPPORTUNITIES BY SUBSECTOR

The market outlook and opportunities for the primary communications infrastructure subsectors are summarized below.

Macro Cell Towers

Macro Cell Towers are the large vertical structures that are typically found in rural areas and along roads in urban areas that lease space to businesses to attach their wireless communications equipment. The typical structure will be a monopole or lattice tower depending on the height and location of the tower.

The tower industry has evolved over the years and will continue to grow based on the large mobile demand explained above. Wireless carriers originally owned and operated cell towers for their networks. As the demand and costs continued to grow, independent tower companies began taking more market share and leasing tower space to the carriers. A tower company can lease space to four or five carriers, creating multiple revenue streams off of one tower. Lease contracts are typically five to ten years (or longer), creating a dependable revenue stream once towers are built and contracts secured.

The demand for additional towers is expected to continue to grow based on several of the factors listed above, including overall mobile data increasing demand and transition from 4G to 5G. The expectation is that 5G networks will deliver data 10x faster than the current 4G LTE networks, significantly increasing the data usage. With the mobile data demand and increased transfer speeds of 5G, there is a need for denser tower capacity, which will require additional tower sites. 5G is also expected to gradually take more market share as lower frequency networks, such as 2G and 3G, continue to be phased out by wireless carriers as more 5G devices penetrate the market.

There are risks to the macro cell tower business that must be monitored with each location. Carrier consolidation or sharing networks would lead to fewer tenants competing for tower space, decreasing overall lease revenue per tower. The expansion of small cell towers will also diminish the demand for large towers, but small cell is mostly being implemented in cities, stadiums, and other areas difficult for large cell towers to service. The long-term leases negotiated with the carriers in the U.S. are primarily fixed, which involves exposure to inflation risk. Carriers in Europe typically negotiate variable rates which will mitigate the inflation risk.

Small Cells

Small cell towers are low-powered antennas installed in dense locations that are difficult to service with macro towers. These locations are heavily-populated, high-usage areas that require improved signal and speed. Small cell equipment is typically situated on large office towers or street light/utility poles.

It is expected that the 50,000 outdoor small cells currently in the market will grow by 4x over the next five years. Two major components of this estimate are the need for small cells with

the deployment of 5G networks and the expected reliance on small cells by self-driving cars using the 5G network. Along with speed and demand, there is increased data capacity that the small and macro towers are expected to absorb. With a 4G network, it takes five small cells to equal the output of one macro cell tower, but with 5G, five times that—25 small cells—equals one macro cell.

The expansion of small cells will also be a key to supporting the adoption of self-driving cars. It is estimated that each car will generate the same data as 3,000 people, so the deployment of 1 million cars would be the equivalent of 3 billion people added to the network. Small cell infrastructure will need to be expanded significantly to handle this capacity demand. By 2020, there are expected to be over 26 billion global IP networked devices/connections. With self-driving cars representing the equivalent of another 3 billion people primarily using small cells, they will add a meaningful amount to the general network demand for this infrastructure (an estimated 11.5% increase).

Small cell tower investments have many similar risks as macro cells, including the threat of carrier consolidation or network sharing taking away demand. Small cells also require more up-front capital than macro towers, as the antennas need to be connected by fiber to the network. The initial lease agreements with tenants typically allow the small cell operators to break even, leaving them to rely on lease-up agreements to earn their required return. However, the increasing need of small cells for 5G adoption is improving the economics with stronger lease-up contracts.

Fiber

Optical fiber is the bundle of glass threads that connect the entire communications infrastructure and is highly correlated with the increasing demand for data. Fiber is the primary mode of transport and communications between the internet, wireless towers, and data centers across the globe. Cell towers have regional reach limited by the short distance of wireless signals. Fiber operates on a global scale through metro networks, subsea cables, wirelines, and long-distance cables. The fiber market is competitive, as many users have their own internal fiber network instead of outsourcing the use of fiber lines. Fiber assets are owned by a diverse group of companies, from data content providers to power utilities.

The key to driving growth and value in this market is to continuously build new fiber networks or expand existing network coverage in order to reach economies of scale. Providers with lower costs will be able to have an advantage in this competitive pricing market. To gain stability, a fiber provider looks to secure long-term contracts with major customers such as government entities, multinational enterprises, healthcare organizations, or international carriers. Fiber can be sold to larger customers as "dark fiber," which involves selling the fiber networks directly to the enterprise who will then control the data on that fiber with their own optical gear. Smaller customers such as retailers or individual businesses can access "lit fiber," which is sold as a service and the customer can transfer data across a shared fiber network for a fee. Dark fiber will provide larger up-front cash payments to the supplier and little incremental income, while lit fiber is the opposite, with minimal initial payments to the supplier and higher incremental income.

The main risk in fiber is the high competition that can lead to pricing constraints and potential overbuild in densely populated areas. The need for expansion to reach economies of scale can involve risks around permitting delays to secure rights for laying underground fiber and the eventual construction project to lay the fiber.

Spectrum

Spectrum refers to the radio frequencies in the electromagnetic spectrum that wireless communications signals travel. Commercial wireless communications are currently located between 300 megahertz (MHz) and 3 gigahertz (GHz). The frequency relates to the cycles per second at each level, which affects how far the wireless signal can travel and the volume of data transmitted.

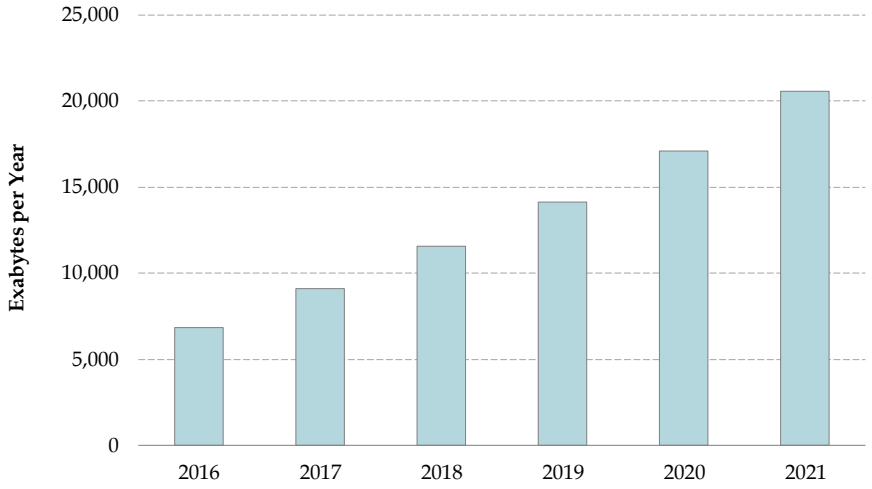
Spectrum is a finite resource and the same frequency cannot be exploited by different users (or applications) in the same geographic area without resulting in major interference. Because of this, regulators, such as the Federal Communications Commission ("FCC") in the United States, are tasked with allocating and licensing spectrum bands. The two ways that carriers can acquire spectrum is through government auctions or secondary market sales. Government auctions are run by the FCC where spectrum licenses are released and sold to private investors that specify the frequency and geographic area each license covers. Acquired licenses can be sold or leased to wireless carriers as the companies attempt to keep pace with increasing demand.

Risks associated with spectrum include that the auction process run by the FCC can lead to inflated prices for licenses. The key is to understand the valuation and complex auction process in order to acquire spectrum at reasonable prices. Risk can also be associated with consolidation within the industry where fewer competitors will create less need for additional frequencies and lower the number of natural purchasers of spectrum licenses.

Data Centers

Data centers are the specialized buildings that house mission-critical information technology infrastructure powering the internet and corporate world. The large annual expected growth of IP data usage mentioned earlier will increase the need for data centers. Another critical demand for data centers is the shift by businesses to outsource data to the cloud. Managed hosting cloud computing companies such as Amazon or Google are struggling to keep up with the pace of increasing demand by building in-house data centers, which is creating greater opportunity for third party investors. As shown in the following chart, data center IP traffic growth is expected to increase by 25% per year through 2021.

Global Data Center Traffic[4]



The two main investment opportunities within data centers are Hyper-scale and Enterprise.

- Hyper-scale is wholesale data center access where a large tenant will lease entire suites or buildings in order to run back office, cloud and content infrastructure, data analytics, and web hosting. The lease is typically in the range of 5 to 20 years with rent escalation typically at 3% per year. Renewal rates are exceptionally high for wholesale data centers due to the high, effectively prohibitive switching costs since many businesses cannot afford to be down during relocation. Hyper-scale infrastructure is usually the lowest cost option for large customers and will provide low but steady cash yield for a data center owner.
- Enterprise data centers cater to the smaller scale cloud businesses that will need more service and less space. The smaller businesses will share data center space and typically pay a premium compared to the hyper-scale customers. For this higher cost, the enterprise data centers typically manage the servers for the businesses.

Data centers also carry risks that must be addressed and mitigated. Hyper-scale data centers have single large tenants, so the center will have more customer concentration risk. This is partially offset with the longer lease contracts and price escalators. Tenants may also revert back to building their own data centers depending on the rent price point and contract situation of the leased data center. But there is some lease stickiness because data center infrastructure is not the core competency of most customers and using a specialized provider is typically a cheaper alternative than in-house options. Consequently, data centers should diversify their customer base to help mitigate this risk.

[4] Source: Cisco Global Cloud Index: Forecast and Methodology, 2016-2021.

SUMMARY

Demand for communication infrastructure continues to grow and is expected to increase by 24% annually over the next six years, and solid growth should continue beyond that time based on the wireless carriers' projections of 5G deployment. Many factors will lead to such growth, including the expected implementation of 5G network and the potential for self-driving cars. There are several subsectors within the communications infrastructure sector that will benefit from increasing IP traffic, including macro towers, small cells, data centers, and fiber. The growth will come from both expanding network reach and regional density requiring additional infrastructure to support increasing data per connection.

There are several key risk considerations associated with communication infrastructure. Wireless carrier consolidation may change the demand level and distribution profile. After a merger, there would be less potential tenants on a cell tower, which would lower the number of revenue streams the asset could exploit. There are also regulatory risks related to the release and uses of spectrum, as well as the ability to lay fiber lines in public areas. In addition, communications infrastructure is a growing sector and this will attract additional investors, thus creating competition for the best deals.

A key to success is to have experience and contacts that can be utilized to find the appropriate deals and location for the towers, spectrum, data centers, or fiber networks. Understanding the client base is also important in targeting key assets. The ideal portfolio will be diversified by location, asset type, and client type. For example, having an appropriate mix of high cash flow mobile carriers and stable moderate cash flow government contracts will create a desirable cash flow stream and risk/return profile for exit opportunities in towers or fiber networks. Data centers can have a mix of large corporations and smaller businesses that require more service, but pay a premium. Once appropriate deals are identified, establishing highly skilled management teams, negotiating favorable contracts, and analyzing asset locations will be needed to set up a successful project or portfolio.

Overall, it is an exciting time in the communications infrastructure sector. We anticipate many interesting opportunities that will appeal to institutional investors with a range of risk-return preferences.

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