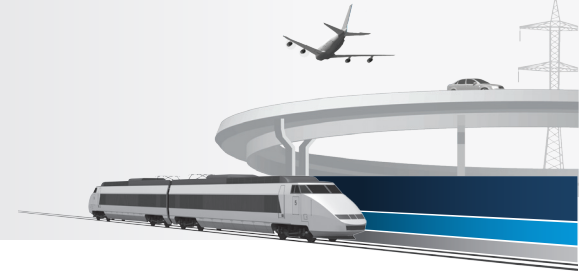


The tangible value of time

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Bad infrastructure wastes time, good infrastructure saves time.

This travel diary explores the tangible value of time through three case studies of good infrastructure; from toll roads in Melbourne to airports in Tijuana to mobile towers in Dallas.

Time also reminds us that the world is not static – infrastructure investors need to navigate potential change; from autonomous cars, to President Trump, to small cells.

Toll Roads: congestion pricing

The annual Transurban Investor Day is often the highlight of my year. Held in Melbourne, Australia, this year the focus was on the tolling value proposition, the optionality of further concession extensions / expansions, and the risks and opportunities of technology advances in transportation.

Transurban has operating interests in 15 roads in Melbourne, Sydney, Brisbane and Northern Virginia. The concessions offer the right to build, maintain and charge inflation-linked tolls on the roads for another 40 years (on average).

Texas A&M Transportation Institute in its 2015 Urban Mobility Scorecard estimate that the annual cost of US congestion was \$US160 billion, from 6.9 billion hours of travel delays and 3.1 billion gallons of wasted fuel.

In contrast, most Transurban toll roads offer material time savings for commuters, typically 15-30 minutes for peak travel. It is interesting to note that the three roads Transurban acquired out of bankruptcy (Lane Cove Tunnel and Cross City Tunnel in Sydney, Clem7 in Brisbane) offer time savings of less than 10 minutes, highlighting the value customers place on time.

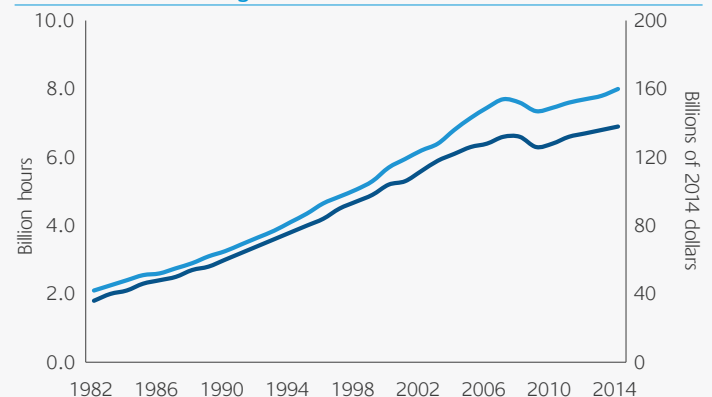
“Time is more valuable than money. You can get more money, but you cannot get more time.” Jim Rohn

Impact of congestion: US travel delays



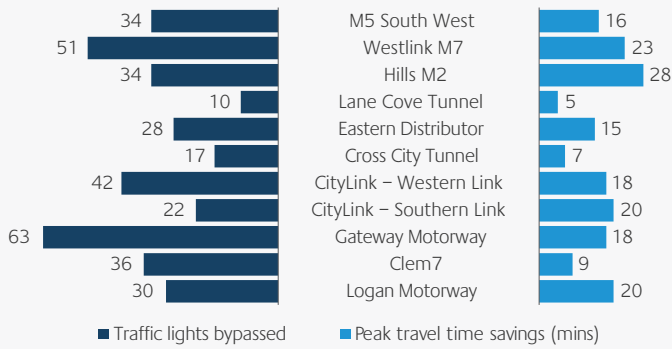
Source: Texas A&M Transportation Institute.

Chart 1: US traffic congestion measures 1982-2014



Source: Texas A&M Transportation Institute.

Chart 2: Network time savings on Transurban toll roads



Source: Transurban, Tom Tom Data.

Transurban toll roads in Australia that have provided material time savings have shown limited, if any, price elasticity. For example, the M2 Motorway in Sydney has increased average tolls from around \$A3.50 to \$A5.50 over the last eight years or 5.5% pa. Over the same period, traffic volumes increased nearly 4% pa. No surprise given the estimated peak time savings.

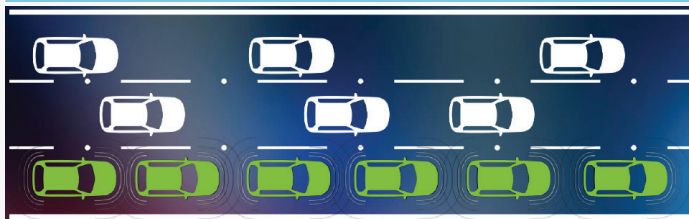
The heavily congested Northern Virginia area will provide a classic case study in toll road pricing in the years to come. Transurban's 495 and 95 Express Lanes (EL) offer commuters a (private) alternative to the (public) interstate – travel for free with three or more passengers, or pay the toll. The opt-in nature of tolled express lanes significantly reduces political risk. Transurban is required to dynamically raise tolls to maintain free flowing traffic on the lanes. Average tolls on the 495EL have increased from around \$US1 to \$US4 per trip in its fourth year of operations. Average tolls on 95EL are already up to \$US6 in its second year of operations.

Transurban argue that it is not just the time saving that customers value, but also reliability and safety. The ELs offer a much more consistent journey time and are free of trucks.

Autonomous vehicles

The development of connected and autonomous vehicles is gaining pace. Vehicles that talk to each other, to surrounding infrastructure and to traffic networks will change the way we move. Vehicle platooning and crash reduction should add capacity. Car-pooling has widely been seen as a negative for traffic but could this be overwhelmed by robo-taxis?

Vehicle platooning



Source: Transurban.

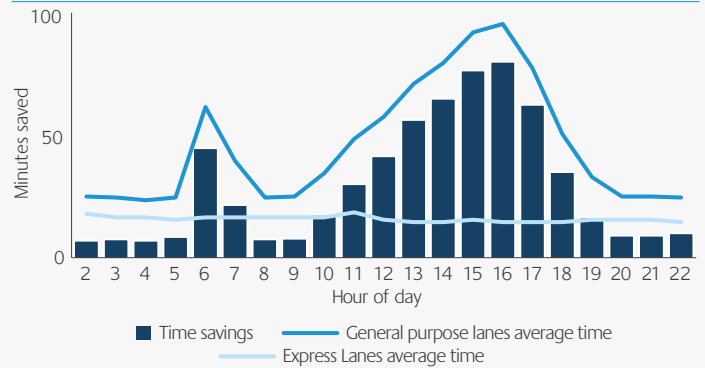
The closed nature of toll roads create a less complex environment to trial and implement this technology, so should be early beneficiaries. Transurban estimate that connected and autonomous vehicles could add 10-25% to motorway capacity by the 2030s. This will be needed if the optimistic scenario of average vehicle occupancy ratio of one results in the doubling of traffic.

Transurban clearly has a biased view and reality may prove to be different, but it is pleasing to see the company at the forefront of innovation and debate.

Portfolio implications

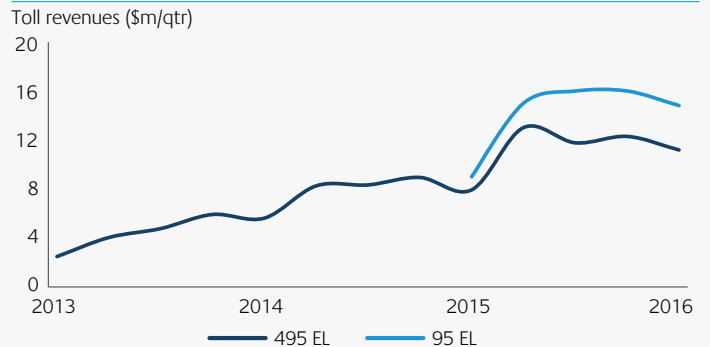
Most Transurban toll roads offer real value for money. The tangible benefits of time, reliability and safety should translate into pricing power that is highly valuable in a low inflation / low return environment. Advances in vehicle technology present risks and opportunities, but on balance look set to expand activity on toll roads. Transurban is actively engaged in both technology development and policy debate and appears well positioned to realise any optionality.

Chart 3: 95 ELs: example time savings



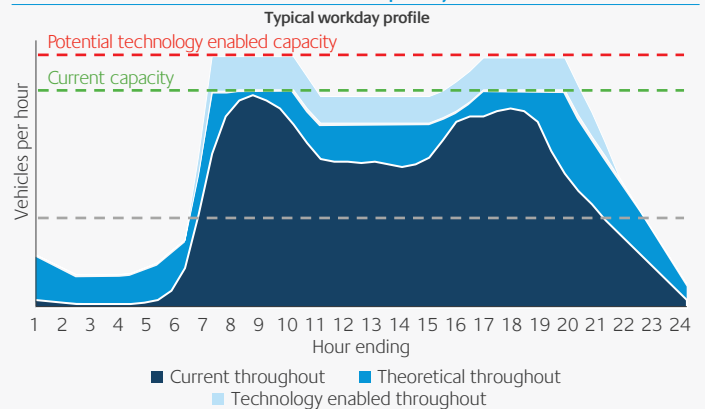
Source: Transurban.

Chart 4: 495/95 Express Lanes



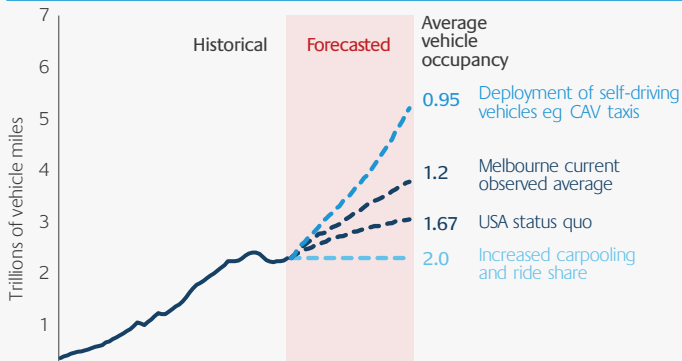
Source: Transurban, First State Investments (First State).

Chart 5: Potential to increase road capacity



Source: Transurban.

Chart 6: Potential trends in road usage



Source: Transurban.

Airports: Bridging the GAP

Grupo Aeroportuario del Pacifico (GAP) is an airport company listed on the Mexican and New York stock exchanges. It has been a holding in the strategy since early 2015. GAP owns and operates 12 airports in Mexico and one in Jamaica, handling over 31 million passengers per year. The fastest growing airport for GAP is Tijuana.

Tijuana Airport (TIJ) is situated close to the US/Mexico border. It is located about 20 miles from downtown San Diego and 140 miles from Los Angeles. TIJ handled 4.8 million passengers in 2015, up 11% on the previous year. This growth accelerated to 38% in the first quarter of 2016 due to the opening of a unique piece of infrastructure.

Cross Border Xpress (CBX) is an enclosed pedestrian bridge for TIJ passengers crossing the US/Mexico border. The \$US120 million project includes ground transport access, car parking, airline check-in, US Customs and Border Protection, retail and duty free shopping and a bridge spanning 390 feet (120 metres) – the southbound process taking 10-20 minutes. A stress-free experience.

CBX is owned by private investors, including Laura Diez Barroso (Chair and key shareholder of GAP) and a US private equity firm. CBX charges \$US12 one-way to use the bridge. This is money well spent given the alternatives. Northbound passengers previously needed to leave the airport in Mexico and drive to the San Ysidro or Otay Mesa Land Port of Entry to the US. As two of the most congested border crossings in the world, this drive could add another two to six hours to the flight and significantly more stress.

An advantage of using TIJ is that it offers direct flights to over 30 destinations in Mexico. The domestic tickets are also much cheaper than flights from US airports. For example, if you lived in San Diego and wanted to take a holiday in Puerto Vallarta, a direct flight from TIJ would cost \$US170/180 with Volaris/AeroMexico. In contrast, a flight from San Diego airport with Delta/American would cost \$US230/245 and you would have to stop in LA/Phoenix adding three hours to the journey. (Source: Expedia).

GAP estimates that 60% of passengers using TIJ are border crosses. CBX opened for business in December 2015 and already handles close to 20% of TIJ passengers. GAP expect this to grow towards 45% over time. The CBX facility appears to have ample space to accommodate this growth, though the lack of car parking has been a concern for customers.

Aerial view of CBX and Tijuana Airport



Source: CBX.

CBX entrance and airport manager Ismael Osuna



Source: First State.

CBX parking rates and duty free shopping



Source: First State.

CBX pedestrian bridge



Source: First State.

Tijuana growing pains

Mexican airlines have added significant seat capacity in recent years. The collapse of nine airlines during 2008-10 sparked a wave of industry consolidation which, together with reduced fuel prices, leaves Mexican airlines in better shape today. Volaris, Interjet and VivaAerobus added over 2.5 million seats to GAP airports this year and the trend looks set to continue.

TIJ airport is suffering from growing pains. The main passenger terminal was built in 1970 and expanded in 2002. The terminal on the landside has recently been renovated offering excellent facilities for food and beverage and airline check-in desks for passengers entering the airport from the Mexican side. In contrast, the terminal on the airside used by all passengers is narrow, dark and congested.

TIJ is embarking on a significant expansion and renovation of the airside facilities. The project will add 18,000 sqm or 25% to available space including significant new commercial activities. While commercial revenue per passenger is unlikely to reach the levels of tourist destinations like Los Cabos and Puerto Vallarta (ie. international visitors spending US dollars), the upside is still material.

The single, long runway has ample capacity and no curfew. With the terminal upgraded and CBX promoted, it is not difficult to envision the doubling of activity to 10 million passengers over three to five years.

Portfolio implications

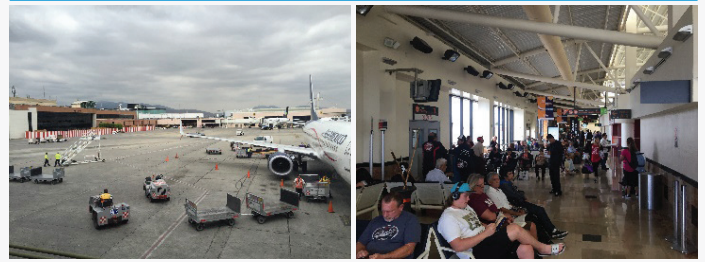
GAP has been a top performing stock in the portfolio in the last two years. The valuation is more full after re-rating from 12x to 15x EBITDA. With earnings upgrade tailwinds of airline capacity and airport improvements, low debt and sensible management, we are inclined to maintain a small position.

Mobile towers: Spectrum of views

The Wireless Infrastructure Show, held in Dallas TX this year, is the key industry event for US tower companies. Public tower companies such as American Tower, Crown Castle and SBA Communications (SBA) were in attendance, but the real value to an infrastructure investor is the access it provides to over 15 private tower operators, carrier customers and technology equipment providers.

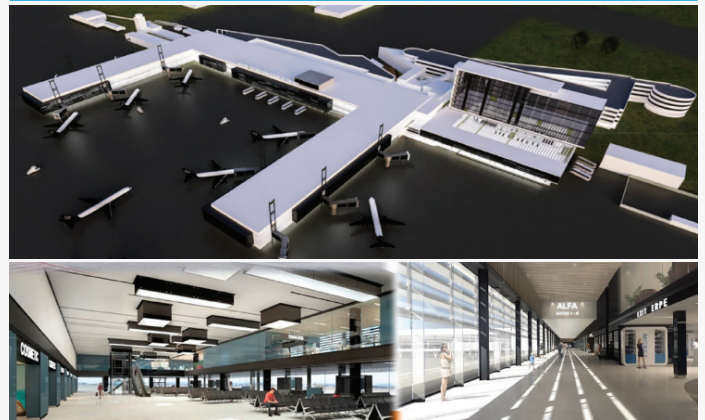
This year's event provided valuable insights into industry growth and pricing power. Interestingly, the discussions went beyond macro sites (towers) to focus on the threats and opportunities of emerging trends in small cells and fibre and international expansion.

Tijuana Airport terminal – 2016 reality



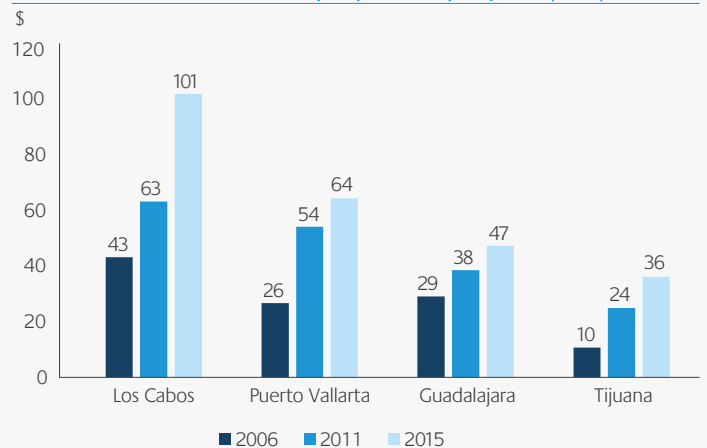
Source: First State.

Tijuana Airport terminal – 2018 vision



Source: GAP.

Chart 7: Commercial revenue per pax at key airports (MXP)



Source: GAP.

Wireless Infrastructure Show – tower panel session



“Carriers are more uncertain than ever, they don’t know where to go.”*

Spectrum? 4G LTE infill? 5G? Small cells? DAS?

“Growth in demand and limited spectrum will ultimately drive investment in infrastructure.”*

Tower growth – strong foundations

The current level of activity in US towers remains at the low end of long-term expectations for 5-8%. Participants were firmly of the view that this decline in growth was not secular, but just another lull in the carrier capex cycle. Carrier spend varied – Verizon was seen as consistent, AT&T diverting cash to spectrum auctions and international acquisitions, T-Mobile growing into spectrum but starting to spend on towers, and Sprint uncertain on what direction to take on technology and hamstrung by a weak balance sheet.

Customer churn also explained some of the current growth shortfall due to the consolidation of second tier players MetroPCS, Leap and Clearwire and subsequent decommissioning of networks.

While the outlook for 2016 had improved marginally, most participants did not expect a return to higher growth until 2017/18. At this point there would be increasing stress on carrier networks from 30-40% pa demand growth plus the availability of new spectrum.

“The foundations for the industry in terms of data usage remain strong, carrier spending is a matter of when not if.”*

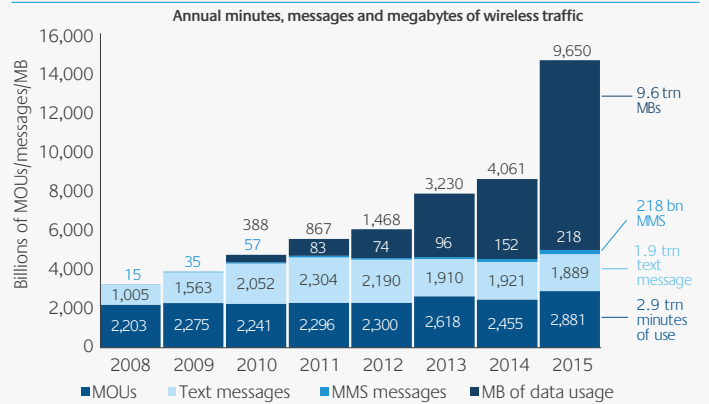
Small cells – a spectrum of views

Small cell deployments are complementary to towers, adding much needed capacity in congested areas. For example, a network of antennas mounted on streetlights and utility poles and connected by optical fibre. Participants noted that small cells are more complex than macro sites as infrastructure providers own and manage more of the network. This would result in higher sales, general and admin costs so scale will be important.

The subsequent land grab for key sites was causing concerns as municipals were being overwhelmed. One participant noted that New York had a backlog of 8,000 applications for small cell sites.

Crown Castle is one of the early movers in this space, having deployed small cell networks supported by 16,500 miles of fibre. Now separately reporting this segment, it is clear that profitability has been diluted with operating margins in the mid-40% compared to macro towers in the mid-60%. Management note this reflects less than one-third of the fibre utilisation and initial low tenancy. Case studies of individual small cell networks revealed returns on invested capital of 13% with two tenants (Las Vegas) and 20% with three tenants (Denver) – similar profitability to macro towers.

Chart 8: US wireless industry growth drivers



Source: CTIA.

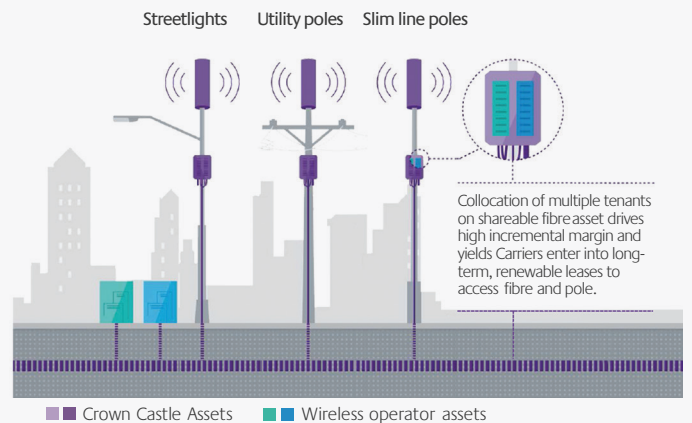
Macro site ownership model

- **Crown Castle Assets**
 - The steel tower structure that typically has capacity for at least four tenants
 - The ground space, which Crown either owns or operates pursuant to a long-term lease
- **Customer Assets**
 - Antenna equipment
 - Coaxial cabling
 - Shelters at the base of the tower, including all of the equipment housed in the shelters



Source: Crown Castle.

Small cell deployments



Source: Crown Castle.

* All quotes from CEOs of private operators



Source: Crown Castle.

In contrast, American Tower noted that only 5% or \$1.5 billion of carrier capex was going to small cells, and expected this to grow to just 10% or \$3 billion. Management noted that small cells made sense in dense areas with capacity constraints, but saw limited threat to its traditional model given 95% of macro sites are outside dense areas. SBA view small cells as a fibre business at risk of competitive overlaying. Management noted that rooftop sites were most exposed to small cell deployment and this was just 1% of their business. A spectrum of views – time will tell.

DAS – stay indoors

Distributed Antenna Systems (DAS) are also designed to add capacity in congested areas. DAS acts like signal repeaters in an office tower or a sports stadium. This was one debate with a clear consensus – indoor DAS is good and outdoor DAS is bad.

American Tower had deployed 300 indoor DAS which had achieved more than two tenants, 70% margins and mid-teen returns. In contrast, the specific nature of outdoor DAS networks made it challenging to add tenants beyond the anchor. 30 outdoor DAS had been deployed, which typically still had one tenant after 3-5 years, with 50% margins and mid-single digit returns.

Price escalators – some pressure but still 3%

Lower inflation and carrier consolidation has led some commentators to question the sustainability of 3% price escalators. Public tower companies were adamant they were continuing to sign renewals with 3% escalators on 10+5+5 year terms. Private tower operators noted that if they compromised on terms and conditions, the exit multiple received on their portfolios would be reduced. All very rational.

Participants acknowledged some pressure on build-to-suit where small, private operators were more active. It was also noted that tower portfolios acquired from carriers included Master Lease Agreements (MLA's), one reducing escalators to 2% and reserving space on the towers to reduce future amendment revenues. Management argued these terms were factored into bid prices and noted they only apply to the anchor tenant, with subsequent tenants paying full terms.

“Carriers want no escalators and larger buckets. People in hell want ice water.”*

International – LatAm beats Europe, from here

International expansion has been an interesting trend for US tower companies in recent years. American Tower (30%) and SBA (20%) generate material earnings outside the US, from Mexico and Brazil to India and Africa. Crown Castle has stayed in the US. Recent public listings of tower companies in Spain and Italy have also piqued attention. There were strong views among the private operators.

Latin America (LatAm) was viewed positively overall. Business models are similar to the US, land rents are passed through to the customer and prices escalate with local inflation. Mexico was seen as highly competitive with a carrier market structure that made it difficult to secure more than two tenants. Brazil was hamstrung by weak carriers, although the restructure of local carrier Oi could be a positive catalyst. Chile, Colombia and Peru were seen as highly investable, though relatively small. Overall, local returns had been “high double-digit” but this had been largely offset by rising country risk premiums and currency depreciations.

Europe was viewed negatively overall. Most markets have limited to no growth with market structures that make it difficult to move beyond the anchor tenant. Given these concerns, public tower companies Cellnex and Inwit were seen as trading on unsustainably high cash flow multiples. The upcoming float of Telefonica’s towers (Telxius) was dismissed given some of the best sites in LatAm had already been cherry-picked.

“Do I take Telefonica risk in Spain, or in LatAm where there is more growth at half the price?”*

Portfolio implications

The portfolio has favoured mobile towers for their structural growth. Short-term headwinds have dampened the outlook but the foundations remain strong for the medium-term. Crown Castle offers a cleaner exposure to the US tower story, without the country and currency risks of international expansion. However, the move into small cells has diluted returns so management need to prove the business model can deliver tower-like returns. The market is now more concerned with international exposure for American Tower and SBA, so risks probably move to the upside.



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* All quotes from CEOs of private operators

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