GSMA

Tower & Fibre – 5G and Beyond

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In the ultra-accelerated 5G era, networks are transforming faster and more fundamentally than ever before. To keep up, Tower & Fibre companies are becoming increasingly agile, flexible and collaborative – juggling an expanding range of technologies, along with complex planning and asset management decisions.

Yet, even with maximum ingenuity and investment, more bandwidth and backhaul is needed for the digital era. There are also other challenges that need to be addressed – from how to increase rural speed and reach, to cutting energy consumption and managing tower estates more efficiently. As ever, exciting new technologies and opportunities are coming to the fore.

The GSMA is monitoring progress and building an understanding of what collaborative requirements are wanted for tower companies, infrastructure vendors and mobile network operators alike. Having held a series of roundtables and seminars in the US and Europe, we hope this snapshot will enhance understanding of the universal challenges and opportunities – and how, together, we can shape the future of connectivity to help business and society thrive.

This report has been compiled based on the views, opinions and knowledge shared by attendees at past Tower & Fibre forum meetings and does not necessarily represent the views of the GSMA or its members.

Evolution and revolution: Supplying the ‘always-on’ generation

5G expected to account for **54%** of global connections by 2030

(excluding licensed cellular IoT) Source: GSMA Intelligence

The 5G era demands a massive increase in bandwidth. Yet digital infrastructures are also bearing the weight of a raft of new services – from video streaming to cloud computing – in homes, businesses and abounding home-businesses across the world.

Habits have evolved too, with people expecting to be able to perform these data heavy actions anywhere and on the move. Even in rural areas, emerging uses such as smart agriculture – from self-driving tractors to drones for crop spraying – now require ubiquitous coverage.

To meet this always-on expectation, digital infrastructures are becoming increasingly layered. In the US and Europe, baseline wireless coverage is still provided by macro cell tower stations. However, other tech is increasingly being drawn into the connectivity mix.

Rather than digging new ground, companies are becoming better at re-using infrastructure. However, streamlined planning and RoW (Rights of Way) are still vital and work needs to be done by the industry to ensure local authorities understand the benefits of digital infrastructure – helping them see connectivity as a commercial and societal enabler.

Urban and suburban

In urban areas, where network densification is required, macro tower coverage is currently being supplemented in many ways, primarily:

- Small cells – built into existing civil infrastructure to boost reach
- Distributed Antenna Systems (DAS) – providing wireless coverage to hotels, subways, airports, hospitals, businesses, roadway tunnels etc.
- Wi-Fi – focused wireless access provided via WLAN and Fibre to the Home (FTTH)

9.8bn SIM connections expected by 2030

Source: GSMA Intelligence

Rural

In more remote areas, the challenges vary with many places still having no or very poor broadband. While there has been a lot of subsidy money for rural fibre, the last mile remains very expensive – limiting the ability to reach every home. Equally, satellite connectivity provides a clean option, but one which can be difficult to justify in terms of cost and reliability.

Connectivity can often be achieved better by fixed wireless access (FWA) – a wireless connection to a local tower rather than fibre to the home. This is an efficient and scalable alternative to wired connections. Often, however, there isn't the business case for ubiquitous rural macro cells and stakeholders are increasingly looking to even more advanced technical solutions such as HAPS.

New technologies at a glance

In this multi-layered mesh of connectivity, some clear opportunities are emerging for the tower & fibre industry, including laser-based backhaul and edge computing.

‘Wireless fibre’ via laser

> “Centauri is about the size of a shoebox, weighs less than 3kg and provides last-mile scalability with throughputs of 10Gbs, 25Gbps and 100Gbps full duplex. It provides the lowest cost per bit whilst typically using less than 20W of power.”
>
> **Brad Ridge,** Head of Business Development, Transcelestial

Backhaul infrastructure is the backbone of most modern digital societies and laser fibre is an exciting new technology for plugging connectivity gaps. Cost-effective, highly secure, and clean and simple to install, it delivers robust performance that compares favourably to alternate technologies such as fibre and mmWave/e-Band spectrum.

A number of other advantages make it an excellent solution in most deployment scenarios, especially in dense urban areas:

- Installed in hours
- No RoW issues
- No spectrum licensing
- No congestion or interference in bad weather
- Good reach of several kilometres
- Highly scalable and secure

The future of this tech is even more promising. For example, Transcelestial are working on an LEO (Low Earth Orbit) space laser system intended to enable a full ‘mesh’ satellite network with Gb/Tb capabilities. Such a system would enable multi-Gbps capacity to anywhere on the planet and can augment the reliance on intercontinental and subsea cables.

Edge infrastructure

More and more functionality is moving to the edge, especially to support the ultra-low latency requirements of cloud-powered technologies such AI and AR/VR. Data caching at the edge gives cell sites advantages in both performance and energy efficiency, avoiding the exchange of vast amounts of data (think of smart transportation, for example).

Further enabling these data centres, cloud on-ramping could be an important interconnection solution for hybrid and multi-cloud environments, whereby the Cloud server (currently in the middle of the network) will move closer to the edge.

Managing sites and digital assets

"There needs to be a massive increase in cell sites and all these additional sites need to be managed...[otherwise] 5G rollout will just grind to a halt."

Tom Leddo, Chief Strategy Officer, MD7

There are hundreds of thousands of individual cell sites across the world, each with an individual piece of real estate that needs to be managed. To ensure the business case for new site development, and maintain existing sites, there is a strong need for these underlying assets to be optimised for efficiency, performance and revenue generation.

Efficient management requires much more collaboration with other industries and can be separated into four main categories:

- Multi-tenanting
- Digitizing to enable remote management
- Cheaper energy and green commitments
- Spectrum optimisation

Multi-tenanting

Data storage companies could emerge as attractive new tenants and a powerful new group of industry players.

Anchor tenants (MNOs) remain vital, along with standardisation of leasing agreements. However, as companies look to maximize leasing growth on existing portfolio assets, adding further tenants can present attractive opportunities. It typically acquires minimal additional operating costs and enables significant operating leverage, new revenue and CAPEX efficiencies as tenancy increases.

Data centres remain solid opportunities with the likes of Google preferring to pay someone to host their software rather than run their own infrastructure. Therefore, to further optimise the edge, data storage companies could emerge as attractive tenants and a powerful new group of industry players. Tower & fibre companies can see this as significant partnership opportunity.

Digitizing to enable remote management

As in other industries, advances in 'Digital Twin' modelling provide exciting opportunities to drive efficiency – enabling sites to be visited and analysed virtually, leading to huge saving in cost and time. Other advantages of digital twinning include the potential to enhance site performance, as well as monetize space by providing a clearer understanding of the asset.

Extensive digital data is the key, as hyperscalers and companies such as Google require certified and precise information.

Energy and green commitments

> "Whilst 5G is more energy efficient in the long run. As 5G becomes more pervasive, the energy consumption demand on mobile networks will rise."
>
> Source: GSMA Intelligence

Power has become a major issue for tower & fibre companies worldwide, not just due to increasing energy-related OPEX but also due to Net Zero commitments and the need for stable and reliable power.

There are varying green energy commitments across the world to limit carbon footprints, along with diverse financial incentives and penalties. Yet the overall challenge is clear: use less energy to handle more data.

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In addition to sustainability, there is also a public safety consideration for powering cell sites independently, with climate change creating more outages. There is a lot of innovation in markets such as Africa, where the grid can be unreliable and a number of different independent energy sources are being deployed, such as wind and solar, along with lithium ion batteries and more conventional diesel generators.

Overall there is a growing need and opportunity to be both cleaner and leaner. Collaborating with power companies and being able to independently power infrastructures is very much the future to keep OPEX down and achieve Net Zero targets.

At the same time, investing in AI solutions will help manage power consumption. Europe is currently leading the way in data collection which is key for emissions reduction.

Spectrum optimisation

Finally, and perhaps most obviously, sites are optimising every last Hz of new spectrum as carriers look to deploy maximum bandwidth on existing macro towers.

Watch this space – and get involved

The GSMA is continuing to engage and collaborate with its members and the broader tower & fibre ecosystem to find ways to meet the exponentially increasing demand for fast, reliable, ubiquitous wireless connectivity.

As this series of roundtables shows, the solutions are out there. And, with the right innovation, investment, regulation and cooperation, together, we can shape the future of connectivity to help business and society thrive.

Why not join us in? Connect with the GSMA and connect with the people, tools and intelligence to transform your business.

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