

TRENDS

The long road to 5G

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5G connectivity promises to revolutionise the global economy and potentially uplift billions of ordinary people into newfound wealth and prosperity. But for all the hyperbole the technology currently attracts, there are major hurdles that need to be cleared before 5G networks hit critical mass.

One of the biggest challenges to its local adoption will be cost. "Once 5G goes mainstream, telecommunications companies globally will need to invest an additional US\$700 billion by 2020. In Malaysia, the cost of setting up a nationwide 5G network will run into the billions of ringgit," says Raju Chellam, vice-president of new technologies at Fusionex International.

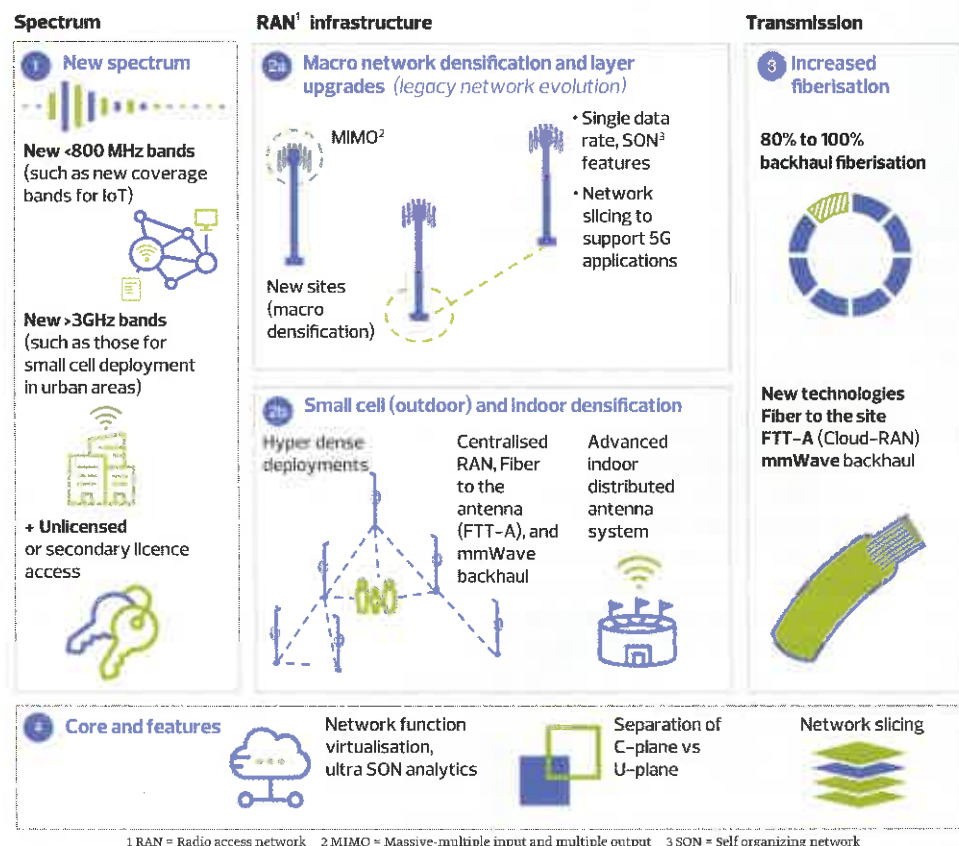
Infrastructure accounts for a big chunk of the set-up costs, specifically small cell towers. These are not "towers" as such. In fact, the 5G-enabled small cell antenna is relatively compact and inconspicuous. They may be referred to as towers because these antennae are typically affixed to tall traffic lights, telephone lines, lamp posts, building façades and so on.

Modern cell towers and wireless networks rely on microwave frequencies to transmit voice and audio data. These frequencies have increased dramatically since the early GSM and 2G standards. For perspective, the prevailing 4G LTE (long-term evolution) network is transmitted at frequencies of up to 2.5GHz. For 5G, however, the frequency demands can be as high as 95GHz to start with.

Such high frequency waves tend to have very short wavelengths (hence the term "micro" wave). In communications parlance, this is generally referred to as millimetre wavelengths (mmwaves). As 5G coverage is gradually expanded, the demand for new mmwave frequencies could increase to the hundreds of GHz.

A key weakness of these micro-

Entry points in the early 5G value chain



waves, however, is that they are vulnerable to blockage and disconnection. Therefore, to facilitate the scale of connectivity that 5G is capable of (not just mobile devices but autonomous vehicles interacting with their surroundings, smart city applications and machine-to-machine communications), small cell antennae will have to be built in large quantities and erected close to one another. This provides overlapping layers of 5G connectivity, thus minimising disconnection risks.

THE BRITISH EXPERIENCE

Early problems are arising in cities where 5G is being piloted. "The business model is not fully fleshed out yet because 5G has not been up and running for long enough," says SilTerra Malaysia Sdn Bhd vice-president of strategic management Tan Eng Tong.

On top of this, the 5G rollout is being conducted in phases, which

means new and unforeseen problems could arise at each phase of the rollout. British network operator EE for instance, is launching its 5G network across three phases, and it is likely to stretch beyond the year 2023.

"In the UK, where full, next generation 5G trials are being run, network operators are trying to attach small cell antennae to lamp posts and buildings throughout the pilot cities. But they are meeting with resistance from local councils and building owners," says Tan.

Recall that small cell antennae need to be erected at least a few stories high and in close proximity to each other. As a result, public structures have become prime real estate for 5G network operators as they compete to cover cities with their respective small cell antennae.

But in the UK, local councils have wildly varying levels of preparedness, according to local news

reports. This is resulting in inconsistent levels of small cell antennae proliferation in certain pilot cities.

Recently enacted network and communications guidelines have unexpectedly complicated the 5G rollout. The December 2017 Electronic Communications Code confers surprisingly wide powers to network providers over right of access to public structures and fixtures, even if private landowners or occupiers are in the way.

Among others, the code allows an operator to apply to the court to impose an agreement that binds the landowner or occupier to the various rights and privileges which the network operator enjoys under the code.

Perhaps unsurprisingly, this has encouraged British network operators to take a litigious approach to local councils and landowners that are less than amenable to 5G infrastructure on their properties. According to *The Guardian*, network operators in the UK are clamouring for access to lamp posts and other tall structures in cities and are threatening legal action against any local authorities or landlords who stand in their way.

Fusionex's Raju cites a 2018 McKinsey report, which suggested that the most logical solution would be for telecommunications companies to share the network infrastructure. "The strongest rationale for sharing will be cost savings and improved network quality. This is especially true for greenfield deployments such as small cells, where three operators can save up to 50% each through sharing, according to our research. Simulations from one case showed that by sharing 5G

small-cell deployment and building a common, nationwide 5G Internet of Things (IoT) macro layer, operators could reduce 5G-related investments by more than 40%," says the report.

"Closer collaboration is another option. Axiata Group Bhd and Telenor Group announced plans to merge their operations in Asia, mainly to defray the huge capital expenditure required for launching 5G services," says Raju. In any event, the prospective merger was abruptly called off in early September. It remains to be seen if the merger is revisited at some point in the future.

Cost notwithstanding, it will still be years before Malaysia sees the effects of a fully fleshed out and operational 5G network. Superfast connectivity speeds are great for the few private users who will be able to afford the service in the early days, but the real benefits of 5G are in the areas of highly intelligent and autonomous industrial and enterprise applications, as well as the resultant big data processing requirements.

Given the relatively limited number of such high-end companies in the local economy, SilTerra's Tan believes that the early touchpoints for 5G connectivity will only apply to a small minority of industry players. "Our economic needs have barely caught up to the efficiency gains that are being provided by 4G, let alone 5G. The early problems that 5G is trying to solve will really only apply to something like the top 2% of businesses. That is because, as of right now, most of the current economy's enterprise connectivity issues can largely be resolved with greater 4G connectivity which, by the way, we are still some ways off from fully realising," he says.

In April, Prime Minister Tun Dr Mahathir Mohamad said Malaysia could leverage 5G technology in the next three years. The manufacturing industry was touted as an early beneficiary of 5G connectivity. More broadly, the proliferation of new 5G networks in the country could attract high-tech, high-value-added and knowledge-intensive investments in a slew of other sectors such as aerospace, medical devices and electrical and electronics, Mahathir was quoted as saying.

Finally, talent will be key to the country's long-term 5G ambitions. Raju says local institutions of higher learning have increased their offerings in artificial intelligence, machine learning, big data analytics and IoT-related subjects.

But he believes the education needs to start much earlier. "It is time for Malaysia to consider introducing coding or programming in the upper primary levels, not unlike what Singapore is planning to do. Starting next year, all Primary 4 to Primary 6 pupils in the city state will have to attend compulsory coding enrichment classes." ■

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