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Contents

Polkomtel Infrastruktura's deal with Cellnex marks the emergence of the mobile NetCo model

Miltos Andriopoulos, Senior Manager, Consulting

Neutral hosting of mobile network services has been a topic of discussion within the mobile industry for years, but examples of its successful implementation are limited. Mobile network operators (MNOs) have been reluctant to even consider outsourcing their networks, widely regarded as a core asset, while the industry has lacked a framework for such an arrangement. However, this has started to change.

The deal that conditionally closed at the end of February 2021 between Polkomtel Infrastruktura (Poland) and Cellnex (Spain) marks the first large-scale disinvestment of an MNO's network to a third-party service provider. Under the conditions of the deal, Cellnex agreed to pay EUR1.6 billion (USD1.9 billion) to buy all the components of the former's network under a long-term network-as-a-service agreement, with a mandate to commercialise that network to interested third parties. The agreement also marks the first such venture of a strategic mobile infrastructure investor becoming a full network-as-a-service provider.

The deal involves the transfer of all passive, active (RAN network) and backhaul assets to a new company, which is referred to as the mobile NetCo (see Figure 1). In this model, MNOs retain ownership of spectrum and core network while all remaining elements of the access network (including towers, active equipment and backhaul) are provided by the mobile NetCo.

With the asset ownership perimeter defined, the natural next question revolves around the definition of the business model, including the service, pricing and value creation mechanisms employed.

The mobile NetCo model enables new service offerings to be established

Historically, towerco services have been based on a passive access[1] model that often centres around a standard

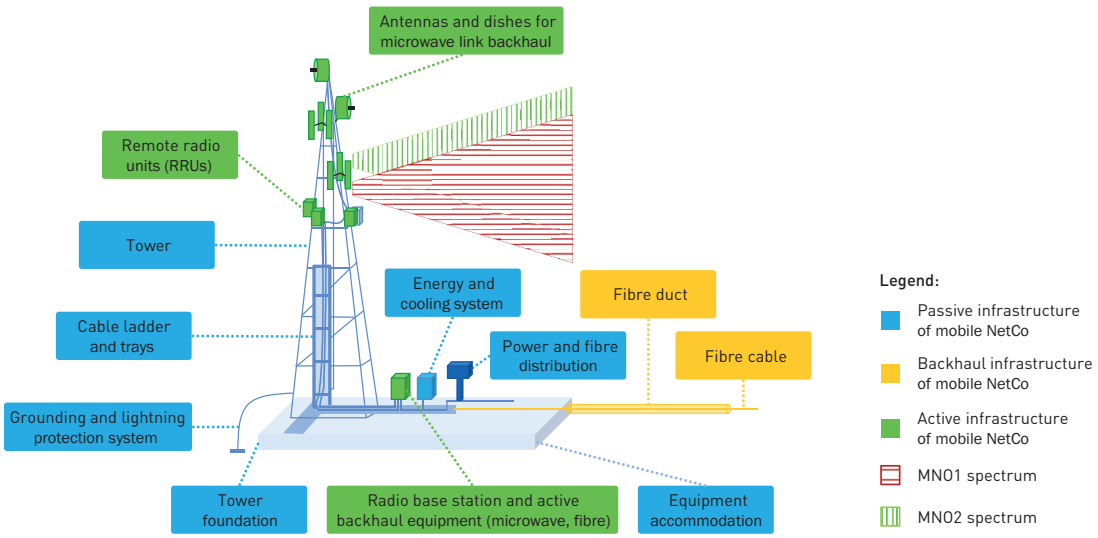


FIGURE 1: OWNERSHIP OF ASSETS UNDER THE MOBILE NETCO MODEL [SOURCE: ANALYSYS MASON, 2021]

configuration allowance, with surcharges applying in case of extra space requirements. The new mobile NetCo model could allow operators to buy services for individual locations, or even their entire network, based on a modular service catalogue. Passive access could be considered as the standard product while active services and/or backhaul could be added on top.

NetCos can offer a flexible and scalable service by introducing 'per carrier pricing'

Pricing mechanisms for passive access (with a standard configuration allowance) and backhaul services (with bandwidth capacity) have been well established in the industry while active services are much newer. Their design needs to handle dynamism and must also accommodate operators' demands for changing network configurations (such as bands and technologies deployed on each site) on a continuous basis. In parallel, active service designs need to capture the complexity of associated costs, as each configuration may involve differences in investment levels, running costs (for example, electricity) and maintenance requirements (including regularly refreshing equipment with a short lifespan).

The introduction of a 'per carrier pricing' model can allow NetCos to manage this complexity while maintaining a price catalogue that is concise and meaningful. In this model, tenants pay for the number of carriers used on each site based on their types.

Transparent baseline pricing will promote trust between the mobile NetCo and its client

Transparency when setting baseline pricing is considered to be essential in such critical relationships. A cost-plus recovery model can be considered, where opex is treated as a pass through and capex costs are recovered with a margin to account for the cost of the investor's capital. Once the mobile NetCo and its client have agreed on the choice of permitted equipment vendors, pricing can be set on a transparent basis using a total cost of ownership (TCO) model.

Mobile NetCo can create value through co-location

The mobile NetCo model enjoys similar value creation potential to the traditional passive co-location model. Operators in the same market often tend to share similar holdings across bands and follow similar spectrum strategies (for example, 3.5GHz as the 5G capacity band, 800MHz as the 4G coverage band). Mobile NetCos have the potential to reuse existing equipment to deploy the spectrum of multiple MNOs and create economies of scope.

The created value can be distributed among the involved parties through margin premiums for the mobile NetCo or discounts flowing to both tenants.

Active services offer towercos a revenue growth opportunity

Active services present towercos with an opportunity to significantly expand their existing revenue base (for example, by up to 2x) by upselling to existing tenants, by attracting tenancies from operators wishing to expand their coverage, by addressing national initiatives for neutral host networks or by becoming network partners to aspiring new entrants. Active services can also present attractive EBITDA margins for anchor tenants (>60%) and sharing synergies that can be attractive for investors.

Established and new-entrant MNOs can benefit from the mobile NetCo model

For established MNOs, the mobile NetCo model can present an opportunity to raise cash by commercialising their existing active equipment estate, as well as to facilitate 5G roll-out or easily expand coverage in underserved areas. For prospective new entrants, this model removes significant barriers to entry such as large peak funding requirements and speed of network deployment.

The telecoms industry is addressing the remaining challenges associated with a mobile NetCo model

Industry stakeholders will need to keep developing frameworks to solve the challenges of the mobile NetCo model. Key issues include practical matters (such as the culture within MNOs' organisations, network integration of neighbouring points of presence when managed together by both an MNO and a mobile NetCo), contractual matters (including the selection of acceptable equipment vendors) and competition (including managing commercially sensitive information across tenants). However, the industry is making positive steps in addressing these issues and more ventures of a similar nature are expected in future.

Analysys Mason provided business planning and sell-side support to Polkomtel Infrastruktura as part of the recent process. Analysys Mason has a strong track record working alongside strategic and financial investors in the mobile infrastructure space and has completed over 100 tower-industry-related assignments in the last 5 years.[2]

[1] Includes provision of access to the passive network elements as shown in Figure 1, and most notably, space on tower to mount equipment.
[2] For further details of our work, please see Analysys Mason's Strategy and planning.

Questions?
Please feel free to contact Miltos Andriopoulos, Senior Manager, Consulting at miltos.andriopoulos@analysysmason.com

Operators are starting to look for new sources of revenue growth in light of the COVID-19 pandemic

Stephen Sale, Research Director, Consumer Services

2020 was a challenging year for many telecoms operators, even though the telecoms sector performed better than many others. The growth prospects for many revenue lines have shifted (up or down) as a result of the COVID-19 pandemic, but we have yet to see any operators undertake a major rethink of their revenue growth strategies.

The effect of the COVID-19 pandemic on operators varied significantly based on their footprint

We analysed the results of a selection of operators of various sizes and in different regions around the world as part of an ongoing series of reports examining operator growth strategies. Operators in developed markets generally faced more challenges (in terms of growing their revenue and number of subscribers) in 2020 as a result of the pandemic than those elsewhere (Figure 1). Indeed, mobile revenue fell for most developed-market operators, notably due to a drop-off in roaming and declining device sales. This was offset to varying degrees by fixed broadband revenue growth. SK Telecom is an exception to this trend, perhaps because the impact of the pandemic in South Korea has so far been relatively minor.

A few operators in our study reported very strong results in 2020, many of which were driven by strong mobile data growth in emerging markets. MTN posted a revenue increase of 17% in 2020, driven by 15% revenue growth (constant currency) from its largest opco, MTN Nigeria. Reliance Jio's revenue growth came primarily from strong growth in the number of subscribers (it added 41 million customers in 2020) alongside increased ARPU. Customers in emerging markets have relied more than ever on their mobile devices and have prioritised spending on mobile data services during the pandemic.

Operators continue to look to digital services for revenue growth

The pandemic has raised a number of questions about operators' long-term growth plans. We consider each of the main areas of operators' retail activity in turn below.

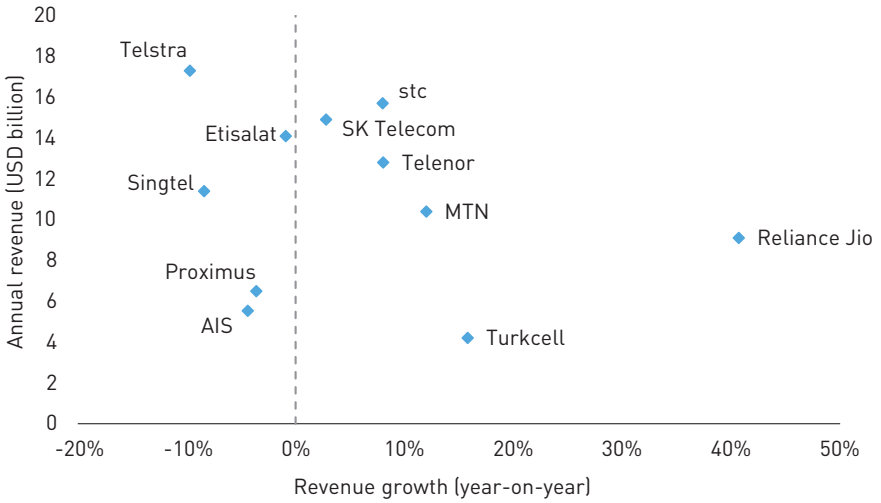


FIGURE 1: SELECTED OPERATOR REVENUE, 2020, AND YEAR-ON-YEAR REVENUE GROWTH, 2019–2020 [SOURCE: ANALYSYS MASON, 2021]

- **Core consumer**. Fixed broadband is viewed as a strong revenue engine by many operators, and fibre investments continue apace (for example, AIS, Proximus and Turkcell). Many operators hope to use 5G to grow mobile ARPU and are building propositions around rich media content, including AR/VR and gaming. Convergence remains a guiding principle and many operators are emphasising a strong network proposition across both fixed and mobile (such as Proximus's 'Best Gigabit Network' proposition). SK Telecom offers the boldest vision for its consumer business and aims to reposition itself as an 'AI platform subscription company'. It plans to sell its own and third parties' services, including financial, educational, rental and travel services.
- **Business services**. Operators continue to look to their ICT service portfolios for future revenue growth. Operators are strengthening their cloud capabilities and many are building strong security propositions, often supported by acquisitions. SK Telecom is building on its security capabilities to explore new use cases such as home, parking and contactless solutions in response to the COVID-19 pandemic. Prospects for enterprise connectivity have been weakened by the pandemic, though some operators are building propositions to address the needs of a newly distributed workforce. 5G features in many plans, but details are often lacking. For example, Singtel is deploying millimetre-wave services for "specific enterprise use cases", though has yet to provide details of what these use cases are.
- **Media**. Many operators' aspirations to move into the media space have waned in recent years. Operators' pay-TV businesses generally suffered in 2020; most of the benefits of increased video consumption went to OTT providers such as Netflix and Disney+. Many operators are shifting their focus to emerging content categories, such as cloud gaming, that can stimulate increased demand for high-performance connectivity. For example, Singtel has teamed up with AIS and SK Telecom to invest in a regional joint-venture company to offer gaming and e-sports.
- **Fintech**. Fintech typically accounts for a low, single-digit percentage of revenue for operators that are active in the sector (for example, it accounts for approximately 3% of Singtel's total revenue). However, mobile financial services have benefitted from behavioural changes during the pandemic, and many operators are aiming to grow the revenue from their existing mobile wallet services, while also looking to benefit from an expansion into related services such as insurance or digital banking. MTN was one of the best-performing operators in the fintech space in 2020: its fintech revenue grew by 24% and accounted for 8% of its total revenue.
- **Data/analytics**. These services are typically very small (usually less than 1%) contributors to operators' overall revenue, and revenue from them has generally fallen during the pandemic. Revenue from Singtel's Group Digital Life, which includes the Amobee advertising platform, fell by 20% between April and December 2020, largely due to decline in advertising spending worldwide. However, the sector is expected to rebound in 2021, along with an accelerated shift to digital channels, so many operators are looking to develop capabilities and get better returns on their data assets.

Operators will need to revisit some of their assumptions about revenue growth in light of the COVID-19 pandemic

Many operators evaluated the need to change their long-term growth strategies in response to the pandemic during 2Q 2020, when the crisis was still at an early stage. However, it became clear over time that telecoms spending was less severely affected by the pandemic than originally feared, though there was a high degree of uncertainty over the longer-term outlook for the economy at the same time. Consequently, very few of the operators included in this article have made significant changes to their approaches. More adjustments are likely to be necessary as we come to better understand the long-term economic and social impacts of the pandemic. Assumptions of a stable economy and a continuation of existing service and technology trends often underpin an operator's strategic plan. These assumptions look outdated and may need a rethink for some of the services offered by operators, particularly business services. For example, many industries are being reconfigured to support higher levels of remote working, thereby exposing the frailties of a connectivity business built to serve centralised offices in CBDs. Cloud services, security and digitalisation have been given a boost. Sectors such as healthcare, transport and education are likely to be profoundly affected, and will potentially present new opportunities. There are signs that operators are starting to address these opportunities, but we expect that many operators will conduct more thoroughgoing strategic reviews in 2021.

Further information on operators' growth strategies is available in our report, *Telecoms operator growth strategies: case studies and analysis (volume IV)*, and further details about the changing industry opportunities can be found in Analysys Mason's *The post-pandemic landscape: the impact of COVID-19 and opportunities for telecoms operators.*

Questions?

Please feel free to contact Stephen Sale, Research Director, Consumer Services at stephen.sale@analysysmason.com

IoT MVNOs need to address the threats to their business

Tom Rebbeck, Partner, Research

The original IoT MVNO model worked well and was stable while the market was relatively small and nascent. However, the two pillars of the IoT MVNO offer – low prices and more support than MNOs offer[1] – are now under threat. IoT MVNOs need to sharpen up their offer if they are to survive and thrive.

The model used by MVNOs to sell IoT connectivity is simple. They buy connectivity wholesale from a mobile operator, add some value (for example, by providing pre- and post-sales support) and sell it to customers. Their focus has typically been on customers that want a few thousand connections at most; MNOs have not been interested in addressing this market directly. MVNOs have won business by being cheaper than MNOs for low-volume contracts and by adding some value that MNOs are unwilling or unable to offer.

The MVNO cost advantage is under threat

MVNOs' price advantage is being eroded for two reasons.

- **The retail price that MNOs are charging for IoT capacity is falling rapidly.** IoT connectivity has long commanded a premium over smartphone connectivity, especially for devices that only require low data volumes. However, this premium is shrinking; MNOs are rapidly lowering their IoT connectivity prices (by as much as 30–40% per year in some cases) as they compete to win or renew deals. The scope for MVNOs to offer lower retail prices than MNOs is therefore diminishing.
- **MVNOs are finding it increasingly difficult to access low-cost connectivity deals.** MVNOs have often bought connectivity indirectly, and have gained access to domestic connectivity through international operators with competitive roaming agreements. This arrangement has given IoT MVNOs access to better prices than they would get directly from a domestic MNO. However, underlying contracts between domestic MNOs and international operators are often created for smartphones and typically exclude (explicitly or not) IoT devices. For example, the agreement may not allow devices to permanently roam, which would affect some IoT devices. This exclusion was not enforced when volumes were low, but as volumes increase, more MNOs are paying attention to IoT devices roaming on their networks. In some cases, MNOs are only allowing continued access upon payment of a monthly surcharge. These extra fees reduce or eliminate any pricing benefit that MVNOs used to have.

In short, MVNOs that have previously won business purely on price may no longer have that advantage.

The IoT MVNO sales model is changing

IoT MVNOs' second strength was their consultative sales model. MVNOs worked closely with customers to help them to define requirements and select the best solution. This model involved extra costs for MVNOs, but was necessary because many customers needed this additional support.

However, the market is changing. Customers have more experience in buying connectivity and need less support. Buying connectivity has also become simpler, and companies such as 1NCE sell IoT SIMs on their websites. 1NCE offers pre- and post-sales support for customers that need it, but the aim is to be predominantly self-service. Its recent agreements with AWS that make cloud integrations easier will also add to its appeal to developers (an important target market).

The simpler sales model has been a success; 1NCE sold more than 5 million connections in its first 2 years of operation. No other MVNO has added more SIMs in this time organically. Even some large MNOs added fewer IoT SIMs in the same period of time (for example, Orange added 4 million IoT SIMs between the end of 2018 and 2020).

MVNOs can respond in a number of ways

IoT MVNOs need to respond to these changes in the market. Competing on price does not look like an attractive option for most. Even if they can get access to competitive wholesale deals (and this is getting harder), MNOs' retail prices are falling. MNOs will also undercut MVNOs when necessary (for example, to win the largest contracts, such as with car companies).

Copying 1NCE's self-service model could be an option for some MVNOs. The key to this strategy is to bulk up and gain scale so that fixed costs can be spread across a large customer base and the MVNO can negotiate better capacity deals. MVNOs that adopt this strategy must invest in new features, such as cloud integrations and security, so that they can compete on more than just the retail price of connectivity.

Another option is to focus on a vertical market. KORE Wireless is taking this approach. Its most recent acquisition (of Integron in December 2019) has given it expertise in the healthcare sector. It is planning to make further investments and acquisitions in this segment. KORE Wireless is targeting USD300 million of revenue from healthcare by 2025, according to its recently announced listing.

Finally, there remains a market for MVNOs to sell to customers that have complex needs and want additional support. These customers have bespoke requirements that cannot be managed through a self-service model, but they are too small to attract the interest of the MNOs. However, their requirements are changing. MVNOs need to be able to address questions concerning security, hardware, cloud integration and international roaming rather than relying on sales of domestic connectivity contracts. MVNOs adopting this strategy will become less like connectivity providers and more like IoT consultants or even small systems integrators.

None of this is happening in isolation. MNOs are also taking some of the steps outlined above. It has taken longer than we expected, but they are starting to offer more self-service features and one-off pricing options, such as providing a multi-year contract for an upfront fee. They are also working more closely with some of the MVNOs (Deutsche Telekom is a shareholder in 1NCE and TELUS recently invested in Eseye) and are incorporating some of the technology developed by MVNOs into their own offers. As with MVNOs in the consumer market, IoT MVNOs need to offer something that MNOs cannot or will not.

Analysys Mason has over a decade of experience helping investors, MNOs, MVNOs and end customers to understand the IoT market. We have also published a number of articles and reports on this topic. Please contact Tom Rebbeck if you would like to discuss this topic further.

[1] Extra support can include pre-sales support (for example, helping select a SIM or understanding different connectivity offerings) and ongoing support (in particular, resolving connectivity problems when they arise).

Questions?

Please feel free to contact Tom Rebbeck, Partner, Research at tom.rebbeck@analysysmason.com

Telecoms solutions have a substantial role to play in achieving net zero

Ian Adkins, Principal, Consulting

Utilities have already begun their progress towards the UK's 2050 goal of net zero, with the transition to smart energy systems taking place across millions of homes and businesses throughout the UK.

Underpinning these 'smart' developments is the need for telecoms network solutions (fixed and wireless) with ubiquitous, reliable coverage.

Herein lies a potential problem. Policy makers and utility regulators tend to assume that telecoms solutions exist or are easily provisioned. This overlooks the commercial challenge that transitioning to smart solutions requires a step change in the capability and coverage of telecoms networks, to communicate with devices on a utility network.

Utility networks need to transition from communicating with a few thousand devices to hundreds of thousands; and the range of applications increases the complexity of telecoms requirements.

Commercial tensions

The wireless networks of mobile network operators (MNOs) offer one possible solution, but their commercial return mostly comes from serving populated areas.

In contrast, utility networks require smart communications to increasing numbers of unpopulated locations. These contradictory positions create a tension between the commercial drivers of MNOs and the need to provide reliable, resilient telecoms solutions to utilities.

The Internet of Things (IoT) and 5G have the technical capability to meet the communications requirements of utilities. However, utilities are just one of many industry 'verticals' that MNOs serve and are probably the hardest to satisfy. This could mean that MNOs will prioritise their solutions for the 'easiest' verticals, creating tension between the commercial drivers of MNOs and utility requirements.

Private 5G network opportunities

Utilities could set up private 5G networks to meet their requirements, but face complexities regarding access and control of the spectrum. Many utilities argue that having access to their own dedicated spectrum is essential to give them full control over the network.

However, MNOs argue that they can use the spectrum more efficiently. Ofcom, as the communications regulator, has to balance these competing arguments. There is also uncertainty about who would take responsibility for investing in the deployment and operation of new private networks dedicated to utilities.

Industry alignment

It will not be easy to unravel these complexities. The UK is not alone in facing these dilemmas – they exist globally. Although the market landscape for 5G private networks is nascent, it is attracting the attention of innovative service providers.

Now is a good time for the utility and telecoms sectors to work together, and for government to encourage dialogue to help them understand each other's perspectives. Given the enormity of the net zero goal, it is vital to achieve better alignment.

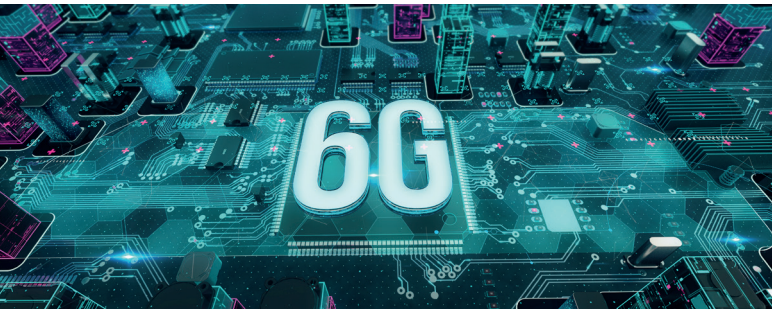
This article was published in The Guardian | Smart Cities Campaign on 16 March 2021.

Questions?

Please feel free to contact Ian Adkins, Principal, Consulting at ian.adkins@analysysmason.com

6G networking is starting to take shape

Larry Goldman, Chief Analyst, Research



Why will we need 6G?

6G networking will be built on new technologies that do not yet exist, and will enable use cases not yet defined.

Operators are only just starting to roll out 5G networks, and most users have not yet experienced 5G services. 5G technology encapsulates a great deal of innovation that we have yet to exploit. It supports higher speeds, greater reliability and lower latency than 4G, and enables a great many new use cases that the communications industry will be developing for many years to come. However, we can anticipate that the new technology of 5G will be found to be limiting. Players in the communications industry are already thinking about what these limits will be, and are developing the fundamental technologies needed to push past them. The new use cases in the 6G era require some imagination. Previous generations of mobile networks have enabled existing wireline applications to be mobile at a reasonable cost. 6G involves applications that do not yet exist in any form. These applications lean heavily on virtual reality, and high-performance, real-time computing will be just as important to the network as communications.

What is 6G?

6G researchers are looking into a great many technologies. We can categorise them into four basic groups.

- **Terahertz wireless spectrum.** Signals will need to be transmitted in ranges above the millimetre-wave (mmWave) bands used for 5G in order to achieve speeds beyond those delivered by 5G networks. The next wireless performance frontier beyond mmWave is Terahertz (THz). THz frequencies can carry vast amounts of data, but also suffer from severe path loss. The large capacity of THz spectrum and the short propagation distances (which in turn limit interference) lead some researchers to suggest that there is no need to license spectrum. An application would use what it needs, when it needs it and would give it up when not using it, making use of shared access spectrum approaches that are emerging today. Much antenna development work needs to be done before moving into the THz frontier. This is one of the primary reasons to start thinking about 6G now. The use of THz spectrum is also the most striking departure from 5G.
- **Machines, not humans, as the primary users.** The vast amounts of 6G data and the rates at which it can be transmitted are way beyond the capacity of humans to handle directly. 6G will be primarily about connecting machines that are involved in handling very complex tasks, such as remote surgery, leaving humans to focus on what they want to achieve, rather than how to carry out the task. 5G will soon be going some way down that path with very low latency, enabling virtually instantaneous response 6G will allow for machine-controlled tasks that are even more complex. The business case for 6G depends upon these machine innovations, as well as networking. iPhones will become quaint relics, akin to how we think of flip phones today.
- **Distributed intelligence.** 6G is not about quickly transmitting a lot of data for people to use; it is about applications getting and acting on data. The virtually instantaneous transmission of 6G data means that much of the understanding of how to react must be physically very close to the source. Highly complex applications cannot wait for data to be transmitted long distances back and forth. Machines will anticipate what will be needed from distant systems and will bring the necessary data and intelligence very close to the place of decision for as long as it is required. Most 6G traffic will be internal to the network, unlike in today's networks where nearly all the traffic travels to a user end-point. Distributed intelligence systems will be needed to take advantage of 6G's performance, for example, to continuously land airliners 10 seconds apart. 6G networking depends on the development of these distributed intelligence applications.
- **Trust.** The biggest obstacle to 6G is not physics but psychology. How can people decide to trust a system that they are not directly controlling and that could be sabotaged by an outside force? Self-driving cars will give us some insight into both the means to build systems that we trust our lives to and the pace at which society will accept them. The technologies and policies developed there will be an essential part of 6G. 6G will force regulators to grapple with how to ensure their citizens can trust the systems that they are using. Today's internet privacy concerns are but a very early indicator of the need to build trust.

Is 6G just an extension of 5G?

There are no proposed 6G capabilities that are not already embodied, to some extent, in 5G. Indeed, 6G may just be a higher-performance 5G. The intended agility of 5G standalone networks built with virtualised infrastructure means that 5G could evolve for a long time, embracing new innovations without the need for a different generation of networking. NTT DOCOMO published a whitepaper entitled "5G Evolution and 6G", which suggests just such an evolution.1 The NGMN Alliance in Europe and the Next G Alliance in North America are both focused on an evolution of 5G networks towards 6G. It is also possible that 6G will manifest as 5G networks that use THz radio.

When will 6G happen?

Samsung and some others have put a 2030 date on 6G. China's MIIT set a 2029 deployment date in an announcement in December 2020. There are no concrete development plans with milestones, so any date is speculation. 2029/2030 seems the earliest point at which significant new technology would be ready. None of the types of development milestones that are always part of major new international standards have yet been set.

How will 6G be developed?

Most 6G work today is in the form of laboratory explorations and discussions among industry consortia. These activities are just getting started. Figure 1 shows some of the notable participants.

Category	Name	Details
Universities	Oulu (Finland)	Has active support from Nokia[2]
Universities	NYU (New York, USA)	Supported by some vendors and operators[3]
Universities	Surrey (UK)	Has launched a 6G innovation centre[4]
Major vendors	Samsung	Has published 6G work and sponsored various alliances[5]
Major vendors	Nokia	Has published 6G work and sponsored various alliances[6]
Major vendors	Ericsson	Has published 6G work and sponsored various alliances[7]
Major vendors	ZTE	Has published 6G work and sponsored various alliances[8]
Operators	NTT DOCOMO	Has discussed the evolution of 5G into 6G[1]

FIGURE 1: OVERVIEW OF SOME THE KEY PARTICIPANTS IN THE DEVELOPMENT OF 6G [SOURCE: ANALYSYS MASON, 2021]

Many major operators are also participating in industry alliances, as shown in Figure 2.

Name	Details
Next G Alliance	North America-focused Related to ATIS All large North American operators are involved
NGMN	A global organisation with support from a wide range of operators worldwide
REINDEER	Led by Ericsson and funded by the EU Horizon 2020 effort
Hexa-X	Led by Nokia, but other vendors (such as Ericsson and Intel) are also involved

FIGURE 2: INDUSTRY ALLIANCES THAT ARE WORKING ON 6G [SOURCE: ANALYSYS MASON, 2021]

Conclusion

Most of the telecoms industry is focused on 5G, but it has long had the ability to work towards new innovations that take a long time to develop. There have been five generations of mobile networking; there will be a sixth that pushes to fulfill the parts of 5G that will prove too difficult and to put the latest technology innovations to use.

[1] NTT DOCOMO (2020), 5G Evolution and 6G. Available at: https://www.nttdocomo.co.jp/english/binary/pdf/corporate/technology/whitepaper_6g/DOCOMO_6G_White_PaperEN_20200124.pdf.

[2] University of Oulu (2018), University of Oulu to begin groundbreaking 6G research as part of Academy of Finland's flagship programme. Available at: https://www.oulu.fi/university/6genesis.

[3] NYU Wireless, Available at: https://wireless.engineering.nyu.edu/.

[4] University of Surrey (2020), University of Surrey unveils its 6G Innovation Centre and distinctive 6G vision. Available at: https://www.surrey.ac.uk/news/university-surrey-unveils-its-6g-innovation-centre-and-distinctive-6g-vision.

[5] Samsung (2020), Samsung's 6G White Paper Lays Out the Company's Vision for the Next Generation of Communications Technology. Available at: https://news.samsung.com/global/samsungs-6g-white-paper-lays-out-the-companys-vision-for-the-next-generation-of-communications-technology.

[6] Nokia (2020), Nokia to lead the EU's 6G project Hexa-X. Available at: https://www.nokia.com/about-us/news/releases/2020/12/07/nokia-to-lead-the-eus-6g-project-hexa-x/.

[7] Ericsson (2021), Ericsson a key player in EU drive to develop 6G multi-antenna technologies. Available at: https://www.ericsson.com/en/news/2021/1/ericsson-in-eu-6g-drive.

Questions?
Please feel free to contact Larry Goldman, Chief Analyst, Research at larry.goldman@analysysmason.com

Indonesia is a key target market for TMT investment opportunities, fuelled by new foreign investment rules

Jay Lee, Manager, Consulting and Lim Chuan Wei, Partner, Consulting

Country	Population not using the internet	% of population not using the internet
India	895.7 million	66%
China	638.8 million	46%
Pakistan	179.6 million	83%
Bangladesh	142.0 million	87%
Indonesia	141.6 million	52%

FIGURE 1: COUNTRIES WITH THE LARGEST NO. OF PEOPLE NOT USING THE INTERNET [SOURCE: WORLD BANK, 2019]

Indonesia has been a prime market for telecoms, media and technology (TMT) investment opportunities over recent years, fuelled by its relatively underdeveloped infrastructure coupled with strong latent demand for connectivity. In addition, it is the fourth most populous country in the world and the largest economy in South-East Asia, which has made it of particular interest for investors looking to capture this sizeable untapped opportunity.

However, foreign investment has so far been constrained through the 'Negative List' that imposed foreign ownership restrictions across multiple sectors, including those within TMT.[1] This has now changed through the new 'Positive List' which lifts restrictions on foreign investment across multiple TMT sectors while providing additional incentives to support investment.[2] This looks set to serve as a catalyst for heightened investment activity in Indonesia's TMT market to support the growth opportunity across multiple areas.

Indonesia's TMT investment opportunity

Indonesia is the largest archipelago in the world – this unique topography has made it challenging to enable widespread internet connectivity. Figure 1 below shows that Indonesia is the fifth largest country when it comes to the number of people not using the internet. At the same time, there is very strong intrinsic demand for internet connectivity, with Indonesia also amongst the top ten countries globally for the average time spent online by internet users.[3] As a result, there are strong investment opportunities to not only support the significant connectivity needs, but also capture the growth from related sectors that will benefit from the increase in connectivity.

Fixed broadband

Fixed broadband penetration remains low at 15.4% of households as of the third quarter of 2020, significantly behind the government's targets from its five-year National Broadband Plan (2014–2019).[4] Due to Indonesia's topography, challengers to incumbent Telkom have been slow in deploying fibre, but the large number of unconnected households still provides a significant opportunity to address. Demand for enterprise connectivity is also expected to see strong growth, including demand from micro, small and medium enterprises (MSMEs) supported by the government's "MSMEs Go Online" campaign. Because of this, there have been several new entrants in the fibre broadband space over the past few years – including XL Axiata, MyRepublic, and MNC Play.

Mobile

While smartphone adoption amongst mobile users is now widespread, the quality of mobile connectivity lags behind other markets as seen via its average mobile download speeds of 9.9Mbit/s in the first quarter of 2020.[5] 5G will improve this and accelerate increased data usage, but this requires the release of 5G spectrum by the regulator. With five major mobile network operators (MNOs), the Indonesian mobile market is relatively fragmented and may present an opportunity for consolidation – Ooredoo and CK Hutchison announced in December 2020 that they were exploring a merger of their Indonesian operations.

Tower companies

Over 80% of towers in Indonesia are now owned by tower companies (towercos), with MNOs continuing to divest towers, as seen via multiple tower transactions in 2020. This is likely to continue, particularly as MNOs seek to free up capital for 5G roll-out once 5G spectrum becomes available. Indonesian towercos have seen a steady growth in tenancy ratios due to continued coverage expansion from the MNOs, along with capacity deployments to support growing data traffic. In addition, towercos are increasingly investing in fibre to support the fibre backhaul needs of MNOs, which provides a secondary revenue stream to complement tower leasing.

Data centres / cloud

Demand for data centres is expected to boom in Indonesia, fuelled by the entry of hyperscalers and their large power requirements. Cloud providers have identified Indonesia as a key target for expansion – Google launched its Jakarta cloud region in 2020 while AWS and Microsoft have both announced plans to do the same. There has been strong interest from financial investors, which enabled the entry of new data-centre players such as SpaceDC (GIC-backed) and Princeton Digital Group (Warburg Pincus-backed). One of the major data-centre providers DCI Indonesia went public on the Indonesia Stock Exchange (IDX) in January 2021 as it looked to tap into rising investor interest to support their expansion plans.

Digital economy players

Indonesia has a large digital economy that is projected to grow in gross market value from USD44 billion in 2020 to USD124 billion by 2025.[6] This has been supported by its vibrant start-up ecosystem that has seen the emergence of several local 'unicorn' companies, such as Gojek, Traveloka and Tokopedia.[7] Due to this, Indonesia has become the second-largest venture capital market in South-East Asia (behind Singapore), with investment opportunities expected to grow further as increased internet penetration expands the addressable market and drives further innovation in the digital space.

New foreign investment rules

Although the TMT investment landscape has been favourable overall because of high untapped demand, foreign investors have been partly constrained in capturing this demand until now owing to the Negative List. This will now change as it is replaced by the new Positive List – which has taken effect from 4 March 2021. The Positive List lifts foreign investment restrictions across various TMT sectors and also provides additional incentives (e.g. tax holidays) in some areas. Examples of changes affecting key TMT sectors are shown in Figure 2 below.

Sector	Restrictions under Negative List	Changes under new Positive List
Mobile telecommunication network services	Foreign capital ownership capped at 67%	Restrictions removed
Fixed telecommunication network services	Foreign capital ownership capped at 67%	Restrictions removed
Internet service providers	Foreign capital ownership capped at 67%	Restrictions removed
Telecommunication tower provider	100% domestic capital	Restrictions removed
E-commerce transaction providers (e.g. online marketplace)	Foreign capital ownership capped at 49% for investmentvalues <IDR100 billion	Restrictions removed
Data hosting and related activities (incl. cloud computing)	No specific restrictions	Tax holiday granted

FIGURE 2: EXAMPLES OF CHANGES IN TMT-RELATED INVESTMENT RESTRICTIONS FROM THE NEW POSITIVE LIST
[SOURCE: PRESIDENTIAL REGULATION NO. 44 OF 2016 AND PRESIDENTIAL REGULATION NO. 10 OF 2021][8]

Conclusion

Indonesia presents a strong opportunity for investment across various TMT sectors, particularly because there is strong intrinsic demand but underdeveloped infrastructure. The recent implementation of the Positive List is likely to serve as a catalyst for increased investor interest in the market as many foreign investment restrictions have now been lifted – it is thus crucial for investors to act quickly before competition increases. Industry players can also benefit from this by having access to a larger pool of buy-side investors and should act now to take advantage of the influx of investor interest.

Analysys Mason has conducted multiple buy-side and sell-side due diligence exercises as well as market studies covering various aspects of Indonesia's TMT market. This includes assets such as fixed and mobile telcos, towercos, data centres, as well as digital economy players.

[1] The Negative List is defined via Presidential Regulation No. 44 of 2016.
[2] The Positive List is defined via Presidential Regulation No. 10 of 2021.
[3] Hootsuite & We Are Social (2021), Digital 2021 Global Digital Overview, Available at: https://datareportal.com/reports/digital-2021-global-overview-report
[4] Liang, Q. and Pascal, R. (2020), Indonesia telecoms market report 2020, Analysys Mason.
[5] Fenwick, S. and Khatri, H. (2020), The State of Mobile Network Experience 2020: One Year Into the 5G Era, Opensignal.
[6] Google, Temasek and Bain (2020), e-Conomy SEA 2020.
[7] A unicorn refers to private companies that have valuations >USD1 billion.
[8] Note that this list is not exhaustive and does not represent legal advice.

Questions? Please feel free to contact Jay Lee, Manager, Consulting at jay.lee@analysysmason.com or Lim Chuan Wei, Partner, Consulting at lim.chuan.wei@analysysmason.com

Filling Europe's 5G coverage gaps

Janette Stewart, Partner, Consulting

A new study by Analysys Mason, sponsored by Ericsson and Qualcomm Technologies, Inc. examines 5G investment and coverage per European market, and calculates costs and benefits of 5G coverage across different 5G use cases.

The study considers the cost and extent of 5G coverage by population-led commercial deployments per European market using a combination of 700MHz, 3.5GHz and 26GHz bands, together with legacy mobile bands. The additional investment to extend 3.5GHz coverage beyond the population-led coverage to cover all road, rail and rural use cases (5G connectivity into homes and businesses via 5G FWA, and smart agriculture) is assessed along with the additional investment to deliver near-universal geographic coverage using 700MHz spectrum. Population-led investment and further 3.5GHz coverage is assumed to be provided on a commercial basis via multiple networks, whereas 3.5GHz coverage beyond the commercial footprint and reaching near-universal geographic coverage using 700MHz spectrum assumes a single network infrastructure.

Analysys Mason estimates the total cost of building and maintaining 5G networks across Europe will be EUR150 billion over the next 20 years. By 2025, the study estimates the population coverage of 3.5GHz services will range from 24% in Norway and 29% in Finland to 53% in Spain and to 68% in the United Kingdom, no longer part of the EU. At the same date, 41% of the French population is expected to be covered and 43% of Germany's. Some smaller nations will have even less access to 3.5GHz services, including Slovakia (17%) and Slovenia (22%). A further EUR20 billion (of which around EUR13 billion is assumed to be commercially delivered, with EUR7 billion funding via public subsidy) will complete the provision of 3.5GHz services (plus further deployment of 26GHz) across European markets covering roads, railways and agriculture areas. Providing near-universal geographic coverage per European market using a single network of 700MHz spectrum would require EUR4 billion of public funding.

Summary of costs and benefits of 5G geographical roll-out

	A 5G eMBB base-case roll-out costs (new 5G bands – 700MHz/3.5GHz/26GHz + legacy mobile bands)[1]	B ... additional cost if LF (700MHz) 5G coverage is expanded beyond the base case to give near-universal geographical coverage	C ... additional cost if 3.5GHz coverage is extended where needed to cover road/rail and agricultural areas (plus further deployment of 26GHz)
Cost per network (for largest European markets)	EUR4–10 billion	We have modelled a single rural network per European market	We have modelled additional deployment of 3.5GHz by multiple networks in commercially viable locations + single network beyond this.[2] We have also modelled some further deployment of 26GHz
Cost per market (for largest European markets)	EUR14–25 billion	EUR400–600 million	EUR1.5–4.0 billion
Total investment in roll-out across all European markets	EUR150 billion	EUR4 billion *(which we estimate requires public funding)*	EUR20 billion *(of which we estimate around EUR13 billion can be provided commercially)*

Note: values shown relate to present value of total network costs (capex and opex) to 2040, expressed in 2020 terms. Calculations A and C take account, where possible, of coverage obligations already in place via existing 5G licences.[1] Assumes a similar rate of roll-out as for 4G in Europe, with roll-out generally complete by 2025. Value excludes any public intervention to extend roll-out beyond commercially viable locations.[2] We assume that 3.5GHz would be deployed on a commercial basis along major transport links. We proxy this by modelling commercial 3.5GHz along rail links, with a single network (requiring public subsidy) beyond this to cover any remaining road/rail/agricultural areas. Additional 26GHz deployment for the FWA use case is modelled in suburban/rural locations. Source: Analysys Mason

Analysys Mason has also updated its earlier estimates provided to Ericsson and Qualcomm Technologies Inc. of the increase in economic output that 5G enabled digital transformation will create. The new report forecasts that 5G could create additional gross domestic product in the EU of EUR250 billion, an increase on last year's figure of EUR210 billion that reflects the inclusion of potential economic benefit derived from the healthcare, road and rail sectors (reflecting the updated coverage modelling that the study presents).

The summary can be downloaded here:

https://www.analysysmason.com/filling-europes-5g-coverage-gaps/

Questions? Please feel free to contact Janette Stewart, Partner, Consulting at janette.stewart@analysysmason.com or Chris Nickerson, Manager, Consulting at chris.nickerson@analysysmason.com

Analysys Mason receives a Queen's Award for Enterprise for International Trade

THE QUEEN'S AWARDS FOR ENTERPRISE: INTERNATIONAL TRADE 2021

Analysys Mason has been awarded a 2021 Queen's Award for Enterprise for International Trade. The Queen's Awards for Enterprise recognise British businesses and other organisations who excel at international trade, innovation, sustainable development or promoting opportunity (through social mobility). They are the highest official UK awards for British businesses.

Analysys Mason is the leading global management consultancy specialising in telecoms, media and technology (TMT). With headquarters in London, and 16 other offices around the world, Analysys Mason plays an influential role in key industry milestones, supporting clients in more than 140 countries.

"We are delighted to receive a Queen's Award for International Trade. The award follows a rigorous review of our vision and objectives for the future and reflects our commitment to corporate social responsibility and the environment. Above all, it underlines our long-term commitment to the TMT sector, putting quality and client satisfaction at the heart of all we do." says Bram Moerman, Executive Vice Chair, Analysys Mason. "This award recognises the outstanding achievements of all our employees across the world in enabling our clients to achieve their goals, as well as our alumni who came before them and helped make Analysys Mason the pre-eminent global management consultancy focused on TMT."

Now employing 350 staff, Analysys Mason delivers bespoke consultancy on strategy, transaction support, transformation, regulation and policy, further strengthened by globally respected research. Since 2004 Analysys Mason has been at the forefront of industry developments supporting companies through every phase of innovation.

Analysys Mason has its head office in London, and offices in Bonn, Cambridge, Dubai, Dublin, Hong Kong, Kolkata, Lund, Madrid, Manchester, Milan, New Delhi, New York, Oslo, Paris, Singapore and Stockholm.

Global leaders in TMT management consulting

Analysys Mason is the world's leading management consultancy focused on telecoms, media and technology (TMT). We give clarity and confidence in answering our clients' biggest commercial questions: What strategy will best enhance value? What implementation plan will be most successful? What is the optimal positioning for five years' time?

We bring together commercial and technical expertise across four interconnected consultancy practices strengthened by globally respected research:

- **Strategy**
  We cover all aspects of strategy development and review based on a highly analytical and data-driven approach. Our propositions include corporate growth strategy (organic and inorganic), business unit strategy (including consumer and enterprise products), and infrastructure strategy (including capex optimisation through data analytics).
- **Transaction support**
  We provide robust commercial and technical due diligence support for TMT debt and equity financing, M&A and IPO processes. We support the full M&A cycle from opportunity scouting through to post-merger integration.
- **Transformation**
  We help structure and operate major IT, digital and business transformation programmes. We also have deep expertise around what it takes to avoid the pitfalls of and maximise the success of complex change programmes.
- **Regulation and policy**
  We play a leading role in helping to formulate and examine policy and regulation related to TMT. We support governments, regulators and the whole telecoms sector in a rapidly changing world increasingly shaped by digitalisation.
- **Research**
  We evaluate the key topics driving the TMT industry and quantify the impact on operators and vendors worldwide. Clients rely on our research as an essential resource for strategic planning, investment and benchmarking.

Global reach, local insight

Our advice is rooted in deep domain knowledge that combines global reach and local insight into markets to help our clients achieve their goals. Our service offerings are fully integrated across all five key strengths. This allows us to make sense of a complex TMT landscape and create valuable insights in ways that cannot be matched by narrower domain specialists or generalist consultants that lack our depth of experience.

Working with private- and public-sector clients in 140+ countries, we are committed to advancing TMT's role as a critical enabler of global economic, environmental and social transformation – and to contributing to a world where technology delivers for all.

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