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Introduction

Welcome to the second Analysys Mason Quarterly for 2019.

In our opening article David Abecassis looks at cloud service providers and how regulators and policy-makers in several parts of the world have started to consider if large internet platform businesses may be a new form of utilities.

Bram Moerman
CEO Analysys Mason

David discusses how internet companies are investing large sums of money into building competing cloud infrastructure across the world.

Rupert Wood examines the contradiction that what really drives interest in 5G slicing is not efficiency, but the lure of price discrimination. However, 5G sets up the very conditions that undermine its ability to monetise smartness. This contradiction is not unique to 5G!

Tried and tested frameworks for the analysis of telecoms markets are well established in developed economies. In our next article Matthew Starling looks at how national regulatory authorities (NRAs) in other regions of the world are often faced with designing their own regulatory regimes in challenging conditions.

SD-WAN developments so far are just the first steps towards offering more network services as software. Catherine Hammond explains how SD-WAN is a significant change for operators, and it is a change they need to embrace. Operators that understand and embrace the changes that come with SD-WAN are most likely to be successful and disruptive in the longer term.

Fabio Fradella reviews two significant events in the Italian mobile market in 2018. He describes how the combination of these events could split the Italian prepaid mobile market into two segments: a 'premium' segment and a 'low-end' or 'value' one , with TIM and Vodafone focused on premium customers and Wind 3 and Iliad focused on those in the low-end segment.

Dana Cooperson forecasts that the revenue from the telecoms software and related services market will grow from USD74.9 billion in 2017 to USD95.1 billion in 2022 (at a CAGR of 5%). Dana explains this will be largely driven by growth in spending for digital transformations, network and operations automation and 5G deployments.

We welcome the opportunity to discuss your views on these and any other key industry topics. I look forward to hearing from you.

Cloud service providers may prove to be the utilities of the future, in a market that remains highly competitive
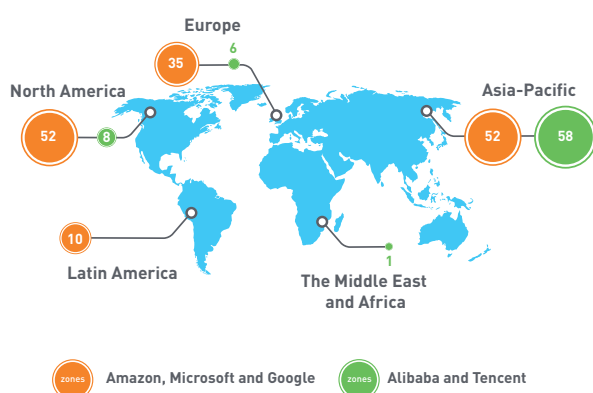
David Abecassis, Partner, Consulting

According to the Oxford English Dictionary, a utility is "an organisation supplying the community with electricity, gas, water, or sewerage". Regulators and policy-makers in several parts of the world have started to wonder whether large internet platform businesses, operated by the likes of Amazon, Facebook, Google and Microsoft, may be a new form of utilities. After all, they provide essential services to virtually everyone in many developed markets, and they are often portrayed as new monopolies. This analogy can appear somewhat facile, and more in-depth and thoughtful reviews (such as the Furman Review[1]) have sought to break down the comparison into objective features such as network effects, high upfront costs and barriers to entry and the importance of intermediating downstream relationships (for example, between individuals and/or firms).
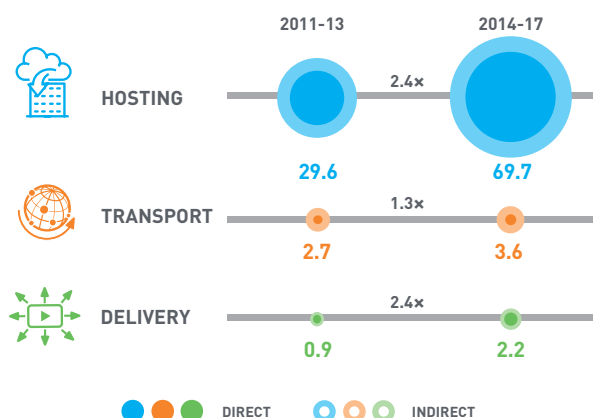
The Furman Review uses a comparison with electricity suppliers to question if online platforms are utilities or not. Electricity is not only a fundamental part of everyday life for most people, but it is also an essential input into virtually every economic activity; it powers factories, farms and offices. Increasingly, a growing proportion of electricity usage comes from computers: a regularly updated paper suggests that ICT currently uses 8–10% of all electricity worldwide, and that this will grow to 20% by 2025.[2] A third of this usage will be linked to data centres; the large internet companies are all committed to power efficiency and the large-scale use of renewable energy to power and cool their facilities.

A recent study by Analysys Mason shows that online content and service providers, and in particular, the major global internet companies, have invested around USD70 billion annually in their data centres since 2014. Google is one of the largest private sector investors in electricity generation outside of energy companies.[3]

Number of availability zones for major cloud providers (Aug 2018)

Europe
35 / 6
North America
52 / 8
Asia-Pacific
52 / 58
Latin America
10
The Middle East and Africa
1

zones Amazon, Microsoft and Google   zones Alibaba and Tencent

Average annual total investment by cluster (USD billion)

	2011-13	2014-17
HOSTING	29.6	2.4×	69.7
TRANSPORT	2.7	1.3×	3.6
DELIVERY	0.9	2.4×	2.2

DIRECT   INDIRECT

FIGURE 1: INVESTMENT IN INFRASTRUCTURE BY INTERNET COMPANIES
[SOURCE: ANALYSYS MASON, 2019]

Data centre facilities are expensive; they are now typically designed to use tens, and sometimes hundreds, of megawatts. Data centres and the cloud systems that run on them are complex, fast-evolving and incredibly investment-intensive: AWS added USD8 billion in assets in 2018, representing around a quarter of its entire revenue. Thanks to these investments, every company in the world has access to computing power and infrastructure that is virtually identical to that that Amazon, Google and Microsoft use for their own services, thereby reducing the technical barriers to entry into many internet-related markets. Apple and Netflix are good examples of this: they are both major customers of AWS, but are also in direct competition with Amazon for video streaming and mobile and home devices.

Cloud providers are increasingly integrating many more-advanced services into their cloud offering, which allow their customers to use not only their IT infrastructure (hardware), but also voice and image recognition software (such as Amazon's Rekognition or Google's Vision AI) and pre-established machine learning algorithms (for example, Amazon's SageMaker or Microsoft's Azure Machine Learning). Voice interfaces are an interesting development: Amazon, Google, Microsoft and even Apple have all developed mass-market voice assistants, partly as an interface to their services, but also as a basic building block to add to their cloud offering to corporations in sectors where voice commands and voice recognition are, or will be, important.

This points to the idea that cloud service providers may be the real new 'utility', in the sense of an essential input into every aspect of everyday life. They harness a traditional commodity (electrical power) to deliver a new form of input (computing services), which is then delivered to any user worldwide in its raw form or combined with any number of structured services (such as voice recognition, AI-as-a-service and visualisation engines). Internet companies such as Amazon and Google have built huge businesses on platforms and intermediation, but are now growing quickly, partly by opening up the building blocks of their platform services to all.

These internet companies are investing large sums of money into building competing cloud infrastructure across the world. Unlike traditional utilities, these companies offer differentiation across multiple dimensions, and are not natural monopolies. This is partly possible because the internet remains an open, worldwide medium, and access networks tend to be operated and regulated effectively, unlike electricity, which relies on national, closed distribution networks.

Regulators and policy-makers will undoubtedly look into the competitiveness of cloud services soon enough. As they do so, they will need to adapt their analytical toolboxes to the new challenges of cloud services, which are infrastructure- and investment-heavy (similarly to power generation), yet fast-evolving and heavily reliant on software. Analysys Mason is already working with clients across the value chain to understand cloud services dynamics, and is ideally placed to advise on their implications for users, telecoms operators and policy-makers.

[1] HM Treasury (UK, 2019), Unlocking digital competition: Report of the Digital Competition Expert Panel. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/785547/unlocking_digital_competition_furman_review_web.pdf.

[2] Andrae, Anders S.G. (2017), Total Consumer Power Consumption Forecast. Available at https://www.researchgate.net/publication/320225452_Total_Consumer_Power_Consumption_Forecast.

[3] See Analysys Mason's Infrastructure investment by online service providers.

Wastefulness is smart and efficiency is dumb: the 5G contradiction and lessons from fixed networks

Rupert Wood, Research Director, Research

5G sets up the very conditions that undermine its ability to monetise smartness. This contradiction is not unique to 5G. The eternally renewed promise of price discrimination has rarely been fulfilled because telecoms networks are intentionally underutilised and because telecoms markets are not usually allowed to descend into oligopolies.

This comment explores how these trends will be realised as 5G is launched.

Contradictory investment aims in 5G

Everyone should now be familiar with the triangle of 5G use cases as originally proposed by the 3GPP: enhanced mobile broadband (eMBB), massive machine-type communications (mMTC) and ultra-reliable and low-latency communication (URLLC).

Figure 1 provides another way of looking at 5G, in which there are just the following two options:

- an investment in huge additional capacity

- an investment in smartness, that is mechanisms that allow mobile network operators (MNOs) to be more efficient or to discriminate between the prices of different use cases.

Bandwidth in modern wireline networks is not a scarce resource, and very few applications other than voice need more than best-efforts. This will also be true for 5G networks. It is useful to remember that, as the 5G era dawns, the average busy-hour usage per mobile subscriber in South Korea is about 35kbps, and that the average 4G macrocell bandwidth utilisation in modern economies such as Germany is less than 10Mbps.

Overprovisioning is a feature of wireline networks, and is often commented on disparagingly as if gigabit connectivity is wasteful or unnecessary for any application. However, the demand for bandwidth has little real connection to the use of real-time services. Customers buy gigabit connections because they enable instantaneous downloads and because they deliver the low latency that some applications require.

Some commentators follow many vendors in asserting that reliability and/or low latency (URLLC) will be the main
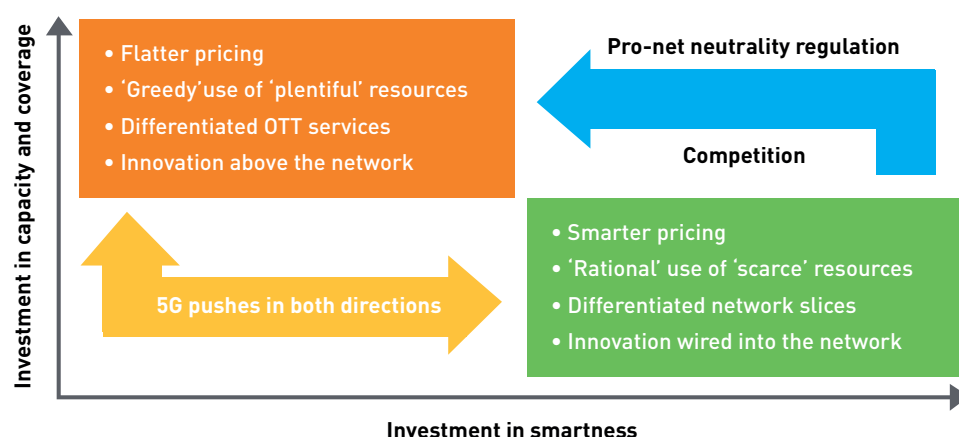
FIGURE 1: THE BENEFITS AND CHALLENGES OF IMPLEMENTING A P-MVNO
[SOURCE: ANALYSYS MASON, 2019]

revenue drivers for 5G new radio (5G NR). Very few wireline subscribers or retail service providers have ever signed up for equivalent services even though they have long been available. Or, to be more accurate, they have signed up, but only as a result of taking faster basic access speeds. The mobile industry often proceeds as if it exists in a vacuum, ignoring the many, often superior, substitutes for 5G for non-mobility-related use cases. There is nothing particularly new about sub-10ms latency; GPON has been delivering it for years as standard.

Price discrimination based on access speed rather than quality of service (QoS) or service level agreements (SLAs) tends itself to break down over time, as has been seen recently in Italy, for example. In a competitive market, operators are incentivised to gain and keep subscribers far more than they are incentivised to maximise ARPL through smart pricing.

Businesses turn to B2B and B2B2X when there is overproduction

Standalone 5G will enable service- and application-based slices of network resources. These are intended to be used not only for managing differentiated downstream retail services but also for B2B and as a service to third parties (B2B2X). One could discriminate – so the argument goes – in the B2B(2X) market, where industrial verticals with different, more stringent, requirements could rent access to heterogeneous sets of differently priced network resources, even if it is difficult to price-discriminate in the consumer market with a broadly homogeneous set of requirements.

There is already a vigorous debate (in Germany, for example) as to whether verticals should prefer the owner-economics of buying local spectrum allocations (in the 3.7–3.8GHz band) for private networks over the tenant-economics of renting virtual slices. Perhaps there are concerns about the effect of unbridled price discrimination in what will probably be a lightly regulated area. Perhaps MNOs are not trusted to deliver networks that are sufficiently robust for verticals' needs.

It could be, though, that this is a false dichotomy insofar as some of the higher-price features that verticals think they need will become standard features, commanding no additional value. In this case, the longed-for insertion of the MNO into the digital services value chain fails. It turns out that some, perhaps most, 'special' use cases can rely on best-efforts networks, that smartness can be applied on top and the current OTT model with no digital service provider (DSP)-to-MNO transaction is preserved.

This brings us to the bigger question of what slicing is really for. Its purpose is certainly not efficiency or capex avoidance.

That may be what network engineers say, believing that future core or access networks will become overloaded, but what really drives slicing is the lure of price discrimination.[1] This has always been the operators' dream, and it always fails to deliver on commercial promise.

It is not just the 5G mobile industry that is ignoring the contradiction

5G is front-of-mind right now, but other parts of the industry are not immune to the above-mentioned contradiction either.

Wi-Fi

Wi-Fi 6 has started to appear in devices at the same time as 5G network are being launched. Conceptually, Wi-Fi 6 pushes in the same two directions as 5G: increased peak data rates and capacity (both of which are higher than those for 5G), and at the same time, reduced spectral wastefulness, the ability to connect a greater density of devices and better performance in terms of SLAs and QoS. Moreover, the commercial dream is the same: better monetisation through price discrimination.

Fixed networks

Fixed access network sharing/slicing (FANS) is already being commercialised by some vendors such as Nokia. It is early days, but like future 5G slicing, it is being touted primarily as means to attract diverse service providers with orthogonal requirements. However, FANS pushes against historical trends. Historically, wholesale customers have tended (over time and with scale) to migrate to simpler, lower-layer access solutions because this allows them greater flexibility and lower TCO. Even where the wholesale customer is looking to the FTTP network to deliver something as demanding as mobile x-haul, it is likely that it will prefer the owner-economics flexibility of dark fibre to a managed, and in this case software-defined, service where flexibility is an operating expense.

In favour of wastefulness

It is therefore perhaps better for MNOs to embrace 5G as a high-capacity dumb pipe, and to use it for low-yield but bandwidth-hungry services such as fixed–wireless access. 5G makes mobile a more effective fixed broadband substitute, so there are real organic revenue growth opportunities for mobile services. This is neither smart nor 'efficient', but rather wasteful in a positive way, and likely to end in less commercial disappointment than trying, once again, to make smart monetisation work.

[1] For a deeper dive, see Andrew Odlyzko (University of Minnesota, 2013), Will smart pricing finally take off? Available at http://www.dtc.umn.edu/~odlyzko/doc/smart.pricing.pdf.

Questions?
Please feel free to contact Rupert Wood, Research Director, Research at rupert.wood@analysysmason.com

Achieving fit-for-purpose regulation in developing markets is challenging, but possible
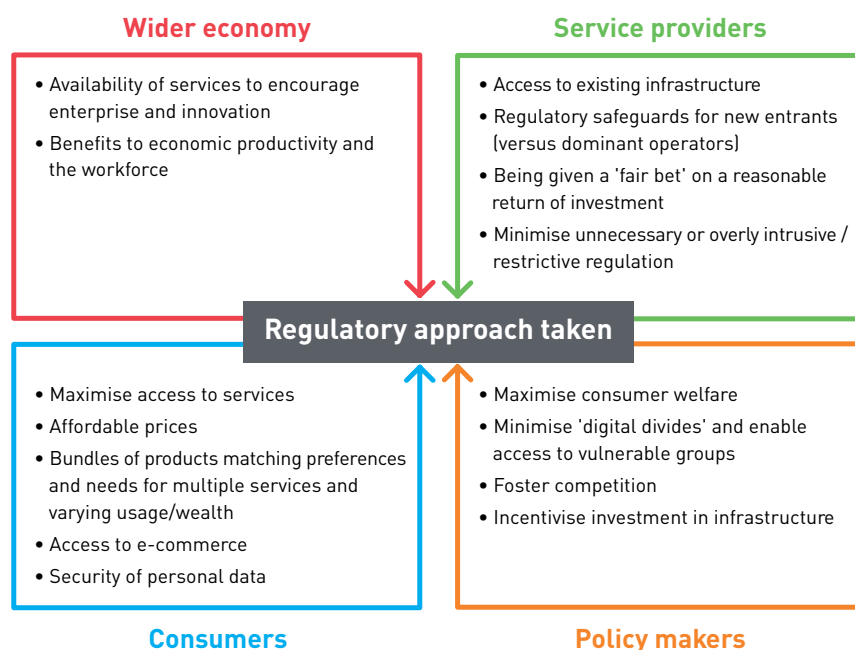
Matthew Starling, Principal, Consulting

NRAs in developing economies often have to design their own regulation in challenging conditions

For many years, tried and tested frameworks for the analysis of telecoms markets have been in place in developed economies such as those in the EU. However, national regulatory authorities (NRAs) in other regions of the world (such as Africa, smaller island states and Asia) are often faced with designing their own regulatory regimes to meet specific national priorities. These vary from country to country.

The process must often be completed with fewer resources than would be available in a developed country. The regulatory regimes must also address issues of competition that may be unique to each market (for example, the presence of highly dominant operators), imbalanced (that is, non-cost-reflective) tariffing, a lack of infrastructure access and the difficulty of making returns from a population with a low disposable income. This is a considerable challenge.

NRAs need to balance the needs of all stakeholders (consumers, service providers and the wider economy), as illustrated in Figure 1. The stakes are high, since telecoms services are absolutely central to facilitating national economic growth.

Wider economy

- Availability of services to encourage enterprise and innovation
- Benefits to economic productivity and the workforce

Service providers

- Access to existing infrastructure
- Regulatory safeguards for new entrants (versus dominant operators)
- Being given a 'fair bet' on a reasonable return of investment
- Minimise unnecessary or overly intrusive / restrictive regulation

Regulatory approach taken

Consumers

- Maximise access to services
- Affordable prices
- Bundles of products matching preferences and needs for multiple services and varying usage/wealth
- Access to e-commerce
- Security of personal data

Policy makers

- Maximise consumer welfare
- Minimise 'digital divides' and enable access to vulnerable groups
- Foster competition
- Incentivise investment in infrastructure

FIGURE 1: BALANCING THE NEEDS OF STAKEHOLDERS WHEN DESIGNING A REGULATORY APPROACH [SOURCE: ANALYSYS MASON, 2019]

Targeted regulation can help to redress market failures in an efficient manner

NRAs may encounter a number of problems without the guidance of an overarching framework. To avoid these, the following recommendations should be taken into account.

- The relevant market definition(s) should be suitable in scope.

- The remedies imposed should be appropriate.

- The remedies should be well-designed to fit with the resources available.

We consider these in turn below.

The relevant market definition(s) should be suitable in scope

The scope and number of relevant markets defined and then analysed should be such that product substitutability can be easily determined, the impact/relevance to consumers can be understood and a clear-cut assessment of dominance is possible.

The remedies imposed should be appropriate

Remedies create a direct cost impact on both the regulated party and the NRA. The former must implement the remedy while the latter must monitor the implementation. It makes little sense to impose all possible remedies (a 'scattergun' approach) in the hope that some of them lead to positive changes in the market, given the constraints on resources. Some remedies such as accounting separation and cost-orientation can require significant time and investment to implement. Remedies should be imposed because they are proportionate, rather than just because they are remedies that other NRAs have used; they should directly target the specific market failure.

The remedies should be well-designed to fit with the resources available

Regulators have a wide range of remedies that can be used, and the level of sophistication required to implement them varies.

- **Lower sophistication.** Simpler remedies include benchmarking, reference offers, obligations to negotiate/ conclude agreements, retail pricing prohibitions, non-discrimination obligations and mandated access.

- **Moderate sophistication.** Examples of remedies with a moderate level of sophistication are accounting separation, retail price caps, 'fair and reasonable' obligations and top-down cost models.

- **Higher sophistication.** Highly sophisticated remedies include bottom-up cost models, basket-based price caps and economic replicability/margin squeeze tests.

The construction of bottom-up cost models for price setting in particular may require a significant amount of detailed information that is neither readily available nor collected by operators. In this case, NRAs may 'pool' available data from all operators instead. The key point is that a sophisticated remedy (assuming it is the targeted appropriate solution to the market failure at hand) needs to be achievable with the data, expertise and resources that are available.

Analysys Mason has more than 30 years of expertise in regulatory analysis and can therefore provide expert support on these issues

Designing regulation to address issues in developing economies, particularly where a tried and tested framework is lacking, can be challenging, but possible. The key for NRAs is to ensure that the regulation that is designed is robust, targeted and proportionate.

Questions? Please feel free to contact Matthew Starling, Principal, Consulting at matthew.starling@analysysmason.com or Ian Streule, Partner, Consulting at ian.streule@analysysmason.com

Operators need to embrace new processes to benefit fully from SD-WAN technology

Catherine Hammond, Principal Analyst, Research

Major operators began launching SD-WAN solutions in 2015, but more recently, there has been a large number of roll-outs of the technology, especially from smaller operators (Figure 1). Initial fears about the impact of SD-WAN are subsiding; few enterprises are opting for DIY solutions from OTT providers or are replacing MPLS with Internet connectivity (which is probably a greater threat to revenue).

Indeed, SD-WAN is quickly becoming a standard way of doing business, and builds on existing hybrid networks to better use connectivity that, in the past, was deployed primarily for redundancy. The differences between operator strategies, and between the underlying technologies used, are hard to distinguish.

However, SD-WAN developments so far are just the first steps towards offering more network services as software, rather than as physical equipment. The ultimate test of SD-WAN will be how well operators are able to adapt to this change; it requires a change in attitude that some operators will struggle to make.

This comment follows the publication of our review of the strategies of 13 operators of varying size and reach, Approaches to SD-WAN: 13 operator case studies.

Operator	Operator type	SD-WAN launch year
Verizon	Incumbent	2015
CenturyLink	Global operator	2016
Colt	Global operator	2016
Tata Communications	Global operator	2016
ngena	Global operator	2017
Telefónica	Incumbent	2017
Telstra	Incumbent	2017
Vodafone	Domestic challenger	2017
Fastweb	Domestic challenger	2018
PCCW Global	Global operator	2018
Virgin Media	Domestic challenger	2018
Claranet	Domestic challenger	2019
Gamma	Domestic challenger	2019

FIGURE 1: YEAR IN WHICH SD-WAN SOLUTION WAS LAUNCHED, BY OPERATOR[1]
[SOURCE: ANALYSYS MASON, 2019]

[1] The table includes all of the operators that are covered in our case studies report, rather than all of the operators that offer SD-WAN.

The similarity of most approaches is striking

The details and timings of operators' SD-WAN deployments differ, but the thinking from different operators regarding the technology itself is strikingly similar.

- **Performance and flexibility are seen as the key selling points, rather than cost savings (which may be minimal).** Operators believe that most enterprises will not be able to realise significant cost savings from using SD-WAN. MPLS costs are often already low and, even with SD-WAN, broadband connections are no match for dedicated circuits for some types of traffic (for example, voice and mission critical-applications). Cost benefits may come later if customers can use SD-WAN to avoid future bandwidth upgrades.

- **Few players consider DIY solutions to be a big threat.** Operators and vendors have told us that the share of SD-WAN contracts using a DIY solution is small; a large and growing share of SD-WAN contracts are being won by service providers, even in the USA, where DIY solutions have been popular historically.

- **Significant effort is needed to educate clients.** SD-WAN solutions can improve application performance and potentially minimise future spending. These attributes are valuable, but lack the immediate appeal of cutting costs. Operators are working hard to help enterprises understand the real benefits of SD-WAN.

- **Many operators are following a similar product roadmap.** Operators typically launch SD-WAN on dedicated CPE with virtual firewalls from key vendors (such as Fortinet and Palo Alto Networks). The longer-term aim is to offer uCPE with a wide range of optional virtualised network functions (VNFs).

- **Many operators are making similar technology choices despite a multiplicity of vendors.** The SD-WAN vendor market is relatively fragmented, but all of the operators that we profiled have adopted similar technology choices based on a small set of vendors. Larger operators tend to include at least one Cisco solution in their portfolio.

- **Many operators are initially targeting large enterprises with customised solutions.** Operators' first SD-WAN customers tend to be large enterprises and MNCs, for whom a customised approach to delivering SD-WAN makes commercial sense. Many operators aspire to develop a more standardised approach in order to sell to smaller enterprises, but few have achieved this yet (with the exception of solutions such as Cisco Meraki that offer SD-WAN as an extension to existing CPE services).

- **Retail, manufacturing and financial services are key verticals.** Businesses in all three of these verticals have many sites and can benefit from a flexible SD-WAN solution. Logistics was also mentioned by some operators as a sector that is interested in SD-WAN.

The similarity between operators' approaches means that differentiation is a challenge. Operators are typically offering SD-WAN to keep pace with their competitors, rather than to gain market share. However, some operators, such as Vodafone, consider an SD-WAN solution to be an essential part of being more competitive with the incumbent.

The implementation of SD-WAN requires operators to adopt a new way of working, even if the short-term disruption is limited

The disruption from SD-WAN has been limited. There is no evidence of the mass adoption of DIY networks or of enterprises 'trading down' from dedicated connections to broadband lines. Enterprises may be able to avoid future costs (for example, by delaying network upgrades) or may be content to use a broadband connection for a secondary connection, but the impact on operator revenue or market structure is relatively small.

Because the disruption has been limited, the nature of competition between operators has been largely unchanged. Challenger operators can use SD-WAN to help them gain market share provided that they move faster than the incumbents and offer more features. However, the fundamental basis of competition is the same; enterprises are still most likely to pick an operator based on the traditional criteria (for example, the quality and reach of the network, existing relationships and price) rather than on differences in the SD-WAN product.

SD-WAN is, instead, part of a more significant change for operators, and it is a change that they need to embrace. MPLS networks were updated two or three times in a decade, whereas SD-WAN can be updated every six weeks. SD-WAN allows other services (such as firewalls, Wi-Fi management and WAN optimisation) to be provisioned and managed remotely as VNFs. New processes are required to offer these services. SD-WAN technology will not realise its potential if only bespoke custom SD-WAN solutions are used (as offered by many operators currently), and its reach will not extend beyond a relatively small base of corporate customers. Nor will it be adopted by the mass market of SMEs. Operators that understand and embrace the changes that come with SD-WAN are most likely to be successful and disruptive in the longer term.

Iliad's market entry and the 5G spectrum auction outcome could split the Italian mobile market in two

Fabio Fradella, Principal, Consulting

Two main events happened in the Italian mobile market in 2018.

- **Iliad's market entry.** A new operator, Iliad (named after and fully owned by the French telecoms group), entered the market in May.

- **The 5G spectrum auction.** Spectrum in the 700MHz, 3.6–3.8GHz and 26.5–27.5GHz bands was awarded to operators in early October. All four mobile network operators (MNOs) as well as the fixed operator Fastweb purchased spectrum that can be used for 5G.

These two events are not likely to affect each other in the short term (although Iliad was included as an additional bidder in the spectrum auction and had a portion of the spectrum in the 700MHz band reserved for it as a new entrant), but this might change in the medium term.

Indeed, the combination of these two events could split the Italian prepaid mobile market into two segments: a 'premium' segment and a 'low-end' or 'value' one, with TIM and Vodafone focused on premium customers and Wind 3 and Iliad focused on those in the low-end segment.

Iliad's market entry

Iliad's go-to-market strategy

Iliad entered the Italian mobile market on 29 May 2018 and since its launch has adopted an aggressive and disruptive pricing strategy. The first 1 million clients paid an activation fee of EUR10 (with no associated traffic allowance) and now pay a recurring monthly charge of EUR6 for unlimited voice minutes and text messages and 30GB of data. By comparison, other mobile operators' monthly recurring charges are in the range of EUR8–EUR10 (with no one-off fees) for similar allowances.

Iliad has also developed a simple commercial offer that is predominantly based on connectivity services with limited customisation options.

Impact on competitors' positioning

The other MNOs have reacted to Iliad's market entry by putting differentiated commercial strategies in place to retain their subscriber base.

- Wind 3 has introduced a set of competitive offers that are in line with Iliad's pricing. For example, the entry-level bundle provides 500 voice minutes and 5GB of data for EUR5 per month. Wind 3 was the only value-oriented operator in the Italian market before Iliad joined, and as such, has been the most affected by Iliad's entry.

- Vodafone and TIM have each launched a low-cost sub-brand (Ho.mobile and Kena, respectively). Their objective is to avoid churn to Iliad without increasing their market shares. This is coherent with the role of these operators in the high-value end of the market; they have been trying to increase revenue, since before Iliad's entry, by selling services beyond basic connectivity, as well as through bundle offers. This is reflected in the wide range of retail prices that are available through a large number of offers. Ho.mobile and Kena have designed and priced their offers in line with Iliad's, in order to limit the revenue cannibalisation of their parent operators.

Iliad's ARPU[1] has been declining since its entry to the market, mainly due to the end of the 'one-off' effect experienced in the third and fourth quarters.

Iliad's increased monthly charges (compared to when it first entered the market) may result in a slowdown of its revenue growth rate, so its impact on the overall market ARPU may be limited.

Impact on market shares

Iliad's customer base reached 635 000 after 1 month of operation, and grew to 2 230 000 by the end of 3Q 2018 with a monthly growth rate of more than 50%. However, it will be challenging to maintain such a growth rate in the medium term due to increasing retail prices, a lack of 'novelty' surrounding the operator and potentially unsatisfactory service quality (indeed, Iliad's subscriber base only grew to 2 800 000 by the end of 4Q 2018[2]).

There may be a limit to the size of the value-seeking prepaid segment, and the inferior quality of service in this segment may deter customers that are quality-sensitive. As may be expected, market research[3] shows that Iliad and Wind 3 offer the worst quality of service of all the Italian mobile operators; at the same time, Wind 3 continues to lose market share despite being the cheapest operator (at least for some levels of usage).

The 5G spectrum auction

The 5G spectrum auction outcome

The 5G spectrum auction took place on September 2018, a few months after Iliad's market entry. MNOs invested more than was expected. Vodafone and TIM invested more than twice as much as the other competitors, mainly in the 3.6–3.8GHz band (the most valuable one for implementing 5G features). This has resulted in significantly different spectral holdings among players.

The 5G spectrum auction outcome was significantly different to the 4G one. In the 4G auction, all MNOs (except for H3G) invested a similar amount of money for comparable spectrum holdings. As such, there were no clear reasons for operators to differentiate their strategies in order to proportionally monetise their investments.

Strategic implications

Vodafone and TIM need to carefully build their value proposition around 5G services in order to gain as much profit as possible (and as soon as possible) from their additional spectrum investments. The elements that they have to consider are the following.

- **Service offerings,** for example:
— providing an appropriate IoT service range to the market
— setting the 'right' level of wholesale prices to be able to maintain some competitive advantage over access seekers and buyers.

- **Business models,** for example:
— making use of partnerships with service providers for 5G-based attractive use cases
— focusing on alternative services: 5G is expected to make access network convergence happen even more than it has happened with 4G.

TIM and Vodafone have also announced plans to form a 5G joint venture as a means of managing the cost side of the 5G business case in order to make the payback of investments more affordable.[4]

In this context, a price war is neither attractive nor affordable, at least for the high-end players (that is, TIM and Vodafone). Conversely, it looks like the battle is to be fought on the service differentiation field. A different strategy (that is, a more price-oriented one) could instead be pursued in non-5G segments (for example, on 4G services), where TIM and Vodafone might potentially opt to compete through the low-cost brands Ho.mobile and Kena.

Conclusion

Iliad's market entry and the 5G auction outcome are likely to have opposite effects on mobile service prices. It will be vital for the high-end players TIM and Vodafone to differentiate their offerings from those of their low-end competitors in order to justify price differentials and allow their considerable spectrum investments to be recouped; at the same time, Iliad may retain its aggressive pricing strategy which will put further pressure on the market ARPU.

It is difficult to know which of the two effects will prevail. There is a risk of market 'bi-polarisation', whereby there are both high-end (high price, high quality) and low-end (value) offerings, with high price and service quality variance between the two poles and a lack of mid-range offerings

[1] As estimated for the period 29 May–31 December 2018.

[2] Iliad (France, 2019), Press release. Available at https://www.iliad.fr/finances/2019/CP_190319_Eng.pdf.

[3] HDBLOG.it (Italy), Vodafone migliore operatore in Italia per Altroconsumo, il peggiore è

[4] TIM (Italy, 2019) TIM's BOARD OF DIRECTORS APPROVED THE 2019–2021 STRATEGIC PLAN "TIMe to deliver and delever". Available at https://www.telecomitalia.com/content/dam/telecomitalia/en/archive/documents/media/Press_releases/telecom_italia/Corporate/Financial/2019/PR-TIM-Strategic-Plan.pdf.

Digitalisation, automation and 5G will drive telecoms software spending to USD95.1 billion in 2022

Dana Cooperson, Research Director, Research

Analysys Mason forecasts that the revenue from the telecoms software and related services market will grow from USD74.9 billion in 2017 to USD95.1 billion in 2022 (at a CAGR of 5%). This will be largely driven by growth in spending for digital transformations, network and operations automation and 5G deployments. Digital infrastructure and network automation and orchestration will be the highest-growth software segments, and NFV and SDN spending growth will play a large role in both cases. Revenue growth in more-established software systems (such as monetisation platforms and customer engagement platforms) will be limited or non-existent because the growth in spending for more-modern, cloud-based and cloud-native replacement systems that support digitalisation will be counterbalanced by spending declines for traditional systems.

Digital transformation, operations automation and 5G deployments will drive revenue growth

Figure 1 shows Analysys Mason's telecoms software market taxonomy.
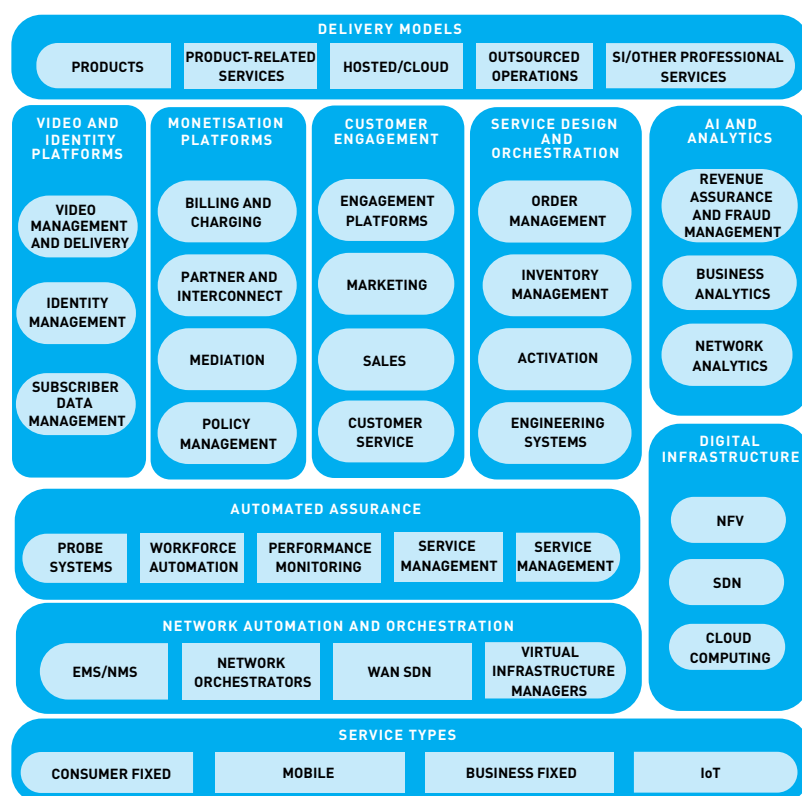
FIGURE 1: ANALYSYS MASON'S TAXONOMY OF SOFTWARE PRODUCT SEGMENTS, DELIVERY MODELS AND SERVICE TYPES [SOURCE: ANALYSYS MASON, 2019]

Analysys Mason splits the market into eight product segments that are delivered using five models and that support four communication service types. Communications service providers (CSPs) are avoiding, or at least limiting, investments in established software systems and are instead investing in new solutions as they strive to become more digitalised, virtualised, automated and cloud-native. The twin goals of this evolution are improved cost-efficiency and support for more-dynamic, personalised services. Automation processes, such as those for enterprise service management and customer engagement, will increasingly use analytics and AI to assess real-time data from a wide range of sources and suggest actions based on rules and policies.

Overall, CSP software spending growth will largely be balanced by a decline in CSP spending on hardware. CSPs' communications service revenue is flat, and they are under pressure from investors to limit increases in capex and opex as a percent of revenue.

Product-related spending growth will mainly be driven by a rapid growth in the adoption of NFV-, SDN- and cloud-computing-based deployments, as well as an increase in commercial product availability. Software (particularly customer-facing software such as customer engagement solutions) will increasingly be delivered as a service (SaaS); SaaS-based spending will grow at a CAGR of 21% (2017–2022) to USD6.3 billion. The increasing use of open-source software will change the product revenue mix from being predominantly licence-based to being formed from software-related service subscriptions. Vendors will need to carefully manage the shift in delivery from traditional models to support subscriptions and SaaS, and must consider any implications that the shift may have for revenue accounting and investor expectations.

CSPs want to reduce their dependence on professional services

Growth in professional services spending will mainly be driven by NOC consolidation, SOC implementation and systems integration for NFV. NFV/SDN, OSS transformation and integration will be the biggest professional services spending growth drivers, but CSPs' desire for software productisation and componentisation will limit the increase in service spending.

Professional services accounted for 56% (USD41.9 billion) of CSPs' software and services spending in 2017. We forecast that services spending will grow to USD47.5 billion in 2022 (at a CAGR of 3%), but that it will form only 50% of the total spend because product spending will grow by 8% during the same period. CSPs would like to limit their future professional services spending as much as is practical. They are tired of paying for expensive, lengthy customisations of monolithic software solutions that tie them to a single vendor and that vendor's timeline. They want more flexibility to only use professional services providers for the new and complex tasks for which they lack expertise or staffing, while having access to more modular and minimally-customised products that are underpinned by open-source software or other collaborative development options.

5G may get all the press, but the growth in software spending will largely be driven by fixed infrastructure and enterprise services

We expect that only 15% of the growth in telecoms software spending between 2017 and 2022 will come from mobile networks, and that this growth will largely be for 5G network builds (and LTE network expansions) and the nascent support for slicing and edge computing. Consumer-focused software systems in this segment are mature, and as such, will only lead to incremental spending changes.

In contrast, 70% of software spending growth between 2017 and 2022 will come from the business fixed services segment. Spending in this segment will be the result of CSPs launching vCPE-based services such as SD-WAN and other NFV/SDN-based enterprise digital services.

CSPs will spend so that they can automate previously manual processes to provision and operate fixed network infrastructure. IP/optical infrastructure is becoming more programmable, and fulfilment, management and other automation tools (including SDN-based tools) can use this programmability to improve operations efficiency. In addition, flexible new digital enterprise services (such as SD-WAN and vCPE-based services) offer revenue growth opportunities and defend against competitors' moves. CSPs need to invest in the automation of service delivery and lifecycle management to give customers greater control, deliver the services more rapidly and reduce opex. A growing number of CSPs will increase their spending in order to improve the enterprise service ordering experience (through the use of self-service portals) and support more-dynamic monetisation approaches.

Questions?
Please feel free to contact Dana Cooperson, Research Director, Research at dana.cooperson@analysysmason.com

AB Stelacon to become part of Analysys Mason

AB Stelacon, based in Stockholm and Malmo/Lund, Sweden, is a respected consulting company with more than 30 years of experience. Its expertise includes smart cities, regional development, digital services, policy & regulation and telecoms & digital communications.

"We are delighted to welcome colleagues from AB Stelacon to Analysys Mason. Our combined consulting and research expertise will enable us to strengthen and enhance our offer to new and existing clients, both in Sweden and internationally. This is a significant further step in building a pan-Scandinavian presence, following our very successful expansion in Norway," says Bram Moerman, CEO at Analysys Mason, "and we continue to evaluate further opportunities to accelerate our growth in the region."

Jenny Robertsson, CEO of AB Stelacon, "Becoming a part of Analysys Mason will strengthen our position in Sweden by accessing Analysys Mason's global research and insights within telecoms, di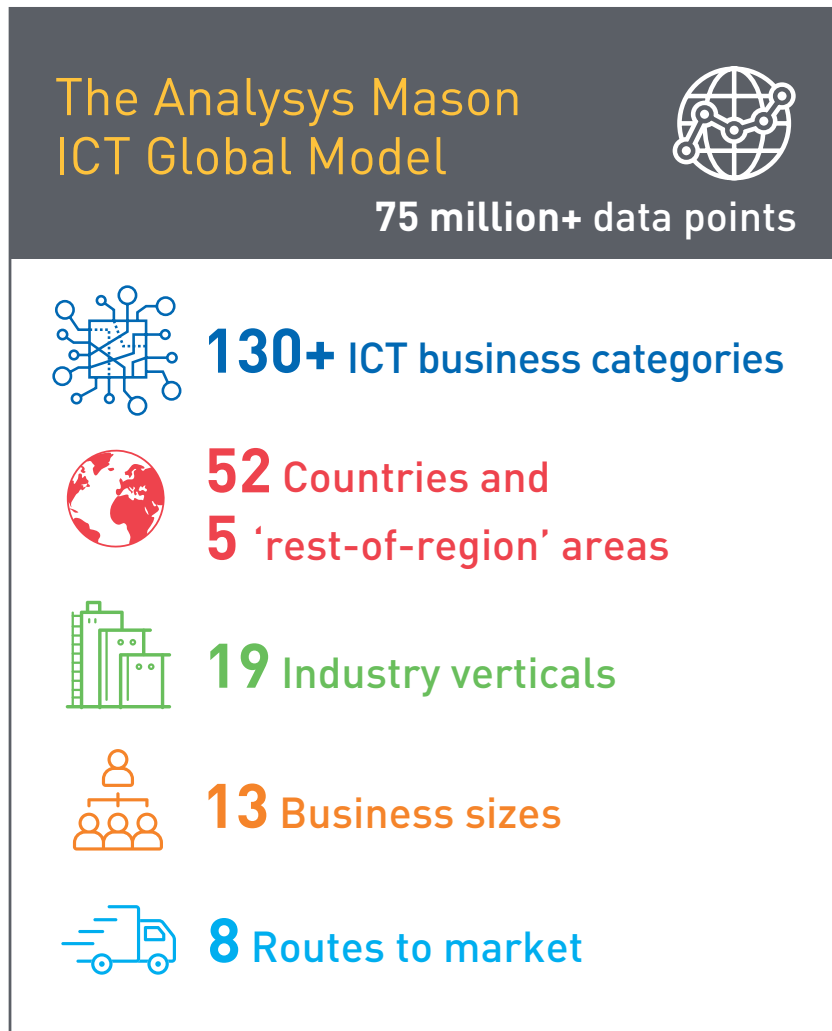gital services and smart cities. We are also excited to be part of such a well-known brand as Analysys Mason and believe that it will enhance our position in the Swedish as well as the Scandinavian market."

"The acquisition of AB Stelacon is strategically important as it significantly strengthens Analysys Mason's position in the Scandinavian region adding valuable skills and expertise to better serve its multinational clients," says Jens Montanana, CEO of Datatec Group, Analysys Mason's parent company.

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

SMB ICT channels and forecasts

The Analysys Mason ICT Global Model

75 million+ data points

130+ ICT business categories

52 Countries and
5 'rest-of-region' areas

19 Industry verticals

13 Business sizes

8 Routes to market

Analysys Mason ICT Global Model

Our small and medium-sized business (SMB) ICT-focused research provides comprehensive coverage of the market and gives insights into:

- how SMBs spend their ICT budget
- the buying behaviour within SMBs
- the channel partners and routes to market that SMBs use.

The Analysys Mason ICT Global Model is driven by extensive primary research and industry trend analysis with fully navigable, granular data points.

For ICT vendors and telecoms operators, the model answers go-to-market and sales-enablement questions such as the following.

- To what extent are businesses adopting cloud and on-premises solutions?
- When will spending on cloud solutions surpass that on traditional on-premises ICT?
- Which industries offer the most potential in the next 3 to 5 years?
- Which sub-segments of the markets represent the best opportunities?
- What is the size of the addressable market by country region of the world?

Questions? Please feel free to contact Andy Bose, Partner at andy.bose@analysysmason.com

Analysys Mason's consulting and research are uniquely positioned

Analysys Mason is the global specialist adviser on telecoms, media and technology (TMT). Since 1985, Analysys Mason has played an influential role in key industry milestones and helping clients through major shifts in the market. We continue to be at the forefront of developments in the digital economy and are advising clients on new business strategies to address disruptive technologies.

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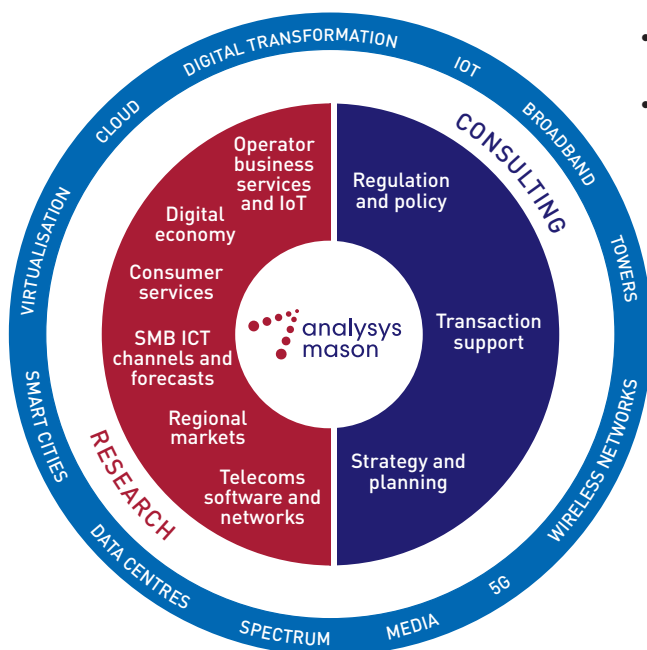
About our services

At Analysys Mason, we understand that clients in the TMT industry operate in dynamic markets where change is constant. Our consulting and research has helped shape clients' understanding of the future so they can thrive in these demanding conditions.

Consulting

- We deliver tangible benefits to clients across the telecoms industry
- Communications and digital service providers, vendors, financial and strategic investors, private equity and infrastructure funds, governments, regulators, broadcasters and service and content providers
- Our sector specialists understand the distinct local challenges facing clients, in addition to the wider effects of global forces
- We are future-focused and help clients understand the challenges and opportunities new technology brings.

Research

- Our dedicated analyst team tracks and forecasts the services accessed by consumers and enterprises
- We offer detailed insight into the software, infrastructure and technology delivering those services
- Clients benefit from regular and timely intelligence, and direct access to analysts.

> ❝Analysys Mason is the global specialist adviser on telecoms, media and technology (TMT). Since 1985, Analysys Mason has played an influential role in key industry milestones and helping clients through major shifts in the market. We continue to be at the forefront of developments in the digital economy and are advising clients on new business strategies to address disruptive technologies.❞

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