Are you ready for 2022?

We recently published our 2022 Research Themes – the big topics that will shape the industry and drive our focus throughout the year. To complement these, and help the industry navigate the year ahead, below we share our views on the key trends to watch in 2022 and what they mean for ecosystem players across five areas:
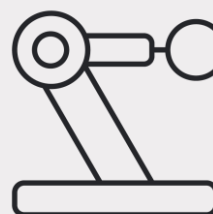

5G and network transformation
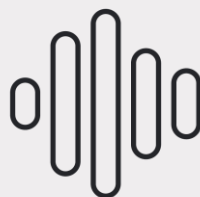
Spectrum landscape

Fixed and pay-TV markets

Digital consumer

IoT and enterprise markets

For more detail on our research themes, see 2022 Research themes.

2021 has been an intense year for the telecoms ecosystem, with new developments and innovation spanning all areas of the industry. While 2022 will see some existing trends continue to run their course, others will evolve in new directions. New themes will also enter the fray for the first time.

To help navigate the year ahead, we are releasing a series of reports that highlight the key trends to watch in 2022 and what they mean for ecosystem players. The analysis covers five key areas: 5G and network transformation; spectrum; IoT and the wider enterprise space; the digital consumer; and fixed and pay-TV markets. This Insight Spotlight addresses the 5G and network transformation opportunity.

Trends to watch

5G set to be the focus of innovation

By the end of 2021, GSMA Intelligence forecasts that 5G will be commercially launched by nearly 200 operators in more than 70 countries, resulting in almost 640 million 5G connections. While 4G will support the bulk of mobile broadband users, operators are focusing their capex and technology innovation strategies on 5G.

As a break from previous network generations, the adoption of 5G gives operators an opportunity to introduce new technologies, and to do things differently in their networks. Indeed, 77% of operators think it likely that they will use 5G as a trigger for introducing open RAN (see Network Transformation 2021). We will also see new network innovations and strategies in 2022 framed within the context of 5G, particularly as 5G SA networks ramp up.

Open RAN matures but is likely to disappoint many

If 2022 sees continuing 5G momentum, and a majority of operators see 5G as an opportunity to introduce open RAN, it is a foregone conclusion that open RAN will remain one of the highest profile network technologies of 2022. With open RAN still in its infancy, we can expect a year of continued learnings, driven by new testing labs (funded by government or industry), supplier partnerships and operator deployments that deliver best practices and signal where open RAN makes sense (as well as where it doesn't). However, after several years of heightened expectations, progress is unlikely to live up to the expectations of many industry watchers. Against a massive installed base of proprietary RAN gear, it will take open RAN years to make a dent.

Telco cloud continues its move from if to how

The question of how telcos would compete in the cloud was largely answered in 2021, even before TelcoDR announced its $1 billion transformation fund focused on telco cloud. Hyperscaler partnerships demonstrated a role for the public cloud while maintaining private cloud assets. Edge computing acquisitions and deployments made it clear that operators would be just one part of the edge ecosystem. The recognition that public and private clouds, along with central and edge clouds, will all be integrated, promises continuing momentum behind public cloud partnerships as well as hybrid cloud management solutions, and a push on how operators can ensure public cloud solutions meet operational and performance requirements.

Radios and antennas become trendy

5G and new RAN technologies are nothing without the spectrum to enable them. Hence, we have seen C-band auctions in the US, mmWave momentum, and global discussions on the best use of the 6 GHz band. Building on the record 33 (2G/3G) network sunsets planned for 2021, the 14 expected in 2022 will represent slowing – yet still impressive – activity, and the second biggest year for 3G sunsets between 2015 and 2025. Of course, more announcements and commitments may still come throughout 2022. Supporting 5G in all of these bands – old and new – will require new radio development and antenna innovations that ensure coverage in higher frequencies is not constrained to the point where deploying them is uneconomical. See the Spectrum Navigator.

6G divides the industry

In early 2021, Samsung claimed a 5G "speed record", reaching 5.23 Gbps using dual connectivity across 4G and 5G. While the limits of 5G are constantly evolving, this compares to an expected peak data rate for 6G of 1 Tbps, or 200× the high end of today's 5G. There are clearly big aspirations for 6G, as evidenced by operator announcements, vendor messaging and 6G conferences in 2021. There are also strong and differing views on various aspects of 6G, including that spectrum should dominate the 6G tech agenda, that we need to focus on use cases versus technology, and that it is just too early to care. As 6G messaging ramps up in 2022, we will see these divisions play out – potentially widened by regional positioning on 6G R&D dominance.

Implications

Operators

- **Don't forget 4G** – 5G technologies and network infrastructure garner lots of attention; they are a focal point for consumers and investors alike. Yet, 4G LTE will support more mobile broadband users than 5G for many years to come. Operators must ensure that their network transformation strategies include a role for 4G, and that this focus is well understood by their network infrastructure suppliers, which will need to continue delivering 4G innovations.

- **Give open RAN a chance** – Despite the high-profile operators that have made public commitments to open RAN, it is not on every operator's agenda. Yet, there are two key reasons for every operator to get involved with open RAN and develop a better understanding of it. Momentum behind open RAN is undeniable. As the ecosystem scales, it is important for all operators to understand how they could benefit, or why they need to avoid it. Whether open RAN is deployed or not, open RAN requirements from suppliers can be a potential sales negotiation tactic, while also playing to investment protection if the technology is needed in the future.

- **Sustainable supply chains** – Sustainability was highlighted by 87% of operators as an extremely or very important part of their network transformation strategies. It plays a role in 5G, 6G, open RAN, cloud and radio discussions. However, it is important not to overstate the importance of network infrastructure in sustainability efforts. Direct emissions represent a minor share of a telco's carbon footprint, with emissions generated by the operator's supply chain often representing 70% or more. It is critical for operators to focus on the efficiency of their supply chains, and to make this focus visible to the consumers and shareholders who care.

Network infrastructure suppliers

- **C-suite priorities** – Vendors need to understand how important it is to garner support for new network technologies at the C-level. Increasingly, such technologies require the support of multiple businesses within an operator. Open RAN and vRAN, for example, require coordination across RAN, transport, IT, cloud and core network teams. Internal ownership battles and differing levels of expertise could derail this coordination, making a strategic push with support from the highest level of the organisation important. Vendors must drive their sales and messaging activities accordingly.

- **Focus on value (and revenues) rather than technology** – Vendor messaging has often focused on technology innovations and advancements, reflecting a natural pride in their engineering prowess and an audience of network professionals for their products. However, there is a very real need to convey the value of the technologies. As vendors play a key role in helping both operators and enterprise customers benefit from the new technologies, value-based messaging is key. Customers wants to buy solutions, not technologies.

- **Frame 6G in terms of 5G improvements** – It is natural for future technology generations to be compared with today's technologies. We want to know what the networks of tomorrow will deliver that today's networks cannot. To this end, asking how 6G can improve on 5G is a good strategy for determining its value and direction. It is also true that 6G R&D can provide valuable input into today/tomorrow's 5G deployments. This is something operators expect, but also a good tool for vendors looking to translate their long-term 6G efforts into near-term business (or mindshare).

Related reading

2022 Research Themes

Author

Peter Jarich, Head of GSMA Intelligence

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Trends to watch

No spectrum, no 5G

2021 will have the highest number of 5G spectrum assignments ever (14 countries in the first nine months, with a few more expected in Q4). Momentum will continue in 2022; plans to release 5G spectrum have been announced in 20 countries so far. With many markets already in the consultation process, more regulators will announce plans to release spectrum throughout the year. Auctions will continue to take place across all 5G bands (low, mid and high bands) and all regions, making 5G a global focus. In terms of regional spread, the number of auctions in Latin America and Africa will rise in 2022. So far only two countries in these regions have assigned spectrum for 5G (Chile and Mauritius), but the mobile ecosystems in both regions are increasingly eager to capture the benefits of 5G, with spectrum being a key enabler.

mmWave is here to stay

mmWave spectrum for 5G has been released in 16 countries, the majority of these in Asia Pacific. By the end of 2021, a total of 21 countries are expected to have made this spectrum available for 5G. Assignments of spectrum in mmWave bands will gain further traction in 2022 as the number of 5G rollouts increase, adoption rises and the mmWave ecosystem matures. As we move away from the early stage of 5G, industry work will increasingly look towards making spectrum available to launch 5G and managing spectrum capacity. Access and use of mmWave spectrum will play a role in the latter case. Deployments in mmWave spectrum, coupled with 5G device developments, will offer new possibilities to expand 5G use cases on a larger scale.

Old versus new networks

2021 is expected to have the highest number of network shutdowns so far – with 33 networks set to be turned off – and this trend will continue in 2022 and beyond. Based on operators' announced plans so far, 14 networks are due to close in 2022. But more announcements may still be on the way. The rollout of 5G networks has led operators to accelerate plans to switch off legacy networks and refarm 2G and 3G spectrum for 4G and 5G. This will only continue as 5G rollouts advance, allowing operators to shift frequencies towards more spectral-efficient networks. Also, by reducing the number of technologies maintained, operators should be able to significantly lower running costs, rationalise device portfolios and simplify tariff structures.

New models for new spectrum

With the arrival of 5G, several new spectrum models have emerged, spanning across three main areas: access to spectrum through different forms of sharing (e.g. in the US and Finland); new forms of licence obligations (e.g. in Italy and France); and novel assignment models (e.g in Norway, the UAE and Qatar). These new paradigms have been driven by an expansion of network models (including private networks), a renewed drive from regulators to tackle mobile network coverage and increased pressure to release more spectrum. This trend is set to continue in 2022 and beyond as pressure to enable 5G network launches intensifies. Although there is a greater spectrum supply (e.g. in mid and high bands) there is also more demand for spectrum from industries (e.g. manufacturing, ports and utilities) and a decrease in capacity available due to rising consumer data traffic. These new models will transform the traditional licensing approaches to adapt to these new challenges.

How will 5G spectrum prices evolve?

Historical trends show significant variation in prices paid for 'new' spectrum for 5G. While generally this is due to specific market conditions and normal competition between bidders, GSMA Intelligence research shows that other factors such as spectrum availability and auction design have played a major role in driving this disparity. With more assignments of new spectrum and renewals of existing licences on the way in 2022 and beyond, it is important to watch how this trend evolves. High spectrum prices are associated with slower mobile data speeds, worse coverage and slower rollouts. GSMA Intelligence research shows that when prices are too high, operators are likely to invest less in their networks – which impacts the quality and reach of services as well as the pace of rollouts.

Implications

Mobile operators

- **Consider the impact on existing customers and network experience** – Spectrum availability is key for 5G, and operators understand this challenge the best. While new spectrum may not be made available in a timely manner, deployments in existing bands using technologies such as DSS can be a game-changer. However, as more consumers migrate to 5G and spectrum resources are shared between legacy and 5G technologies, the network experience could be significantly impacted for 2G/3G/4G users. Operators must plan ahead to mitigate these risks. One way to help with such challenges is to retire older technologies and refarm the spectrum for 4G and 5G networks. But this is not a straightforward exercise and involves much more than the consumer segment. A number of IoT applications still rely on 2G or 3G connectivity, with some of these being critical applications. On average it takes 2–4 years between the shutdown announcement to the actual switch-off, so early planning is crucial for a smooth transition to new, more efficient technologies and for successful customer migration.

- **Demand acceleration in innovation from suppliers** – Vendors will always push for the adoption of new technologies. To ensure these technologies continue to advance 5G offers, operators need to demand innovation from their suppliers. With new models such as spectrum sharing and obligations to make key bands available for other players, the technical requirements and timing of these solutions will have an impact on deployment as well as the quality of services offered.

- **Do not underestimate the role of mmWave** – Following several consultations on interest for mmWave bands, some operators have expressed little appetite for this spectrum and have proposed delays in its release. This is driven by demand uncertainty on the consumer side following initial 5G rollouts. However, the interest from vertical industries in 5G capabilities is clear. mmWave spectrum may not be suitable for extensive coverage, but it is a robust solution for areas where traffic is concentrated, and it will be an enabler of future 5G use cases where high capacity and throughput are required.

Regulators

- **Remove spectrum roadblocks** – The lack of new 5G spectrum is a barrier to 5G rollout. In the absence of new spectrum, and to ensure efficient use, operators must be free to use their spectrum flexibly across technology generations. Operators that deploy 4G radios will in fact deploy multi-mode radios capable of 4G and 5G with a software upgrade. Regulators that issue 4G-specific licences are limiting the use of spectrum, which can lead to delays to the introduction of 5G. Regulators must work with the industry to remove spectrum roadblocks if they are to make widespread 5G connectivity a reality.

- **Align license terms with reality on the ground** – Spectrum availability alone does not equate to success. Assigning frequencies under the right conditions and with the right obligations ultimately ensures the best use of spectrum. Licence duration, price and obligations are key terms that need to be aligned with the reality on the ground, and regulators have to increasingly work with the industry to develop innovative models. While most countries have released mmWave spectrum with upfront payments, Hong Kong has adopted an approach in line with the technology lifecycle. mmWave technology is still nascent, being a few years away from chips and industrial devices becoming available; based on this, the Hong Kong authorities have assigned spectrum in mmWave bands without spectrum fees until bands reach 75% occupancy.

- **Innovate in spectrum management** – The increased pace of technological change presents a challenge to the traditional pace of spectrum release. This is compounded by the increasing demand for spectrum from operators to meet growing demand for broadband services and from other players to gain access to spectrum to support their innovation goals. New models for assigning spectrum have emerged in the 5G era. From sharing and leasing approaches to local licensing and various wholesale models, these new paradigms emphasise the need to transform the traditional licensing approaches to adapt to the current challenges. Licensing authorities must explore new ways of assigning spectrum to ensure they achieve the economic growth that new technologies can enable while making sure any risks associated with inefficient spectrum use are averted.

Related reading

2022 Research Themes

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Trends to watch

5G FWA: attention turns to customer adoption

While FWA solutions have been deployed since the late 1990s, they are seeing renewed interest, driven by the arrival of 5G. As of September 2021, 66 operators had launched 5G FWA services across 34 countries. The number of deployments will continue to grow, but 2022 will also need to show progress with customer adoption. Our consumer survey shows there is untapped demand as more than 40% of consumers see 5G FWA as an appealing proposition – a greater share than for any other new 5G use case. 5G can make FWA a competitive solution versus predominant fixed technologies (e.g. cable, fibre), but operators will need to focus on broader coverage, competitive costs and speeds in keeping with household use cases; service bundling; fully featured CPE products; and easy set-up.

Fibre rollout is moving up the agenda

Covid-19 has underlined the importance of resilient and high-speed fixed broadband infrastructure, boosting FTTP/B rollouts worldwide. For example, NBN Co in Australia and Openreach in the UK have both accelerated their FTTP/B rollouts since the beginning of the pandemic. According to GSMA Intelligence, by the end of 2022, FTTP/B as an average share of total fixed broadband connections across 36 major markets will be more than two fifths. Operators with large DSL footprints using FTTC/N or vectoring as a stopgap to FTTP/B will likely accelerate their FTTP/B rollout, including redirecting funding to it. Cable companies, depending on their market position, will either continue to accelerate network upgrades to DOCSIS or upgrade their networks to FTTP/B, as Virgin Media O2 is doing in the UK. For further coverage, cable companies are likely to prefer FTTP/B.

LEO satellite broadband will gain momentum

Satellite broadband is undergoing a period of reinvention through the low Earth orbit constellation model that has emerged from the likes of Starlink. Momentum and industry traction for LEO broadband is set to grow, underpinned by a reduced cost structure and higher performance capability relative to legacy geostationary satellites. Amazon's Project Kuiper and Telesat both plan to launch LEO satellites in 2022. OneWeb, Starlink and other providers will increase their country coverage. According to GSMA Intelligence, the total 'not-spot' addressable base worldwide stands at 1–1.5 billion people, representing a significant opportunity for LEO broadband. This even accounts for factors such as increasing mobile and wired broadband coverage and the growth in FWA. LEO broadband services will be delivered either directly to consumers or via wholesale models with telcos and user terminal suppliers.

Traditional pay TV will come under renewed pressure

All the big US media houses now offer a D2C service and are expanding their international reach. The stellar subscriber performance by Disney+ (reaching 100 million subscribers in a record 1.5 years) is the latest sign of the strength of streaming. With the growth of local streaming services such as Zee5 in India, the library of original content being offered by video streaming services is expanding at an unprecedented rate, creating a strong alternative to pay TV. In addition, the older demographic groups that represent a core base for pay TV have a newfound savviness of video streaming, which accelerated due to pandemic lockdowns, setting the scene for potential pay-TV churn.

Fight for control of the TV platform will intensify

Given TV's leading position for home viewing (with 88% of smart TV users streaming video on them at least once per week) and the increasing shift to online viewing, the battle to control the TV streaming platform will intensify. Technology giants such as Amazon and Google, which already have tens of millions of customers globally, are in pole position to lead. Pay-TV providers are also joining the fray, though are focussed on local markets. Comcast recently launched its own-brand of smart TVs and TV streaming device running its platform. Such product releases indicate the type of response to be expected in the coming year from the big pay-TV providers at least, to bolster their positions as content gatekeepers and address the growing threat of cord-cutting.

Implications

Operators

- **New opportunities from shifting landscape** – Operators can use FWA to drive first-time adoption in developing markets that have low fixed broadband penetration. In developed markets, operators without existing fixed infrastructure can use FWA to challenge DSL, fibre and cable competitors. Operators with a fixed network can expand into new areas using FWA or migrate subscribers from copper-based networks to FWA. Operators can also forge wholesale partnerships with LEO broadband providers to reach unconnected regions. Meanwhile, operators with fixed operations including pay-TV can use their expanding fibre footprint to transition pay-TV delivery from satellite to IPTV.

- **Pay-TV business under pressure but fighting back** – Pay-TV's response so far is a combination of initiatives including service bundling, skinny bundles to introduce lower price points, super-aggregation, OTT presence, original programming and premium sports. According to GSMA Intelligence, the top two areas consumers would like pay-TV providers to focus on to make their services more attractive are pricing and content.

- **Slicing and edge for FWA** – Operators launching FWA services need to consider how to integrate slicing and edge capabilities, both of which can enhance FWA offers. Slicing can be used to prioritise certain in-home services (such as gaming or interactive video). Edge networking can improve latency for those services and minimise backhaul costs.

- **Backhaul savings with LEO** – Backhaul links to rural areas carry a high price premium, at more than double the cost for a city, accounting for 15–20% of the total cost of ownership. LEO broadband should provide telcos with a material reduction in rural backhaul rates by removing distance as a factor that would otherwise drive up costs in linking remote base stations with fibre or microwave backbones to the core.

Video streaming services

- **Low prices are a key enabler; local content a differentiator** – The relatively low pricing adopted by video streaming services has helped them gain subscribers from traditional pay TV. However, with video streaming subscribers likely to be rather price sensitive and with a wide choice of services (most allowing monthly cancellations), price rises can quickly result in subscriber losses. This creates a tricky situation for video streaming services, which need these price rises (and likely regularly) to offset sharp inflation in content costs. Video streaming services are rightly focussed on achieving subscriber scale. This has meant expanding outside their home markets, with local content a key aspect of their international growth strategies.

LEO broadband providers

- **Push on costs** – Indications from early retail prices suggest LEO broadband costs remain high relative to fibre and 4G/5G tariffs. For some households that lack an internet connection, this may be a price worth paying. However, the fees are likely to constrain mass-market adoption without further reductions or subsidies passed on.

Altnets

- **Increasing opportunities** – The growing importance of FTTP/B infrastructure worldwide has led to increased investor funding for such assets, which is a positive development for the fibre altnet sector both in terms of more peers being launched and existing altnets expanding their fibre network coverage. For ISPs (e.g. Sky in the UK), the increased choice of fibre wholesalers will be welcome.

Vendors

- **FWA CPE innovation needed** – FWA vendors that can offer outdoor CPE that is low cost and cost effective to install (with potential for self-install) can help deliver the clear benefits FWA brings in terms of coverage, speed and efficient use of an operator's spectrum. Vendors can also include embedded edge compute in their CPE devices to improve the value of FWA services. Vendors can further support enterprise FWA by delivering CPE solutions tailored to enterprise requirements and explicitly linking FWA offers to enterprise demands such as for security.

Related reading

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Fixed Broadband, Video and Convergence

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Trends to watch

5G smartphones: attention turns from device availability to prices

5G models represent about 60% of the total number of smartphone models launched in 2021 by the 20 major manufacturers we tracked. This represents a major year-on-year increase from 2020; however, the 5G share has stayed roughly even from the beginning of the year, suggesting that manufacturers are satisfied with their current balance of 5G and non-5G phone models. This is to be expected, as 4G will continue to represent the lion's share of mobile connections in most developed markets for at least the next 2–3 years. Our research shows that the cost of 5G is the second-largest barrier to 5G adoption after satisfaction with existing networks (e.g. 4G). The cost barrier should become less relevant in 2022, as cheaper 5G devices will likely enter the market. The average retail price for a 5G phone has fallen significantly, falling below $500 in H1 2021.

Wearables: all eyes on health and fitness

Over the past few years, and especially because of Covid-19, wearables have benefited from an increased interest among consumers in health and fitness features and services. Indeed, monitoring of personal health was the fastest-growing smartphone use case in 2021 across the 10 major countries we surveyed. The growth in wearables is being driven and will continue to be driven by smartwatches. The portfolio of watches available to consumers is expanding, alongside lowering price points. Vendors are building their smartwatch propositions around health and wellness, and the ecosystem of subscription services that are offered by smartwatch vendors on their platforms will expand in 2022.

Gaming: digital transformation disrupting the industry

The partial shift of gaming consumption from consoles to mobile devices is a major driving force in the gaming sector, as is recent progress with enabling technologies such as cloud, 5G and immersive reality. In 2022, we expect to see subscription gaming rise in popularity. Microsoft has made significant long-term investments in content for its gaming platform, and its cross-platform strategy will have an impact on the wider industry since the competition does not want to be left behind. Despite low customer uptake so far, cloud-based gaming remains a significant opportunity going forward. Facebook joined the fray in Q4 2021, offering native mobile games over the cloud for free. From a technology perspective, cloud-based gaming requires high-speed connectivity and low latencies; as such, much attention will be placed on how to leverage the new capabilities brought by 5G, edge computing, network slicing and private networks.

Retail: resetting B2C strategies for customer engagement and distribution

Even before the pandemic the trend towards digitisation was clear, but Covid-19 has accelerated the shift to digital for consumers on many fronts. For example, e-commerce as a share of total retail sales is now 30% higher than pre-pandemic levels in major countries. While most of the retail industry is making unprecedented use of digital channels, our consumer survey shows that 44% of consumers still prefer to purchase their next smartphone in a physical store – a greater share than online (37%). This means in-store shopping will remain a vital distribution channel for handsets. It also means operators will need to reset their B2C strategies for omnichannel customer engagement and distribution.

eSIM: from deployments to customer adoption

The last two years have been important for expanding the eSIM ecosystem, moving the technology from niche to mainstream. The number of eSIM-capable smartphones keeps growing and more than 200 operators now offer commercial eSIM services for smartphones. The focus in 2022 will need to shift to consumer adoption. While consumer awareness of eSIM remains low (below 30% of smartphone users in most of the 10 major countries analysed), it grew year on year from 2020. More importantly, nearly 60% of smartphone users are interested in using eSIM on a mobile phone at some point in the future, suggesting untapped demand. Raising consumer awareness of eSIM and promoting its benefits are crucial to drive adoption. MNOs, MVNOs and OEMs have an important role to play here, as they are the key touchpoints with end users.

Implications

Mobile operators

- **Opportunities beyond 5G connectivity** – As consumers switch to 5G smartphones, they are likely to revisit their mobile subscription contracts and consider new bundled services available from operators. Our research indicates that 5G users are more interested than 4G users in adding digital services and content to their mobile contracts. 5G customers are most keen on video streaming and digital security services, but they are also interested in wearables devices and services. With the advent of new fitness subscription models offered by vendors (e.g. Apple Fitness+ and Fitbit Premium), 2022 could be the year operators start bundling these services.

- **Gaming also offers new opportunities** – So far, operators have mostly benefited from gaming indirectly through upselling, as heavy gamers need larger mobile data allowances. However, the shift of gaming to mobile devices, coupled with technology innovation that heavily involves (or is led by) operators (e.g. cloud, edge, 5G), is driving new operator thinking. A range of operators have already launched their own local cloud-gaming propositions, including Deutsche Telekom, TIM, Vodafone Italy, Turkcell, China Mobile, Singtel and the three South Korean operators, among others. In a previous analysis, we estimated that in 2025 gaming subscriptions could generate 4% of new revenues for operators in South Korea and 3% in the UK, Italy and the US.

- **Changing role for physical retail** – In-store retail interaction is key for building and maintaining loyal customer relationships and launching new market products effectively. Customers are showing a preference for buying smartphones in-store, indicating the importance of these devices since consumers are evidently putting much thought into their purchases to ensure they select the right device. With the rest of the retail industry shifting to digital, operators can use this opportunity to make physical engagement less transactional in nature and instead more about deepening relationships with customers.

Smartphone and wearables vendors

- **Think beyond devices** – Digital services show great promise for future revenue growth. Vendors should prepare to take advantage of the burgeoning markets for digital security and entertainment services that will continue to shape the strategic landscape for years to come. Apple represents a successful example of an OEM tapping services to complement its device business: services accounted for 19% of Apple's revenue in the 12 months ended in September 2021, growing 27% year on year.

- **Watch out for the Wear OS 3.0 platform** – Wear OS 3.0 has been the biggest refresh in the smartwatch market in recent years, coming from the newly combined efforts of Google and Samsung, which have merged Android Wear and Tizen into a unified platform. The resultant single API shared across a bigger share of the market should boost the ecosystem of apps and services available. Wear OS 3.0 is being shipped across new devices at the end of 2021, and we will see in 2022 how well it is received by consumers and if it will indeed prove to be the challenger to Apple's dominance.

Digital service and content providers

- **Make the most of 5G** – 5G users make greater use of digital entertainment services on their smartphones compared to 4G users. In the more developed countries, the share of 5G users who consume paid-for content on a weekly basis is 46% for video services, 43% for music and 25% for games. This means 5G is expanding the base of consumers who consume content regularly – by 13 pp for video and 9 pp for both games and music (compared to the corresponding figures for 4G users). Effectively, 5G serves as a catalyst to increase the value of digital services and content for both subscribers and providers of such services.

- **Leverage operator strengths** – Providers of digital services and content typically have a dual distribution strategy: direct to consumer (D2C) and via third parties. Operators are key partners, as they have unparalleled customer reach, granular distribution and established customer expertise. For example, in video streaming, partnerships with operators have helped Netflix to expand its geographical presence and customer reach over the last 10 years. D2C and operator bundles can certainly coexist, allowing providers of digital services to reach more consumers and, in some cases, optimise subscriber acquisition costs.

Related reading

2022 Research Themes

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Trends to watch

Enterprise use cases driving IoT growth

Global IoT connections will increase by 12% in 2022 – an encouraging growth rate considering chip shortages and supply chain disruptions will likely continue throughout the year (see our latest market update). Nearly 70% of IoT growth will come from enterprise use cases, with the rest from consumer segments. Smart buildings will be the largest growth segment in 2022 (and through to 2030), driven by the need to ensure workers' health and safety but also to adhere to energy-efficiency guidelines, stimulating adoption of smart lighting, HVAC systems, security and automation. Smart manufacturing IoT connections will also see solid growth in 2022, driven by Industry 4.0 initiatives and manufacturers deploying IoT to automate production, streamline operations and increase productivity. In light of these trends, having a clear and focused enterprise IoT strategy is crucial to capture new business opportunities.

Operators scaling B2B services

5G is driving renewed interest in B2B, with nearly 70% of operator CEOs viewing enterprise use cases as the incremental opportunity for monetising 5G deployments. 5G network investments (more than $700 billion globally for 2021–2025) and the wider 5G business case are more difficult to justify if based on B2C only. For operators, B2B is the main driver of revenue growth. The average contribution to total revenues of B2B services (connectivity and beyond) reached 30% in 2020 for the major operators analysed, up from 27% in 2017. That represents good progress, but there is potential for further growth as IoT deployments and enterprise digitisation scale. The shift from trials/PoCs to commercial deployments seen in 2021 is a clear sign of progress, but proof of value is key to scale enterprise 5G going forward. We expect players across the mobile industry to increasingly show how 5G can create value to enterprises, based on tangible projects and outcomes achieved so far.

Public cloud's growing influence in the mobile industry

Operators see IT and cloud vendors as their main competitors in some B2B markets such as private networks, IoT and security. Interestingly, they also see them as their main partners, indicating

a new trend towards co-opetition. Partnerships between operators and cloud companies will continue to develop in 2022. On one side, advancing the use of cloud technologies in networks is a priority for 72% of operators, which are looking to increasingly move certain network functions to the public cloud. On the other side, Microsoft's acquisition of AT&T's Network Cloud technology shows webscalers are playing their part in building telco-specific expertise.

Network slicing comes of age

Network slicing has been heralded as a prominent feature of 5G. Although slicing is possible on 4G/LTE and 5G NSA, its benefits can only fully be realised with 5G SA. Thus far, delays in end-to-end slicing across RAN, transmission and core have led operators to pitch 4G private networks with 5G upgrade paths to keep up with demand from early adopters. While these involve technical differences in how connectivity is provided, both serve the same base purpose: to provide an enterprise customer with a guaranteed level of 5G service across the dimensions of speed and latency. However, the tide is turning. According to the GSMA Intelligence Operators in Focus research (Enterprise Opportunity Survey 2021), 20% of operators already position 5G network slicing capabilities as a primary 5G value proposition (compared to 6% in 2020), ahead of private networks (12%) and edge computing (12%).

Security everywhere

According to our research, security saw the strongest growth in demand from enterprises due to the pandemic; it was highlighted as the primary growth area by 44% of operators surveyed, followed by cloud (29%). The majority of operators (85%) consider it important to invest in security to help them achieve a long-term enterprise revenue goal (compared to 68% in 2020). In the 5G era, security risks are greater than before due to the combination of cloud, data and IoT security threats. The pandemic has intensified ransomware attacks and cybercrime in general; it is no surprise that operators are reporting not having enough knowledge or tools to discover and solve upcoming security vulnerabilities as a top challenge (48% of those operators), which is further exacerbated by a limited pool of security experts.

Implications

Operators

- **Build on progress** – At its current trajectory, the contribution of B2B to operator revenues will grow by 1 percentage point per year. However, major operators are strengthening their B2B strategies to accelerate this, particularly in the context of 5G. Ensuring the capabilities and business models are in place to fully service enterprises will take time, but the direction of travel is clear. Operators should also balance short- and long-term expectations; B2B often requires an initial investment of resources as well as establishing dedicated business units, whereas monetisation is a multi-year journey that will also span the 6G era. B2B is also more complex than B2C. Different vertical sectors have different technology requirements, goals and timelines for their digital transformation. As such, operators should look to provide a standard set of capabilities and B2B service offerings across sectors, while maintaining the flexibility to cater to custom requirements.

- **Assess your B2B portfolio** – Having a fit-for-purpose portfolio of B2B services is vital to capture the new opportunities. While B2B growth increasingly depends on offering integrated solutions (e.g. connectivity, equipment, IT, cloud, edge, security, IoT), it is crucial for operators to identify which products or services should be positioned as the lead value-added elements when approaching enterprise customers. This should take into account the strengths of each operator and their competitive edge, but also the new trends shaping enterprise demands and purchasing decisions. 2020 changed the hierarchies, especially in the context of Covid-19. Our operator research shows security is now the main pull factor (which is no surprise, given the shift to digital during the pandemic), followed by professional services. Both moved up the ranking of pull factors (compared to 2019), while SD-WAN services moved down.

- **Move ahead on slicing** – Although there are no firm timelines for 5G network slicing commercial solutions, Google's Android 12 announcement brings network slicing one step closer to a commercial reality. Google has already been testing networking slicing with Nokia and Ericsson, and Taiwan's Far EasTone has conducted proof-of-concept trials using Android 12 devices connected to multiple 5G slices utilising URSP. Having a solution ready to go to market with will help with customer acquisition.

Vendors

- **Co-opetition is the name of the game** – Being the sole supplier of end-to-end digital transformation packages is challenging for most suppliers (whether they are a cloud company, operator or network vendor). This explains why we see new partnership announcements each week. Complementing capabilities and resources (but also sharing efforts and investments) is a sensible play, as is developing seamless integration between technologies. Traditional competitors are becoming partners to better address the new B2B opportunities.

- **Security is a must** – Regulatory pressure with regard to data privacy and security, particularly for IoT devices, is set to increase. For instance, the EU Commission recently adopted the Internet-Connected Radio Equipment and Wearable Radio Equipment initiative, which sets baseline criteria for IoT security. As a result, any device sold within the EU needs to be security hardened and tested to obtain CE certification.

Enterprise customers

- **Prioritisation is key** – New network technologies and capabilities bring new opportunities but also extraordinary complexity. Enterprises' budgets for digital transformation investments are not infinite; allocating budgets to the rollout of new technologies is increasingly a function of the expected returns and associated timelines. Determining priorities and balancing them with resources is key.

- **Take a position on slicing** – Recent developments pose the question of whether enterprises should wait for 5G slicing to mature or get involved. The answer depends as much on the availability of 5G SA networks and 5G SA devices as it does on the enterprise's individual needs. Large enterprises with deep pockets and particular requirements for customisation and security may prefer to pursue a private/campus network approach. Meanwhile, smaller enterprises with demands for lower TCO and opex, or those with dispersed end devices (fleet management as opposed to a static manufacturing plant), may be better served by network slicing. Enterprises' appetite will vary by use case. For the financial sector, for example, the ability to segment data by priority and security would enable traffic to be routed to ensure that the most critical data is passed directly to the defined slice without transitioning via the internet.

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