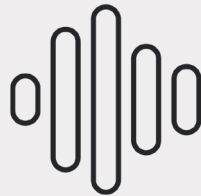


Are you ready for 2023?

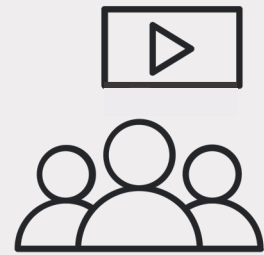
We recently published our 2023 Research Themes – the big topics that will shape the industry and drive our focus throughout the year. To complement these, and help the industry navigate the year ahead, below we share our views on the key trends to watch in 2023 and what they mean for ecosystem players across five areas:



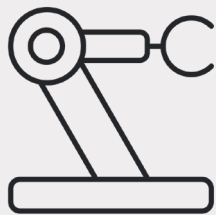
[5G and network transformation](#)



[Spectrum landscape](#)



[Fixed and pay-TV markets](#)



[IoT and enterprise markets](#)



[Digital consumer](#)

For more details on our research themes, see [2023 Research Themes](#).

INSIGHT SPOTLIGHT

Throughout 2022, we have analysed important developments and innovation spanning all areas of the telecoms industry and wider digital ecosystem. How will the industry evolve in 2023? Which trends will continue to run their course? Which trends will take a new direction? And which will 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 2023 and the implications 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 transformation and evolution of mobile networks and network infrastructure.

Analysis

The three S's dominate strategic priorities

Sustainability and security topped operator network transformation priorities in our [survey from earlier in the year](#). As energy costs rise and end users (particularly in enterprise verticals) move increasingly more activities into the digital realm, the focus on sustainability (energy efficiency) and security will not wane. Meanwhile, spectrum concerns were seen as much less important, appearing near the bottom of the list when checking on 5G RAN investment priorities. However, with the next World Radiocommunication Conference (WRC) scheduled for late 2023, spectrum will be top of mind for mobile operators, particularly as they look to prepare for how they will support rising data traffic demands into the future; while there was good progress on 5G spectrum allocations in 2022, there is more work to do to make 5G a reality at scale.

Open RAN fervour transitions into realism

Open RAN ranked top on 5G RAN investment priorities. This is not surprising, as the promises being made about open RAN in terms of opex and capex savings, combined with global supply-chain challenges, virtually ensure that open RAN will command attention. Yet, as trials and deployments move forward, it's increasingly clear that open RAN is not necessarily less expensive than competing solutions. Meanwhile, support from the top echelon of network infrastructure suppliers – Ericsson, Huawei, Nokia, Samsung, ZTE – remains minimal at best. Ecosystem suppliers (particularly silicon suppliers and innovators) will introduce innovations to drive open RAN forward, but CFO priorities around deployment costs and the time required to turn innovation into mature solutions will dampen, though not kill, open RAN excitement.

5G standalone and 5G-Advanced compete for the spotlight

Since the initial deployments of 5G non-standalone, the industry recognised that deployment of the standalone (SA) version would be required in order to deliver on the promise of 5G in terms of latency, slicing and IoT support. But year after year, 'planned' deployments of SA trailed actual deployments by a wide margin. Going into 2023, it seems that SA deployments may be poised to take off – if all SA deployments planned for 2022 materialise, the year will end with a twofold increase in the number of SA networks. However, the planned arrival of 5G-Advanced standards in 2025,

combined with vendor messaging around 5G-Advanced R&D, could complicate or at least postpone SA plans, as evidenced by the fact that more than half of operators say they plan to launch 5G-Advanced within one to two years after the release of the technology's standards.

Cloud solutions get broader, and more confusing

Following security and sustainability, the use of cloud and IT technologies was the top network transformation priority for operators. On the cloud front, operators have already established many diverse partnerships and strategies. In doing so, they've exposed the complexity and breadth of 'the cloud': public cloud versus private cloud; edge cloud versus centralised cloud; the interchangeable use of the terms 'cloud' and 'virtual' by vendors; and the need for solutions that stitch these dynamics together across diverse suppliers. As the use of cloud technologies in operator networks continues its pace in 2023, these broad, complicated intersections will be more evident than ever.

API exposure stages a comeback

The promise of mobile network API exposure is straightforward: allowing third-party developers to tap into network capabilities should scale the use of those capabilities, driving operator profits in the process. There have been many attempts to expose network APIs on a global scale in the past, which have largely failed. The mobile developer ecosystem in 2022, however, is much more developed. Operators, meanwhile, are looking to scale their support for demanding B2B use cases (leveraging resources beyond their own) while leveraging 5G capabilities and generating a return on their 5G investments. With vendors eager to support them (such as Ericsson via its Vonage aspirations or Nokia via its longstanding focus on APIs), there will likely be a return to the topic in 2023.

Implications

Mobile operators

- **Align internally on innovation** – Moving from the planning stage to the deployment of new innovations is key for understanding how they can be put to use at scale, and for working out any issues with new suppliers. When taking these together, internal issues remain the greatest roadblocks to deployment (including contract administration, technology integration and bias against new solution providers). Beyond streamlining processes and technology integration, bringing internal teams together around strategic innovation priorities is crucial – ideally driven from an executive champion who has the power to make changes take place.
- **Balance new tech optimism and realism** – Whether or not it's easy for operators to get new technologies deployed, there is an obvious interest in doing so, as signalled by open RAN being a top 5G RAN investment priority and optimistic 5G-Advanced deployment plans. These examples, however, highlight that many operator executives might have an unrealistic view of how mature these technologies truly are – likely based on messaging from their solution suppliers.

Network infrastructure suppliers

- **Keep innovation grounded in automation** – Automation might not be a standout 2023 network infrastructure trend, but that's only because it's foundational to enabling nearly every other technology; without the support of automation, it will be next to impossible to deploy, manage and secure new network innovations and the services they support. This is why 'increasing service complexity' and 'increasing network complexity' are among the top three drivers of network automation for operators, according to GSMA Intelligence research. It's also why automation needs to be an integral part of all vendor technology messaging.
- **Pay attention to the role of networks in supporting services** – The fact that operators see 'increasing service complexity' as the number one driver for network deployment and operations automation underscores how operators see the role of networks as supporting services. In developing and selling new network innovations, suppliers need to keep this in mind and make the connection.

Mobile device suppliers

- **Support the 5G monetisation agenda** – Many network capabilities are only enabled when supported by the end-user device. In the 5G era, network slicing is a good example. As new 5G-Advanced (and later 6G) technologies come to market, this dynamic will become more apparent. To be fair, it's easy to ignore some capabilities when it's unclear how widely they will be deployed; again, network slicing is a prime example. Building in support early, however, can help device suppliers build relationships with new customers while supporting existing customers by aligning with network strategies and priorities.
- **Don't forget upper mid-band and high-band spectrum** – It is not reasonable to expect many devices to support all available mobile spectrum bands. And, as operators sunset older networks to optimise network costs and support 5G, it's easy to believe that currently supported bands are sufficient. However, operators will need all the spectrum they can access as they look to support increasingly demanding data usage – a message that will be reinforced at WRC-23. mmWave is one area where operators have lamented the need for more device diversity, particularly outside of the US. Decisions around the use of 6 GHz spectrum for IMT, in turn, are still being made, though operators will grapple for all the mid-band spectrum they can get in order to meet data demands across the next few years. Supporting operators on each front could help to differentiate a device portfolio and build longstanding relationships. For network infrastructure suppliers with device businesses, bundling the two could drive larger overall deals.

Related reading

[Network Transformation 2022](#)

[Operators in Focus: Network Transformation Survey Dashboard 2022](#)

Author

Peter Jarich, Head of GSMA Intelligence

INSIGHT SPOTLIGHT

Throughout 2022, we have analysed important developments and innovation spanning all areas of the telecoms industry and wider digital ecosystem. How will the industry evolve in 2023? Which trends will continue to run their course? Which trends will take a new direction? And which will 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 2023 and the implications 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 spectrum landscape.

Analysis

New spectrum for 5G with mid-band leading the way

GSMA Intelligence research shows that, at the end of November 2022, more than 225 operators from 87 countries had launched 5G services. The number of 5G mobile connections will rise by some 50% next year, hitting 1.5 billion by the end of 2023. This growth will require additional spectrum resources in all frequency bands. In 2022, mid-band spectrum (1–7 GHz) accounted for over 60% of total frequencies assigned. This trend is set to continue in 2023 based on the range of confirmed spectrum assignments for next year. The spectrum bands under consideration at WRC-23 also speak to the importance and potential of mid-band spectrum, alongside other bands, to put 5G services into the hands of more people and reduce the digital divide.

Vertical set-asides versus spectrum capacity for operators

In 2023, regulators and policymakers are likely to take a more thoughtful approach to spectrum set-asides for industry verticals. As spectrum is a limited resource, set-asides for verticals in prime 5G bands can jeopardise the ability to realise the full expected benefits of spectrum, creating a shortage of spectrum to deliver on the 5G technical requirements as per IMT-2020 criteria. In 2022, some countries resorted to licensing obligations, such as sub-leasing by operators, to provide spectrum for verticals and this trend is expected to become more prominent in 2023. Sub-leasing, without compromising on spectrum availability for operators, allows verticals to access spectrum while creating opportunities for operators to provide customised 5G services for verticals. Finland and Sweden are examples of where policymakers have preferred providing spectrum to verticals by routing through operators.

More network shutdowns and tech-neutral assignments

Operators need additional spectrum, across bands, in their portfolios to meet rising data traffic demands (consumer data traffic has almost doubled in the last two years) and support the increasing customer base. Spectrum, however, is a limited resource and this poses challenge for operators to increase capacity. To address the situation, operators have been resorting to shutting down older networks to support newer networks and using any tech-neutral spectrum assigned to support multiple networks. As operators set their eyes on expanding their 4G and 5G networks,

we expect 2023 to be the year of network shutdowns and tech-neutral assignments. There were 39 network sunsets initially planned for 2022 that did not materialise, with 20 more shutdowns announced for next year. This means that 2023 is likely to be the record year for sunsets. Similarly, most of the planned spectrum assignments in 2023 have been confirmed to be tech neutral.

Rational spectrum pricing balanced with obligations

High spectrum prices can impact network rollouts and coverage, as well as having a negative impact on consumers. A GSMA [study](#) highlights that spectrum prices in developing countries have been found to be, on average, almost three times more expensive than in developed countries. However, the prices (calculated per person in PPP) paid by operators for spectrum assignments in 2022, across bands, were below the historical average price for each band, barring a few exceptions. Based on the growing realisation among regulators and policymakers that spectrum pricing is more than just a means to maximise state revenues and is key to unlocking the digital growth of nations, we expect governments and policymakers to continue with rational spectrum prices in 2023. In exchange for more rational prices, there will be licence obligations demanding coverage of networks and quality of services, with Brazil being a notable example of a country that has adopted this approach.

WRC-23 will set 6G spectrum discussions in motion

At WRC-23, additional spectrum bands (6 GHz, 4.8 GHz, 470–960 MHz) and an increase in the range in existing bands (3.5 GHz) will be considered, to identify spectrum that will help expand the availability of affordable 5G services. This will play a key role in supporting the reduction of the digital divide. Additionally, WRC-23 will also discuss the agenda for WRC-27, thereby setting out the likely roadmap for spectrum bands supporting future networks e.g. 5G-Advanced and 6G. There have been previous discussions and some prototype demonstrations on the use of THz spectrum for 6G, and the use of mid-band spectrum in 7–15 GHz for future networks, speaking to the possibility of these making it on the agenda for WRC-27. Inklings of the WRC-27 agenda will also act as a blueprint for discussions outside the ITU and for regional band harmonisation agreements, such as 3.4–3.8 GHz in Europe.

Implications

Mobile operators

- **Demonstrate the value and progress on customised 5G services for verticals** – Operators have the advantage of using their diverse spectrum and network resources to design virtual network slices that can provide tailored connections for verticals, rather than one general-purpose connection. Demonstrating a range of solutions to offer customised services to verticals, depending on the requirements, will favour the argument with policymakers to offer sufficient capacity to operators for public 5G services over set-asides for verticals. Notable examples of telcos demonstrating their solutions to support verticals include Telefónica's deployment of a private 5G SA network with end-to-end slicing capabilities at the University of Vigo, Turkcell building a private LTE network for energy company SOCAR in Turkey and Telenor partnering with the Norwegian Defence Material Agency to create a defence-specific network slice.
- **Align network investments with the spectrum roadmap** – Access to adequate and affordable spectrum resources increasingly comes with associated obligations, most of which involve commitments/targets related to network rollout, coverage and base stations/cell sites. It is therefore imperative for operators to have a detailed network rollout and evolution roadmap that considers the licensing obligations and future requirements from networks to align with the spectrum roadmap. A robust network infrastructure not only improves spectral efficiency but also helps unlock monetisation opportunities for operators.
- **Mitigate the impact of network sunsets** – An increasing number of operators are resorting to shutting down older generations of technology to support newer technology generations, providing increased capacity and coverage. However, these shutdowns come with their own set of challenges, including disruption of services for retail customers and enterprise customers that find it challenging to transition their services to newer-generation networks (especially in the context of a growing IoT market). Operators also face the risk of losing out on roaming revenues if sunsets are not properly planned. They can mitigate these impacts by designing a sunset plan that includes an inventory of devices on their network, ensuring VoLTE roaming agreements are in place before shutdown, and by providing support to enterprises to help them smoothly transition to new networks in a timely manner.

Policymakers and regulators

- **Formulate spectrum policies to encourage investment by operators** – Spectrum resources and network infrastructure rollouts entail heavy capital investments. The speed of rollouts, quality of service and coverage levels will all be compromised without sufficient investment. Regulators and policymakers should encourage these investments by designing policies that provide certainty to the licensing process, renewals, conditions and obligations, and offering a clear spectrum roadmap that enables operators to plan for the long term.
- **Assign sufficient spectrum across bands with an eye on long-term requirements** – To deliver capacity, speed and coverage everywhere, and to address the digital divide, 5G needs spectrum across low, mid- and high bands. Most of the spectrum assignments in 2022, specific or tech-neutral, were in mid-bands and this is also likely to be the case in 2023. According to a recent GSMA [report](#), regulators need to increase low-band capacity by assigning new and existing bands; aim for 2 GHz of mid-band spectrum to be available per market by 2030; and allow for an initial assignment of 800 MHz per operator in mmWave and plan to make 5 GHz available per market by 2030 as demand grows.
- **Engage actively in the WRC-23 process** – WRC-23 has the potential to put 5G in the hands of more people and reduce the internet usage gap. To achieve this, regulators and policymakers need to actively engage in the WRC-23 process with a long-term view to ensure sufficient low- and mid-band spectrum is made available. They should look to reach a consensus on the harmonisation and expansion of bands. If members do not reach an agreement, harmonisation will be lost, the potential for the ecosystem to efficiently scale will be reduced and the spectrum capacity needed to deliver a cleaner and greener future will become fragmented. WRC-23 will be the enabler of 5G for all.

Related reading

[Spectrum Navigator, Q3 2022: new insights and trends to watch](#)

[The socio-economic benefits of mid-band 5G services](#)

Author

Radhika Gupta, Head of Data Acquisition

INSIGHT SPOTLIGHT

Throughout 2022, we have analysed important developments and innovation spanning all areas of the telecoms industry and wider digital ecosystem. How will the industry evolve in 2023? Which trends will continue to run their course? Which trends will take a new direction? And which will 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 2023 and the implications 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 fixed and pay-TV markets.

Analysis

FTTP/B to remain at the forefront of fixed broadband network rollouts

FTTP/B is seen globally as a future-proof fixed broadband technology. Its share of total fixed broadband connections is expected to continue increasing across all markets, reaching an average of 47% by the end of 2023 and rising to almost 50% by 2025 (based on 36 of the world's largest fixed broadband markets). Between 2022 and 2023 (and indeed 2022–2025), the majority of FTTP/B's growth in share will come from shifts from xDSL, with the rest mainly from cable. Regulatory and government action in support of FTTP/B rollouts is expected to increase globally, including measures such as ensuring a level playing field for altnets. Meanwhile, wider adoption of FTTP/B innovations such as XGS-PON and fibre to the room should provide additional tailwinds for FTTP/B adoption.

5G FWA rollout and adoption set to strengthen

5G FWA connections are forecast to almost double in 2023 (though from a small base), with an acceleration in subscriber net adds. 5G FWA as a share of total fixed broadband connections will continue growing, reaching 2% by the end of 2023 and heading towards 3% by 2025. Although 5G FWA's growth will be gradual, there is momentum behind it; 84 providers had launched 5G FWA across 44 markets as of Q3 2022, while a further 18 have announced plans to do so in the near future. In several markets (e.g. Austria, Australia, UK, Germany and Italy), 5G FWA household penetration will reach 10% or more by 2025.

Ad-supported video streaming back in vogue

Ad-supported video streaming is not new but was overshadowed by the rise of SVOD. It will, however, continue to grow in 2023. Contributory factors include a huge, expanding base of consumers viewing free video (around 60% of adults watch free video on their smartphones on a weekly basis, according to the GSMA Intelligence Consumers in Focus Survey), supportive video streaming advertising trends, and increasingly challenging conditions for SVOD subscriber growth. According to TiVo's Video Trends Report: Q2 2022, ad-supported services as a share of the

average number of video streaming services watched per person (across the US and Canada) rose from 26% in Q4 2021 to 32% in Q2 2022. Almost all global video streaming services are adopting a hybrid monetisation model.

Pay-TV will see increasing use of new technologies

New technologies such as 5G, cloud, AI and blockchain will increasingly be used in 2023 across the entire video value chain (from creation to distribution and playback) to optimise processes and foster innovation. 5G network rollouts will support remote and enhanced video production and help advance 5G video broadcast. 5G will spur an overall boost to video streaming's cause. A case in point is 5G subscribers' stronger interest in bundling video streaming with their mobile contracts – 62% versus 50% for all mobile contract subscribers, according to the GSMA Intelligence Consumers in Focus Survey). Cloud-native solutions will be the focus of pay-TV's cloudification efforts. AI will increasingly be considered a necessity in pay-TV – to enable service personalisation, for example.

Efforts to enhance the user experience set to accelerate

As the video streaming market becomes crowded and growth in content budgets is reined in, efforts by video streaming providers to offer users new and better platform features are set to accelerate, with service differentiation in mind. Key areas include:

- content discovery – content navigation/search is among the top three factors for consumers when choosing a video streaming service, according to the GSMA Intelligence survey
- personalisation, such as personalised poster and video thumbnails
- social features, such as allowing subscribers to recommend content to each other, and co-viewing
- super-aggregation – aggregation of content related to a TV show or movie (e.g. music, podcasts and ratings), as well as aggregation of third-party video content.

The delivery of this enhanced user experience will need to be balanced with data privacy concerns.

Implications

Fixed broadband providers

- **Cable looks beyond DOCSIS upgrades.** Given that fibre remains a superior fixed broadband technology to cable in terms of performance and reliability (even accounting for DOCSIS 4.0 upgrades), depending on their individual market and financial position cable companies could look to transition their networks to FTTP/B. As FTTP/B rollout gathers pace globally and trends such as cord-cutting and pay-TV's shift to IPTV come into the mix, the pressure on cable companies to consider FTTP/B is likely to increase. For example, Virgin Media O2 in the UK has announced plans to upgrade its entire cable network to FTTP/B by 2028. Some cable companies could also adopt a hybrid approach of deploying both DOCSIS 4.0 and FTTP/B.
- **FTTP/B supports sustainability ambitions.** According to the GSMA Intelligence Network Transformation Survey 2022, more than 90% of operators (including converged operators) rate sustainability as a priority of their network transformation strategies. Fibre – which is longer lasting, requires less maintenance and consumes less energy – supports fixed broadband providers' sustainability drive. As an example, Proximus in Belgium expects 75% energy savings from its fixed broadband network upgrade to fibre. While fibre's relative sustainability benefits are clear, there is a significant cost involved in upgrading existing networks to fibre. As such, some providers have (at least in the interim) opted for mitigating approaches such as vectoring or a hybrid network such as FTTN.
- **A multi-faceted approach required to deliver 5G FWA.** According to the GSMA Intelligence Consumers in Focus Survey, 42% see home broadband via 5G as an appealing proposition – a greater percentage than for any other 5G use case. However, delivering a successful 5G FWA service will require a keen focus from service providers on four priorities: 1) delivering on the basic service aspects of coverage, speed and cost; 2) building 5G FWA offers with service bundling in mind, and ensuring the customer experience is seamless (in terms of service access, billing and support); 3) enabling in-home experiences, by providing fully featured CPE products that incorporate, for example, plenty of ports and the ability to deliver prioritised sets of services; and 4) offering a smooth set-up experience for customers.

Pay-TV providers

- **Opportunities and challenges with ad-supported video services.** Pay-TV providers can leverage ad-supported tiers or services to upsell users to SVOD or traditional pay-TV plans. Pay-TV providers hold a substantial amount of user data, including data on user location, profile and behaviour, and can monetise this (on an anonymised basis) by offering it to third-party, ad-supported, video service providers. Pay-TV providers that are also content creators can use FAST channels to create an additional source of advertising revenue at low additional cost (e.g. by using existing programme inventory). In terms of challenges, a key concern for ad-supported services is the quality of the content library compared to SVOD services, with the latter having more premium and exclusive content. Several ad-supported services are now investing in such premium content, with per-programme spend likely to be on the lower side to manage margins. Pay-TV services employing advertising will also need to find a balance between advertising revenue and acceptable advert load.
- **New tech-enabled transformation presents hurdles.** New technology such as 5G, cloud, AI and blockchain is helping pay-TV's evolution, but there are associated transformation challenges including (likely) provisioning for higher capex – at least in the short to medium term; contending with regulatory risks such as around blockchain-based smart contracts and data privacy; upskilling the workforce; updating processes and introducing a new work mindset to fully capitalise on the business potential of these new technologies; and finding ways to maintain control of the TV platform. In addition to tackling these challenges, pay-TV providers will need to understand how the individual technologies intermesh, to achieve a holistic tech implementation across their product and solution portfolio. For example, AI and cloud have a synergistic relationship across various touchpoints such as computing power, serverless computing, cloud process automation and data management & analytics.

Related reading

[5G FWA: assessing trends, rollout and adoption](#)

[Pay TV in flux: consumer behaviour, competitive dynamics and future trends](#)

Author

Anshu Goel, Lead Analyst, Digital Consumer

INSIGHT SPOTLIGHT

Throughout 2022, we have analysed important developments and innovation spanning all areas of the telecoms industry and wider digital ecosystem. How will the industry evolve in 2023? Which trends will continue to run their course? Which trends will take a new direction? And which will 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 2023 and the implications 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 IoT and enterprise markets.

Analysis

Enterprise 5G to prove itself

2023 will be the year when more than half of operators (64%) plan to launch enterprise 5G services beyond connectivity, compared to 13% of operators that have already done so. These services combine 5G connectivity with other services or network capabilities such as cloud/edge, security or slicing. By the end of 2022, 42 operators will have launched 5G standalone (SA) networks, which, in combination with wider 5G rollouts and beyond-connectivity services, are important for enabling transformational 5G use cases for enterprises and a more global environment for adoption. Learnings from early enterprise adopters, as well as operators' ability to land services that add value to enterprises' operations and digital transformation, will be crucial to help drive momentum for enterprise 5G in 2023 and beyond.

Private wireless to sustain high growth

Throughout 2022, operators have made significant progress in the private wireless space and are now the main contractors of private network deployments alongside network vendors. Our research shows that the number of operators' private wireless customers increased significantly compared to the previous year. In 2023, operators will be busy deploying new private wireless networks while also launching private 5G networks. Today, only 12% of operators offer private 5G solutions (4G has been the main access technology for private networks so far). More companies are now entering the growing private wireless market. In 2023, established companies and startups in infrastructure and the software networking space will make their mark in private wireless.

Enterprises becoming more selective about digital transformation priorities

Many enterprises currently fear potential economic downturns and rising inflation. Over the course of 2022, several companies reported spikes in their cloud bills due to rising energy costs or general challenges in managing cloud workloads. Many enterprise technology vendors started pitching their digital

offerings (e.g. Microsoft Cloud, Siemens industrial automation and SAP ERP software) with expected sustainability benefits. These trends will persist in 2023, pushing enterprises to become more selective about which digital transformation projects to pursue, including those that are helping them save costs and those that are conducive to the sustainability imperative.

Operators exploring new disruptive technologies

In 2022, the metaverse and unmanned aerial vehicles (UAVs), or drones, were referenced by various operators as emerging business opportunities. Various operators are making inroads into the metaverse, such as SK Telecom, NTT Docomo and Orange. Our research shows that only 5% of operators have already defined a strategy, but many more are still exploring opportunities in both the consumer and enterprise metaverses. As for UAVs, some operators are already active, such as Verizon, which has integrated UAVs with its robotics division, or Telefónica, which has been developing drones-based solutions in its Telefónica Tech unit. As interest increases in beyond visual line of sight (BVLOS) flights and regulation evolves in 2023, we expect operators to clarify their strategies and expand on any offerings they have in place.

Passive/ambient IoT emerges

IoT will continue to grow in 2023 with new flavours of IoT emerging, including passive or ambient IoT. This refers to IoT sensors that are smaller and cheaper compared to previous generations of IoT (e.g. NB-IoT and LTE-M) and are powered by radio waves, solar, wind, vibrations and heat. China Mobile and Huawei have already showcased passive IoT's potential through field tests, while a few innovative startups, such as Wiliot and Atmosic, have developed relevant IP and commercial solutions. Passive IoT promises to disrupt existing RFID, NFC and Bluetooth IoT use cases and will lead to many new use cases where power sufficiency, tiny tag-like designs and very low costs are critical. The fully specified technology will be part of the 3GPP's anticipated release of 5G-Advanced in 2023 as well as future releases.

Implications

Mobile operators

- **Prove 5G's value for enterprises** – Since 2023 will be the year when enterprise 5G will start gaining traction with enterprise customers, operators should document and report any achieved results and benefits, as early evidence of success will be critical to move to the next stage. Metrics such as enterprise satisfaction, improvement in operational KPIs and cost reduction, simplification of business and especially an account of new use cases will help prove the value of 5G and pave the way for successful enterprise 5G evolution and monetisation in the coming years.
- **Don't forget private 4G** – In 2023, operators will need to double down on their private 4G/LTE offerings, which are currently more widely available than private 5G; when the equipment and spectrum are available, operators should look to migrate these to private 5G. Also, as the number of entrants in the private wireless space is increasing, there are various specialised startups that operators can look to as strategic partners for private wireless. For example, Rogers Canada partnered with Expeto to enable enterprises to seamlessly manage their private wireless connections, including IoT devices, independently of the connectivity technology.
- **Validate first, then pursue new business** – In the metaverse, operators need to carefully validate opportunities and match them with their capabilities and network roadmaps. They should also look for synergies with their current enterprise solutions, such as private wireless networks that cater for on-site and remote operations or edge computing that reduces user-experienced latency, both of which are relevant to AR/VR applications in the metaverse. As for UAVs, at a minimum, mobile operators need to consider the presence of UAVs in their network operations due to the emerging security, reliability and spectrum implications. UAVs will also present new business opportunities for operators, particularly once BVLOs are allowed e.g. using network-generated data for UAV authentication and telematics or even offering end-to-end UAV services.

Network vendors

- **Claim a key position in enterprise 5G** – 2023 will be the year that many enterprises will come to grips with enterprise 5G for the first time; however, 5G monetisation will span several years. Operators have had telecoms network/equipment vendors as their primary suppliers for network and enterprise solutions so far, but 5G's cloud-native nature is leading to an increasingly diversified market and selection of hardware and software suppliers, including infrastructure players, software companies and hyperscalers to some extent. In light of this increasing competition, network vendors need to cement their partnerships with operators as well as other companies – including end-user enterprises – as this will be key to maintaining relevance in the enterprise networking space.
- **Anticipate operators' energy-saving needs** – Sustainability is among the top priorities for operators' network investments for 2023. Much like other enterprises, operators have been hit with high energy bills and are simultaneously committed to ambitious sustainability goals – both of these need the right equipment and software tools to address. Network infrastructure and software vendors should prioritise offerings that help operators to achieve necessary energy savings and become more energy efficient going forward. These include network-energy-consumption monitoring tools, the integration of energy saving into network risk assessments and the use of AI to better plan shutdowns.

Enterprises across verticals

- **Connectivity strategies are essential** – In 2023, enterprises will be carefully assessing which digital transformation projects to pursue, whether it's for achieving operational efficiencies, such as increasing visibility of supply chains, or bringing down energy costs. Connectivity has become an essential part of most business transformation projects, such as for flexible working in multiple locations, connected products and emissions monitoring. Enterprises need a connectivity strategy in their IT and operations units, in addition to connectivity-related skills and awareness in order to understand the options available to them to procure and implement in the short, medium and long terms.

Related reading

[5G for the enterprise: headway, hurdles and the horizon for operators](#)

[Enterprise opportunity: operator strategies, plans and expectations](#)

Author

Christina Patsioura, Lead Analyst, IoT & Enterprise

INSIGHT SPOTLIGHT

Throughout 2022, we have analysed important developments and innovation spanning all areas of the telecoms industry and wider digital ecosystem. How will the industry evolve in 2023? Which trends will continue to run their course? Which trends will take a new direction? And which will 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 2023 and the implications 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 digital consumer.

Analysis

5G becomes a truly global trend

2022 has confirmed that the rollout and adoption of 5G has been faster than that of previous mobile network generations. As of the end of September 2022, 205 operators in 79 markets had launched mobile 5G services, with consumer adoption set to reach the 1 billion user milestone at the end of 2022. Throughout 2023, some 30 new markets will launch 5G mobile services; importantly, many of these will be developing markets across Africa and Asia, making 5G a truly global trend. As 5G adoption scales from 1 to 1.5 billion users (end of 2023) the monetisation imperative will grow. To that end, it will be important to assess what makes the new wave of 5G users different from the early adopters and the impact of scaling 5G adoption on data traffic and ARPU levels.

A new value story for smartphones

2022 has been a tough year for smartphone sales. As supply-chain issues, geopolitical tensions and rising inflation are still ongoing, sales are not expected to recover before H2 2023. Nevertheless, innovation continued, including new 5G and eSIM capabilities, foldable designs and breakthroughs in some of the features that consumers value the most (camera and battery quality). These trends will be even more important in 2023 as vendors look to take advantage of the recovery of smartphone sales.

Hardware innovation is important, but the value for consumers will increasingly lie in two areas beyond the smartphone itself: smartphones as a central control platform for other devices (e.g. smartwatches and smart TVs) and as the platform most frequently used for digital entertainment and services. New developments in such areas will be key to building a new value story for smartphones.

eSIM adoption finally set to accelerate

Apple's launch of eSIM-only iPhones in the US in September 2022 was a major milestone for the eSIM industry, as demonstrated by an acceleration of operator eSIM deployments and commercial launches since then. Turning eSIM availability into customer adoption will be the most important area of development to watch in 2023. For consumers, the transition to eSIM will be gradual (we forecast it will take until 2026 to see an adoption rate of 20% globally), but 2023 will certainly be the long-awaited turning point.

We expect operators and OEMs to do more to raise consumer awareness of eSIM, and more work at an ecosystem level to enhance the user experience for eSIM activation/onboarding and beyond (e.g. service management).

Gaming becomes a major battleground

Google will discontinue Stadia from January 2023, but despite this setback cloud gaming will advance further. Growing competition will be a catalyst for new developments. This includes competition among the leading cloud gaming services (e.g. Microsoft and Sony), probable new propositions from games studios (e.g. EA) and video streaming providers (e.g. Netflix), and existing cloud gaming services (e.g. Amazon Luna) further expanding their country coverage.

Beyond competition, cloud gaming's cause will also be boosted by the widening rollout of 5G and fibre networks, increasing smartphone gaming engagement, the growing use of AI and blockchain in gaming, and wider distribution through burgeoning telco partnerships.

Content moves up the agenda for XR and the metaverse

VR headset adoption has been mostly flat for the last few years, in large part due to weak VR content libraries. The arrival of the metaverse has rekindled hopes for wider adoption, but in order to realise this, extended reality (XR) content development will need to keep pace. Product developments from XR device makers will be keenly watched as well. Meta recently released the Meta Quest Pro line of advanced XR headsets to support its metaverse strategy, while Apple is expected to enter the market soon with its own highly anticipated high-end XR headset.

While we are in the early days of the metaverse, we expect some content developments in 2023, with gaming, video and music at the forefront. Proto-metaverses such as Roblox and Fortnite will continue with content innovation, while new metaverse platform owners will prioritise content availability (e.g. SK Telecom's content development efforts for its Ifland metaverse platform). User-generated content will be another promising area for content supply.

Implications

Mobile operators

- **The 5G monetisation imperative** – Our research shows that, for major operators, B2C accounts for 70% of revenues on average, but B2B is the main driver of growth. That means B2C and B2B are equally important: B2C brings scale, while B2B brings incremental revenue growth. For consumers, the link between mobile devices, connectivity and services has never been stronger. Our research shows that 5G users are more interested in adding digital services and entertainment content to their mobile contracts (50% for 5G users across the nine categories of add-on compared to 38% for 4G users). This is something for operators to consider when designing their 5G offerings.
- **From gaming to the metaverse** – Until two years ago, operators had mostly benefited from gaming indirectly through upselling, as heavy gamers need larger mobile data allowances. However, the shift of gaming consumption from consoles to mobile devices, combined with the rise of cloud-based gaming and 5G, is driving new thinking (our [research](#) shows that an increasing number of operators are seeking a more direct role in gaming via four routes). Meanwhile, work on the metaverse has started. There is a link between gaming and the metaverse, as gaming is expected to account for over half of the metaverse's market value in 2024 according to Bloomberg, but over time the metaverse will be much more than just gaming. Of the operators we surveyed, 74% said that the consumer metaverse is not part of their strategies for the time being because it's unclear whether there is a business opportunity. That's understandable, but 3% (mostly in developed Asia Pacific) said they have already defined a strategy – all eyes will be on them and the progress they make.

Device manufacturers

- **Smartphone sales recovery means new opportunities** – Our research of 10 major countries worldwide shows that some 30% of consumers will replace their smartphones in 2023. It also highlights that brand loyalty is high: 74% are likely to purchase the same brand of smartphone again. Therefore, 26% may consider buying from a different vendor, which provides an opportunity to increase market share. Understanding purchase criteria and where people will buy their next smartphone is key. In-store continues to be the preferred retail channel for consumers purchasing smartphones, but online is becoming increasingly important. Mobile operator stores are preferred over smartphone manufacturer stores, but young urban dwellers show a stronger preference for the latter (due to greater choice of phones and price options).
- **eSIM on the agenda for everyone** – Our 2022 eSIM vendor survey revealed that the top two factors that could accelerate eSIM adoption in the smartphone market are the transition to eSIM-only by smartphone manufacturers and operators prioritising eSIM when onboarding new customers. On the first point, Apple has made its move in the US, but timelines for similar launches in other regions by Apple or other OEMs (in the US or globally) are unclear. As a minimum, all OEMs will need to make their internal considerations and ideally start planning for the transition.

Digital content/services providers

- **Customer segmentation is key** – A growing share of consumers use their smartphone to access digital entertainment content and other digital services (e.g. payment, health, information) on a weekly basis. 5G is also enhancing the user experience, making some of the digital services even more attractive. These can drive greater smartphone usage beyond communications services but will require focused marketing activities towards specific consumer segments. Age is a major factor of differentiation. Digital entertainment content wins among younger consumers (18–24 years old), who are also more interested in how 5G can provide a better user experience for UHD entertainment content. Digital security and health services come out top for older consumers (65+), who also show greater interest in wearable devices (due to the link to health services).
- **Metaverse's success lies in content as much as it does in the enabling platforms and networks** – Partnerships will be key to boosting content libraries, such as partnerships with media studios (e.g. Meta's deal with NBCUniversal). Inter-platform deals that allow content sharing will also help address the content deficit, such as SK Telecom's agreement with NTT Docomo. Unsurprisingly, monetisation of content will be a major focus as well, to create a virtuous circle of content with monetisation methods that include subscriptions, advertising and individual payments for goods (e.g. merchandise) and services (e.g. access to extra features and functionality).

Related reading

[Smartphones and beyond: device innovation continues but incremental value lies in digital services](#)

[eSIM: market progress, consumer behaviour and adoption to 2030](#)

Author

Pablo Iacopino, Head of Research and Commercial Content

Anshu Goel, Lead Analyst, Digital Consumer