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Spectrum Policy Trends 2024

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Foreword

Spectrum has a vital role in supporting the productivity delivered by the communications sector. This is true every year, but in today's challenging climate, the ability of mobile to act simultaneously as an enabler of sustainability and driver of economic development will benefit global growth. Using spectrum capacity to enable mobile and licensing it to maximise productivity will be our market's enduring theme in 2024.

For many countries, closing the usage gap – those who live within mobile coverage but do not use it – will remain the central policy imperative this year. Whether governments are connecting the unconnected or improving the connectivity of those already with some service, spectrum licensing policies in 2024 must focus on delivering for consumers and industry. The world has begun to move away from spectrum licences with heavy financial burdens towards those with network commitments, and the days when spectrum auctions were celebrated for their dollar value are now 20 years behind us. Governments prioritising improving network quality and coverage in their licensing approaches will be rewarded by better connectivity and sustainable economic growth.

Fair and robust competition is vital to developing the networks required to bring about a new era of digitisation and its enabling impact on carbon emission reduction. 2023 saw one particular policy reach its final demise, and the concept of single wholesale networks now appears to have declined irreversibly. These government-initiated monopolies have not been successful, and a return to solid competition will help the coverage and quality of networks develop in markets where single wholesale networks have stifled growth.

The medium-term capacity requirements of mobile were largely guaranteed by WRC-23, with 6 GHz now the harmonised home for the future of mid-band capacity. Countries that support this can now get busy building a clear roadmap towards the future. Those not supporting 6 GHz mobile have work to do, and keeping up with the 6 GHz community is now the challenge for this second group. Some have already set about it, while for other countries, the road towards higher ARPUs or lower quality delivered by constrained mid-band is the only one on the map.

Closing the usage gap (at 38% of the global population) may be the biggest issue facing global connectivity today. Still, the coverage gap (5% of the global population) is getting attention through new technologies. Direct connectivity between satellite networks and mobile handsets has been seen as a potential coverage solution since the 1990s. However, attempts at providing direct-to-device solutions at scale have failed over several technology cycles. With standard handsets and lower satellite capacity costs, this technology's new wave of interest has begun. Still, for all the innovation, enthusiasm must be tempered. D2D will apply to a small percentage of the global population, and the current service is only for SOS and SMS.

As we begin working towards the next era of universal, meaningful connectivity, policies promoting digital inclusion and encouraging network investment will be central to ensuring that the world realises its connectivity ambitions.

That work continues in 2024.

Luciana Camargos, Head of Spectrum, GSMA

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For the benefit of billions: the impact of WRC-23 decisions on spectrum policy in 2024

The ITU's World Radiocommunication Conference 2023 (WRC-23) has opened the doors to a new era of connectivity for all services and laid the foundation for mobile progress into 5G-Advanced and 6G. Governments worldwide convened under the auspice of the International Telecommunication Union (ITU) to make balanced decisions for all services that will shape the global spectrum policy landscape both in 2024 and onwards to the end of the decade.

Why does it matter?

The decisions made at the Conference will serve as a catalyst for delivering mobile connectivity to more people, closing the usage gap, and ensuring sustainability, affordability, and global inclusivity. For the mobile industry, WRC decisions are critical to provide certainty of future spectrum availability on which to plan investment and build better connectivity services. Mobile operators require predictable access to low, mid- and high-band spectrum. Providing this certainty helps encourage the long-term investments needed to meet growing demand and increase innovation. The results from WRC-23 have provided a clear roadmap for the mobile sector, allowing for planning in the low bands (below 1 GHz) and mid-bands (3.5 GHz and 6 GHz ranges), while ensuring studies for future IMT identification to develop during the new cycle.

What are the policy considerations?

Harmonising spectrum for a connected future

WRC-23 played a pivotal role in the international harmonisation of spectrum, a critical aspect of ensuring the continued evolution and expansion of mobile services. Spectrum harmonisation is crucial to achieving economies of scale and facilitating the growth of mobile connectivity. Final harmonisation of the 3.5 GHz band (3.3-3.8 GHz), recognised as the pioneer 5G band, was achieved across Europe, the Middle East and Africa (EMEA) and the Americas. This harmonisation ensures a seamless deployment of 5G services in these regions.

Expanding mid-band spectrum in the 6 GHz band

One of the significant outcomes of WRC-23 was the identification of additional mid-band spectrum to meet the growing demand for mobile data. The 6 GHz band (6.425-7.125 GHz) was identified for mobile use by countries in every ITU Region – EMEA, the Americas, and the Asia Pacific (APAC). This band, supported by countries representing over 60% of the world's population, is now the harmonised home for expanding mobile capacity for 5G-Advanced and future technologies. This licensed mobile band sits above the lower 6 GHz band (5.925-6.425 GHz) which is increasingly being assigned for unlicensed technologies including Wi-Fi and WRC-23 thus gave a balanced decision which supported both services.

Fostering digital equality through low-band spectrum

WRC-23 took a step towards greater digital equality by defining the mobile use of more low-band spectrum in the 470-694 MHz band in EMEA. Low bands play a crucial role in expanding capacity for internet connectivity in rural communities, as their signals cover wider areas. The allocation of low-band spectrum addresses the urban-rural connectivity divide, breaking down barriers toward digital inequality in the EMEA region.

WRC-23 results for IMT

6 GHz	3.5 GHz	Low Bands
IMT throughout EMEA and CIS in 6.425-7.125 GHz IMT footnotes for APAC and Americas Footprint expansion in 2027 60% of global population covered by countries supporting 6 GHz IMT 700 MHz of new IMT capacity in 6 GHz band	Harmonisation throughout EMEA, CIS and the Americas within 3.3-3.4 and 3.6-3.8 GHz 400 MHz+ harmonised spectrum in nearly all countries Harmonisation of 3.5 GHz completed in over 150 countries	IMT throughout Middle East in 600 MHz Mobile allocation in 470-694 MHz in Europe 600 MHz foothold in some African countries 60+ countries signed into new footnotes for low-band spectrum

What we expect to see in the year ahead

WRC-23 marks a significant milestone in the evolution of mobile communications. In 2024, regulators and policymakers can implement WRC-23 decisions and results in their national tables of allocations in a timely manner to support spectrum harmonisation and avoid interference issues. National tables of allocation underpin spectrum roadmaps, which are essential to encourage long-term investment from mobile operators in their networks.

5G adoption will continue to grow at a sound pace to reach 2.1 billion connections by the end of 2024 (up from 1.6 billion in 2023), according to GSMA Intelligence. The harmonisation of mid-band spectrum such as 3.5 GHz will help expand the availability of affordable 5G services. Low bands will play a key role in supporting the reduction of the digital divide but more government action is required to increase the harmonisation of low bands such as 600 MHz. Spectrum identification in 6 GHz will be key to developing its ecosystem in 2024. While mid-band spectrum resources will continue to see new assignments, we expect this to be supplemented by growing availability of spectrum resources in low bands (e.g. 600 and 700 MHz) and high bands (e.g. mmWave).

Finally, WRC-23 has set the agenda for the new cycle, WRC-27, thereby setting out the likely roadmap for spectrum bands to support 5G-Advanced and 6G. WRC-23 is, therefore, the platform to shape the present and guarantee the future of mobile telecommunications.


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Technology-neutral licensing and network sunsets take up to drive spectrum efficiencies

The need for additional spectrum to meet coverage and capacity expectations for 4G and 5G services is driving the refarming of spectrum from legacy technologies worldwide. Technology-neutral spectrum licensing is crucial to allow mobile operators to refarm spectrum used by legacy (2G and 3G) networks to 4G and 5G services at a pace driven by market demand.

Why does it matter?

Optimising spectrum licensing is a crucial success factor for countries that want to reap the rewards of mobile connectivity. That includes maximising the use of existing resources using tools such as technology-neutral spectrum.

Spectrum is a limited resource, making it a challenge to increase capacity in response to the growth in data traffic. In recent years, regulators and operators have explored the flexibility afforded by technology-neutral spectrum licensing frameworks and network sunsets to use spectrum resources more efficiently. Technology neutrality allows flexible approaches to spectrum management, such as enabling technology sunsets and allowing operators to phase out legacy networks and migrate spectrum resources to support new, higher quality, more spectrally-efficient technologies.

What are the policy considerations?

Spectrum licensing

By allowing mobile operators to upgrade their legacy networks to 4G and 5G, technology neutrality is an important enabler of economic growth, productivity and employment. According to GSMA Intelligence:

- Over the period 2000–2017, on average, a 10% increase in mobile adoption increased GDP by 1%.
- The economic impact of mobile increases by approximately 15% when connections are upgraded from one mobile network technology to another.
- By 2019, the benefits from the additional services and functionalities enabled by 4G upgrades contributed almost $390 billion (or 1% of income growth) to the $2.5 trillion of economic activity enabled by mobile technology.

This has important implications for the potential benefits of new generations of mobile technology, such as 4G and 5G, and highlights how technology-neutral spectrum licences enable efficient spectrum management and help unlock significant economic growth.

Additionally, by enabling technology neutrality in spectrum assignments, regulators can ensure a substantial reduction in carbon emissions, given the lower energy consumption of more efficient and newer mobile technologies. According to GSMA Intelligence report, spectrum assignments that are not technology-neutral would force operators to rely on less energy-efficient 3G and 4G networks, while also slowing adoption of 5G.

As with all policy measures, the way in which countries implement technology-neutral spectrum licensing directly affects the impact of the policy. For instance, technology neutrality should not incur fees as charges for converting technology-specific to technology-neutral licences, as this risks eroding the benefits of new technology to end-users. Crucially, an established service-neutral operating environment is vital to maximising the value of technology-neutral spectrum licensing frameworks.

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Service neutrality

Service neutrality describes a regulatory approach where the license granted to a service provider does not specify a particular type of service and is necessary to unlock the potential of technology-neutral licensing. Where the latter exists but not the former, operators are still restricted in their ability to refarm their spectrum holdings for newer technologies and other types of service in a way that maximises the efficient use of spectrum and meets market demand for new services. Conversely, together, these approaches create a more flexible and competitive telecommunications environment that allows for graceful network sunsets.

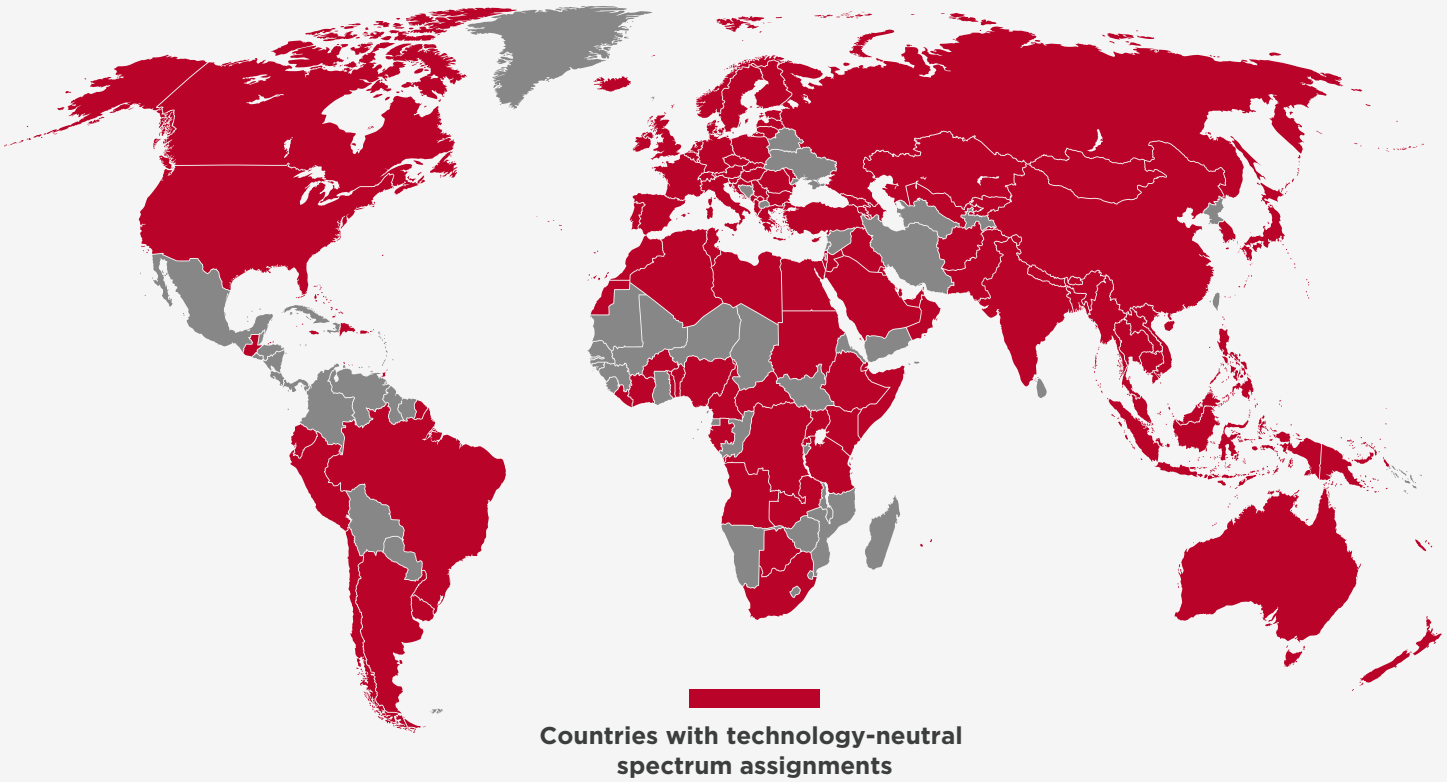
Network sunsets

Legacy network sunsets are closely linked to technology-neutral licensing. The sunsetting of legacy networks describes the gradual phasing out of mobile infrastructure that supports devices running on previous technologies, such as 2G and 3G.

The motivation for legacy network sunsets varies, with factors including refarming spectrum for 4G/5G services, optimising network operations (with potential capex and opex savings), rationalising device portfolios and mitigating the risks associated with the maintenance of legacy equipment.

Market conditions, rather than government-issued mandates, should drive the process. This calls for close collaboration between regulators, mobile operators and other ecosystem players to identify and implement the enablers of a smooth phasing out of legacy networks.

Global state of technology-neutral spectrum licensing (December 2023)



Source: GSMA Intelligence, based on data available. Includes countries that have at least one spectrum band that is technology neutral, permitting the use of more than one spectrum technology.

What we expect to see in the year ahead

In 2024, sunsets are no longer a question of 'if', but 'when', emphasising the importance of a well-planned network sunset roadmap. According to GSMA Intelligence, 143 networks (2G and 3G) are scheduled to go offline globally between the end of 2023 and 2030, with around 50% of these planned by the end of 2024. Most of these networks operate primarily on 900, 1800 or 2100 MHz.

A growing number of regulators will create a service-neutral or unified licensing framework that allows operators to utilise technology-neutral spectrum licences to offer different mobile-based services, including FWA, using the most efficient networks and technologies. This means removing restrictions or requirements for a new licence, usually at an additional cost, and undue red tape, which can delay the introduction of new mobile services in response to market demand. Otherwise, countries considering tech neutrality can learn lessons from countries that have already implemented technology upgrades and are planning to retire legacy networks.

For operators, a sunset cycle (the time between starting to sunset the network and finally shutting down the last connection on the network) can range from two to five years, depending on how prepared they are. A well-planned network sunset roadmap should account for the transition of enterprise and consumer customers and a device upgrade strategy to support the availability of VoLTE roaming agreements to support 3G sunsets.

Policy good practice: South Africa continues to exploit technology-neutral licensing

The Independent Communications Authority of South Africa published three final Radio Frequency Spectrum Assignment Plans (RFSAPs) for International Mobile Telecommunications (IMT) Systems in April 2023. The three bands addressed in the RFSAPS – 450-470 (IMT-450), 825-830 and 870-875 MHz (IMT850), and 1427–1518 MHz – were earmarked to be auctioned on a technology-neutral basis, building on an existing technology-neutral licensing framework, to enable the rollout and uptake of 4G and 5G services across South Africa where mobile internet penetration is at 61.5% according to the GSMA Intelligence.

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Spectrum pricing as an enabler in bridging the coverage and usage gaps

Attitudes towards spectrum pricing have changed since the early 2000s, and there is a growing realisation among regulators and policymakers that spectrum pricing best practice is important for digital development. The high costs demanded for spectrum licences in the past are being replaced by new assignment approaches that propose investment commitments. These are given in return for more rational prices, leading to better quality of services, expanded coverage and faster adoption.

Such measures are important regulatory tools for delivering affordable connectivity to more consumers and helping lower the broadband usage gap and the digital divide.

Why does it matter?

Licensed spectrum is central to the quality and affordability of mobile broadband services. However, some government policies – inadvertently or not – result in high prices being paid to access the spectrum. There is strong evidence that high spectrum prices have a negative impact on the speed of network deployments, the quality of services, and affordability, which are critical factors in increasing digital inclusion.

Spectrum assignments seeking to increase socio-economic benefits rather than short-term income through high licence fees often have far higher value to GDP growth and overall social benefit. High spectrum fees also risk spectrum being underused and, as spectrum has no intrinsic value, it does not generate wealth if underused or idle, limiting all benefits it could bring to society.

Spectrum has value only when used, and government and industry collaboration is essential. Capex, including spectrum costs, is a significant portion of operator revenue, so operators and governments need to agree on a spectrum roadmap with which operators can align their investment plans. Through such transparent negotiation, governments can ensure that the industry is ready to invest at the right time and that spectrum use has the maximum socio-economic value to their citizens.

What are the policy considerations?

Bridging the digital divide and fostering digital inclusion are priority policy issues for governments worldwide. Delivering connectivity to underserved areas is one part of closing the digital divide and requires appropriately licensed spectrum. Historically, regulators and policymakers have used spectrum assignment processes to achieve upfront and annual fees. However, regulators are now designing different assignment models, substituting spectrum fees for investment commitments, including sharing initiatives in rural areas.

The coverage gap, or the proportion of any population that lives outside of mobile coverage, is decreasing and stands at around 5% globally. Meanwhile, the usage gap, the percentage of people living within mobile coverage but not accessing mobile broadband, stands at 40% globally but increases as a country's income decreases. Spectrum pricing can directly impact lowering the usage gap by encouraging the quality and affordability of mobile services. It can also help reduce the coverage gap by encouraging investment from operators.

Policy recommendations on spectrum pricing

- Set modest reserve prices and annual fees and rely on the market to set prices.
- Consider mechanisms allowing operators to exchange spectrum fees into investment commitments.
- License spectrum as soon as needed, as this helps avoid artificial spectrum scarcity.
- Avoid measures that increase operators' risks and jeopardise their market value.
- Publish long-term spectrum roadmaps prioritising public welfare benefits over state revenues.

What to expect in the year ahead

Closing the mobile broadband usage gap and increasing coverage are both aspects of closing the digital divide, supported by licensing best practices. Regulators and policymakers have implemented innovative spectrum fee payment strategies in 2023. Brazil, Guatemala and New Zealand set precedents by assigning spectrum in exchange for connectivity, coverage and infrastructure build-out rather than fee payment. Meanwhile, Germany prolonged licences at the time of renewal in exchange for network investments, a practice that France had previously put in place.

This trend is expected to continue in 2024, with more countries accepting investment commitments as the new currency for spectrum fee payments. Such initiatives will free operators to invest in additional spectrum resources and provide a clear pathway to better connectivity. A strategic vision on spectrum requires long-term policies created through dialogue with industry to ensure that the main priority is the delivery of socio-economic benefits to consumers.

Policy good practice: flexible, innovative 3.5 GHz award sets the foundations for 5G deployment and rural connectivity expansion in New Zealand

Traditionally, New Zealand has used auctions to award new mobile spectrum. In 2023, the government demonstrated flexibility by adopting a direct allocation process for the 3.5 GHz band through negotiations with mobile network operators.

The direct award ensured an equitable allocation of 80 MHz for each of the three MNOs. This gave early certainty on access to prime mid-band spectrum and allowed operators to seamlessly transition from interim licences to long-term rights, avoiding unnecessary delays to their 5G deployments.

In exchange, each operator committed NZ$24m in financial contributions towards improving rural connectivity and pledged to speed up 5G deployment to specific rural towns nationwide. For the government, this bespoke deal represented a step towards expanding and improving coverage in regional and rural New Zealand.

By setting a fair price level for the spectrum and ensuring that the revenues are directly invested into connectivity infrastructure, the New Zealand approach will help sustainable investment and growth in 5G, benefiting consumers and enterprises in the long run.

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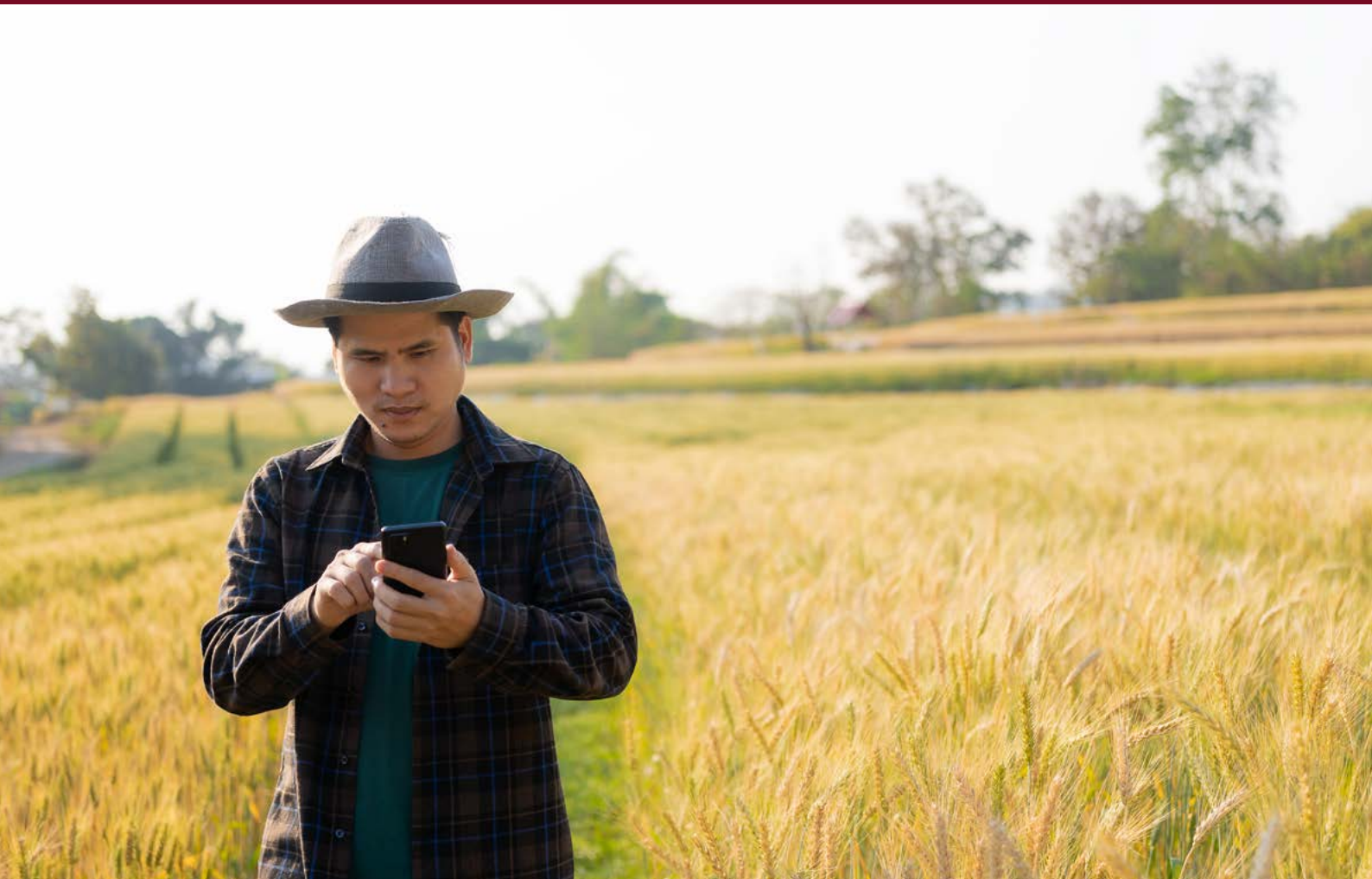
New regulatory approaches emerging from the demise of single wholesale networks



Some countries in the mid-to late-2010s considered single wholesale networks (SWN) as a novel policy concept that might help provide greater mobile coverage. These government-initiated monopolies are now fading as a trend and do not boast a single successful implementation anywhere in the world. Policymakers considered SWNs instead of relying on competing mobile networks to deliver mobile broadband services in 4G or 5G, but 2023 saw such monopolies abandoned for competitive market approaches.

Why does it matter?

Supporters of SWNs argued that they would improve connectivity better than the traditional model of network competition in some markets. The hope was that they would address concerns including inadequate competition or lack of coverage in rural areas, inefficient use of radio spectrum, or fears that the private sector may lack incentives to maximise coverage or investment. However, SWNs have not delivered those promises anywhere in the world.

Why are regulators and governments changing their views on SWNs? Two of the most important reasons are the lack of take-up of their services and the fact that coverage improvements have been slower compared to competitive rollouts. SWNs are government-backed monopolies and, as such, tend to encourage high consumer prices, which has resulted in low adoption. Other shortcomings illustrated by real-world use cases include SWN licensees that have been unable to recoup investments and increased government involvement.

Altogether, the results of nearly all SWN programmes have been idle spectrum, lower levels of innovation, limited socioeconomic benefits, and restricted quality of service.

SWN – expectations vs reality

Expectations	Higher coverage	Faster MBB adoption	Lower Prices	Competition and QoS
Reality	Coverage growth slower in comparison to competitive roll-out	Adoption has been limited and did not follow SWNs coverage	Prices have not been reduced and users may pay a premium	Lower levels of innovation, social-economic benefits and restricted quality of service
Expectations	Investment-friendly environment	Easy capacity availability	Spectrum efficiency	Less issues to government
Reality	SWN licensees have not been able to recoup investments	Negotiations not commercially attractive	Idle or non-used spectrum ranges	Governments to solve challenges via reversions and investments

What are the policy considerations?

All governments should carefully consider their approach to increase the quality and reach of next-generation mobile broadband. The GSMA recommends that governments, regulators, and mobile operators collaborate on long-term solutions that help address both coverage and usage gaps, including:

- Affordable access to low-band spectrum promotes mobile coverage and increases capacity.
- Setting out a robust spectrum roadmap allows long-term planning and minimises OpEx.
- Technology neutrality and spectrum refarming deliver efficiency.
- Voluntary infrastructure sharing will support wider coverage.
- Voluntary spectrum leasing or trading helps maximise efficiency.
- Elimination of sector-specific taxation delivers growth.
- Resilient assignment processes help streamline planning.
- Streamlining of Quality-of-Service requirements will support roll-outs.

The coverage gap, or the proportion of any population that lives outside of mobile coverage, is decreasing and stands at around 5% globally. Meanwhile, the usage gap, the percentage of people living within mobile coverage but not accessing mobile broadband, stands at 40% globally but is higher in middle-income countries. Spectrum policies can directly impact lowering the usage gap by encouraging the quality and affordability of mobile services.

What to expect in the year ahead

In 2024, we expect a further demise of the SWN approach. Instead, policymakers will rely on network competition to deliver mobile network coverage and broadband adoption, bolstered by supportive government policies. In areas where building networks is not economically viable, we will see innovative approaches, including voluntary network and infrastructure sharing, technology-neutrality and spectrum refarming.

Enabling competition and encouraging private sector investment are proven methods of developing connectivity in underserved areas. The growth of mobile broadband, and with it, the social and economic development of the world, will depend on collaboration rather than intervention.

Policy good practice: UK's non-spot network

The UK's Shared Rural Network (SRN) project is a non-mandated joint operator and government initiative designed to improve mobile coverage in rural areas of the UK. The project's overall objective is to increase total 4G coverage to 95% by 2026.

To deliver the programme, EE (BT), Vodafone, O2, and Three UK will invest £532m to eliminate the majority of 'partial not-spots' –areas that receive coverage from at least one but not all operators. The UK Government will provide a further £500m to build new masts to eliminate 'total not-spots'–hard-to-reach areas with no coverage.

This was a collaborative solution, put together through commercial agreements between the mobile operators and has proved far more successful than the monopoly wholesale approach of SWNs. The UK example, rather than a government monopoly, is a single, commercially shared network focusing solely on areas where competitive networks are not commercially viable.

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Private mobile network strategies gain momentum

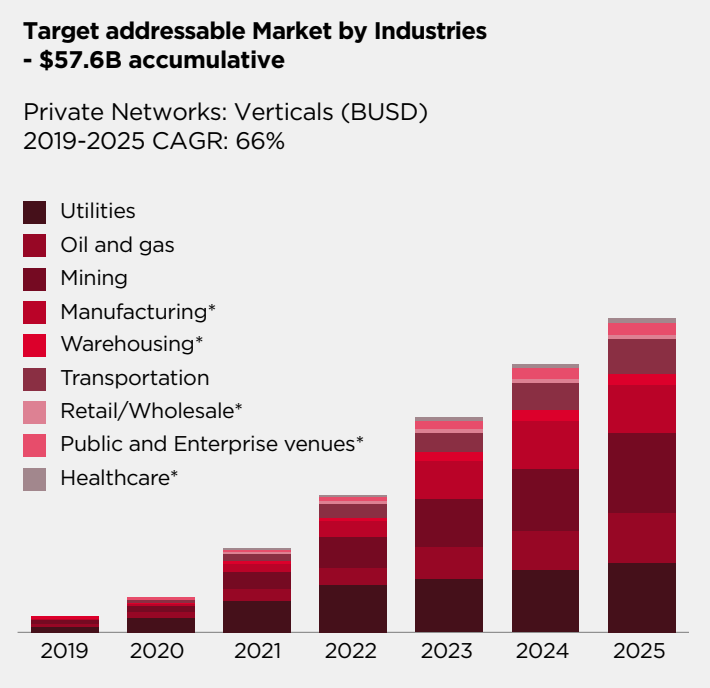
The digitisation of industry has significantly impacted the spectrum strategies of some countries already, with regulators choosing to limit macro-cell spectrum in favour of more capacity for local or standalone private networks. However, while regulator-enforced sharing mechanisms and spectrum carve-outs have been considered imperative in some countries, they have been deemed unnecessary in others as less intrusive measures are implemented to facilitate bespoke industry networks.

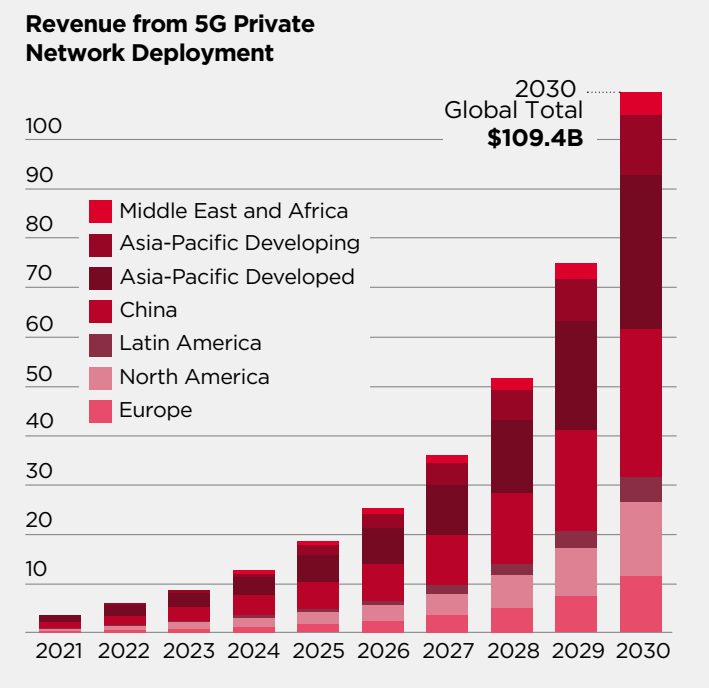
Best practice regulation for private mobile networks (PMNs) is still being developed, and the coming years will clarify which approach brings the greatest positive impact to society.

Why does it matter?

While private mobile networks do not necessarily require 5G NR technologies, as many rely on LTE, the 5G era has provided a new wave of digital transformation and a fresh business opportunity for the mobile ecosystem. Private mobile networks and massive IoT can play a role in delivering productivity growth while offering one of the core business opportunities of the 5G era. However, nearly six years after the first 5G launches, private networks still represent new ground in terms of regulatory best practice.

The addressable market and revenue opportunities for 5G private networks

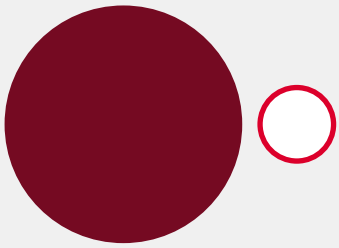
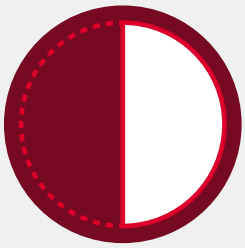
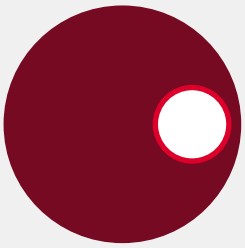




What are the policy considerations?

Regulators have taken different approaches to meet the interest in private mobile networks, which typically fall into one of the three categories outlined below.

Approaches for providing spectrum to private networks for industry users

Set aside spectrum	Spectrum sharing framework	Licence conditions for public mobile operators
		
Assigning a range of spectrum to be exclusively licenced to industry users.	Enabling several users to access spectrum simultaneously.	Enabling or requireing public mobile operators to deploy private networks or lease spectrum.

Making spectrum available for industry users can be done through public mobile operators, enforced sharing approaches, or exclusive set-asides. Needs must be balanced against demand from other users. As a result, the benefits regulators expect from assigning mobile spectrum to private or local networks must be carefully weighed against the cost of potentially denying other users access to the same resources.

Set-asides create spectrum scarcity and raise prices for enterprises and consumers. Meanwhile, mobile operators have the ability to create customised networks to meet enterprises' specific needs through public spectrum without a set-aside. However, regulators may feel that carving out spectrum through regulatory-enforced sharing mechanisms or spectrum set-asides can enhance competition and bring value to their markets.

There is evidence that:

- Set-asides create spectrum scarcity, raising the price of spectrum to operators and impacting investment and positive consumer outcomes.
- Spectrum sharing frameworks have a negative impact on the value of spectrum.
- Well-designed licence conditions for mobile are the least intrusive mechanism for delivering private mobile networks.

What to expect in the year ahead

A deeper and more granular analysis of regulatory practices for set-asides will begin to shape government thinking in the next year. There has been ongoing debate on set-aside spectrum for PMNs versus offering services through the public spectrum of operators, with mixed opinions globally. Early examples of set-asides came from countries with sizeable high-tech industry sectors in their economies, and setting aside spectrum for private or local networks has been assumed to facilitate their use in these countries. However, there is no evidence that the correlation between set-asides and PMN growth in such countries implies that the growth was caused by the set-aside itself rather than their large high-tech industrial sectors.

There has also been an increase in the number of partnerships between operators and enterprises/ ecosystem players to deploy private networks.

Operators have the advantage of using their diverse spectrum and network resources to design virtual network slices that can provide tailored connections for private networks rather than one general-purpose connection. Depending on the requirements, demonstrating a range of solutions to offer customised services to PMNs can also be an advantage.

GSMA Intelligence research shows that most operators should offer private 5G networks by 2025. As momentum accelerates, we expect to see more partnerships between telcos and other ecosystem players in 2024 to provide end-to-end private wireless solutions to enterprises.

We also expect to see a better data-based understanding of the impact set-asides have on PMN growth and their negative impact on public mobile.

Policy good practice: Finland delivers PMNs without carve-out

As part of a policy to promote Finland as a 5G innovator and testbed, licence conditions in the 3500 MHz mobile spectrum auction in 2018 fostered the provision of private network services without a dedicated set-aside.

The licence conditions stipulate that mobile operators must, where requested by tender, deploy a private network that meets the specified customer needs in a localised area, such as a hospital, port, or industrial facility. Operators can charge reasonable, non-discriminatory fees for these deployments. Alternatively, if they consider the tender requirements overly onerous, they must sub-licence 3500 MHz spectrum within the specified area instead.

Finnish operators are among the world leaders in 5G deployment. Telia had infrastructure ready ahead of the auction in September 2018, allowing it to launch a pre-commercial network in November 2018. All three operators launched 5G services in 2019 and expanded network coverage throughout the coming years. Telia then launched 5G Standalone in November 2021, making it one of the first operators to do so in Europe.

Finland has seen successful and innovative cooperation between industry and mobile operators.

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The road to WRC-27: a new cycle begins

The agenda for the next World Radiocommunication Conference in 2027 (WRC-27), held under the auspices of the International Telecommunication Union (ITU), has already been agreed, having been finalised by the previous conference, WRC-23. This agreement has initiated a new cycle of technical spectrum studies and starts to give clarity on the likely roadmap for spectrum bands supporting future mobile technologies. WRC-27 will also look at a range of other issues, one of which will be connectivity between satellite and mobile handsets, known as Direct-to-Device (D2D).

Why does it matter?

The identification of harmonised frequencies at the ITU has allowed mobile to evolve and develop, creating global marketplaces and huge economies of scale that enable widespread mobile use. The WRC cycle allows countries to identify their needs, participate in the international regulatory processes and plan their roadmaps to allow citizens and industry to get full value from new technologies.

Mobile operators and equipment manufacturers require predictable access to spectrum and providing this certainty helps encourage the long-term investments needed to meet growing demand and increase innovation.

What are the policy considerations?

The agenda for WRC-27 includes new studies for mobile in the bands 4400-4800 MHz; 7125-8400 MHz and 14.8-15.35 GHz. These bands may be identified for International Mobile Telecommunication (IMT) by WRC-27 to provide future harmonised capacity for mobile. By the 2030s, a new era of connectivity will carry its own spectrum requirements, and these bands will represent a potential resource for the next stage in mobile evolution.

WRC-27 IMT bands under consideration

Region 1	Region 2	Region 3
4 400-4 800 MHz		4 400-4 800 MHz
7 125-7 250 MHz 7 750-8 400 MHz	7 125-8 400 MHz	7 125-8 400 MHz
14.8-15.35 GHz	14.8-15.35 GHz	14.8-15.35 GHz

In addition to possible new IMT bands, the WRC-27 agenda will consider studies on other radio services, including direct connectivity between satellites and mobile devices to complement terrestrial network coverage. Direct-to-Device (D2D) technologies allow satellites to have direct connectivity to standard mobile phones. This concept has been considered a possible technical solution to closing the coverage gap for many years, but the handset scale has always been a barrier.

However, following equipment developments and 3GPP standardisation, it is now technically possible for consumers to have satellite connectivity using their standard smartphone, without purchasing a dish or large receiving equipment.

This new topic in the agenda will have to study various aspects regarding its feasibility, including sharing and compatibility with other services and technical and operational measures to avoid interference. But it also faces challenges regarding cross-border spectrum management, roaming and national licensing. D2D is a new and highly complex issue, and the ITU work on spectrum is only a small part of the new regulatory and technical activity which will be required.

On top of D2D in mobile bands, WRC-27 will also study new mobile satellite bands, which may provide a similar service in either bespoke or tailored mobile handsets.

WRC-27 Mobile-satellite service (MSS) bands under consideration

Direct to Device	New Mobile Satellite
Mobile satellite in IMT bands between **694/698 MHz** and **2.7 GHz**	**1 427-1 432 MHz** 1 645.5-1 646.5 MHz **1 880-1 920 MHz** **2 010-2 025 MHz** **2 120-2 170 MHz**

WRC-27 Mobile-satellite service (MSS) bands under consideration

The start of the new WRC cycle will see a year of organisation and understanding of the new topics. Studies that need to be carried out include coexistence, spectrum use, and needs. For mobile evolution, this will involve understanding new mobile use cases and their spectrum requirements.

We will also see more focus on D2D connectivity. A growing number of partnerships between terrestrial and satellite networks are being announced globally. While such partnerships can support the coverage gap and be a driver for digital inclusion, regulatory issues surrounding regulatory parity, spectrum acquisition, licensing conditions, and quality of service will have to be discussed to understand how harmonised regulatory frameworks can benefit all. There will also be a reality check on this new technology, and consideration of how it will impact global connectivity. The global population in the coverage gap is also likely to be in the mobile usage gap – people who live within coverage but do not use it. The 5% of the global population that lives outside coverage could, in theory, be connected by D2D, but rural communities are much more impacted by the usage gap, and the actual impact of D2D in connecting the unconnected is likely to be small.

The spectrum conversation will guide global policy, ensuring a balanced approach to connectivity governance that serves the broader goal of digital inclusion.

GSMA

1 Angel Lane, London, EC4R 3AB, UK
Tel: +44 (0)207 356 0600
Email: info@gsma.com