

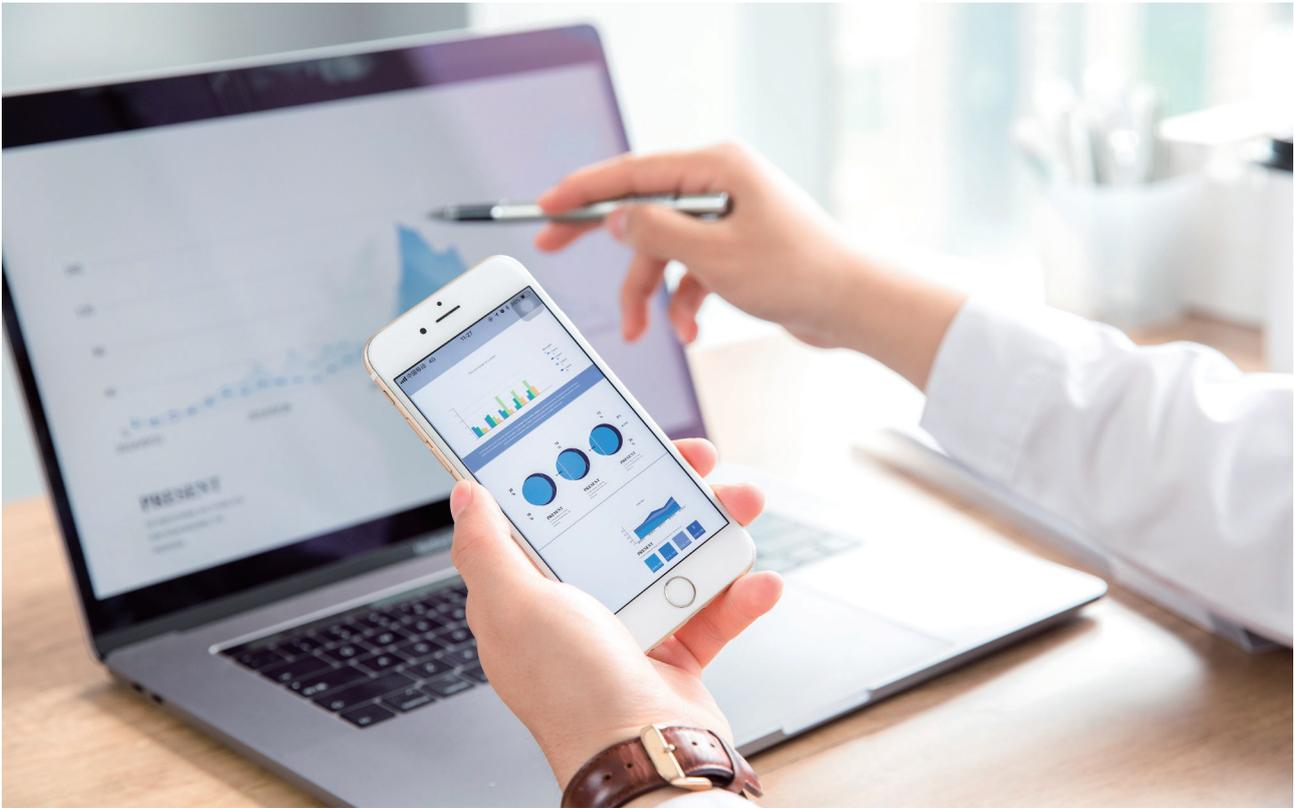
**GTI**



# Supportive Policies for a Sustainable Mobile Industry in the 5G Era

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March 2020



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## Executive Summary

The mobile industry plays a key role in boosting the growth of the global economy. In 2019, mobile technologies and services generated 4.7% of GDP globally. By 2024, the mobile industry's contribution will reach \$4.9 trillion (4.9% of GDP). Research shows that every \$1 invested in digital technologies over the past three decades has added \$20 to GDP, on average. [Digital Spillover, Huawei and Oxford Economics, 2017]

5G will be a key pillar of the era of intelligent connectivity, supporting economic growth, transforming businesses and delivering innovative new services. However, the outlook for the mobile industry is subdued, with revenue growth modest at best. While global mobile traffic has grown 1,000 times in the past decade, operator revenue growth was lower than GDP growth in many countries. This is a challenge to the future development of the mobile industry, despite its role in supporting the digital transformation of both society and economies. Moreover, 5G deployment will bring new challenges, including the large cost incurred by the demands for more spectrum, the heavy financial burden of network deployment as well as multilateral coordination with diverse vertical industries. Therefore, more supportive policies are needed from governments and regulators if the mobile industry is to realise the full potential of 5G and so enable both digital transformation and to further support global economic growth.

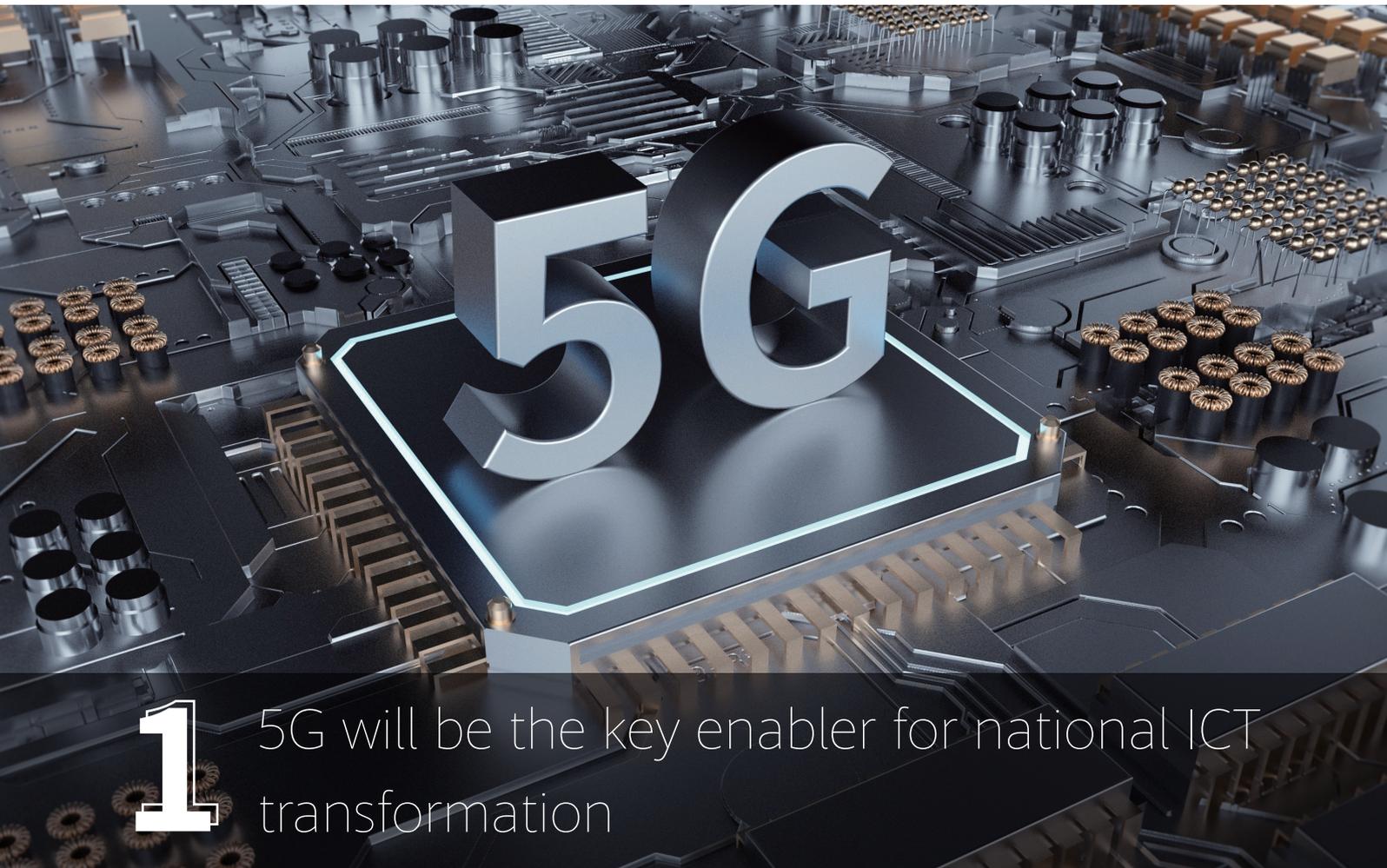
In this white paper, a number of recommendations from 5G pioneering countries are reviewed, including those from China, Finland, South Korea, Saudi Arabia and Germany. Based on the learnings from 5G national plans, the paper highlights the following elements for countries deploying 5G networks:

- More exclusive spectrum assigned to mobile operators at more reasonable prices.
- Lower taxes and tax reliefs to stimulate 5G investments.
- 5G as a critical enabler for national broadband ambitions.
- Policies to encourage innovation and industrial collaboration.
- Facilitate access to public infrastructure to accelerate 5G deployments.

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# 1

## 5G will be the key enabler for national ICT transformation

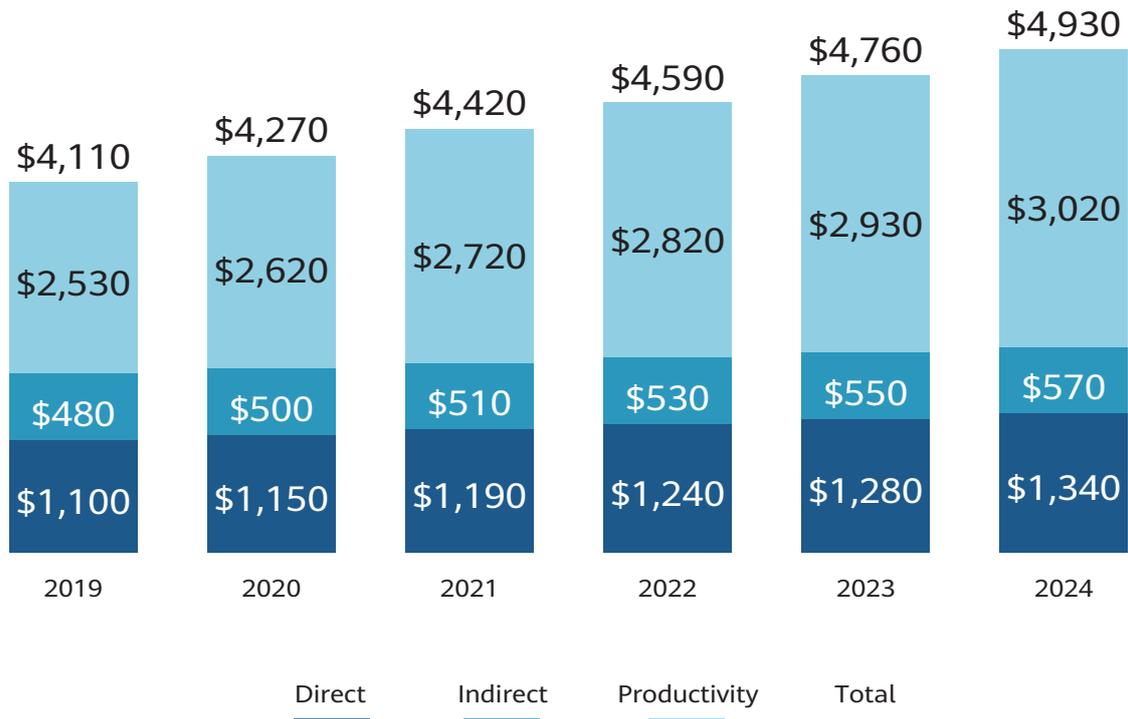
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ICT (Information and Communication Technology) has become a fundamental element of modern society and can help to deliver sustainable economic growth. Research shows that every \$1 invested in digital technologies over the past three decades has added \$20 to GDP (Gross Domestic Product), on average. This is an enormous return compared to non-digital investments, which delivered an average return of around US \$3 to US \$1 invested. [Digital Spillover, Huawei and Oxford Economics, 2017]

Mobile industry plays a key role in boosting the fast growth of global economy. In 2019, mobile technologies and services generated 4.7% of GDP globally, a contribution that amounted to \$4.1 trillion of economic value added. By 2024, mobile's contribution will reach \$4.9 trillion (4.9% of GDP) as countries around the globe increasingly benefit from the improvements in productivity and efficiency brought about by increased take-up of mobile services.

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billion



Source: GSMA Intelligence

Figure 1: Mobile industry contribution to global economy (2019~2024)

5G is the fifth-generation wireless technology for digital cellular networks. Compared with 4G, 5G utilizes a range of spectrum (including much higher frequencies) and a new network architecture to help significantly boost overall performance. 5G will potentially deliver data rates of over 10 Gbps, millisecond-level latency, and the capability to support massive connections. With these features, 5G could herald a world filled with unlimited possibilities and an exciting new era that promises the connectivity of everything.

5G will herald a range of services and capabilities for both consumers and enterprises, accelerating industrial transformation and digitisation, and act as the cornerstone of the digital society.

- 5G will elevate the role of mobile networks to not only connect people, but also connect and control a whole new range of machines, objects, and devices, and provide enhanced capacity with always-on connectivity.
- 5G will deliver new levels of performance and efficiency that will empower new user experiences and help to develop new industries. The wide range of potential 5G applications will act as a driving force for entrepreneurial development and innovation, as well as accelerating industrial transformation and digitisation.
- In the future, 5G will be deeply integrated with cloud computing, big data, AI (Artificial Intelligence) and edge computing; building a new generation of ubiquitous intelligent infrastructure and serving as the cornerstone of the digital society.



## 2 A supportive public policy environment underlies the sustainable development of 5G

### The mobile industry underpins the digital society, requiring better infrastructure in future

Over the past decade, the rapid development of the mobile industry, especially with the deployment of 3G and 4G networks, has created a range of new services and in particular new ways for people to communicate. Nowadays, people's social activities, shopping, transportation, and entertainment are heavily dependent on the use of mobile networks and services. This is not just a change in technology, but also relies on huge investment in mobile communication infrastructure by the operators. Global mobile operators have invested hundreds of billions of dollars each year in the construction and maintenance of mobile communications to meet the growing demand for data traffic. The widespread use of smartphones, affordable data plans, and the diversity of apps and content have further stimulated the growth in mobile data traffic. Global data consumption across mobile networks has increased from 0.04 to 38 Exabyte (EB) per month from 2009~2019 [Ericsson Mobility Report]. It's about 1000 times

growth, doubling at a rapid rate of every 12 to 18 months.

These huge investment from mobile operators not only support the growing volumes of data traffic and facilitate consumers' new digital lifestyles, but also facilitate the digital transformation of other vertical industries. For example, internet players have relied on the ongoing improvements in mobile network speed and coverage to grow their user bases. Google's market value has tripled in the past decade; Netflix's market value has risen by more than 20 times; and Facebook has risen by more than 100 times.

In the future, the growing number of mobile subscribers and a range of new services will further fuel the growth of mobile traffic. This huge growth in data is supported by the ongoing efforts of the entire mobile industry, including investment in spectrum, sites, and new network technologies.

# The mobile industry faces a range of challenges in the 5G era

Mobile industry revenue growth has stagnated in recent years. In contrast to the rapidly growing data volumes and associated network costs, the revenue growth of operators has been declining. The growth rate of mobile carriers' revenue in the past decade has fallen from the 6%~7% range to less than 1.5%. Considering an average of 3% global inflation rate over the past decade, in real terms operators' revenue growth has been almost stagnant. Going forward, GSMA Intelligence forecasts the overall industry revenues will grow at a compound annual growth rate (CAGR) of 1.3% over the period to 2025.

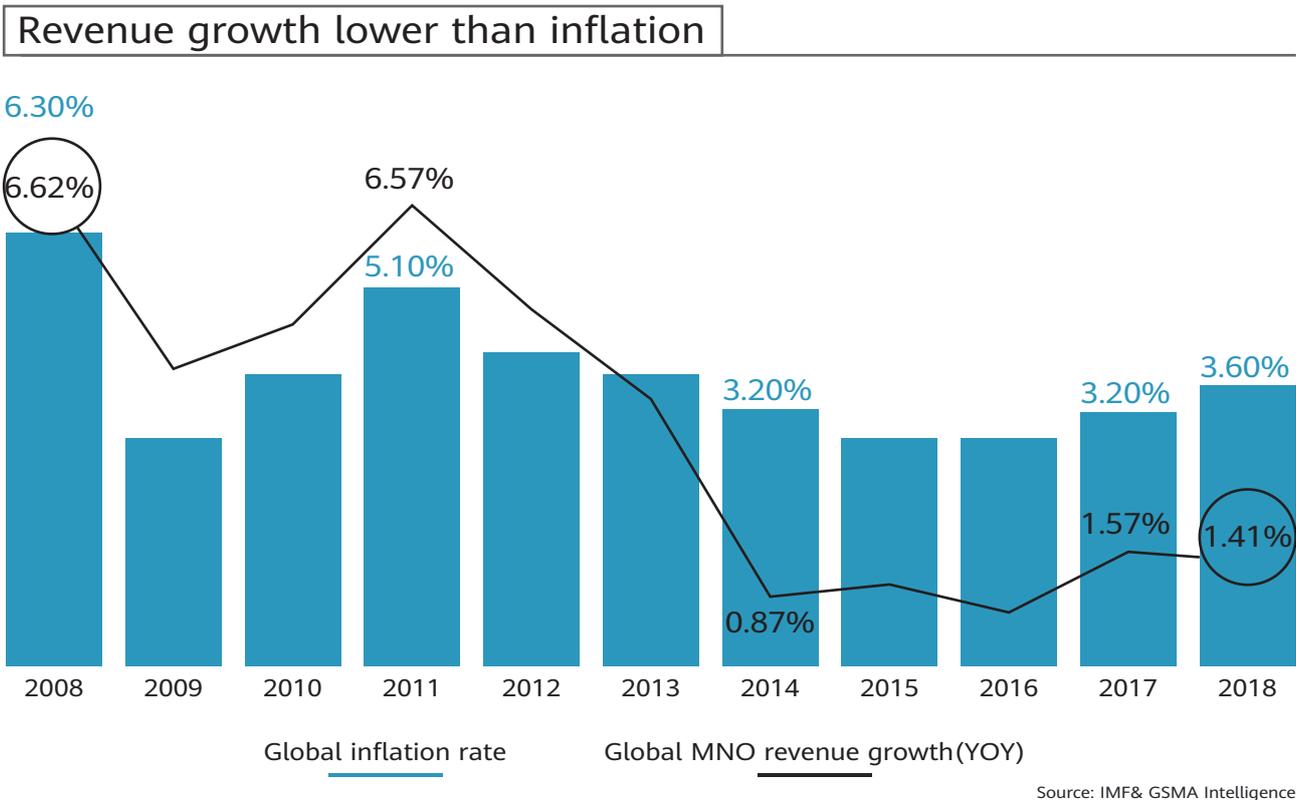


Figure 2: mobile operators' revenue trend VS global inflation rate

The rapid growth in data traffic volumes requires significantly more spectrum, which leads to higher spectrum costs for operators. Driven by the ever-increasing demands of mobile data consumption, one of the critical improvements that 5G offers over previous generations of cellular technologies is the support for additional spectrum bands, including in higher frequencies. This will allow 5G networks to deliver a multi-gigabit user experience and a massive increase in capacity. However, the need for new spectrum may incur heavy costs for operators, which

could further hinder the 5G deployment progress. Many countries around the world have adopted auctions to assign spectrum. While auctions can be an efficient market-based approach when properly designed, a number of auctions appear to have focused on revenue generation rather than efficient spectrum allocations. The high spectrum prices in those markets have seriously hampered operators' ability to invest in networks and negatively impacted network quality and coverage. The significant investment in 5G deployments will

increase the pressure on the industries' finances. The mobile industry in the 5G era will continue to expand into machine communications through connecting a broader range of devices, as well as engaging more closely with vertical industries to explore new opportunities. However, the industry is facing challenges from the level of investment required for 5G network deployments and the ongoing deterioration in its traditional businesses. These factors are making operators more cautious on new investments, which may in turn affect the pace and extent of 5G network deployments. Reduced investment into 5G networks may also affect the scope for digital transformations of industries that could potentially benefit from the capabilities of 5G networks. In addition, sector specific taxes, fees and other levies would have a significant impact not only on operators' costs and consequently affordability of services for end users, but also on the entire mobile ecosystem. In some countries, the speed of mobile broadband is still much lower than that of fixed broadband, which

restricts the potential development of new mobile services. 5G technology and infrastructure will become more and more important in the ecosystem value chain, such as through enabling new services such as ultra-HD video. Governments will need to create appropriate broadband development strategies and plans in order to avoid a case where data demand outstrips capacity on existing broadband networks.

The diversity of regulations in verticals complicates the issue of industry coordination. To fully realize the potential of 5G networks and their capabilities, operators will need to work closely with vertical industries to explore new business models and to help accelerate their ongoing digital transformations.

The deployment of 5G networks requires many more sites, as it requires more base stations and small cells to achieve the required coverage as compared to 4G, which is likely to lead to increasing difficulties to gain new site access, especially in dense urban areas.

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## Supportive policies are required to realise the full potential of 5G

5G will be more than just a traditional consumer-focused mobile broadband service. It is believed by some that 5G will become a General Purpose Technology to enable a diverse range of industrial transformations, although cross-industry efforts might bring higher risks and greater costs. In the face of

weak growth and rising costs, the challenge is to construct a supportive policy environment that will encourage operators to invest in 5G and to break the barriers of cross-industry innovation and collaboration.

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## 3 Best practices for supportive policies

### 3.1 China: Reduction of frequency utilisation fees, "Dual Gigabit Plan" to speed up digital transformation

#### Reduction of frequency utilization fees

The Chinese government has made the deployment of 5G networks a national priority, recognizing the potential economic benefits that 5G can bring. The "Report on the Work of the Government" by the State Council of China in March 2017, clearly stated the government's commitment to accelerate the development of 5G. The Ministry of Industry and Information Technology also formulated the "5G Development Guidance Document" that identified 5G as an important infrastructure component for China's economic and social development. The Chinese government has announced a series of national

policies in order to make this vision a reality, including the 13th Five-Year Plan and Made in China 2025 strategy. One of the key policy areas concerns spectrum.

In order to encourage the overall development of 5G, the National Development and Reform Commission and the Ministry of Finance issued a directive to reduce the 5G frequency utilization fees on April 26, 2018. It detailed a plan to waive the first three-years of fees from the commencement date of the 5G licenses and a phased approach for the following three years: 25% in the fourth year; 50% in the fifth

year; and 75% in the sixth year; before returning to normal fees from the seventh year. Such extensive measures to reduce spectrum fees was a first for China's mobile industry. This will reduce the opera-

tors' spectrum cost burden and allow the operators to invest more into network deployments, laying a solid foundation for the sustainable development of 5G in China.



Source: official website of the state council of China

Figure 3: Deduction on Spectrum License Fees in China

## Set up "Dual Gigabit Plan" to speed up digital transformation

As it stepped into the 5G era, China's government announced its "Dual Gigabit Plan", gigabit fibre + Giga 5G, to accelerate digital society transformation and promote sustainable economic growth from 2019 onwards. The state council of China declared the target that "This year (2019), fibre-to-household access ports will account for more than 90 percent of the total, and 5G gigabit broadband access networks will be deployed in more than 300 cities, bringing fixed and mobile broadband into the Gigabit era."

On November 1, 2019, China's "Gigabyte urban construction index system" was officially released, which clarified the development direction and key work of current China's urban Gigabyte optical fibre broadband and 5G deployment. It is of great signifi-

cance to the development of the "Giga city" concept. Under the guidance of the Ministry of industry and information technology (MIIT), the broadband development alliance and China Academy of Information and Communication Technology (CAICT) have jointly organized relevant units to study and formulate the "Gigabyte urban construction index system" in China through field research, in-depth analysis, research, discussion and consultation.

Specifically, the first phase focuses on network infrastructure capacity and coverage. It includes the coverage of urban gigabit optical fibre networks, the proportion of urban 10G PON (Passive Optical Network) ports, the proportion of 5G base stations, the coverage of Gigabit broadband and the coverage

of 5G network in key locations.

In the second stage, the evaluation indicators will mainly consider the development and users penetration rate, mainly including the development and popularization of Gigabit fixed broadband service and 5G mobile broadband service users.

The third stage evaluation index is focused on busi-

ness application and industry promotion. The focus of consideration will be on the enterprise proportion of 5G data traffic, HD IPTV users, available download rates of fixed and mobile users, 5G internet of things connections and applications in key industries such as industrial internet, the internet of things and the internet of vehicles.

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## 3.2 Saudi Arabia: Reduction of annual fees

In 2016, the kingdom of Saudi Arabia developed its Saudi Vision 2030 plan to reduce Saudi Arabia's dependence on oil, diversify its economy, and develop public services such as health, education, infrastructure, recreation and tourism. The National Transformation Program 2020 for the transformation of the ICT sector was launched to fill the policy gaps and to meet the requirements of Vision 2030, as well as to identify the main challenges over the next five years. Goals include reinforcing economic and investment activities, increasing non-oil industry trade between countries, and increasing government spending on manufacturing equipment. Broadband infrastructure was one of the major challenges identified. To help achieve these targets, the government reduced the top three mobile operators' annual royalty fees from 15% to 10% of net revenues to encourage the national ICT transformation.

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## 3.3 South Korea: Lower taxes and light-touch policy for 5G innovation

In January 2014, the then Ministry of Science, ICT and Future Planning (now Ministry of Science and ICT) announced its plan to inject \$1.49 billion into local businesses to help build 5G networks in South Korea.

In December 2018, South Korea reviewed its taxation framework and cut a further 2–3% from the tax on network investment to support the roll out of 5G infrastructure.

In April 2019, South Korea announced its 5G+ strategy to further develop the 5G ecosystem and to foster

the creation of a number of 5G-based strategic industries. It outlined that South Korea would create programs to support advancements in industrial structure (10 trillion won between 2019–2021), a KP Innovation fund (1.2 trillion won between 2019–2022), and a smart factory fund (300 billion won for 2019–2021).

Based on the carrier networks, 13 open test platforms were built in five areas providing test and demonstration services for small and medium-sized enterprises, reducing the barrier for 5G innovation.

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## 3.4 Finland: Digital infrastructure strategy

The Digital Infrastructure Strategy 2025 is Finland's overarching national policy to position itself in line with global trends and development, such as 5G, artificial intelligence, and IoT, and to empower the country to establish infrastructure that supports and propels innovation, digitalization and new service creation.

It places 5G and supporting facilities such as fibre as key to enable the digitalization of services and businesses, sets out to create an active and progressive spectrum policy and promote cost-effective and fast construction of networks, all of which will ultimately accelerate the progress of its utilization of automation, robotization and real-time data economy.

It outlines measures to:

- allocate appropriate spectrum for 5G.
- cost-efficient construction of telecommunication networks.
- streamline network permit procedures according to the 'one-stop shop' principle.
- supporting research and innovation.

This strategy was developed through considerations of needs of both businesses and consumers.

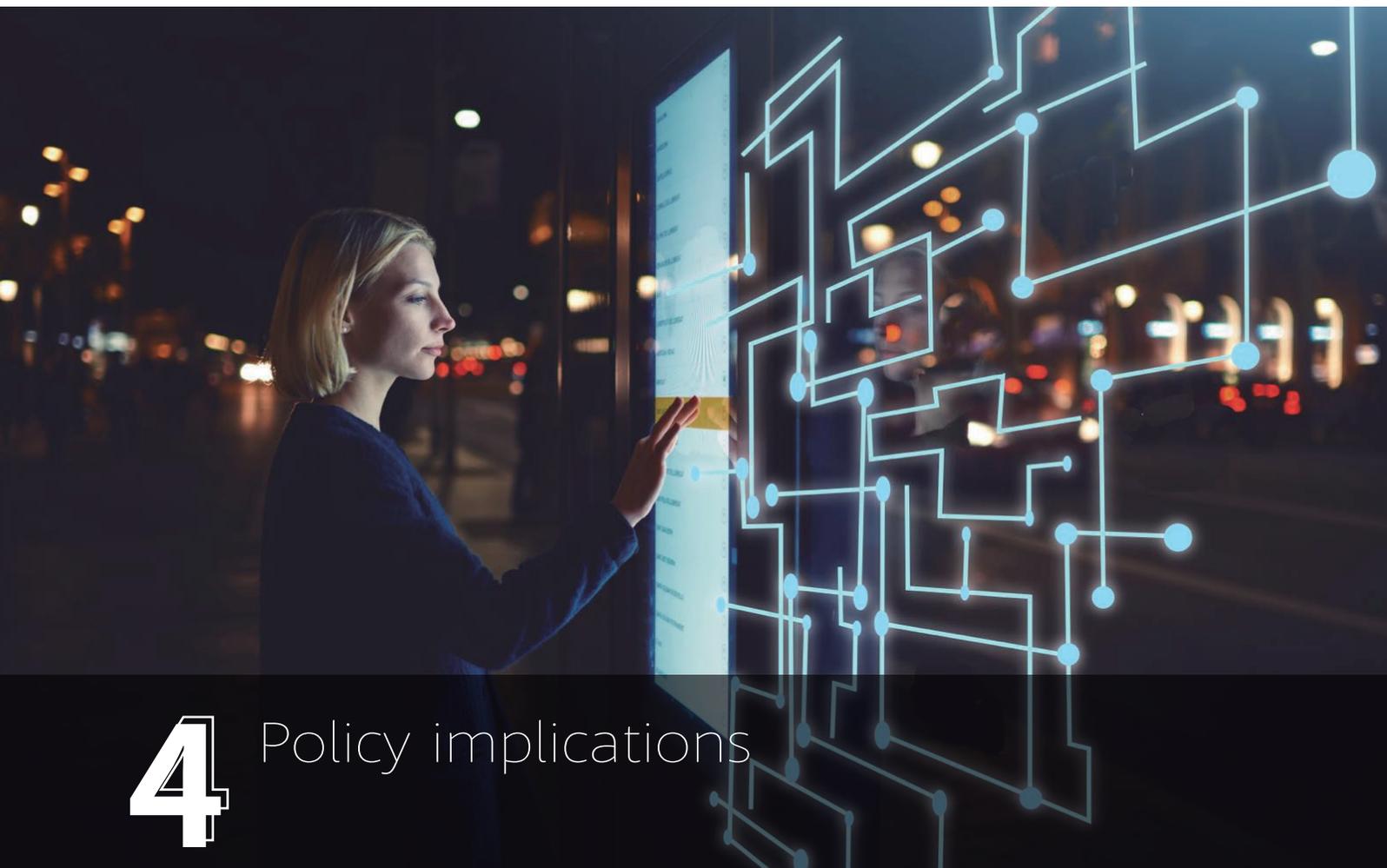
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## 3.5 Germany: Infrastructure measures to accelerate 5G deployment

The Federal Ministry of Transport and Digital Infrastructure of Germany announced its 5G strategy ( '5G Strategy for Germany' ) in July 2017. The strategy includes the target of 5G coverage along all major roads by 2025. The strategy also highlights that the co-use of passive infrastructure particularly in terms of the development of small cell networks in city centres, as well as facilitating access to public infrastructure. Road infrastructure which already has power connections today, for example traffic lights and street lamps, can be used for the cost-effective development of picocells. The Act on the Facilitation of the Deployment of High-Speed Digital Networks (Digi-Netz) has defined some requirements with regard to:

- the co-use of public supply infrastructure for fibre and the co-deployment of fibre within the framework of public road construction schemes, as well as.
- the use of public passive infrastructure to install micro or picocells.

For the co-use of public passive infrastructure, a working group was setup within the framework of the deployment of fibre networks. It comprises representatives from the federal states, the local government associations and the telecommunications sector and is to provide information on issues related to the technical implementation. The working group is analysing which of the passive infrastructure that the DigiNetz Act makes reference to, for instance traffic lights, traffic signs, street furniture, crash barriers or manhole covers, are particularly suitable for the deployment of 5G by means of co-use.



## 4 Policy implications

The learnings from 5G commercial deployment in the pioneering 5G countries carry a number of implications for developing policies with the ambition of creating a sustainable mobile industry. The following aspects could be beneficial for countries which plan to launch 5G commercial deployment in the near future:

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### More exclusive spectrum assigned to mobile operators with reasonable prices

Spectrum mid-bands such as 2.3/2.6/3.5/4.9 GHz are emerging as the primary bands in the early phase of 5G deployment, providing an optimal balance between coverage and capacity for cost efficient implementation. It is believed that the availability of at least 80–100 MHz of contiguous spectrum per mobile operator in these bands will ensure a tenfold increase in user experience with one tenth of the per bit cost. In order to relieve the huge cost burden of new network deployment in the early stage of 5G build outs, governments can and should cut down the cost of new spectrum and of renewals for existing spectrum. Doing so allows operators to focus their cash flows on 5G network deployments. Where appropriate, and after full and open consultation with stakeholders, the corresponding annual spectrum fees could be further reduced or exempted if operators are willing to meet reasonable deployment incentives.

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## Lower taxes to stimulate 5G investment

Reducing or removing sector specific taxes and providing tax reliefs for network deployments by operators can help achieve a greater socio-economic impact in the long-term across the society.

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## Clear national broadband strategies to enable 5G innovation

Governments should consider setting up national broadband plans to define short- and mid- to long-term development targets for broadband deployments, which not only accord with existing national conditions but also meet the needs of economic development in the coming 3-5 years.

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## Policies to encourage innovation and industrial collaboration

To facilitate 5G empowered digital transformation across sectors, governments will need to adopt more holistic digital policies to encourage innovation across the sectors. This could include the measures to coordinate cross-sector policies, supporting research and innovation and encouraging industry collaboration.

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## Facilitate access to public infrastructure to accelerate 5G deployment

A good infrastructure policy will not only help operators reduce the cost of deploying 5G networks, but also expedite the deployment of their 5G networks and bring high-quality 5G services to people more quickly. Governments should facilitate access to and improve the co-usability of public buildings and street infrastructure (such as bus-stop shelters and street light posts owned by municipalities) to help remove a significant hurdle to deployment.

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