India: becoming 5G-ready

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Foreword

In this report, the GSMA provides insights, based on its global perspective, on how India can best become 5G-ready. A number of reports have been released in India on this issue, including the following:

- *Making India 5G Ready*,[1] released in August 2018 by the 5G High Level Forum, under the overview of the Department of Telecommunications. The forum included members from other areas of government (the Ministry of Electronics and Information Technology, and the Department of Science & Technology), industry (including mobile operators Reliance Jio, Bharti Airtel and BSNL) and academia. The report contains a number of insights and suggestions, which are broadly in line with many of the GSMA's own positions.
- *A White Paper on Enabling 5G in India*,[2] released in February 2019 by the Telecom Regulatory Authority of India (TRAI); this included detailed insights into enabling 5G deployment in India.

Underpinning these reports runs an ambitious National Digital Communications Policy issued by the Department of Telecommunications in 2018. The three main missions of the Policy – 'Connect India', 'Propel India' and 'Secure India' – are relevant to the timely adoption of 5G. Achieving these goals will require significant deployments of new infrastructure, a sustainable investment climate, a competitive market structure and a suitable framework around privacy and data protection. The GSMA would like to commend the relevant Indian institutions for their thoroughness and understanding, and offers the following insights and recommendations to ensure that adoption of 5G in India is sustainable and achieves the results intended, within an appropriate timescale.

[1] Making India 5G Ready, India Department of Telecommunications, 2018
[2] See "TRAI releases White Paper on Enabling 5G in India", TRAI, February 2019

Executive summary

The GSMA's vision of 'Intelligent Connectivity' highlights how the combination of 5G, artificial intelligence, smart platforms and the Internet of Things can deliver benefits for consumers, enterprises and society at large. The Indian government and policy-makers have a similar shared vision for the future, as clearly articulated by the 5G High Level Forum: '*5G technology has the potential for ushering a major societal transformation in India by enabling a rapid expansion of the role of information technology across manufacturing, educational, healthcare, agricultural, financial and social sectors*'.

India's new National Digital Communications Policy (NDCP) similarly presents a positive vision for the industry and country, with the goal of creating the digital infrastructure that supports the next generation of digital services and allows India to realise the true potential of the digital economy. Mobile has already played a central role in realising the ambitions of the Digital India initiative, and will also be central to realising the NDCP's goals to 'Connect India', 'Propel India' and 'Secure India'. However, a number of challenges need to be addressed if India is to realise the full promise of 5G and see the significant investments from mobile operators that this will require.

India is now firmly established as a giant in the global mobile industry, with almost 750 million unique subscribers at the end of 2018. India alone is forecast to generate almost a quarter of the world's new mobile subscribers over the period to 2025, and the market is seeing rapid migration to 4G-capable devices and smartphones. By 2025, India will have cemented its place as the world's second largest smartphone market, with an installed base of almost 1 billion devices.

The mobile sector is already active in advancing financial access, improving information flows and raising productivity in the economy. Efforts are ongoing to address the digital divide by extending inclusive internet access to every Indian, as mobile technology looks to empower everyone and become the key access technology for accessing a broad range of public services.

Though the Indian mobile market has reached significant milestones over recent years, the overall financial health of the sector is still weak. As a result, questions remain as to whether the industry is yet on a sustainable footing or indeed if it has the financial capacity to make the investments required for the transition to 5G, as recognised by the Department of Telecommunications (DoT) and the Telecom Regulatory Authority of India (TRAI).

As India moves along the road to 5G and aims to deliver on its digital goals and ambitions, it is important that mobile broadband remains at the heart of the country's policy vision, considering the uniqueness of India's telecoms infrastructure and industry and the potential of mobile technology to address some of the challenges the country still faces.

To achieve the potential of the 5G era, three critical elements are required: substantial investment in digital infrastructure, which should largely come from private sources; a digital environment that inspires trust; and a modernised policy and regulatory framework that enables this.

The NDCP is positive in terms of overall regulatory approach, calling for steps to reduce the regulatory burden and barriers that hamper investment, while also calling for efforts to stimulate innovation and promote consumer interest in the digital communications and infrastructure space. However, the challenge for the Indian government and policy-makers is to move from plans to action, and begin to create a supportive regulatory environment that allows the mobile industry and broader digital ecosystem to realise its true potential.

The NDCP should be implemented in such a manner as to create a sustainable investment environment and allow operators to make a reasonable return on their investments. Policy-makers should address key issues that have a direct impact on the sustainability of the industry, including more realistic pricing of scarce spectrum resources, a practical policy on network deployment for digital infrastructure (covering issues such as rights of way and tower sharing) and the simplification of definitions and processes under the licence terms.

Key policy asks

Enabling network deployment and densification

- To accelerate 5G to commercial use, regulators need to promote streamlined network deployment regulations to address the emerging challenges of network densification. Specifically in the context of the Indian market, we recommend that there should be cooperation between central authorities and local authorities on this issue.

The importance of spectrum to 5G

- Sufficient, affordable, exclusively licensed, contiguous spectrum across the three key frequency bands should be made available in harmonised 5G bands.
- In India, spectrum is usually allocated by auction. In allocating spectrum, designing auctions and packaging lots, regulators often take a view on the competitive structure of the downstream market. Spectrum caps are a mechanism that can be employed to prevent spectrum concentration that adversely affects the downstream market. Spectrum caps can be helpful, but they need to be deployed cautiously to avoid unintended consequences and, ultimately, poor outcomes for consumers
- Spectrum policy measures should be adopted that support 5G investment. By adopting a long-term perspective, setting modest reserve prices and prioritising spectrum allocation, the Indian government and regulators can ensure the long-term sustainability of the industry and its ability to fund the significant investment required for 5G network deployments.

Modernising legacy regulatory structures

- Regulators should promote flexibility to support emerging 5G services (e.g. through a pragmatic interpretation of the Open Internet principle) and should modernise regulatory frameworks.
- India has been at the forefront of the adoption of a coordinated approach under the banner of Digital India. This needs to be maintained and developed further as the cross-sectoral use cases require coordinated efforts in managing the 5G ecosystem across the relevant players.
- On the 'level playing field' issue, the GSMA has contributed to TRAI's consultation on the best way to ensure that digital services are subject to the same rules as equivalent telecoms services.

The need for a supportive investment and taxation policy

- Reducing taxation and regulatory fees on revenues could contribute to further evolution of the tax framework. The GSMA suggests that as the industry is a key enabler of socioeconomic growth, there is a strong case to lower the GST rate from 18% to 5% as prescribed for other essential services.
- The complexity of the mobile taxation structure – in terms of, for example, the interpretation of the basis on which licence fee and spectrum usage charges are levied – results in disputes between the sector and the government agencies. To foster an environment that encourages investment in mobile service provision, the mobile taxation framework should be simplified.

1 India: a mobile market in transition

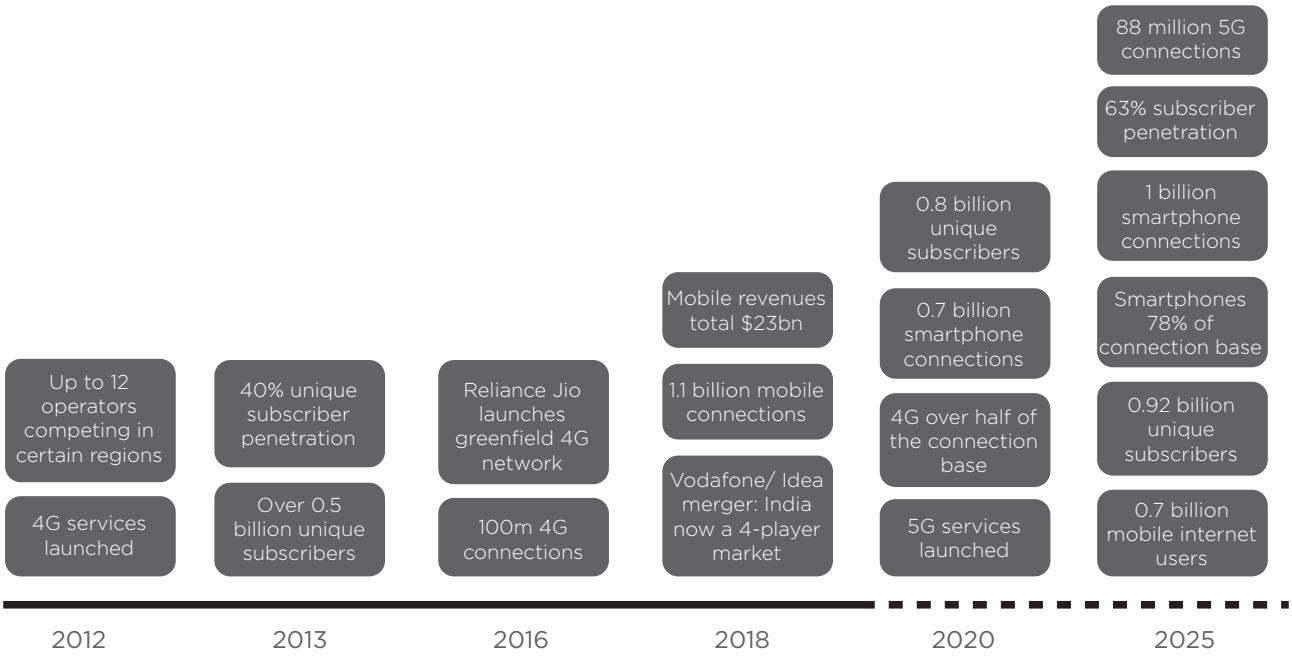
Since the launch of mobile services in India in 1995, mobile networks have been an engine for social and economic transformation. As highlighted by the TRAI[3], a number of policy developments have facilitated the liberalisation of the telecoms sector and helped boost the competitiveness of the Indian mobile market. The New Industrial Policy of 1991 initiated the process of liberalisation in India, which was then followed by the pro-competition stance of the National Telecom Policies of 1994 and 1999. These moves led to the opening up of basic telecoms services to the private sector, now widely recognised as an inflection point for the subsequent tremendous growth of the telecoms sector in the country. The National Telecom Policy 2012 saw the delinking of spectrum awards from telecoms licences, with spectrum allocated through market-based processes.

More recently, a key development has been the accelerating migration to 4G services and smartphones. This has proved to be a catalyst for the rapid growth of mobile data as well as new apps and services, helping to lay the foundations for the development of a modern digital economy in India.

[3] A Twenty Year Odyssey 1997-2017, TRAI, 2017

Figure 1

Key mobile market milestones in India



Source: GSMA Intelligence

1.1 India driving growth in the global mobile industry

India is now a giant in the global mobile industry, with close to 750 million unique subscribers at the end of 2018 – a figure that will grow significantly over the coming years to reach almost 920 million by 2025. India alone will generate almost a quarter of the world's new mobile subscribers over this period. In absolute terms, India will remain the second largest mobile market in the world, behind only China.

Figure 2

Seven countries will account for half of new subscribers to 2025

	% of global new additions
India	**24%**
China	**8%**
Pakistan	**4%**
Nigeria	**4%**
Indonesia	**3%**
US	**3%**
Brazil	**3%**

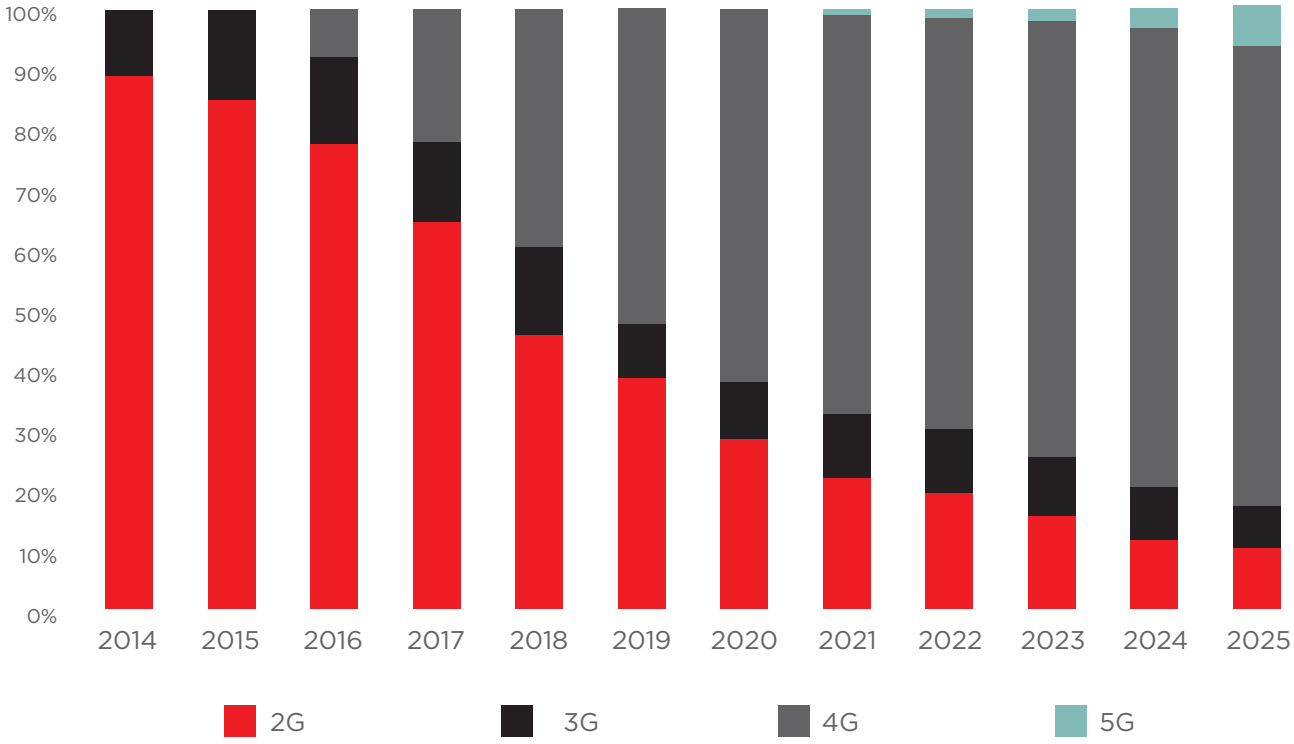
Source: GSMA Intelligence

India is seeing rapid migration to mobile broadband, particularly 4G-capable devices. At the end of 2017, almost two-thirds of the connections base in India were running over 2G networks, yet 4G will account for more than half of all connections before the end of 2019. The entry in 2016 of a greenfield competitor with an LTE-only network and focus on stimulating data traffic growth has been a major catalyst.

4G represented just 9% of total connections in India at the end of 2016. At that time, LTE was a relatively mature technology with networks launched in around 166 countries around the world.[4] However, a number of developing markets had seen only limited adoption and coverage was a key issue, suggesting that India was far from unique in terms of its adoption rate. All the main Indian operators are now focused on growing their 4G subscriber bases and building out coverage and capacity.

Figure 3

India moving to 4G



Source: GSMA Intelligence

Note: data shows percentage of total cellular connections excluding licensed cellular IoT

[4] 4G deployments reach a peak, but still room for growth, GSMA Intelligence, 2016

The ongoing shift to 4G reflects the rapid adoption of smartphones in India. By the end of 2018, smartphones accounted for just over half the connections base, a figure that will increase to more than three quarters by the end of 2025.

Adoption has been fuelled by the global trend towards lower cost devices and the emergence of a new wave of device vendors. A number of local manufacturers have grown rapidly in India, including Micromax, Intex, Lava and Karbonn. In addition, Chinese and Korean brands such as Samsung, Vivo, Oppo and Xiaomi have captured the imagination of consumers. Samsung and Xiaomi, as well as contract manufacturers such as Foxconn, have also opened plants in the country. Jio launched its branded JioPhone in 2017, an LTE-capable featurephone that was initially manufactured in China, though production has recently moved to India.

The size of the Indian market and the rapid adoption of smartphones means that by 2025 it will have cemented its place as the second largest smartphone market, with an installed base of almost 1 billion devices.

Figure 4

India to cement its place as the world's second largest smartphone market

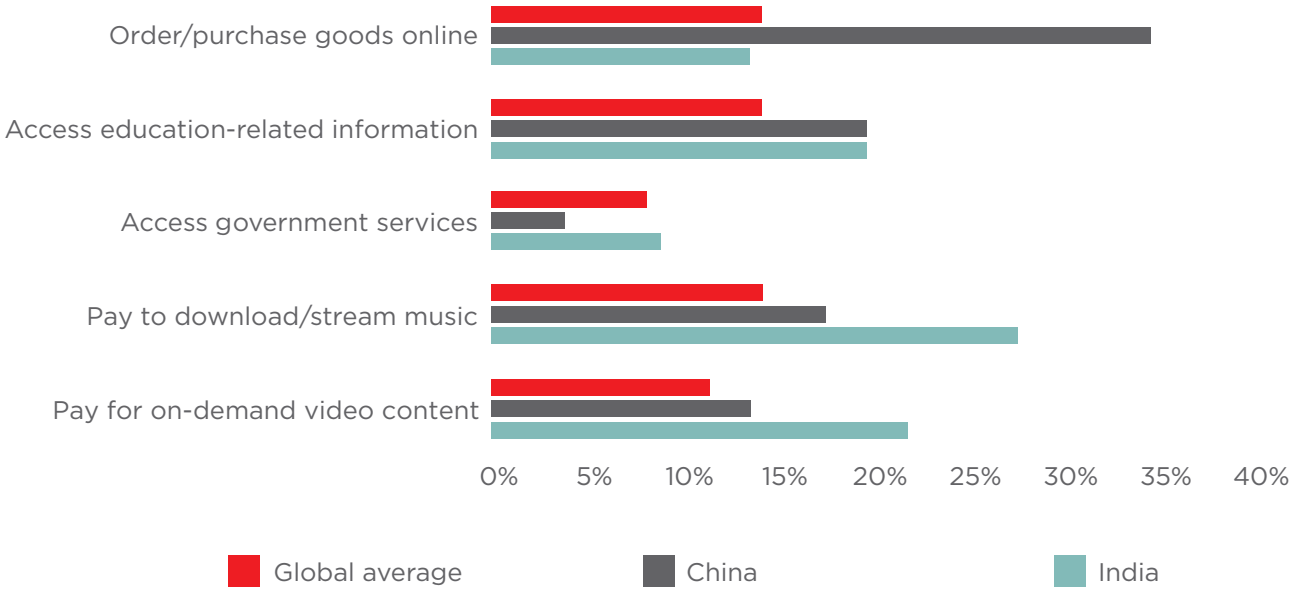
2025 rank	Country	Smartphone connections, 2025 (m)	Change in rank since 2018
1	China	**1,458**	=
2	India	**983**	=
3	Indonesia	**410**	↑ 1
4	US	**346**	↓ 1
5	Brazil	**204**	=
6	Russia	**190**	=
7	Japan	**176**	=
8	Pakistan	**146**	↑ 14
9	Nigeria	**143**	↑ 11
10	Bangladesh	**133**	↑ 11

Source: GSMA Intelligence

According to the GSMA Intelligence Consumer Survey, smartphone users in India are already highly engaged in the digital world and use their smartphones frequently to access and consume a range of digital services and content. In a number of areas, particularly in terms of consuming paid-for digital content (both music and video), Indian smartphone users score well above the global average. While the number of users is significantly lower, there is a clear appetite in India to access government services through apps and online. In the area of digital commerce, India is broadly in line with global averages but lags significantly behind leading markets such as China.

Figure 5

Smartphone users' access of digital content and services (at least weekly)



Note: Percentage of respondents

Source: GSMA Intelligence Consumer Survey 2018

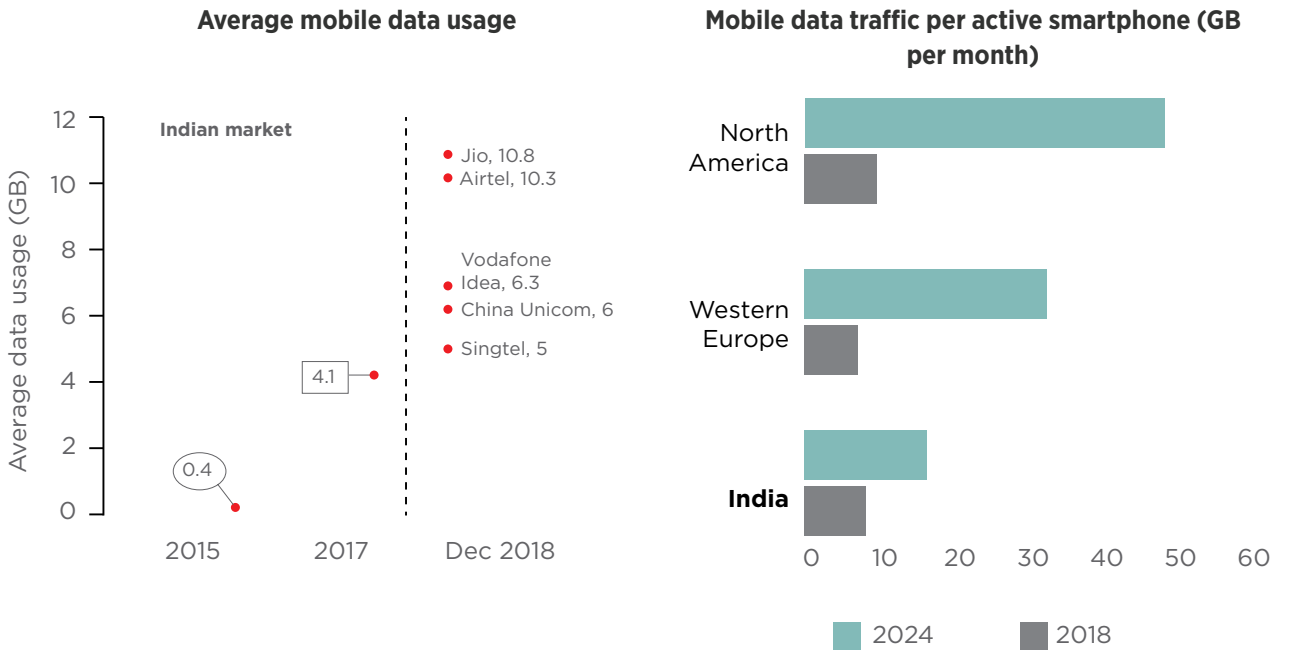
These scores reflect surging data volumes – a trend that will continue both with the ongoing shift to 4G networks and in time with the uptake of new 5G devices and services.

Higher speed networks and the growing base of smartphones have fuelled rapid growth in data volumes in the Indian market; the increased viewing of video content is an important factor in India, as in many other markets. The TRAI has highlighted that mobile data usage per month in India increased from 39 petabytes in June 2016 to 4,178 petabytes in September 2018. Ericsson estimates that in 2018 India generated more traffic than the whole of Western Europe, with total data volumes set to increase four-fold by 2024.

Operators are using a combination of their own apps and premium content partnerships to defend market share and to help monetise the strong growth in data traffic. Content partnerships include those with international players such as Amazon and Netflix, and domestic players including Voot, Eros Now, ALTBalaji and ZEE5.

Figure 6

Data usage in India



Source: Company data, TRAI; average wireless data usage (GB) per active data user per month represents all technologies (2G, 3G, 4G and CDMA)

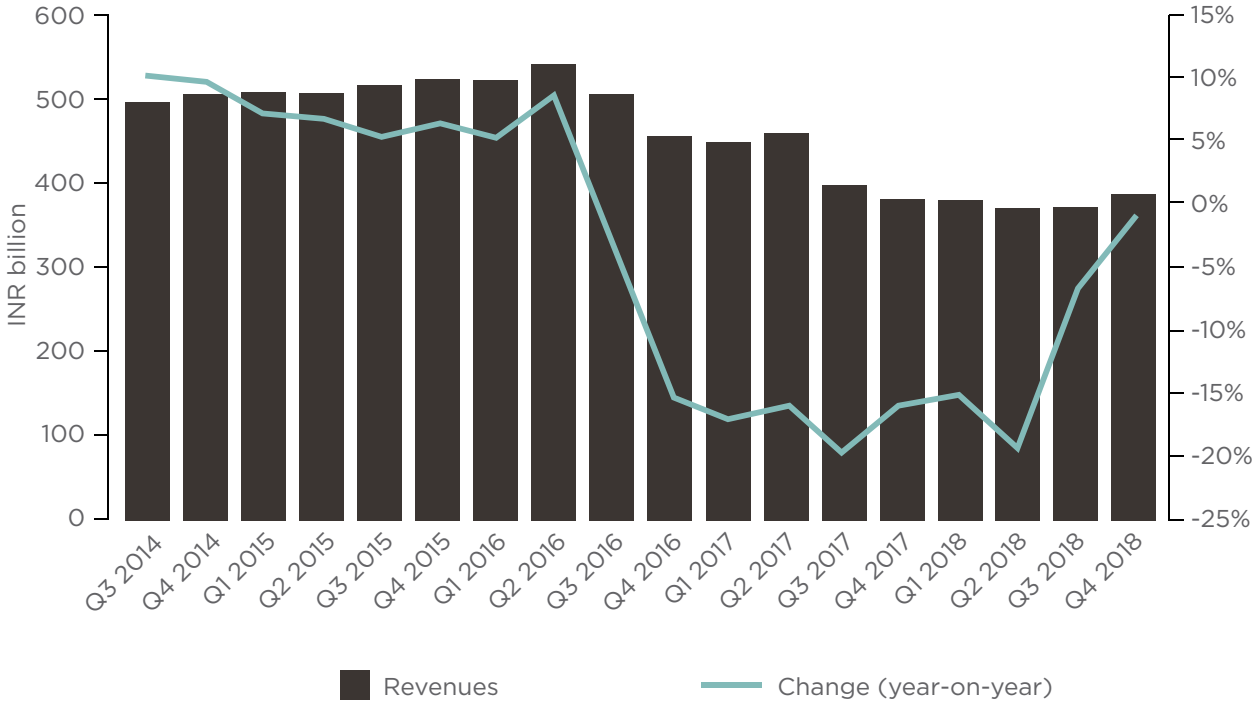
Source: Ericsson Mobility Report November 2018

1.2 Financial outlook: still subdued

Despite fast growth in subscribers over recent years, and the rapid evolution to a more technologically advanced market dominated by higher speed networks and smartphones, the financial performance of the market has remained subdued. On a quarterly basis, revenues have been declining on a year-on-year basis since the end of 2016. Total mobile revenues in India have fallen by more than 20% over the period. ARPU levels have fallen significantly over recent years, despite strong data volume growth, to levels that are likely to prove unsustainable.

Figure 7

Mobile market revenue trends in India



Source: GSMA Intelligence

However, recent quarters are showing signs of a stabilisation in market trends, with the rate of revenue decline easing significantly:

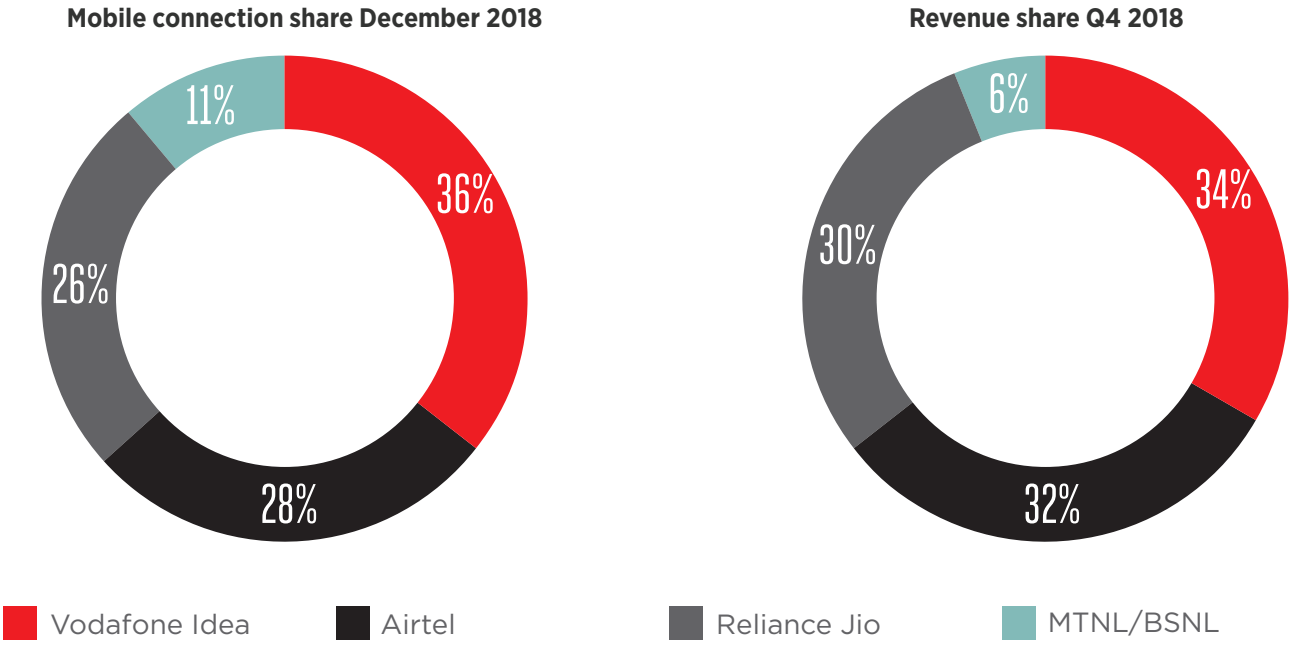
- Market shares are now stabilising, with Reliance Jio gaining scale following a period of rapid market share gains: the company is close to achieving a 25% share of the total connections base at the end of 2018, which translates to close to 30% share of the market in revenue terms.
- Recent consolidation moves (which have transformed the once highly fragmented industry and seen the emergence of three private sector players and one public sector player) will potentially present a more sustainable market structure, allowing the remaining operators to realise scale benefits.
- The two incumbent operators (Vodafone Idea and Bharti Airtel) are investing heavily in their 4G networks to close the coverage gap with Reliance Jio, as well as improve capacity in areas of high demand. Operators are also investing to deploy more fibre, densify their networks and roll out new technologies such as massive MIMO.

Market shares in the Indian mobile market can be calculated across a range of different definitions, suggesting in some cases that Reliance Jio is already in a strong position in the market. On the basis of adjusted gross revenues (AGR[5]), at the end of 2018 Reliance Jio had a share as high as 37%, while headline gross revenues and AGR plus national long distance both put Jio at around the 30% level. A key question for the market outlook will be the extent to which Jio continues to focus on market share gains or shifts more to focusing on investment returns.

[5] Gross revenues adjusted for certain standard deductions. The AGR figure is the basis on which operators make licence fee and spectrum usage payments to the government. Gross revenues and AGR reported by TRAI include other revenues including fixed line and other non-core revenues.

Figure 8

Connection and revenue share for mobile operators in India



Source: GSMA Intelligence; TRAI, company data

ARPU is already extremely low in India, reflecting significant competitive pressures and efforts by operators to expand their services to lower income population segments. The GSMA's Mobile Connectivity Index, which tracks countries' progress on key enablers of mobile internet access and use, shows a 26 percentage-point increase in the affordability of mobile internet in India between 2014 and 2017 — the largest increase in any country over this period.[6]

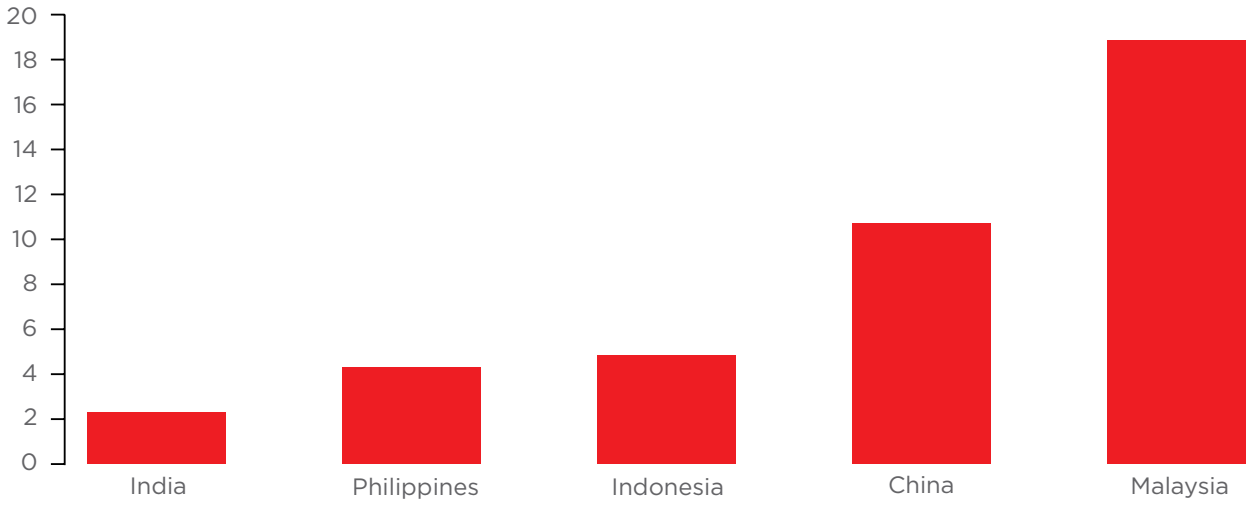
A recent survey of global mobile data pricing highlighted that India was the cheapest market of a total of 230 countries surveyed in the final quarter of 2018.[7] The average price for 1 GB of data during this period was INR18.5 ($0.26), compared to a global average price per gigabyte of $8.53.

Lower tariffs and ARPU levels help drive affordability and are important elements in addressing the digital divide. However, at low levels they also affect the financial stability of the sector and the ability of operators to maintain sustainable business models while investing in networks and new services. For 2018, ARPU per unique subscriber in India was substantially below the level of other markets in Asia Pacific. Indeed, across all developing markets, India is the second lowest in the world, behind only Ethiopia.

[6] https://www.mobileconnectivityindex.com/
[7] https://www.cable.co.uk/mobiles/worldwide-data-pricing/

Figure 9

ARPU per subscriber ($, 2018)



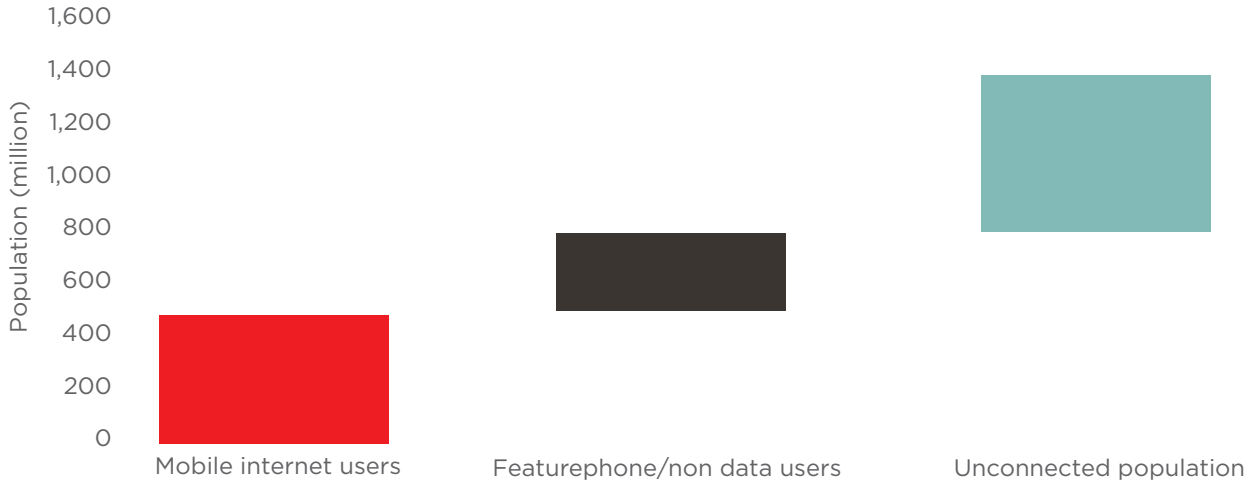
Source: GSMA Intelligence

There have been signs in recent months that competitive pressures are easing. Both Bharti and Vodafone Idea launched minimum ARPU bundle plans across India, which are likely to reduce the number of multiple SIMs held as well as help to stabilise ARPU levels. This trend will be reinforced by the ongoing shift to 4G and smartphones, and the bundling of premium content services that will drive users towards higher-ARPU plans.

There are also longer term opportunities for operators to grow their subscriber bases and migrate users from featurephone or more basic devices to mobile broadband-capable devices, and to actively use mobile data services. In addition, there remains an even larger base of still unconnected people in the country. While many of these will come from lower income groups and rural areas, this is not exclusively the case. The extent to which operators are able to leverage these opportunities to drive higher ARPU levels will depend on a number of factors, particularly the level of competitive pressures in the market.

Figure 10

Significant opportunity to migrate featurephone users and the unconnected in India

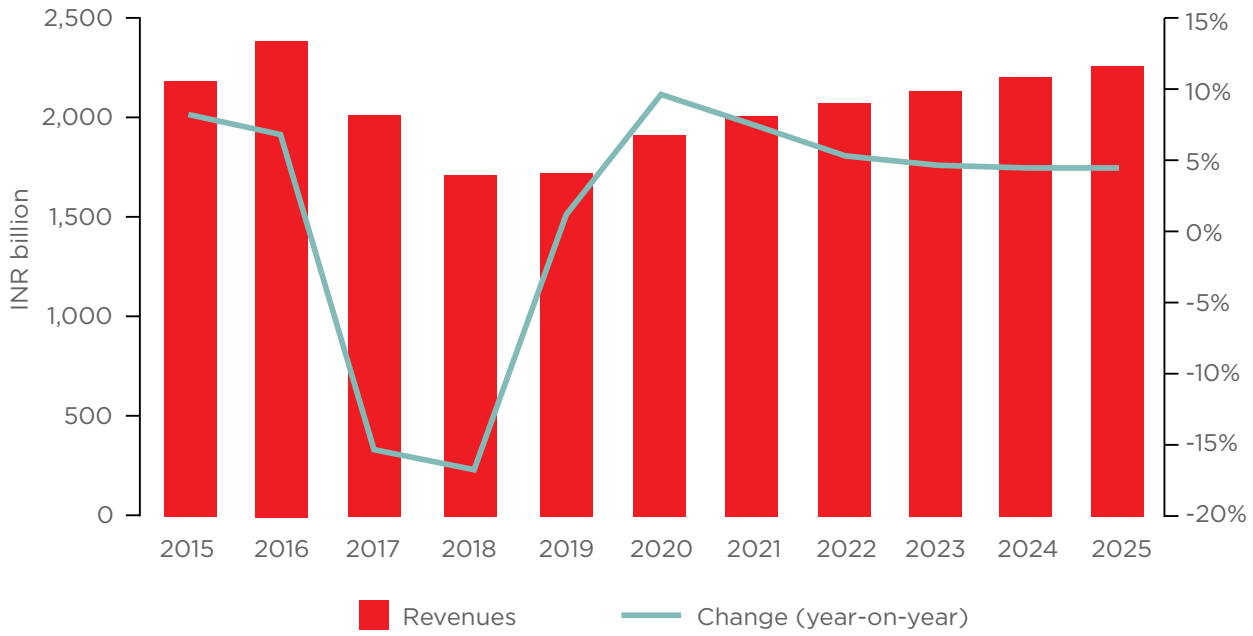


Note: Data as of end of 2018
Source: GSMA Intelligence

GSMA Intelligence forecasts suggest that the Indian mobile market will return to revenue growth in the second half of 2019 and continue to grow modestly throughout the remainder of the forecast period. However, by 2025 market revenues will still be below the level of 2016, indicating that market repair will be a slow and challenging process.

Figure 11

India mobile market revenue outlook



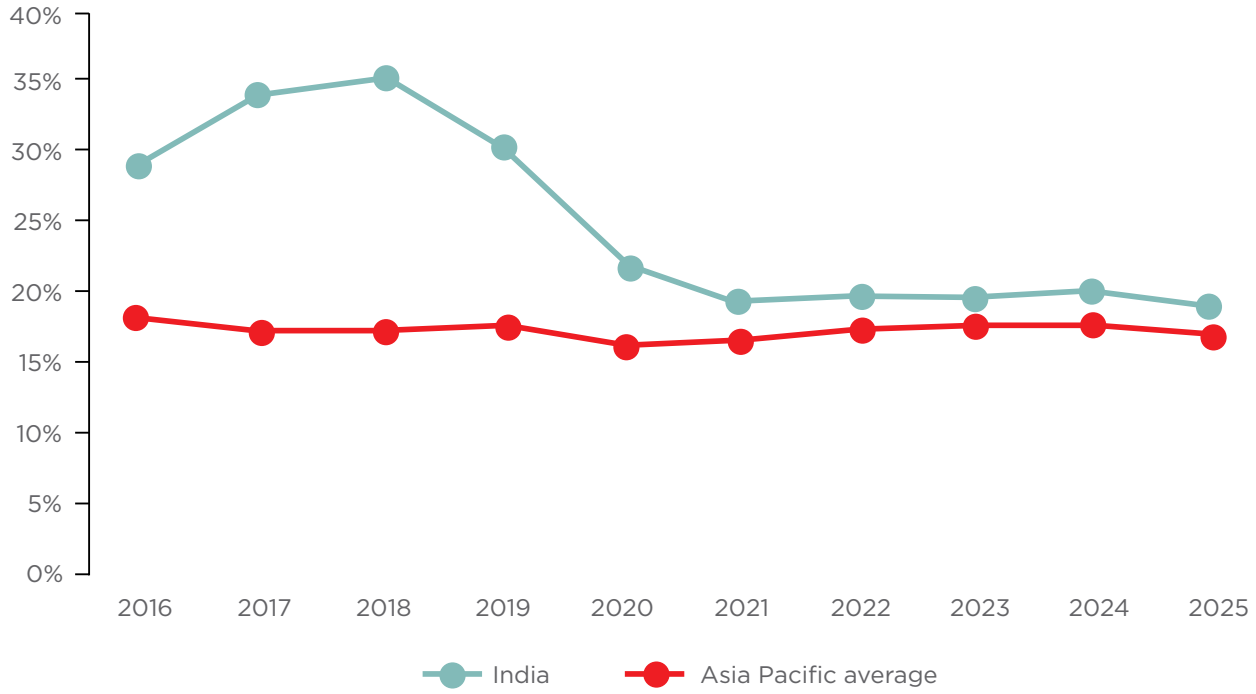
Source: GSMA Intelligence

The entry of a well-resourced new operator in 2016 spurred an uptick in overall investment levels in the Indian mobile market, as shown in Figure 12. Both Vodafone Idea and Bharti Airtel have invested heavily over recent years, with capex totalling around $18 billion over a five-year period as the two companies expanded their 4G network coverage and capacity.

India currently has one of the highest capex-to-sales ratios in Asia Pacific, driven by a combination of significant investments to build out 4G network coverage and capacity, and revenue declines driven by competitive pressures. From a high of around 35% in 2018, capex/sales for India is forecast to decline steadily over the next couple of years before stabilising at around 20% of revenues. In absolute terms, total investment levels are forecast to decline in the short term, before increasing from 2022 as operators invest to add network capacity and begin the initial phases of 5G deployments. The exact path of operator investments over the next few years will depend on a number of factors, including the overall financial health of the sector and the pace of 5G adoption.

Figure 12

Capex/sales: India versus Asia Pacific average



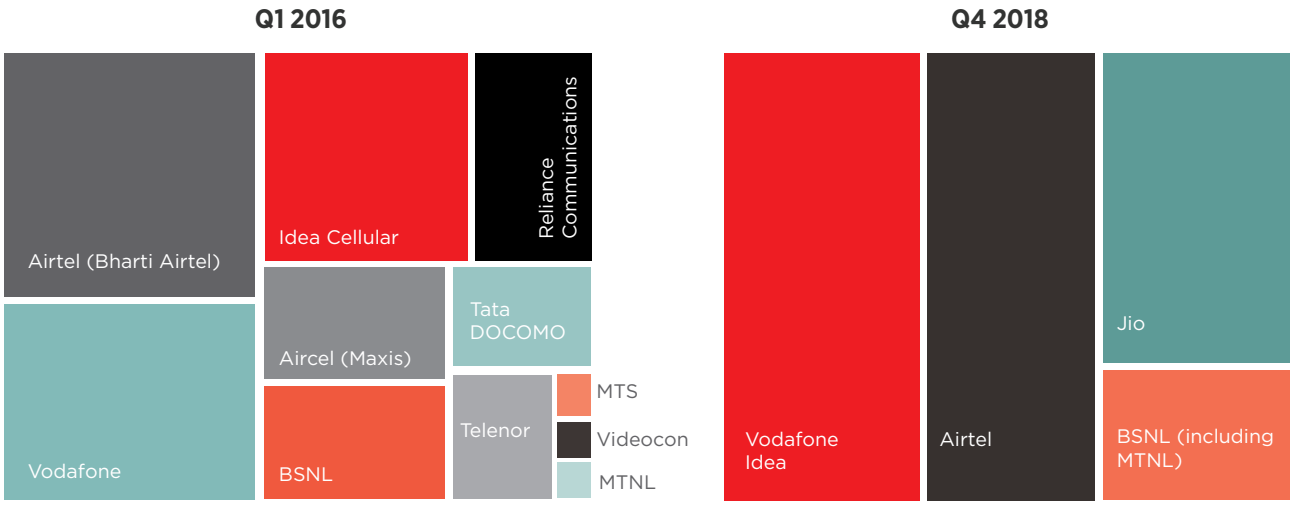
Source: GSMA Intelligence

1.3 The impact of consolidation: margins now key for investments

A wave of consolidation deals over the last two years has transformed the Indian market from one of the most fragmented markets in the world to a four-player market, albeit one with three larger players and one smaller operator. Similar moves towards consolidation in other markets across the world have been linked to periods of market repair and an improving outlook for overall market performance.

Figure 13

How consolidation has reshaped the Indian market



Source: GSMA Intelligence

One measure of market concentration in competition economics is the Herfindahl-Hirschman Index (HHI). An index score of 10,000 indicates a monopoly. A number below 1,500 indicates a non-concentrated market. Numbers in between indicate degree of market concentration and competitive pressures. As a result of consolidation moves over recent years, the HHI score for India rose from 1,483 in 2014 to 2,717 in 2018. Previous research indicated that historically, at an individual circle level within India, competition was even more intense and HHI scores were below 1,000.[8] Despite consolidation, India remains more competitive than the average for the broader Asia Pacific region, where the HHI index in 2018 stood at 3,854.

Mobile mergers have been a common theme across many mobile markets in recent years, in developed and developing markets. Certainly India is now more in line with other developing markets across the world which typically have three or four national operators. There is no magic number of operators that would guarantee the optimal market structure from investment and consumer benefit perspectives. There are factors beyond just the number of players in a market that influence an operator's ability to invest, including the impact of regulation.

[8] Competition and concentration, GSMA Intelligence, 2011

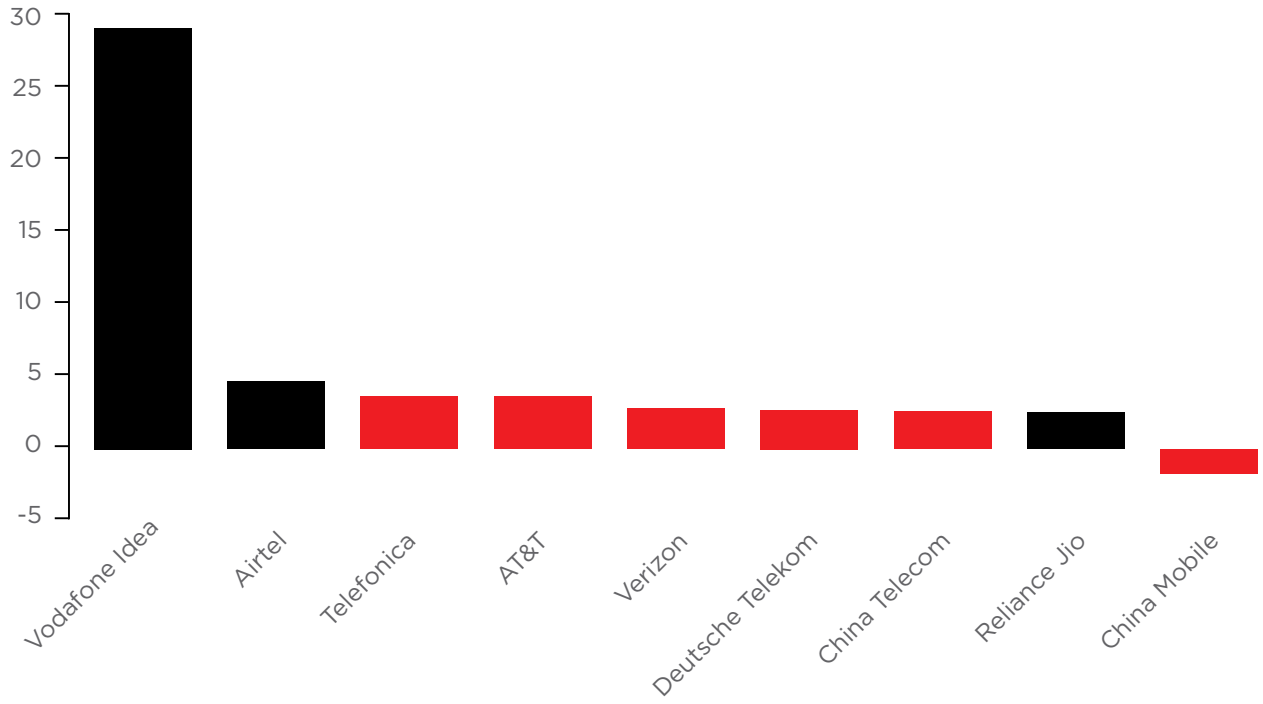
GSMA research on the situation in Central America shows that operator investment is not necessarily higher in markets with a higher number of players.[9] It confirmed the findings of competition economics – namely, that there exists an inverted 'U': operators' investment is maximised when operators have an EBITDA margin in the range of 32–38%. Similar research in Europe suggested that an EBITDA margin of 38% is the level of competitive intensity at which operator capital investments are maximised.[10] While a degree of caution should be exercised in extrapolating results from other markets, these analyses underline the need for operators to realise sustainable returns if they are to optimise network investment.

1.4 Market structure improved but leverage remains a concern

Consolidation is yet to feed through to improved financial performance for the industry in India. High levels of network investment, significant spectrum fees and the costs of consolidation deals have left the industry with significant debt levels. Debt levels are high for the Indian mobile operators compared to their global peers, with the newly merged Vodafone Idea having net debt/EBITDA of around 29× at the end of 2018.

Figure 14

Selected operator leverage (net debt/EBITDA, 2018)



Source: Thomson Reuters, company data
Based on consensus data for 2018

[9] Assessing the impact of market structure on innovation and quality, GSMA Intelligence, 2018
[10] European telecoms mergers will boost capex, driving prices lower and speeds higher, HSBC, 2015

Operators are undertaking measures to address these significant debt levels. For example:

- Vodafone Idea has a significant capital injection plan of INR250 billion ($3.5 billion). The company's two key shareholders have indicated their intention to support this by up to INR182.5 billon. In addition, the company plans to sell its 11.5% stake in the tower company Indus Towers for an estimated INR0.5 billion.
- At the parent company level, Bharti Airtel is also focused on debt reduction. Management has recently approved a rights issue of INR250 billion; the planned IPO of the African business; and the transfer of Airtel's Indian fibre assets into a separate company that could pave the way for a partial sell down.

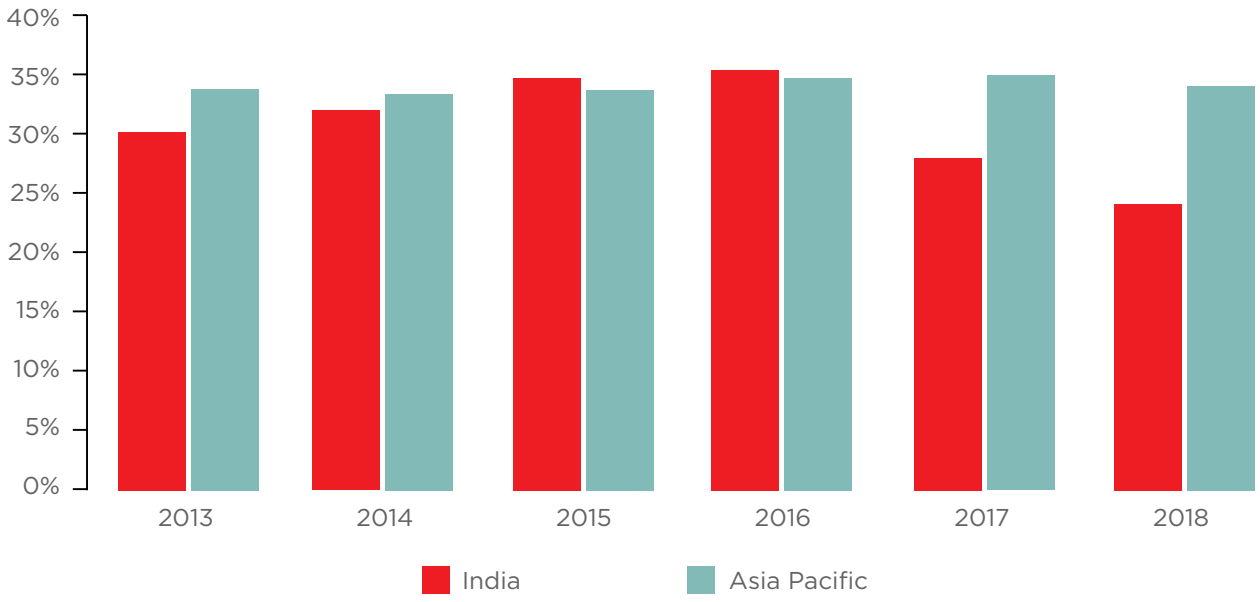
Of the approximate $90 billion of total capital employed by private players in 2018[11], a significant proportion relates to deferred spectrum liabilities payable to the government, accounting for about 27% of the total. For Vodafone Idea, of the reported net debt at the end of 2018 of INR1,147.6 billion, INR914.8 billion related to deferred spectrum payments to the government. The government has already moved to reduce the cashflow pressure on operators by extending the repayment terms for these fees from 10 to 16 years, but given the magnitude of these debts they will remain a significant drain on sector free cash flow over the coming years. As discussed in the final section of this report, some additional steps may still be required to create a more sustainable investment climate.

1.5 Market outlook: India trailing regional peers

The Indian market has seen significant competitive pressures over recent years, reflecting a number of dynamics, including the fact that India was for several years a highly fragmented market with a large number of operators. The entry of a greenfield operator with an aggressive pricing strategy further compounded pressures, leading to profitability coming under pressure. Margins on average have fallen by around 640 basis points over the last two years, and now trail well behind the regional average. It is noteworthy that India also did not experience the high margins that have been seen in many emerging markets at the early stages of growth where margins can consistently be above 40%.

Figure 15

India and Asia Pacific mobile EBITDA margins



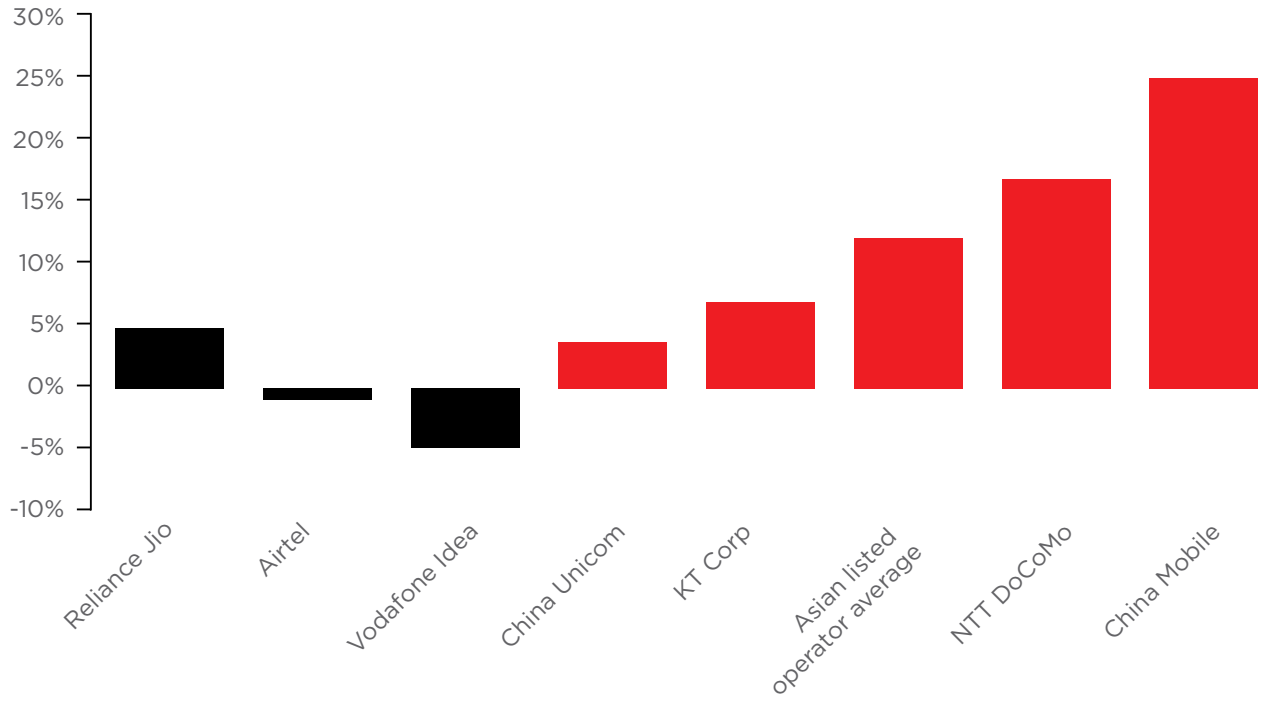
Source: GSMA Intelligence

[11] Source: HSBC India Telecoms outlook 2019. Capital employed is derived by subtracting current liabilities from total assets

The combination of high investment levels (in both tangible network assets and intangibles such as spectrum licences) and falling EBITDA margins has seen industry-level returns in India fall sharply. As a result, returns on capital are on average negative and trail well behind the average of regional telecoms peers.

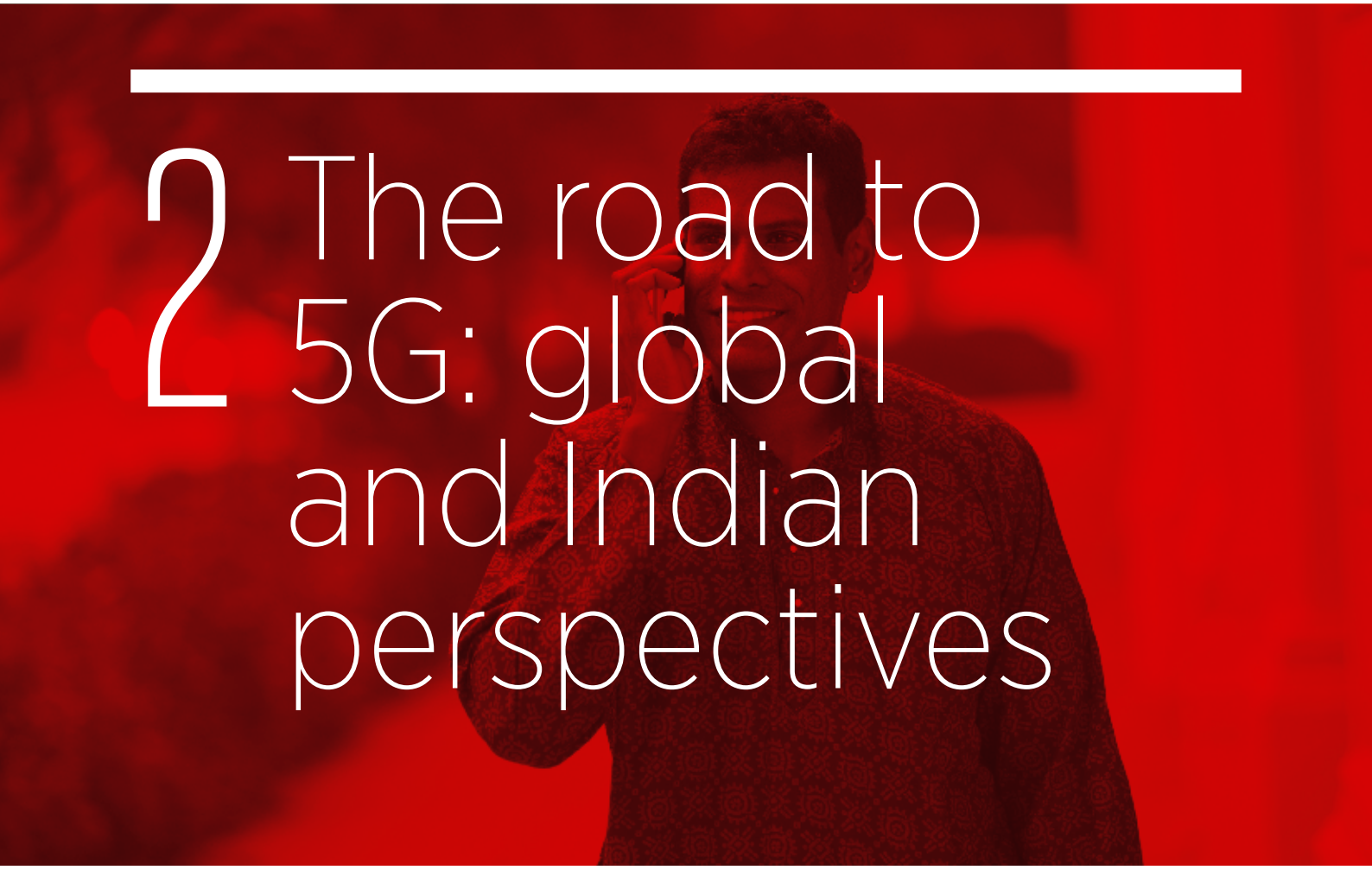
Figure 16

Return on invested capital for Indian and selected regional operators, 2018



Source: operator data, Thomson Reuters, HSBC

Consensus forecasts suggest Bharti Airtel will report a margin of 21% for the current financial year for its Indian operations, and Vodafone Idea around 10%. Reliance Jio reports the highest margin of the three main operators, with a figure of 39% in the final quarter of 2018. It can be difficult to directly compare margins across the Indian operators due to differences in network ownership (mainly towers) and accounting. The extent of any margin uplift will depend on a range of factors. The outlook for competitive pressures and the related impact on any potential ARPU recovery will likely be key.



2 The road to 5G: global and Indian perspectives

The GSMA's vision of 'Intelligent Connectivity'[12] highlights how the combination of 5G, artificial intelligence, smart platforms and the Internet of Things can deliver benefits for consumers, enterprises and society at large. India has a similar vision of the future and sees the pivotal role of 5G as the enabling connectivity layer. The Indian government's 5G High Level Forum has stated a clear 5G vision for India, including the following:

'5G technology has the potential for ushering a major societal transformation in India by enabling a rapid expansion of the role of information technology across manufacturing, educational, healthcare, agricultural, financial and social sectors. India must embrace this opportunity by deploying 5G networks early, efficiently, and pervasively, as well as emerge as a significant innovator and technology supplier at the global level. Emphasis should be placed on 5G touching the lives of rural and weaker economic segments so as to make it a truly inclusive technology.'

At a global level, 5G technology is rapidly moving from trials to early commercialisation. Between 2018 and 2020, more than 50 countries will launch 5G mobile services across most regions. In some markets, the launch of 5G commercial services is occurring earlier than initially announced – notable examples include the US, China, South Korea, Australia and some of the Gulf Cooperation Council (GCC) Arab States. Approximately 40% of the mobile operators worldwide that have announced 5G commercial network plans will launch in 2019, and the remaining 60% plan to do so in 2020 or later.

[12] https://www.gsma.com/IC/

2.1 The 5G opportunity: cost and revenue considerations

5G is fast becoming a reality in many parts of the world, but at the same time the traditional operator business model remains under pressure. Many operators are already looking to expand beyond their traditional telecoms businesses to explore new revenue streams in a fast-changing competitive landscape, with the added challenge of how to fund the incremental investments for 5G networks.

Three factors will affect the speed at which 5G is adopted in specific markets and the value that it will generate:

- **New revenue opportunities:** most operators around the world see the provision of enhanced mobile broadband (eMBB) to the consumer market as the core commercial proposition in early 5G deployments. eMBB refers to data-driven use cases that require high data rates across wide areas, with 5G initially deployed in many regions to provide higher speeds and additional network capacity in urban areas. In addition, in some markets 5G-based fixed wireless access (FWA) services will be deployed, offering a potentially lower cost and faster means of expanding high-speed services to households and businesses (versus fibre to the home/building deployments).

  Enterprise use cases that use massive IoT and/or ultra-reliable, low-latency communications to transform verticals (such as manufacturing, utilities, healthcare, retail, agriculture and automotive) could gain scale at a later stage. Further use cases could be developed, with the potential to revolutionise industries and consumer experiences.

- **Cost considerations:** 5G networks are distinct from previous generations because of the level of heterogeneity, flexibility and automation inherent in their design. The cost dynamics of 5G networks will therefore not only be influenced by traditional network factors such as capacity and coverage but also by factors such as network flexibility and network ownership. Some of these are already being addressed in 4G networks (for example, NFV/SDN for network flexibility and edge computing for low-latency capabilities), but their impact on the cost of 5G network rollout and operations is less clear.

  To date, the industry landscape has generally been shaped by infrastructure-based competition among operators (with networks built by established equipment vendors and managed by engineers). The 5G era will potentially see the introduction of new models of network ownership and new ways of building networks (such as more widespread adoption of open source software and hardware) as well as new network management approaches (using AI-based automation, for example).

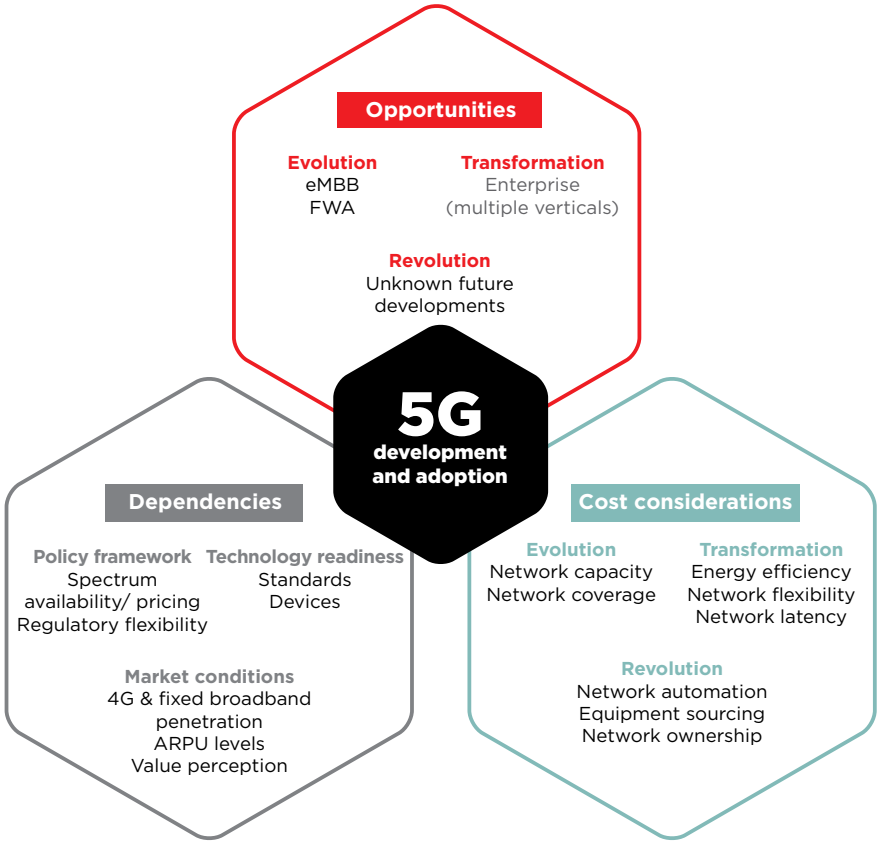
- **Dependencies:** a number of factors are required for the development of 5G services, including a supportive policy framework, operator access to appropriate spectrum, the completion of all the necessary standards and the widespread availability of 5G devices. The rate of 5G adoption will also reflect prevailing local market conditions including competitive dynamics, legacy network availability, the affordability of devices and connectivity, and customers' perception of value.

  On perception, an important issue needs to be addressed. While there is growing news flow from industry events and company announcements on the new services that 5G will enable, to date these have not resonated strongly with consumers.[13] There is a general consumer perception, in part driven by the industry, that 5G will mainly deliver improved data speeds and coverage – essentially a continuation of previous generations of mobile technology. There is clearly then a market opportunity for operators to meet this demand. A challenge for operators lies in highlighting to consumers a broader range of use cases for 5G services; this will go a long way to determining its value in consumers' eyes.

[13] 5G's great expectations: do consumers see anything novel?, GSMA Intelligence, 2019

Figure 17

5G is an inevitable network evolution and will create significant opportunities if the right conditions are in place



Source: GSMA

With 5G deployments still at early stages even in the leading markets, operator business models and specific use cases are still evolving. Beyond the consumer space, 5G will bring new capabilities and the flexibility for mobile operators to better serve the specific needs of enterprise customers. 5G will be a key enabler of the Fourth Industrial Revolution, as technology is seamlessly embedded within society and in commercial and industrial processes. However, to fully capture this opportunity, operators will need to tailor their value propositions to large organisations (including municipalities and government agencies) as well as small and medium-sized enterprises (SMEs).

IoT is a key focus for operators looking to expand their enterprise revenues in the 5G era. Many IoT applications are already well supported by existing 4G networks, but a number can also benefit from enhanced 5G capabilities for massive IoT, such as by providing more capacity for scale, for critical IoT, and supporting enhanced quality of service and lower latency.

2.2 5G deployment models

Two 5G deployment models have been standardised to meet initial market requirements: non-standalone access (NSA) and standalone access (SA). NSA and SA 5G deployments are optimised for different needs:

- NSA configuration is suitable for providing more broadband capacity, since 5G NR can act as a supplementary capacity overlay to the 4G network.
- SA configuration allows operators to fully exploit the features of NR as well as the capabilities of the new core network architecture.

It is likely that operators in India will follow the NSA deployment model, which allows both lower overall investment levels and an initial focus on eMBB services. Operators are able to use existing macro sites and LTE spectrum as an anchor connection, with a densified network of small cells and use of mid-band (1-6 GHz range) and upper-band (above 6 GHz) spectrum to facilitate high-speed data services.

Initial deployments are likely to focus on utilising mid-band frequencies in urban areas with high-capacity needs, reflecting the surging demand for mobile data services in the country. While spectrum refarming and moves towards network densification can increase the capacity of existing 4G networks, in the medium term 5G networks represent the most cost-effective way to accommodate the likely future growth in data traffic in India. As highlighted earlier in the report, revenue per gigabyte of data traffic is already extremely low in India; 5G networks offer the promise of lower opex costs and therefore a lower cost per gigabyte for operators.

There is an equally pressing objective to provide greater mobile broadband coverage in rural areas in India – 5G networks utilising sub-1 GHz bands (and particularly the 700 MHz band) will also be used to address this. The 700 MHz band has yet to be successfully assigned in India, and may be used initially for 4G networks. Refarming to 5G can then be done on a dynamic basis, as 5G supports the use of a specific band for both 4G and 5G simultaneously, depending on the proportion of devices on each generation in a cell.

4G and 5G networks are likely to coexist in India for a number of years. In common with many markets around the world, 4G networks will continue to service a significant share of mobile data traffic, leaving 5G with the dual remit of absorbing increasing demand for capacity and underpinning consumer and enterprise services that require higher speeds and/or lower latencies, such as immersive reality, remote surgery or autonomous transport.

Alongside eMBB, fixed wireless access (FWA) is an important early-stage use case for 5G. FWA is the use of 5G as a last-mile technology to provide fixed broadband connectivity. 5G FWA is already being deployed in markets such as the US and is seeing growing interest in India.

Indian operators are currently investing heavily in their LTE networks; Jio has built a greenfield LTE network over the last four years, while Bharti Airtel and Vodafone Idea are investing in adding coverage and capacity to their LTE networks. All the operators are therefore deploying the most advanced versions of LTE which should enable an easier and more cost-effective migration to 5G. Bharti Airtel and Jio are deploying LTE Advanced, which uses carrier aggregation to increase data speeds. Vodafone Idea is deploying massive MIMO in a number of cities, while looking to increase 'cloudification' of the network core and trialling software-defined networking (SDN) and network function virtualisation (NFV) as it looks to ready its network for 5G.

2.3 5G market readiness

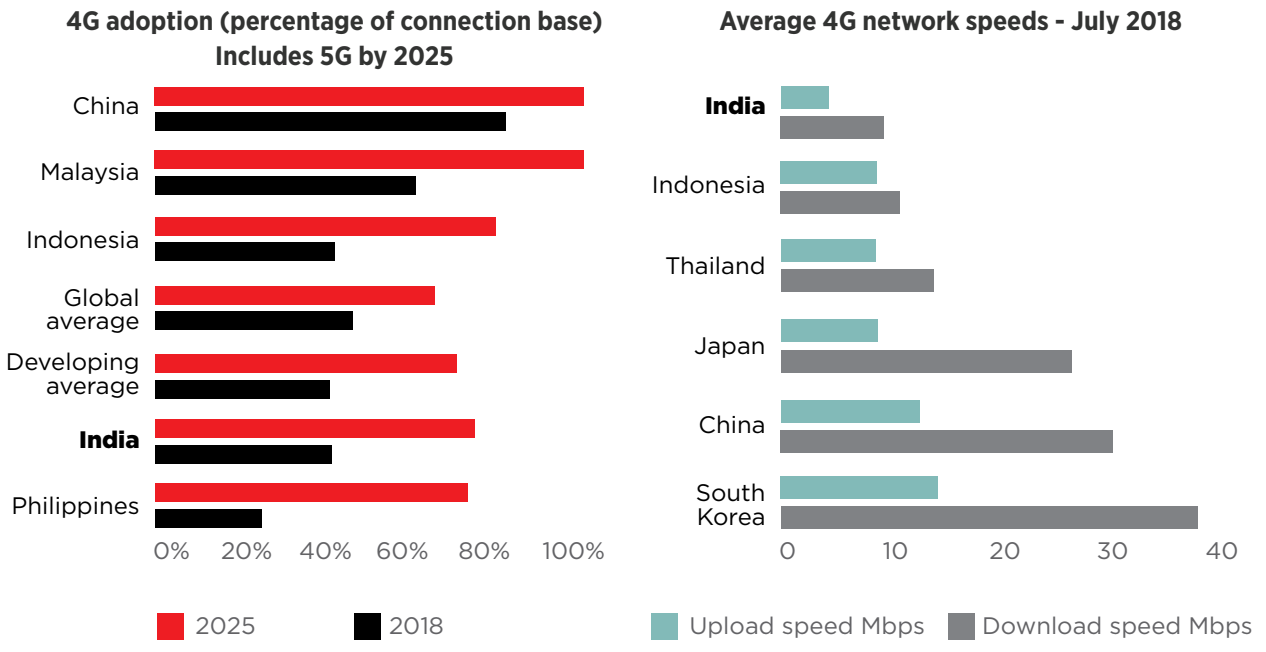
Though operators recognise the potential for 5G to transform aspects of the consumer and enterprise experience, they also have concerns around identifying specific business models and how much scope there is to monetise the new services that 5G will enable. A number of countries are already leading the way with early launch plans for 5G, some of which have already taken place, while others appear more willing to be followers and allow the technology to mature.

Assessing the readiness of an individual market for 5G is a complex task. Each individual country is at a different state of readiness depending on a range of factors, from the maturity of the mobile market to the maturity of the enterprise and consumer sectors in terms of their adoption of new mobile and other ICT technologies.

A number of these indicators suggest that the mobile ecosystem still needs to develop further for India to be truly ready for 5G launches. These include the relatively low levels of 4G adoption across the Indian market as a whole, and low network download speeds. However, 4G adoption is accelerating rapidly and by 2025 will exceed averages globally and for developing markets. This highlights the importance of operators continuing to invest in the latest LTE network technologies, including network densification and additional fibre deployments, as building blocks for 5G.

Figure 18

4G adoption and average network speeds



Source: GSMA Intelligence, Ookla

An additional factor is the relative lack of fibre in India. According to the DoT[14], India has approximately 1.5 million kilometres of optical fibre cable, and less than a quarter of the towers are fibre-connected. Indian operators typically rely on microwave for backhaul. TRAI data indicates that there were only 21 million fixed internet subscribers in India as of September 2018, a significant proportion of which are on narrowband internet. The number of FTTH subscribers is effectively zero.

The rapid technology migration currently underway in India towards 4G networks and smartphones means that the 5G readiness score will improve significantly over the next few years. This in turn highlights the need for operators, governments and policy-makers in India to begin creating the right environment for 5G deployments today.

2.4 5G forecasts and trials

A growing number of 5G trials are planned in India, and the government has created a High Level Forum that has made recommendations around spectrum, as well as other initiatives to support 5G including the development of India-specific 5G applications. A number of operators and vendors have already entered into agreements and set plans for trials, with field trials generally planned for the second half of the year:

- Bharti Airtel and Huawei have successfully conducted India's first 5G network trial under a test setup at Airtel's network experience centre in Manesar, Gurgaon, achieving a user throughput of more than 3 Gbps. Bharti Airtel has signed a memorandum of understanding (MoU) with Nokia and Ericsson to support the company in its preparations for 5G rollout.
- Vodafone Idea has also proposed 5G trials with multiple vendors including Huawei and Ericsson.
- Samsung will conduct 5G field trials in New Delhi in 2019, and is working closely with the DoT. Samsung is also likely to be one of Jio's partners for 5G field trials.
- BSNL has signed an MoU with Ciena to conduct field trials with the goal of a commercial launch by 2020. Ciena and BSNL intend to jointly evaluate fronthaul, midhaul and backhaul transport-based use cases and scenarios to address resiliency requirements and latency concerns.

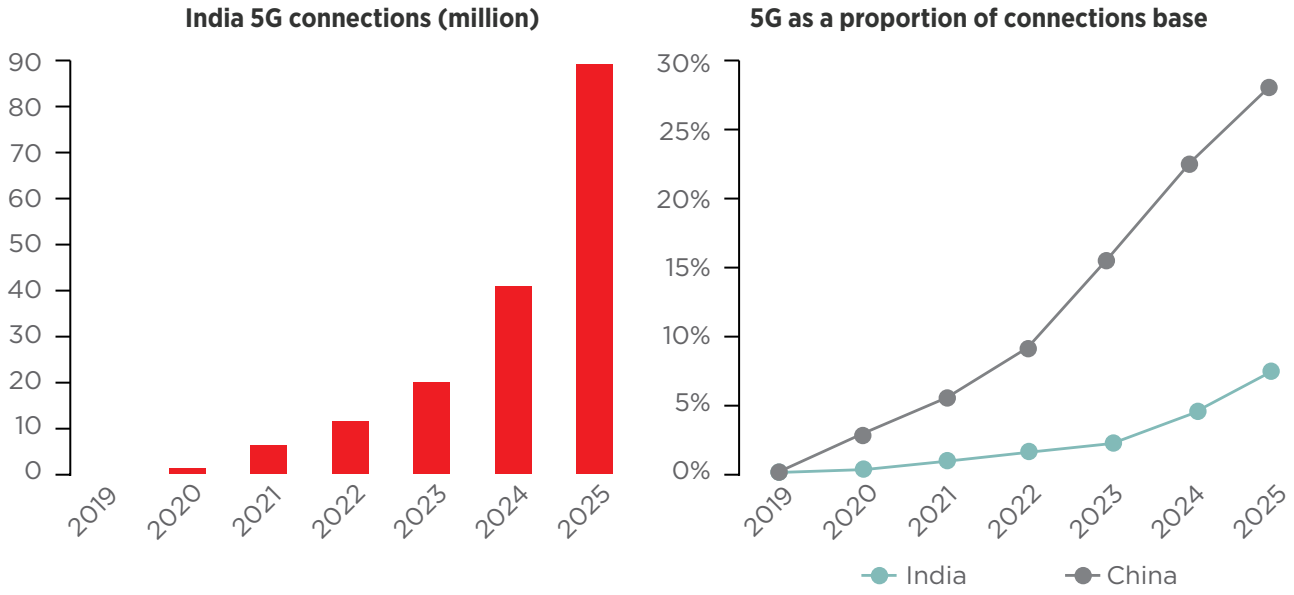
GSMA Intelligence forecasts suggest that the first commercial 5G services will launch in India in 2020, with gradual uptake in the first few years reflecting likely constraints including limited network coverage and relatively expensive devices. The cost of handsets will be an important factor in a price-sensitive market such as India. The first 5G handsets are likely to be at a premium to existing 4G devices, but prices will fall as the technology scales and matures.

5G connections in India are forecast to reach 88 million by 2025, equivalent to around 7% of the total connections base in the country. This will leave India trailing regional peers such as China, which is set to see almost 30% of its total connections base on 5G by 2025, making it by some way the largest 5G market in the world. The Indian market forecasts also reflect a number of factors highlighted earlier, including the financial constraints currently faced by several of the Indian operators, and the need to make adequate returns on recent high investment levels to build out 4G coverage and capacity.

[14] Source: NDCP-18

Figure 19

5G connections in India



Source: GSMA Intelligence

2.5 5G use cases: the Indian context

To play an active role in the emerging use cases and help ensure their relevance to the Indian market, the government has created a 5G High Level Forum.[15] The goals of the forum include ensuring that India can play an active role in the development of 5G, and ensuring 5G can assist in delivering existing government initiatives such as the Digital India, Smart Cities and Smart Village missions. A particular attraction of 5G to the Indian government is the potential to 'leapfrog' earlier technological generations and compensate for the lack of various types of physical infrastructure in the country, whether in areas such as transport, education or healthcare.

The 5G High Level Forum report recommended establishing application and use case labs in India, which could serve a number of purposes, including interoperability testing for new applications, fostering innovation and developing locally tailored solutions. The latter point is of particular relevance in terms of 5G (compared to 4G), as many use cases – especially those developed for the enterprise market – will be tailored specifically to local market conditions. In this case, it makes little sense to adopt a global approach to developing new use cases. A number of countries have already announced similar labs and research facilities to develop locally relevant use cases.

The GSMA has promoted the development of Mobile IoT labs.[16] Mobile operators and network equipment vendors generally set up Open IoT Labs to help IoT service providers (such as smart energy, smart parking or smart lighting companies) test their device prototypes, fine-tune their IoT services, and provide technical support in preparation for commercial deployments. Massive IoT is one of the principal use cases for 5G. Potential use cases in India target key verticals such as health, agriculture, manufacturing and environmental monitoring.

To further these ambitions, the government has launched the programme 'Building an End-to-End 5G Test Bed' to advance innovation and research into 5G. The three-year programme began in March 2018, with a budget authorisation of INR2,240 million. Ericsson installed the first public access 5G test bed at IIT Delhi in July 2018 to develop new applications to allow the industry and relevant institutions to work on India-specific usage scenarios and applications.

[15] "India Joins Race in 5G Ecosystem, Constitutes High Level Forum on 5G India 2020", Ministry of Communications, India, September 2017
[16] "The Mobile IoT Labs Pioneering Next Generation LPWA solutions", GSMA, January 2018

The provision of enhanced mobile broadband to the consumer market will be the core proposition in early 5G deployments in India, as well as potentially 5G FWA. However, there are a growing range of additional 5G use cases, which can be broadly grouped into the categories of massive IoT and ultra-reliable, low-latency communications. There is interest in these applications in the Indian market from both the government and ecosystem players, but these applications are likely to gain scale at a later date as the 5G technology matures and coverage levels improve.

Figure 20

Example 5G use cases

Enhanced mobile broadband

- Gigabytes in a second
- Immersive reality
- eSports
- Live in-venue digital entertainment
- Work and play in the cloud

5G-based fixed wireless

- Last-mile technology for fixed broadband access

Massive Internet of Things

- Smart homes
- Smart cities
- Smart buildings
- Multiple vertical industries
- Wearables

Ultra-reliable, low-latency communications

- Autonomous driving
- Industrial and vehicular automation
- Robotics
- Remote surgery
- Mission-critical applications

Source: GSMA Intelligence, ITU, 3GPP and major vendors

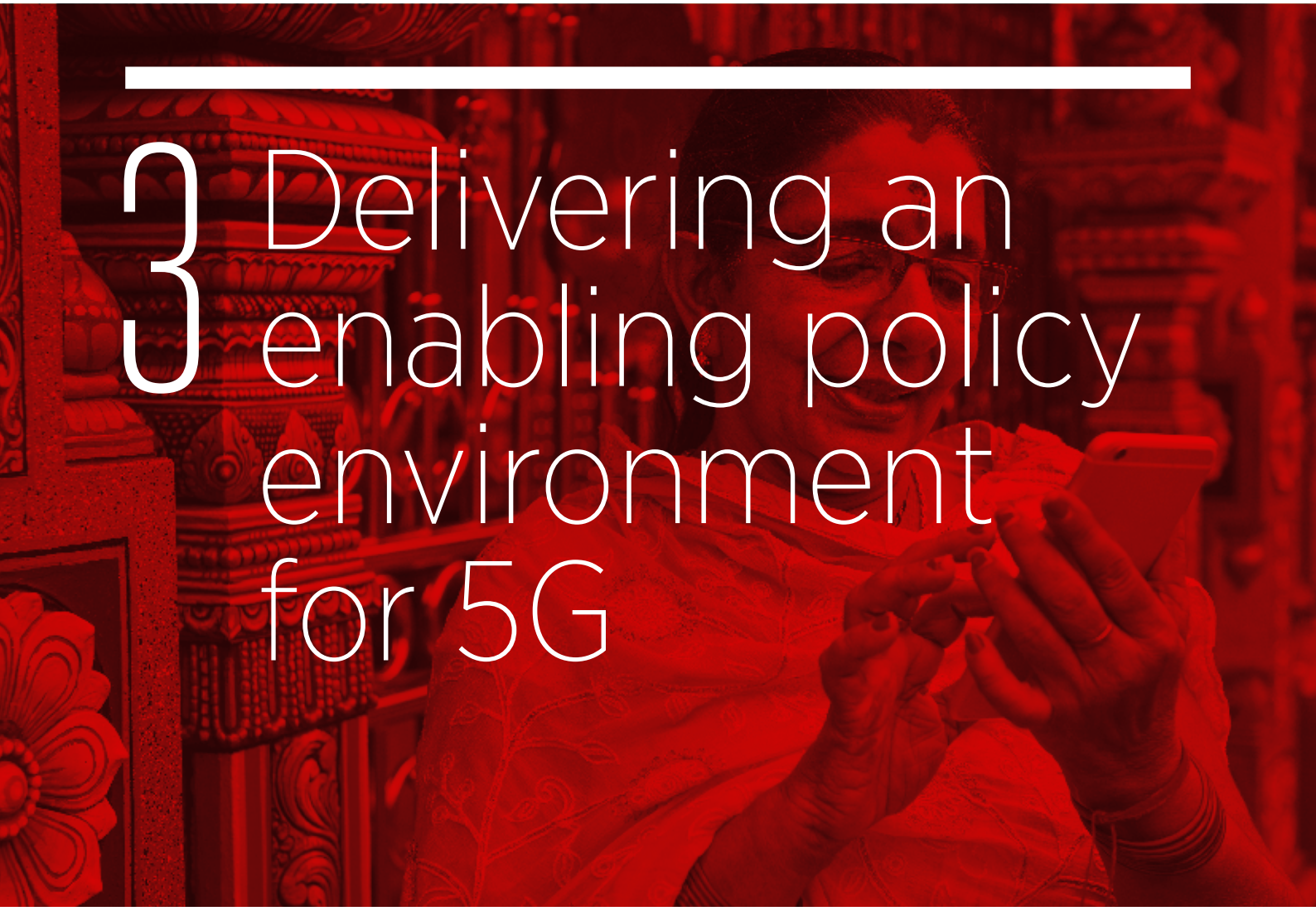
5G networks offer the prospect of a range of new and enhanced consumer experiences, drawing on the higher data throughput and lower latency of 5G. These new services include 4K and 8K ultra-HD video, 3D video, holograms, AR/VR devices and applications for gaming and immersive TV, as well as digital services and content for connected stadia and smart cities.

These new services will provide clear opportunities for Indian operators to enhance the customer experience while also driving incremental revenue in the consumer market. However, a number of challenges need to be addressed over the next five years, at the regional and global levels:

- Advances in immersive digital entertainment are key to driving incremental revenue for operators: some of the use cases in applications and content for immersive reality, eSports and enhanced in-venue digital entertainment (stadia, music venues) are still at an early stage of development, even in advanced markets.
- 5G smartphone models are likely to cost more than the most advanced 4G devices currently available, as they will offer enhanced features (potentially including advanced video capabilities such as 4K and 8K displays) as well as additional cameras and sensors to support AR and VR applications. These handsets will also need to support multiple spectrum bands as well as 4G and 5G in the same form factor.

The issue of 5G device costs is of particular relevance to a lower income market such as India, where the government's desire to build a domestic high-tech manufacturing sector adds a further dimension. There is a growing handset ecosystem in India that could provide the basis for the domestic production of 5G devices.

It will likely take several years for some of the outstanding technological issues to be addressed and for device and component manufacturing to scale and bring 5G devices costs more in line with existing 4G devices.



3 Delivering an enabling policy environment for 5G

3.1 The GSMA global 5G policy framework

To accelerate 5G to commercial use, governments and regulators across the world need to consider market structures that will foster a pro-investment and pro-innovation environment for the mobile ecosystem. Mobile operators in many markets face significant headwinds from the prevailing policy and regulatory environment, in terms of investment, spectrum access, network management flexibility, and infrastructure deployment.

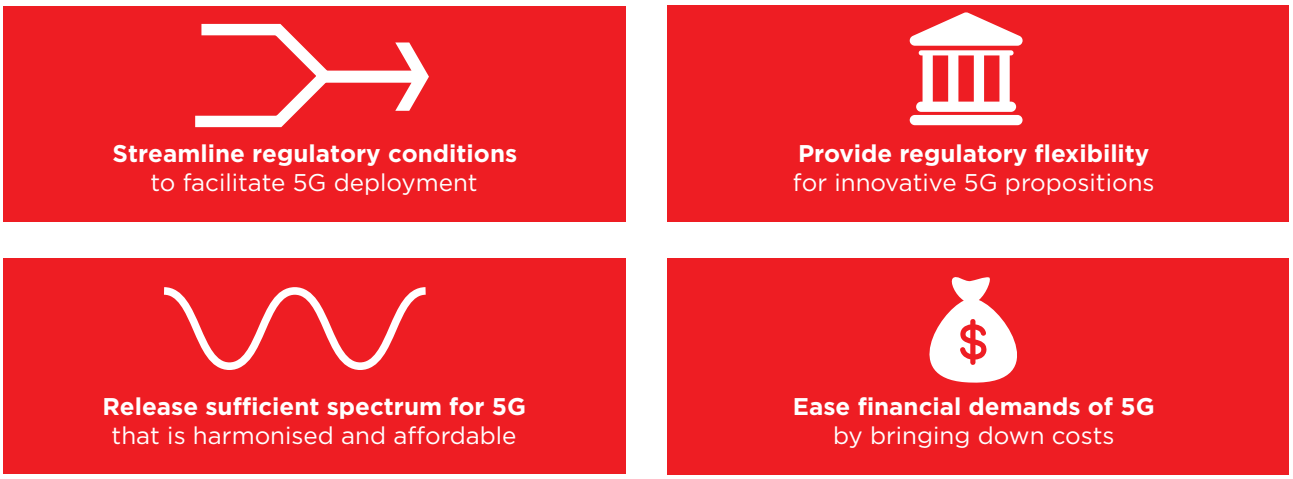
It is important to note that across a broad range of policy and regulatory issues, the industry position is no different in a 5G world to earlier generations of mobile network technology. Positions published in the GSMA Mobile Policy Handbook[17], spanning infrastructure sharing, taxation and spectrum, to name but a few, are as relevant and applicable as ever.

Policy-makers, as vocal proponents of mobile network evolution and technology-led economic growth, should play a driving role in the realisation of 5G, creating the conditions for efficient and timely mobile network deployment while bringing down the regulatory costs for operators. Their attention should focus on key areas to bring 5G to fruition: network deployment, network flexibility, spectrum access and regulatory costs.

[17] https://www.gsma.com/publicpolicy/mobilepolicyhandbook/

Figure 21

Key policy considerations for the 5G era



Source: GSMA

3.2 The current situation in India

Spectrum pricing remains high

The overall financial health of the Indian mobile operators remains challenging, with high debt levels and low levels of profitability. Beyond competitive market factors, a number of other issues contribute to this situation, including the disproportionate cost of spectrum, high rights-of-way charges and regulatory levies/taxes, and spectrum usage charges.

A report by the GSMA, *Spectrum Pricing in Developing Markets*, highlights that high spectrum prices are a significant issue in developing countries.[18] On average, between 2010 and 2017, final spectrum prices in developing markets were more than three times those of developed countries once income levels are taken into account. Although high proceeds from spectrum assignments increase public funds to help ease short-term public sector fiscal pressures, there can be significant adverse effects for the mobile market. These include slower deployment of LTE networks and more expensive, lower quality mobile broadband services.

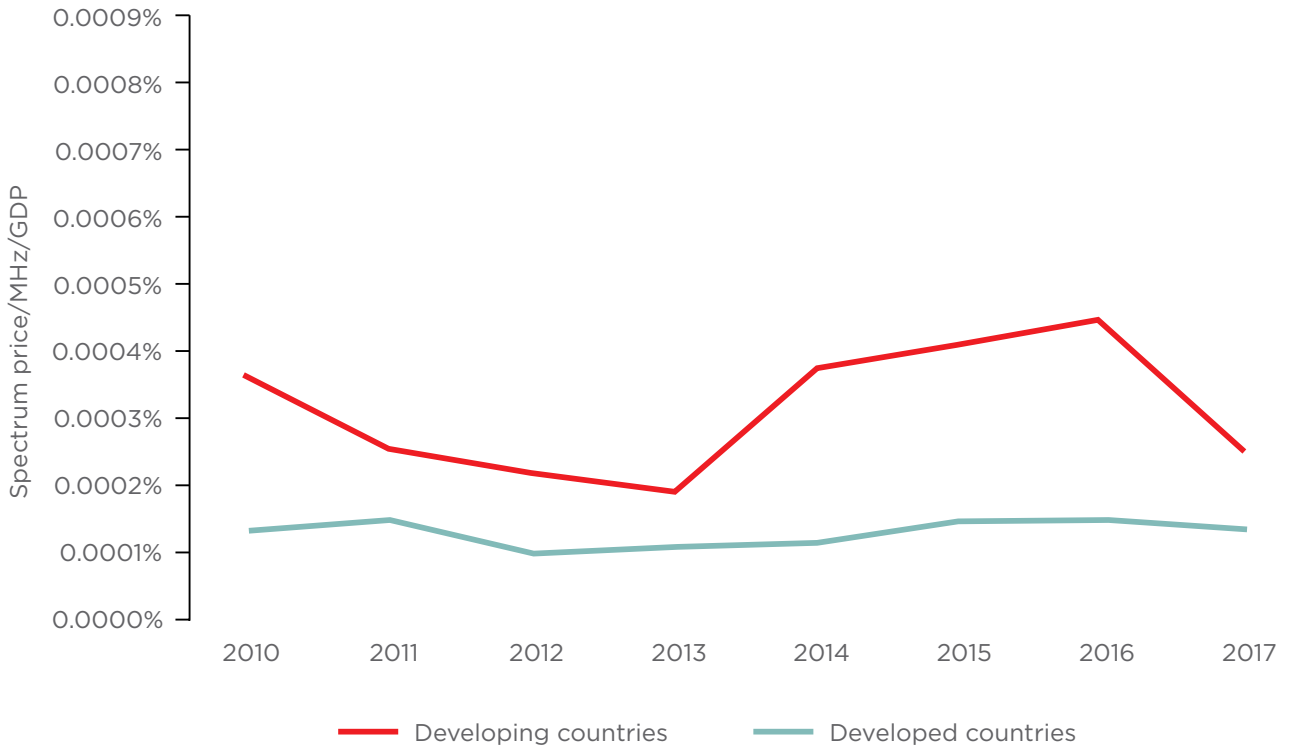
The report highlights that in the period following the Indian 3G auction in 2010, a number of factors led to both relatively high spectrum prices and unsold spectrum in India. A total of six auctions were held in the country between 2010 and 2016.

The October 2016 auction featured a much greater quantity of spectrum than previous awards and included seven bands. However, only 41% of the available spectrum was sold. The average price was $0.33/MHz/pop (across 850, 1800, 2100, 2300 and 2600 MHz), which was almost 33% higher than the median price in developing countries between 2015 and 2017. By way of context, ARPU levels in India were over the period 2010-2017 on average almost 35% lower than developing countries in Asia Pacific overall. This suggests policy decisions by the government and regulator played a role in the high spectrum prices realised in the auction, rather than local mobile market conditions.

[18] Spectrum pricing in developing countries, GSMA, 2018

Figure 22

Final spectrum prices as a percentage of GDP per capita



Source: GSMA Intelligence

Notes: spectrum prices in local currency (by MHz/pop/year) have been adjusted by inflation, GDP per capita, and licence duration, and aggregated by country, band, generation and assignment. All spectrum bands for which relevant data was available are included in this chart. Outliers have been excluded from the analysis. The analysis is based on 3-period moving averages. The spike between 2014 and 2016 is mostly due to a number of expensive assignments in India, Iraq, Pakistan, Niger and Afghanistan, among others. In 2017, prices fell back in line with the levels between 2010 and 2013.

The TRAI has given its recommendations on spectrum prices, and it seems that the DoT is planning spectrum auctions for the second half of 2019. These would potentially cover a number of bands relevant to 5G, including 700 MHz and 3.3-3.6 GHz. Pricing will be a key consideration in the success of these auctions, especially given the high debt levels, low ARPU levels and poor profitability of the industry. The existing significant deferred spectrum payments faced by several operators will also be an important factor.

However, some of the operators have raised concerns over the timing of the planned auction, noting that existing significant deferred spectrum payments will be a drag on cash flows and raising more fundamental questions over the near-term need for incremental spectrum in India at a time when the 5G ecosystem is relatively immature.

The negative impact of general taxes and regulatory levies on the sector

Mobile consumers and operators in many markets across the world are subject to substantial taxes and regulatory levies, increasingly driven by sector-specific taxes/levies. A recent report by the GSMA highlighted that on average taxes on consumers and operators accounted for 22% of sector revenues in 2017.[19] This poses a significant risk to the growth of mobile services among citizens, limiting the widely acknowledged social and economic benefits associated with mobile technology.

With a sector-specific tax burden of around 11% of revenues, India is within the top 20 nations with the highest incidence of sector-specific taxes and fees. The overall picture in the country is one where a combination of taxes and spectrum fees have a significant impact on the health of the mobile sector.

A GSMA report published in December 2015, *Digital inclusion and mobile sector taxation in India*,[20] highlighted the significant contribution mobile networks and the ecosystem played in India's socioeconomic success, but also highlighted that investment in infrastructure is constrained by an excessive tax burden on the sector. By directly affecting prices, taxes and fees on revenue tend to distort production and consumption behaviour, which may limit the use of digital services by creating a cost barrier to digital inclusion of the poor. Revenue-based taxes and fees reduce the ability of mobile operators to finance investment in digital infrastructure, and may in the long term reduce government revenues. The report recommended reducing the then licence fee from 8% to 6% and the spectrum fee from 3–8% to 1%. It estimated that by taking these steps India could realise a significant uplift in investments and total tax revenues for the Indian economy overall.

The Indian market: local policy perspectives on 5G

As the mobile industry looks to 5G to meet the demands of a digitised world, the need for pro-investment policies and modernised regulatory regimes has never been greater. 5G promises boundless connectivity and intelligent automation, taking network performance to a new level and providing a platform on which new digital services and business models can thrive.

To achieve the potential of the 5G era for consumers and industry, three critical elements are required: substantial investment in digital infrastructure, which should largely come from private sources; a digital environment that inspires trust; and a modernised policy and regulatory framework that enables this. India's National Digital Communications Policy (NDCP) unveiled in 2018 contains the necessary ingredients to encourage adoption of 5G:

- The NDCP acknowledges the importance of high-quality sustainable investments in networks. Specifically, 'Given the sector's capital-intensive nature, the Policy aims to attract long-term, high quality and sustainable investments'.
- Legacy regulations need to be reviewed, and regulatory barriers that hamper investments, sustainability and innovation need to be removed or adjusted to the new economy.
- As recognised in the NDCP, it will be critical to focus on initiatives related to fibre deployment and rights-of-way clearances, for both overground and underground infrastructure, which will be prerequisites for 5G network deployments.
- Given the ongoing financial challenges of the industry, it is a positive that the NDCP highlights the aims of achieving 'universal coverage rather than revenue maximisation', with a clear reference to the 'optimal pricing of spectrum'.
- The policy document also calls for a review of 'levies and fees including licence fees, spectrum usage charges and the definition of adjusted gross revenue, and rationalisation of the universal service levy'.

[19] Rethinking mobile taxation to improve connectivity, GSMA Intelligence, 2019
[20] Digital inclusion and mobile sector taxation in India, GSMA, Deloitte, 2015

As the GSMA highlighted in its reply to the Consultation, the NDCP identified fundamental policy levers to usher in the emerging digital future. The High Level Forum Paper provided further guidance on the potential roadblocks to adoption of 5G in India. The TRAI White Paper identifies some of the most important issues that have already been addressed and provides an overview of what needs to be done for 5G to become a reality in India.

The 5G High Level Forum recognised that the right policy and processes for rights of approvals and clearances are critical for infrastructure densification. It recommended that *'the DoT create strict guidelines for the State and Local Governments in issuing clearances. These guidelines should also be promulgated uniformly nationwide. Some key improvements in permitting are: enabling online applications, reduced fee structures, single window clearance, and time-bound permit decisions.'*

What is important now is to start delivering on the policy goals of the NDCP and other relevant Indian policy-makers.

3.3 GSMA recommendations for India

The GSMA makes a number of recommendations to help facilitate the deployment of 5G services in India and realise the potential of India's digital economy.

Enabling network deployment and densification

The GSMA agrees with the 5G High Level Forum's recommendations highlighted in the previous section on rights-of-way approvals, and notes the jurisdictional complexities brought about by the federal and state government structure in India. The GSMA has published a report on enabling rural coverage.[21] Although the focus was on rural coverage, a number of recommendations relate to the need to have the right policies for permits and rights of way and are still relevant today. Specifically, there should be cooperation between central and local authorities. Central authorities have an important role to play in:

- defining standardised permit procedures and requirements for notification, health and safety, and visual integration
- creating a single point of information for granting permits
- providing an independent appeal process, which prohibits unfounded bans of mobile network antennas
- enforcing advance notification of civil works for infrastructure deployment (e.g. road, sanitation, energy, telecoms)
- promoting initiatives to map infrastructure.

Local authorities will have to implement procedures that are efficient and consistent with the national framework and follow national health and safety policies for approving permits.

The importance of spectrum to 5G

- In India, spectrum is usually allocated by auction. In allocating spectrum, designing auctions and packaging lots, regulators often take a view on the competitive structure of the downstream market. Spectrum caps are a mechanism that can be employed to prevent spectrum concentration that adversely affects the downstream market. Spectrum caps can be helpful, but they need to be deployed cautiously to avoid unintended consequences and, ultimately, poor outcomes for consumers.
- The 5G High Level Forum recognises it is important to ensure spectrum is auctioned at a reasonable price. A specific area of focus going forward is that the reserve prices for spectrum in future auctions should be set at reasonable levels so that price determination is through fair market price discovery. By adopting a long-term perspective, setting modest reserve prices and prioritising spectrum allocation, the Indian government and regulators can ensure the long-term sustainability of the industry, its competitiveness and its ability to fund the significant investment required for 5G network deployments.

[21] Enabling Rural Coverage, GSMA, 2018

- In addition to reasonable prices, the GSMA believes that 5G needs a significant amount of new harmonised mobile spectrum in the three key frequency ranges to support coverage and capacity. Regulators should aim to make available 80–100 MHz of contiguous spectrum per operator in prime 5G mid-bands (e.g. 3.5 GHz) and around 1 GHz per operator in millimetre wave bands (above 24 GHz). 5G also requires spectrum within three key frequency ranges to deliver widespread coverage and support all use cases: sub-1 GHz, 1-6 GHz and above 6 GHz.
- Spectrum policy should also focus on incentivising heavy investment in 5G networks. This should include support for long-term, exclusive, technology-neutral spectrum licences with a clear renewal process. It is important to publish a spectrum roadmap so operators can plan and value spectrum accordingly.
- The TRAI has recommended that spectrum in the 57–71 GHz band be released as unlicensed spectrum, as well as 71–76 GHz and 81–86 GHz for use in backhaul.[22] These bands could be used in higher density urban areas as last-mile solutions where fibre links are not available. The 66–71, 71–81 and 81–86 GHz bands are part of the WRC-19 Agenda item 1.13 for possible identification for 5G/IMT. The GSMA agrees with TRAI's recommendation to retain the bands 71–76 and 81–86 GHz for backhaul. For the 66–71 GHz band, the GSMA's view is that this could be used for both licensed and unlicensed technologies for last-mile solutions and/or for backhaul depending on the situation in a given geographic area.

Full details of the GSMA's 5G spectrum positions can be found on the GSMA website.[23]

[22] "TRAI releases White Paper on Enabling 5G in India", TRAI, February 2019
[23] 5G Spectrum: GSMA Public Policy Position, GSMA, 2018

Legacy regulatory structures and the need for a new, whole of government paradigm

- Issues surrounding legacy regulatory structures are identified both in the High Level Forum report and in the White Paper. For the GSMA, an important aspect of this is the different treatment of the mobile operators (generally subject to specific regulation and to the jurisdiction of a sector-specific regulator) and other players.

- The digital age has forced on the wider ecosystem, policy-makers and traditional industry a new way of thinking and a need for increased cooperation. India has been at the forefront of the adoption of a coordinated approach inclusive of a governance structure that reports directly to the Prime Minister office, under the banner of Digital India. This approach needs to be maintained and developed further as *the cross-sectoral use cases require coordinated efforts in managing the 5G ecosystem with cross-sectoral involvement.* (see White Paper, paragraph 7.26). Already various committees with representatives from different industries have been created. The GSMA is seeking to find the best whole of government approach to 5G and has had discussions with policy-makers in India on the best way forward.

- The GSMA has contributed to TRAI's consultation on the best way to ensure that digital services are subject to the same rules as equivalent telco services.[24] By adopting a policy framework built around same rules for the same service and recognising the competitive constraint imposed on mobile operators by OTTs currently playing by different rules, policy-makers can enable an environment of fair and sustainable competition that promotes the best interests of consumers and fosters economic growth.

The need for a supportive investment and taxation policy

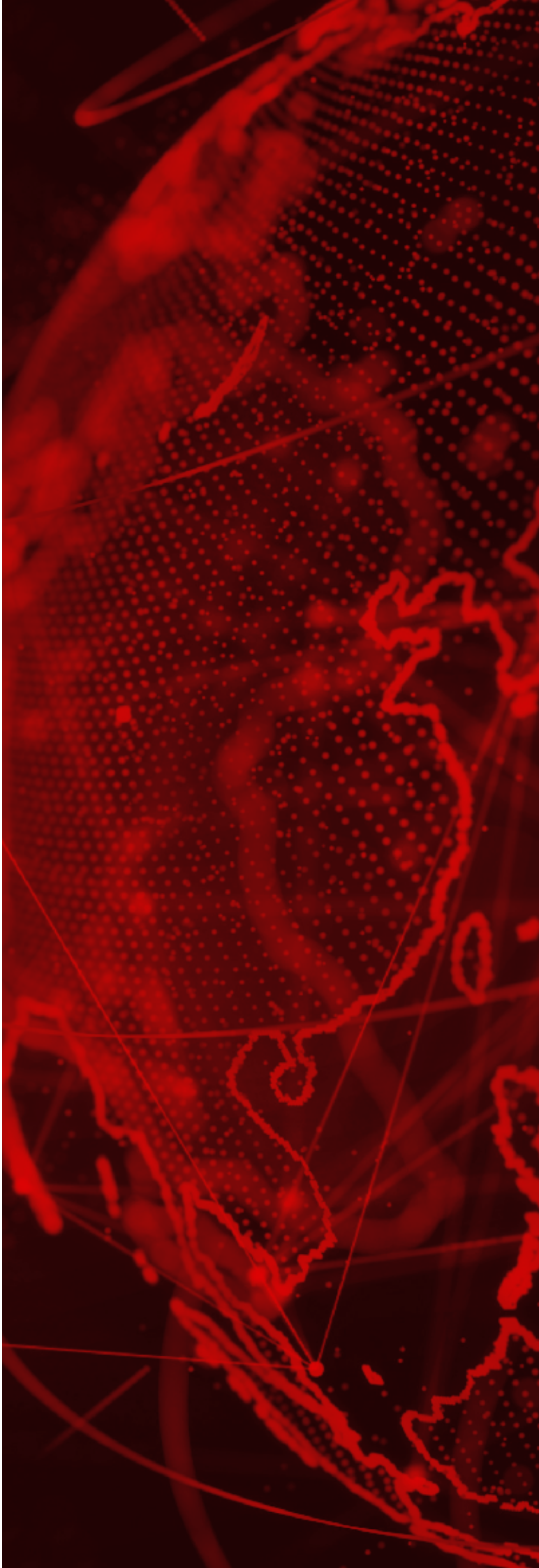
- The need for investment for 5G deployment is recognised in all relevant documents issued in the past few months on making India 5G-ready. An important aspect is that the tax framework in India should be aligned to that of developed economies. In these economies, taxes and fees on revenues are rare. Reducing taxation and regulatory fees on revenues could contribute to further evolution of the tax framework.

- The GSMA advocates for a taxation system that applies equally to all actors in the same position. Contrary to this, when India introduced a Goods and Service Tax (GST), in 2017, mobile services nationwide were taxed at 18%. The GSMA suggests that as the industry is a key enabler for socioeconomic growth, there is a strong case to lower the GST rate to 5%, as prescribed for other essential services.

- The complexity of the mobile taxation structure – for example, regarding the interpretation of the basis on which licence fee and spectrum usage charges are levied – results in disputes between the sector and the government agencies. To foster an environment that encourages investment in mobile service provision, the mobile taxation framework should be simplified.

- The current state of mobile coverage in India does not warrant the 5% USOF levy, particularly compared to universal service levies in other countries. The GSMA recommends that the present levy be reduced or phased out. This can be achieved by reducing the USOF levies on a glidepath starting from 2019.

[24] Policy-makers should look to create the same rules for equivalent digital services, with an even playing field for operators and internet/OTT players. As OTT services become more popular, they increasingly render unjustified a number of regulations designed to address alleged network bottlenecks. The principle of same rules for the same service maintains that where regulation is considered to be necessary, all equivalent services should be subject to the same regulatory and fiscal obligations, regardless of underlying technology, geographic origin or whether they are delivered by a mobile operator or OTT service provider. This framework must be driven by clear policy requirements around consumer protection, innovation, investment and competition.



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