The Mobile Economy
Latin America
2019

The GSMA represents the interests of mobile operators worldwide, uniting more than 750 operators with almost 400 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces the industry-leading MWC events held annually in Barcelona, Los Angeles and Shanghai, as well as the Mobile 360 Series of regional conferences.

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www.gsmaintelligence.com

info@gsmaintelligence.com

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Executive Summary

Surging 4G adoption lays the foundation for 5G

Driven by ongoing network investment and upcoming spectrum assignments, 4G adoption will accelerate in Latin America over the next few years, reaching 67% by 2025. This will pave the way for 5G. The two technologies will coexist for a long time, with 5G's first commercial launches in the region expected in 2020 (in Mexico, Uruguay and Brazil). We expect 5G adoption in Latin America to reach 7% by 2025. Spectrum access, site acquisition, fibre backhaul and other infrastructure regulations will become increasingly important as operators and policymakers prepare to build 5G infrastructure.

Organisations in the region agree that the main opportunity for incremental revenue from 5G lies in enterprise use cases. Higher data speeds will improve productivity in sectors relying on massive machine-type communications (mMTC), as well as in mining, logistics and manufacturing; for this reason, enterprises in the region see enhanced data speeds as the most important 5G capability. 5G-based fixed wireless access (FWA) represents another opportunity, as enterprise 5G deployments in remote areas can also improve coverage for nearby villages.

Nearly 90% of mobile subscribers will be mobile internet users by 2025

By the middle of 2019 there were 422 million unique mobile subscribers across Latin America, accounting for 67% of the total population. Nearly 80% of mobile subscribers also subscribe to mobile internet, and this is forecast to reach 87% by 2025.

Subscriber penetration varies by country. A number of markets (including Chile, Panama, Uruguay and Costa Rica) are approaching saturation with penetration rates at around 80%. Other countries (such as Nicaragua, Cuba, Guatemala and Honduras) still exhibit growth opportunities, however. The subscriber penetration rate in Venezuela is forecast to decline in the short term because of socioeconomic instabilities, which have caused its population to shrink. We expect the country's subscriber growth rate to become positive again by 2025.

Mobile boosts economic growth and supports UN Sustainable Development Goals

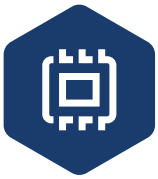
In 2018, mobile technologies and services generated 5% of GDP in Latin America, a contribution that amounted to around $260 billion of economic value added. The mobile ecosystem also supported 1.7 million jobs (directly and indirectly) and raised more than $38 billion through taxation for public sector funding. By 2023, mobile's contribution to the Latin American economy will reach just over $300 billion as countries increasingly benefit from the increased uptake of mobile services and the associated improvements in productivity and efficiency.

The mobile industry has also been a strong advocate for the UN Sustainable Development Goals (SDGs): since 2015, it has increased its impact on all 17 SDGs. In Latin America, the industry has made a strong contribution over the past year specifically on SDG 4 (Quality Education) and 5 (Gender Equality), such as through the GSMA Tech4Girls initiative, which comprises a series of hands-on educational workshops for young girls, designed to increase their self-confidence and interest in technology.

Gauging the potential of key IoT growth areas

Total IoT connections in Latin America are growing at an average annual rate of 14% and are on track to reach 1.3 billion by 2025, accounting for 5% of global IoT connections. While consumer IoT will still make up the majority of IoT connections (56%) in the region in 2025, the number of enterprise IoT connections is set to almost triple between 2018 and 2025. Enterprises in Latin America believe that IoT deployments have a strong impact on productivity; revenue protection and security are listed among the primary operational benefits.

Barriers to deployment, such as upfront costs, are gradually being addressed through national IoT deployment strategies. Governments can play a key role in strengthening the rollouts and growth of IoT, to improve living standards through security and healthcare, for example.



Advancing the digital era with startup investments and future technologies

There have been many initiatives between startups, operators, ecosystem players and venture-capital firms to advance the development of emerging technologies such as AI. Startups, in particular, have helped to drive innovation and unlock commercial opportunities. Businesses, as well as government bodies, need to prepare for the emergence of future technologies. The groundwork for this can already be seen in three Latin American markets: Mexico has set out a national strategy for supporting digital transformation and AI, while Uruguay and Colombia have begun to formulate similar frameworks.

Policy and regulation to enable a digital society

Governments and regulators across Latin American countries frequently modify policies and regulations to keep up with political developments and technological change. Recent regulatory changes to support digital transformation have included:

- creating independent institutional frameworks for legal certainty
- aligning municipal laws and national digital ambitions in areas such as network deployment
- planning for 5G development through spectrum roadmaps
- designing tax policies that foster connectivity and affordability
- devising national data protection frameworks to accelerate the digital economy.

Mobile Economy Latin America

Unique mobile subscribers

2018

416m

67% PENETRATION RATE (% of population) 73%

CAGR 2018–25

484m 2%

2025

Mobile internet users

2018

326m

52% PENETRATION RATE (% of population) 64%

CAGR 2018–25

422m 4%

2025

SIM connections

Excluding licensed cellular IoT

2018

644m

102% PENETRATION RATE (% of population) 104%

CAGR 2018–25

700m 1.2%

2025

Operator revenues and investment

Total revenues

2018

$67bn

2025

$76bn

Operator capex of $127 billion for the period 2018-2025

Smartphone connections

2018
427m (66% adoption rate)

2025
543m (79% adoption rate)

IoT connections

2018
526m

2025
1.3bn

4G connections

2018
263m
(41% adoption rate)*

2025
468m
(67% adoption rate)*

5G connections in 2025 (7% of total connections)* **51m**

*Excluding licensed cellular IoT

Mobile industry contribution to GDP

$261bn 2018 — 5% of GDP

$300bn 2023

Public funding

Mobile ecosystem contribution to public funding (before regulatory and spectrum fees)

2018
$38bn

Employment

1.7m

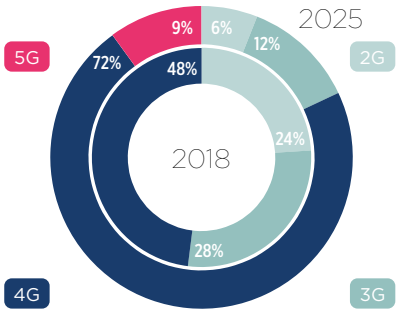
2018

Jobs

directly and indirectly supported by the mobile ecosystem

Argentina

TECHNOLOGY MIX*



SUBSCRIBER PENETRATION

2018 — 2025

69% 79%

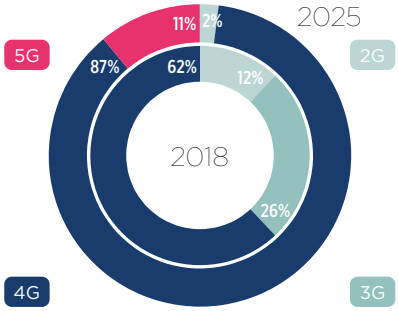
SMARTPHONE ADOPTION

2018 — 2025

60% 77%

Brazil

TECHNOLOGY MIX*



SUBSCRIBER PENETRATION

2018 — 2025

69% 75%

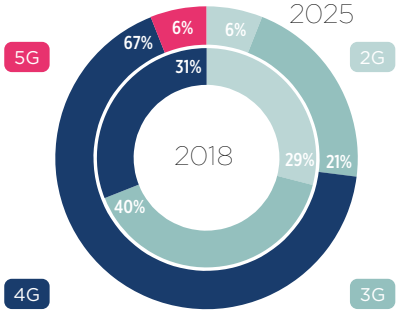
SMARTPHONE ADOPTION

2018 — 2025

81% 88%

Colombia

TECHNOLOGY MIX*



SUBSCRIBER PENETRATION

2018 — 2025

70% 76%

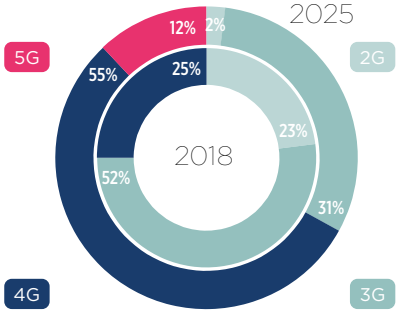
SMARTPHONE ADOPTION

2018 — 2025

55% 81%

Mexico

TECHNOLOGY MIX*



SUBSCRIBER PENETRATION

2018 — 2025

62% 70%

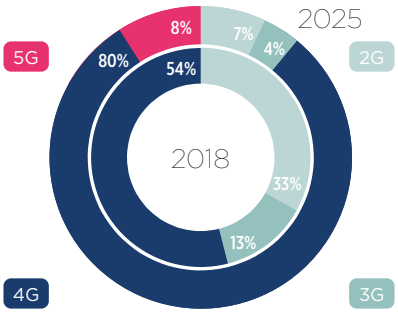
SMARTPHONE ADOPTION

2018 — 2025

63% 76%

Chile

TECHNOLOGY MIX*



SUBSCRIBER PENETRATION

2018 — 2025

84% 86%

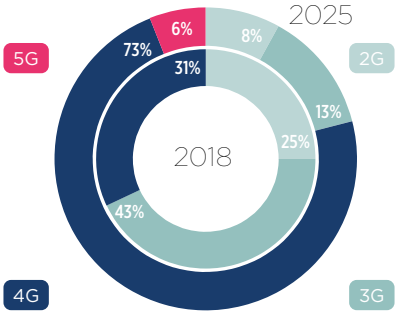
SMARTPHONE ADOPTION

2018 — 2025

62% 81%

Peru

TECHNOLOGY MIX*



SUBSCRIBER PENETRATION

2018 — 2025

72% 77%

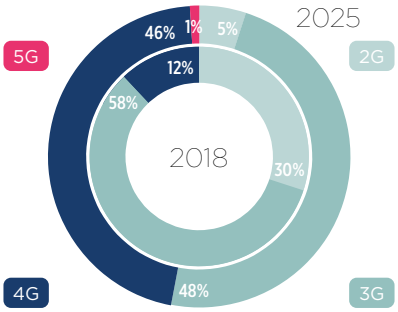
SMARTPHONE ADOPTION

2018 — 2025

52% 70%

Costa Rica

TECHNOLOGY MIX*



SUBSCRIBER PENETRATION

2018 — 2025

77% 81%

SMARTPHONE ADOPTION

2018 — 2025

58% 75%

**Totals may not add up due to rounding*

01
The mobile market in numbers

1.1
484 million unique mobile subscribers by 2025

Figure 1 Source: GSMA Intelligence

Subscriber growth continues at a steady pace

Million

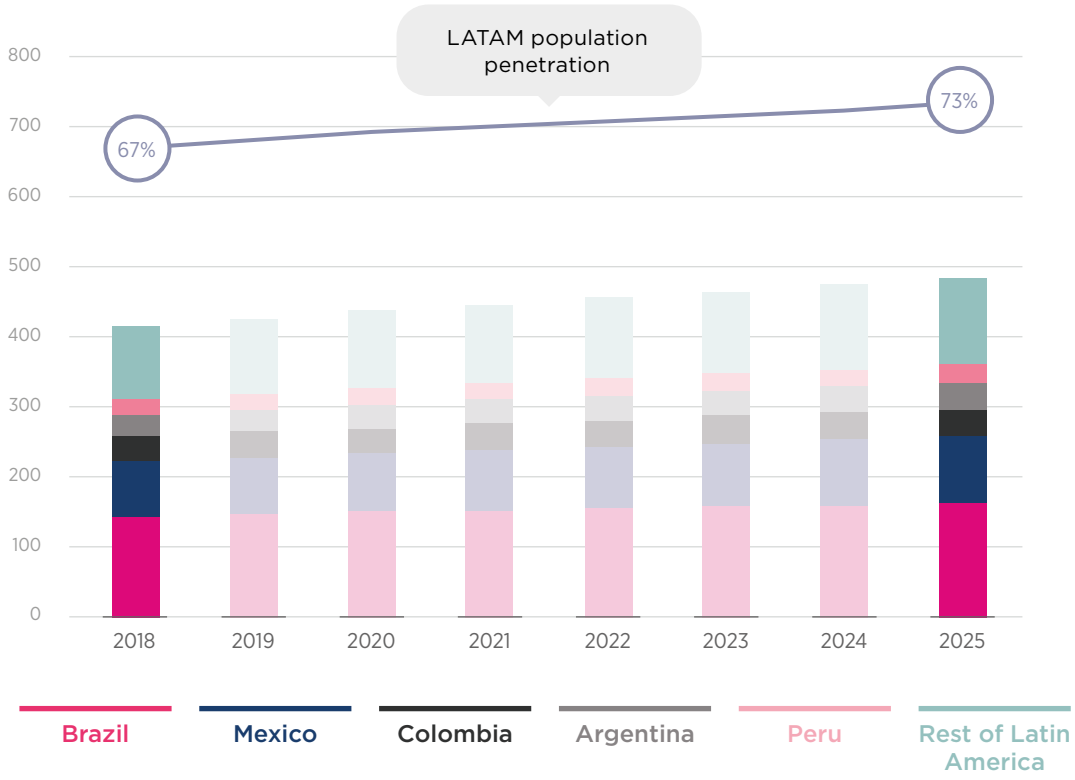


Figure 2 Source: GSMA Intelligence

Brazil, Mexico and Argentina will account for nearly two thirds of new subscribers between 2018 and 2025

Million

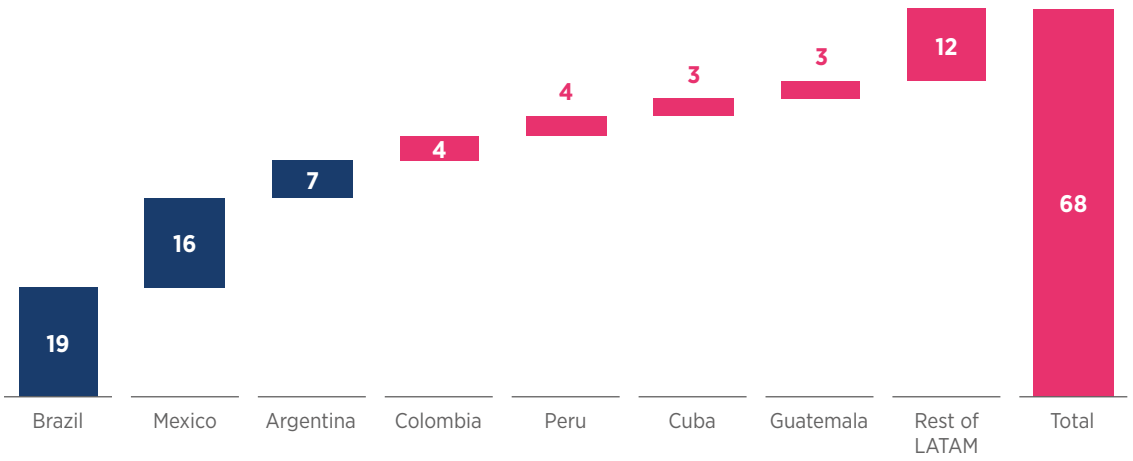


Figure 3

Source: GSMA Intelligence

Almost 90% of mobile subscribers in Latin America will be using mobile internet by 2025

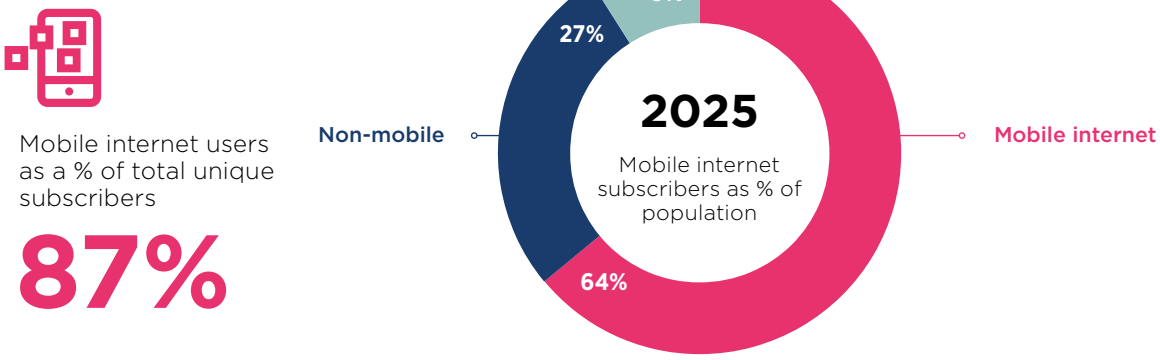


Figure 4

Source: GSMA Intelligence

Five markets will outpace the region's average smartphone adoption rate in 2025

Smartphone adoption (% of total connections)

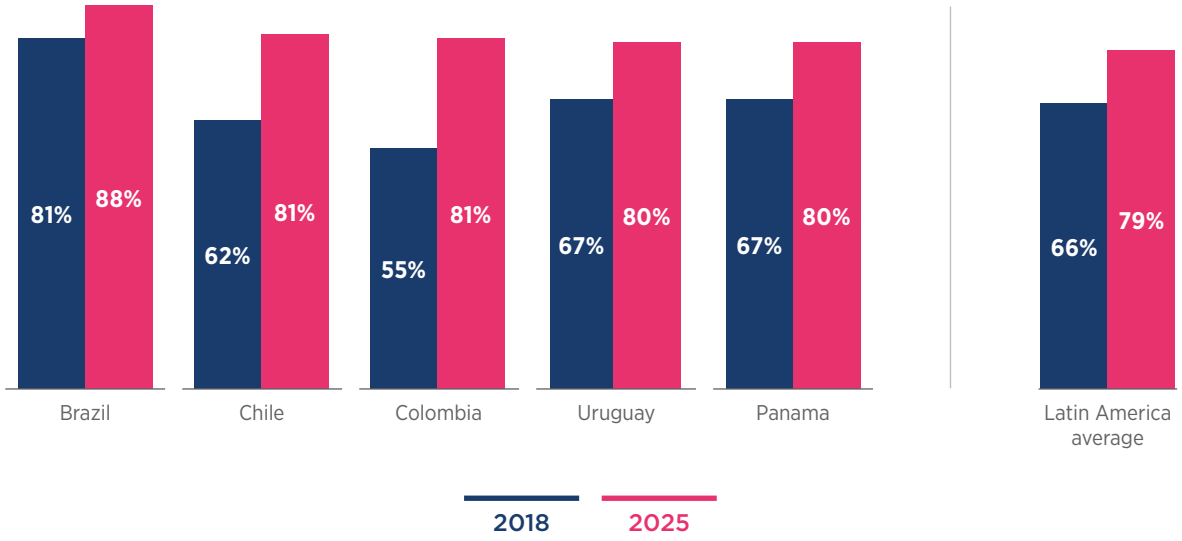


Figure 5

GSMA Intelligence Consumer Insights Survey 2018

Media and entertainment, particularly free streaming among 18-34 year-olds, is driving smartphone adoption

Average % of smartphone users in Latin America with an active SIM or mobile handset using media and entertainment services at least once a month

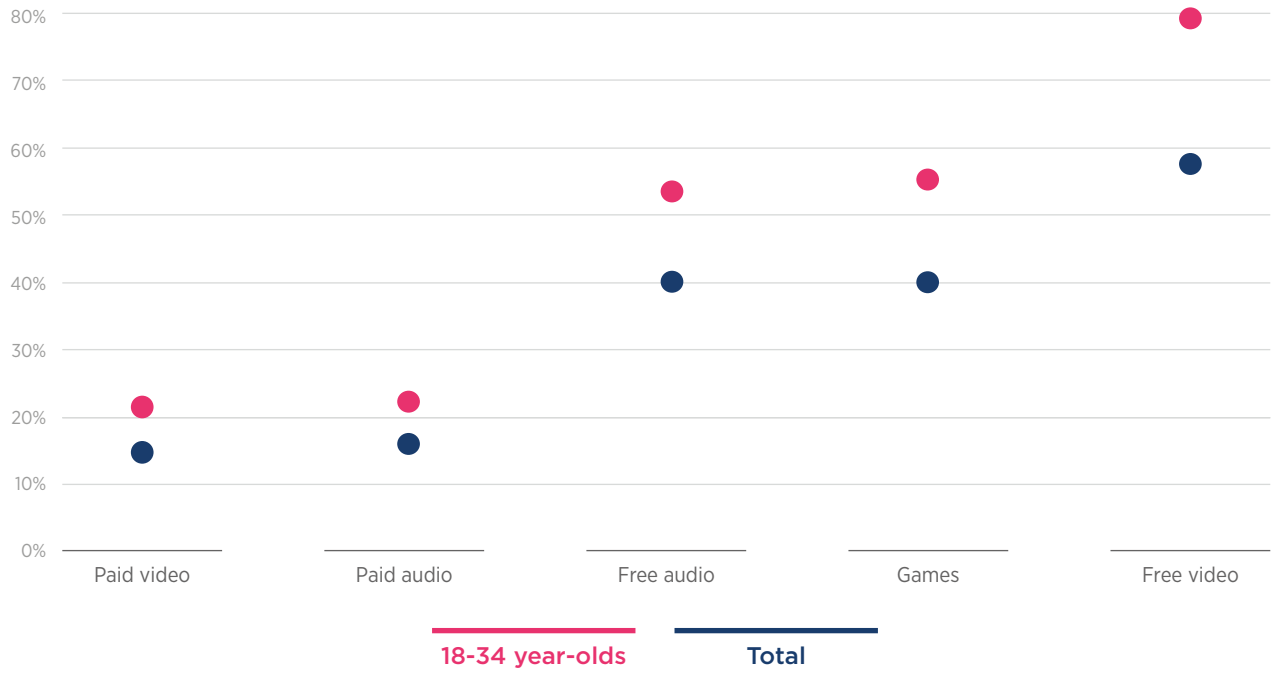
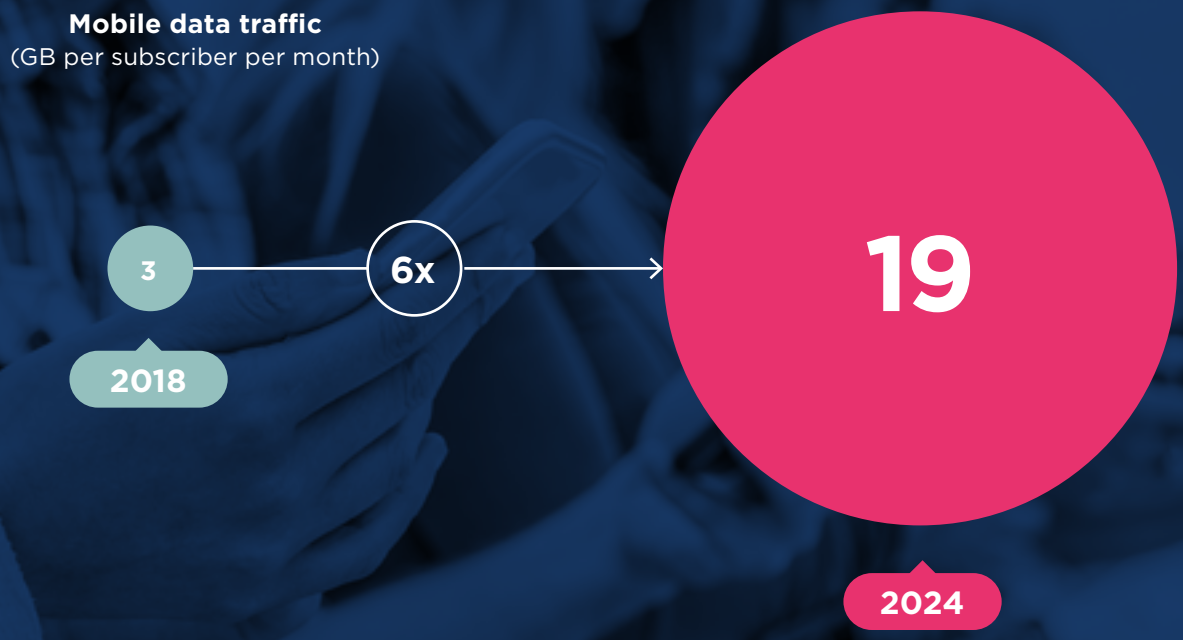


Figure 6

Source: Ericsson, GSMA Intelligence

With the growth of smartphone penetration and mobile internet, data traffic will grow more than sixfold by 2024



1.2
Latin America continues its transition from a connected to digital society

Figure 7

Source: GSMA Intelligence

4G is set to become the region's dominant technology by 2020

% of connections (excluding licensed cellular IoT)

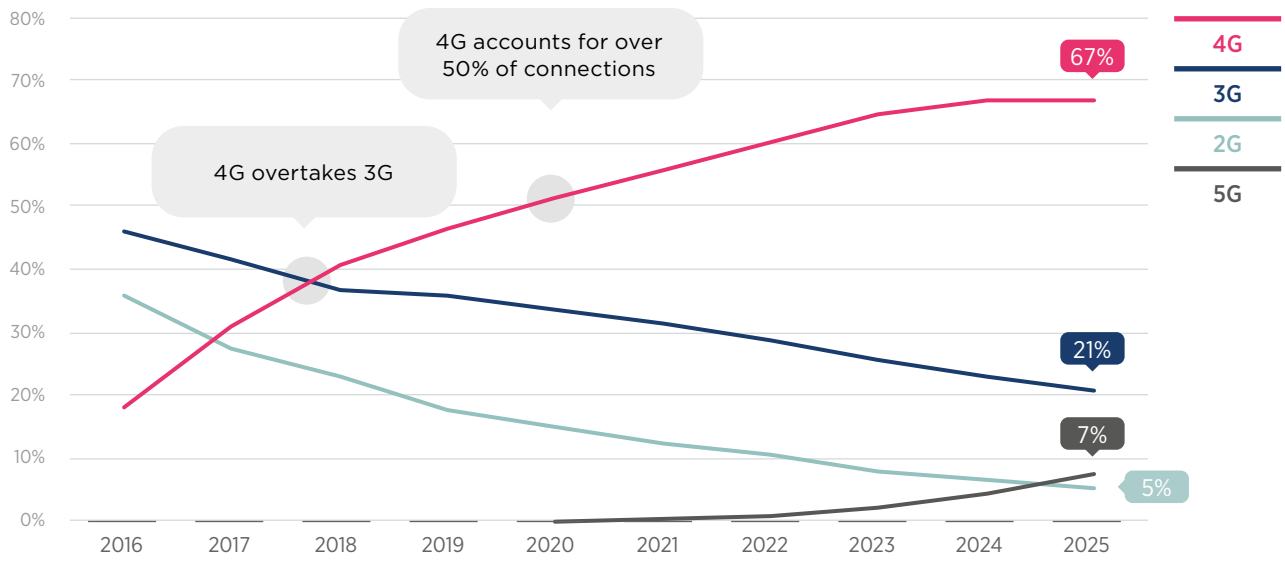
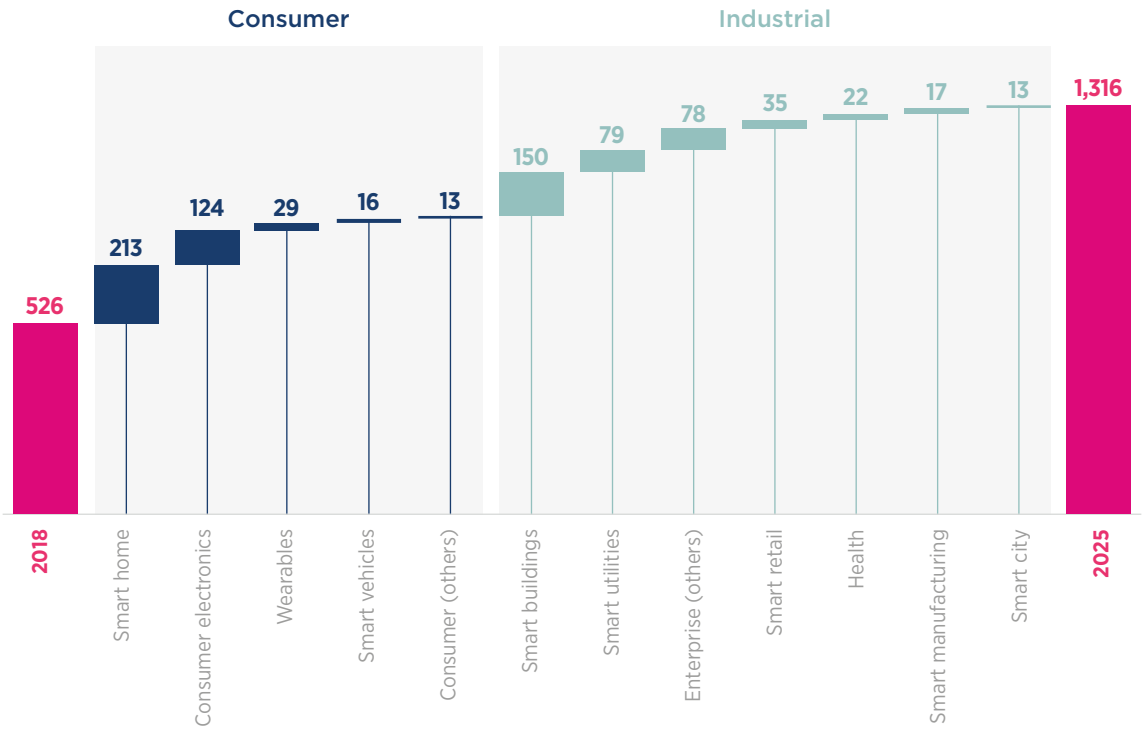


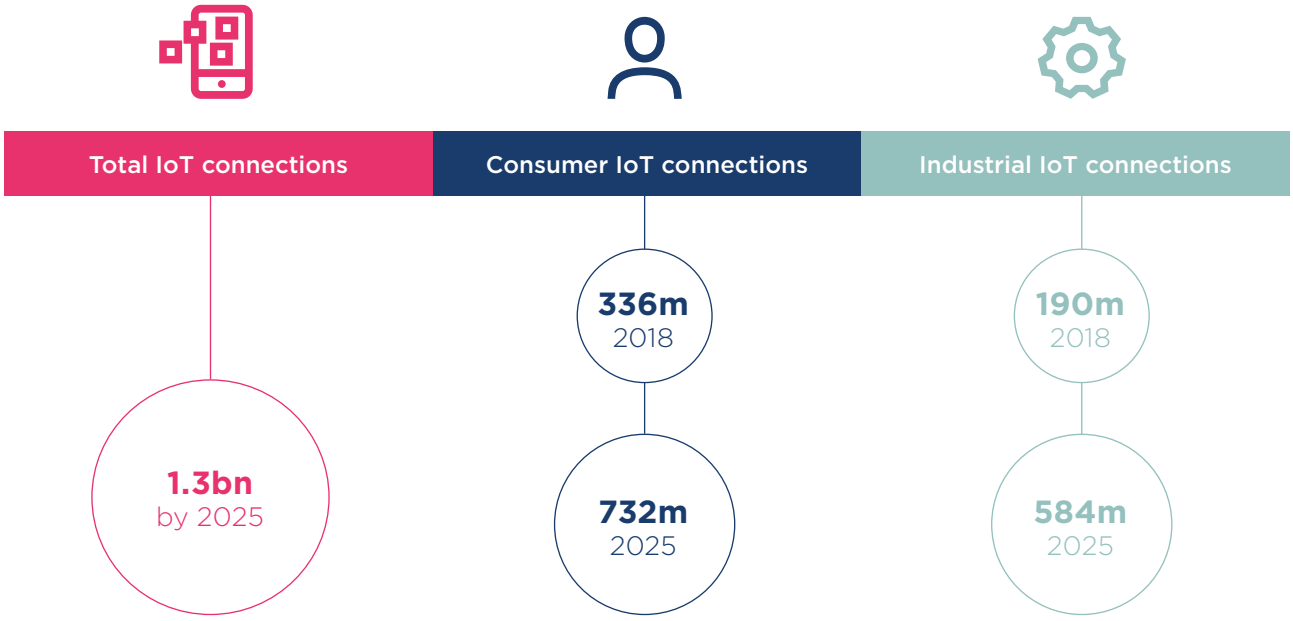
Figure 8

Source: GSMA Intelligence

Consumer IoT will account for 56% of connections by 2025 in Latin America, while industrial IoT connections will almost triple

Connections (million)





Consumer (others) includes trackers for children, the elderly and pets, as well as drones and robots.
Enterprise (others) includes fleet management and applications in agriculture, oil, mining and construction

1.3
A modest financial outlook: 4G begins to pay dividends, as 5G capex ramps up

Figure 9

Source: GSMA Intelligence

Currency fluctuations and economic instability have resulted in revenue volatility in Latin America, but 4G will support top-line growth

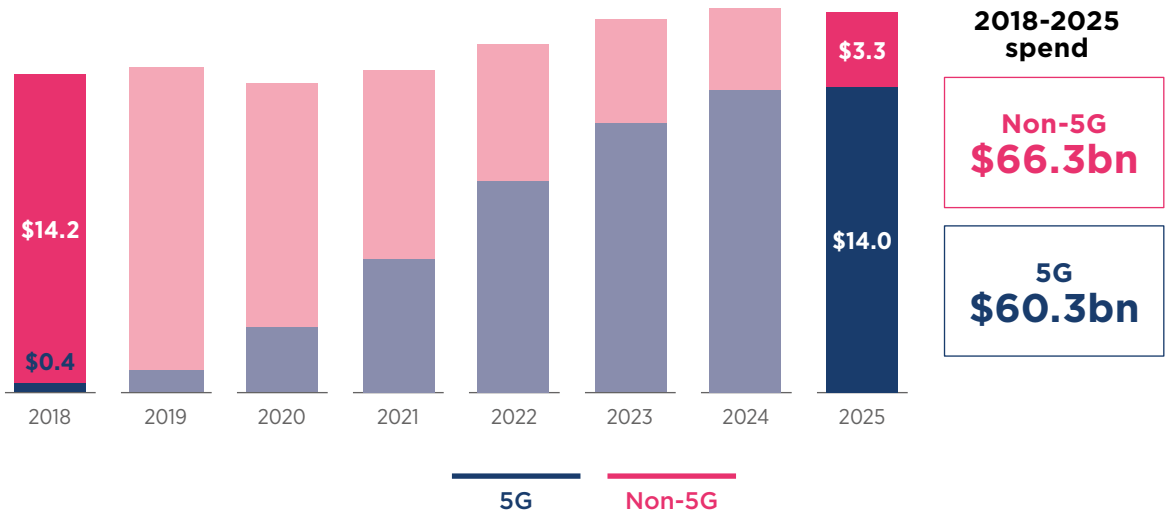
Billion

Figure 10

Source: GSMA Intelligence

Infrastructure investment will continue to be dominated by 4G until it is surpassed by 5G in 2022

Capex (billion)



02
Mobile contributing to economic growth and addressing social challenges

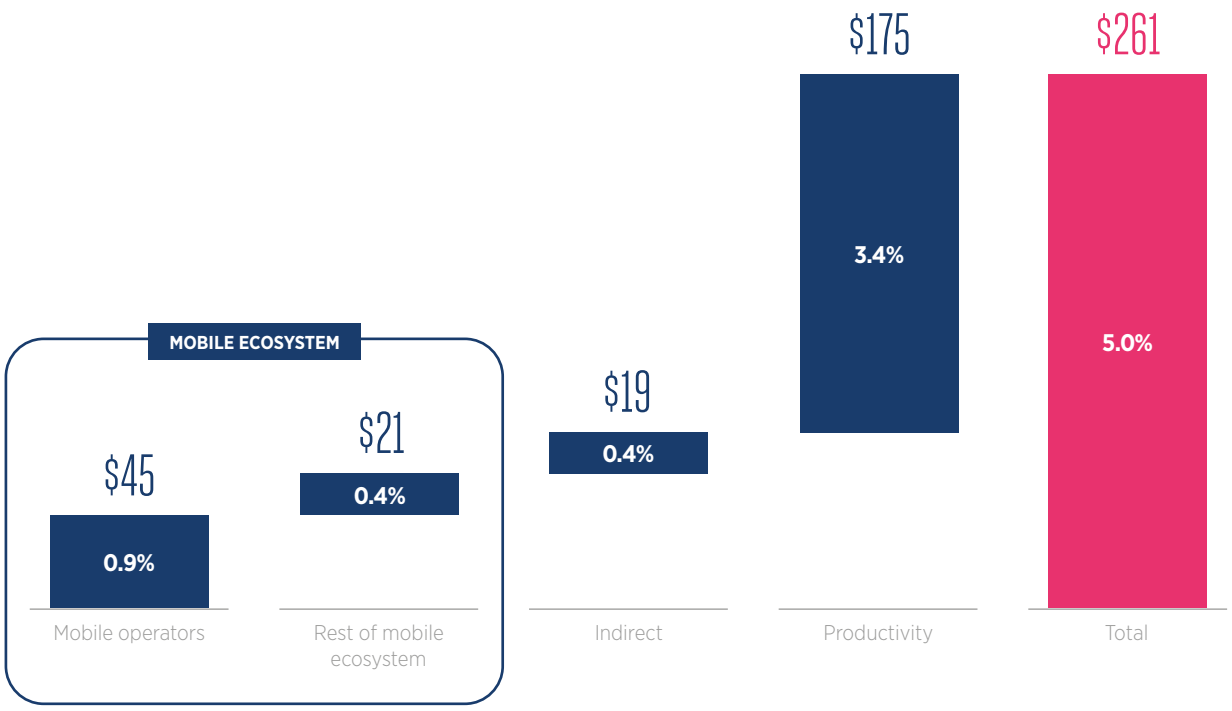
2.1
Economic contribution

In 2018, mobile technologies and services generated 5% of GDP in Latin America, a contribution that amounted to around $260 billion of economic value added. The mobile ecosystem also supported 1.7 million jobs (directly and indirectly) and raised more than $38 billion through taxation for public sector funding. By 2023, mobile's contribution to the Latin American economy will reach just over $300 billion as countries increasingly benefit from the higher uptake of mobile services and the associated improvements in productivity and efficiency.

Figure 11 Source: GSMA Intelligence

The mobile ecosystem contributed around $260 billion to Latin America's economy in 2018

Total economic contribution of the mobile ecosystem (billion, % of GDP).



Note: totals may not add up due to rounding.

Figure 12

Source: GSMA Intelligence

The direct economic contribution is mainly being driven by mobile operators

Direct economic contribution (billion, % of GDP)

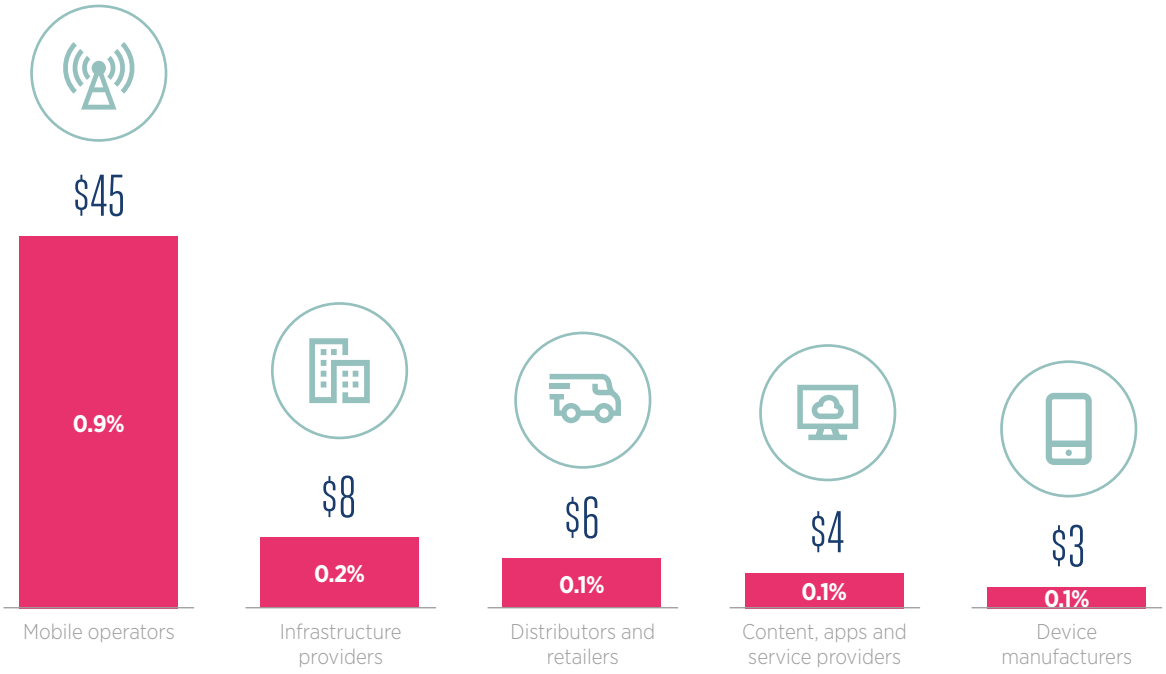


Figure 13

Source: GSMA Intelligence

The mobile ecosystem directly employs 740,000 people in Latin America and supports another 980,000 jobs indirectly

Employment impact (jobs, thousands)

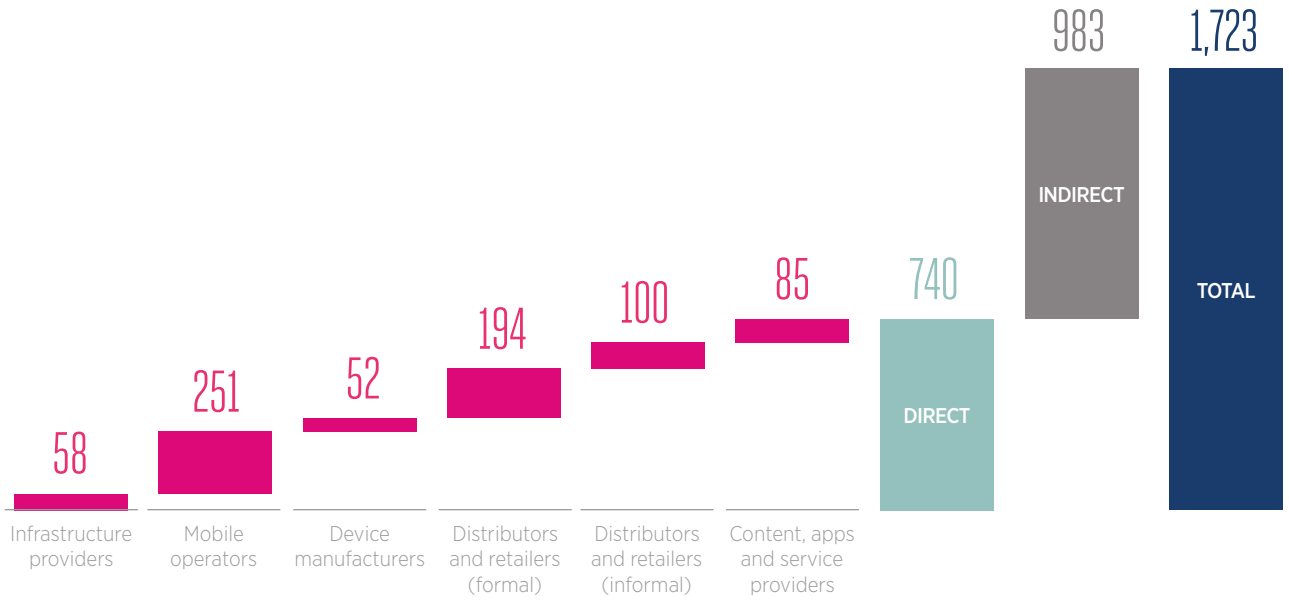
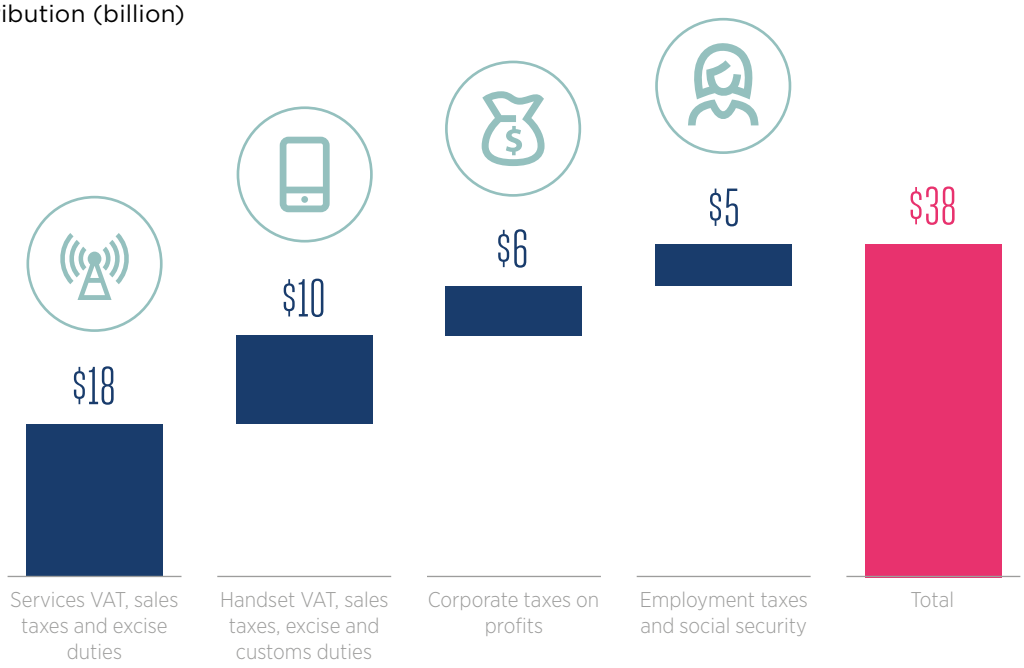


Figure 14

Source: GSMA Intelligence

In 2018, the mobile ecosystem contributed just over $38 billion to the funding of the public sector through consumer and operator taxes

Fiscal contribution (billion)



Note: totals may not add up due to rounding.

Figure 15

Source: GSMA Intelligence

Economic contribution of mobile in Latin America will increase to over $300 billion in 2023, mainly driven by productivity gains

Economic contribution of mobile ecosystem (billion)

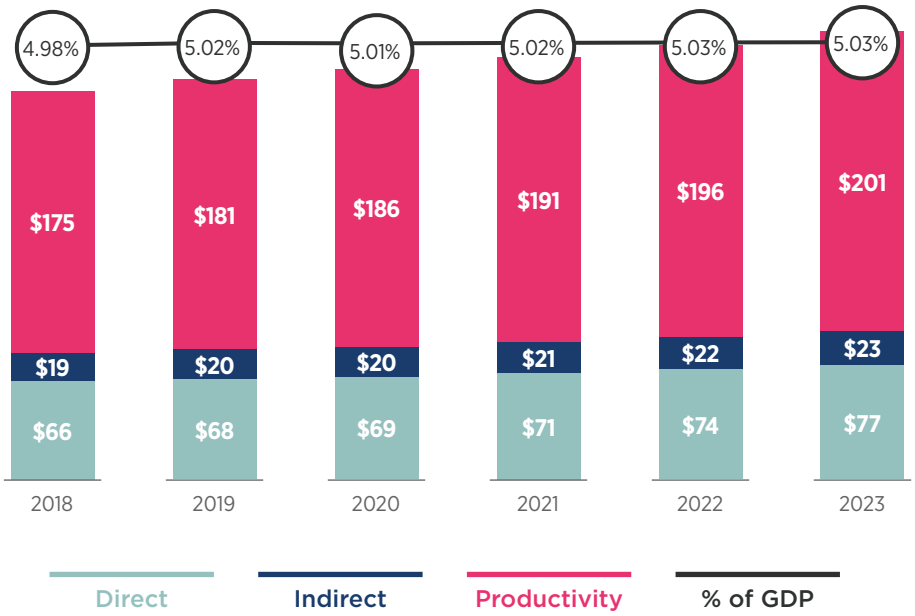


Figure 16

Source: GSMA Intelligence

5G will contribute $90 billion to the Latin American economy by 2034, representing 5.4% of GDP growth

5G's contribution to GDP over the next 15 years by sector (%)

For more information, see *Study on Socio-Economic Benefits of 5G Services Provided in mmWave Bands*, GSMA, 2019

2.2
Enhancing the benefits of mobile internet

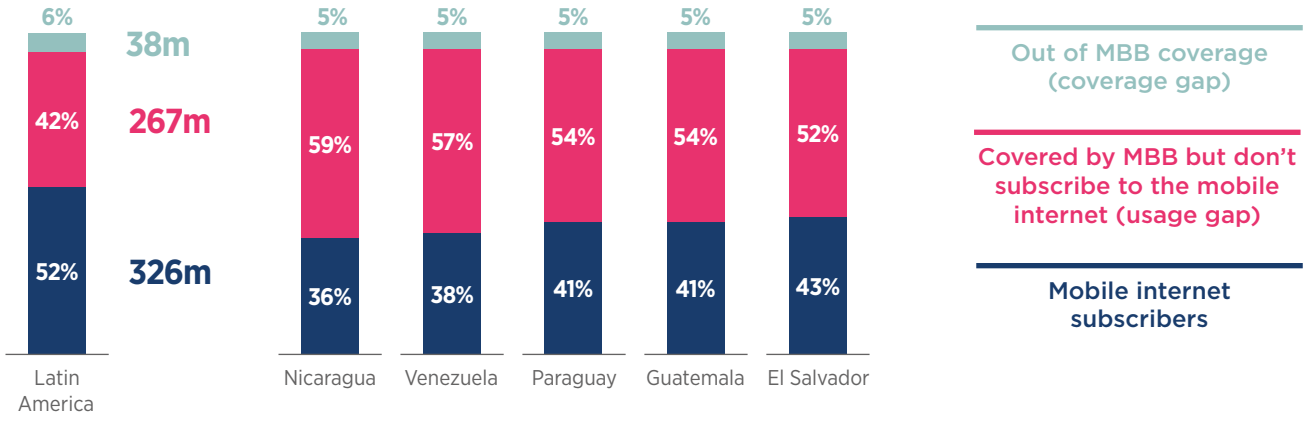
At the end of 2018, 326 million people across Latin America were subscribed to mobile internet, an increase of 18 million on the previous year. Although 48% of the population still do not subscribe to mobile internet networks, the coverage gap is not a barrier considering that 94% of the population in Latin America has access to mobile internet services.

Figure 17

Source: GSMA Intelligence

With almost universal mobile internet coverage, there is an opportunity to connect around 267 million new subscribers

% of population for countries with the highest usage gaps in Latin America



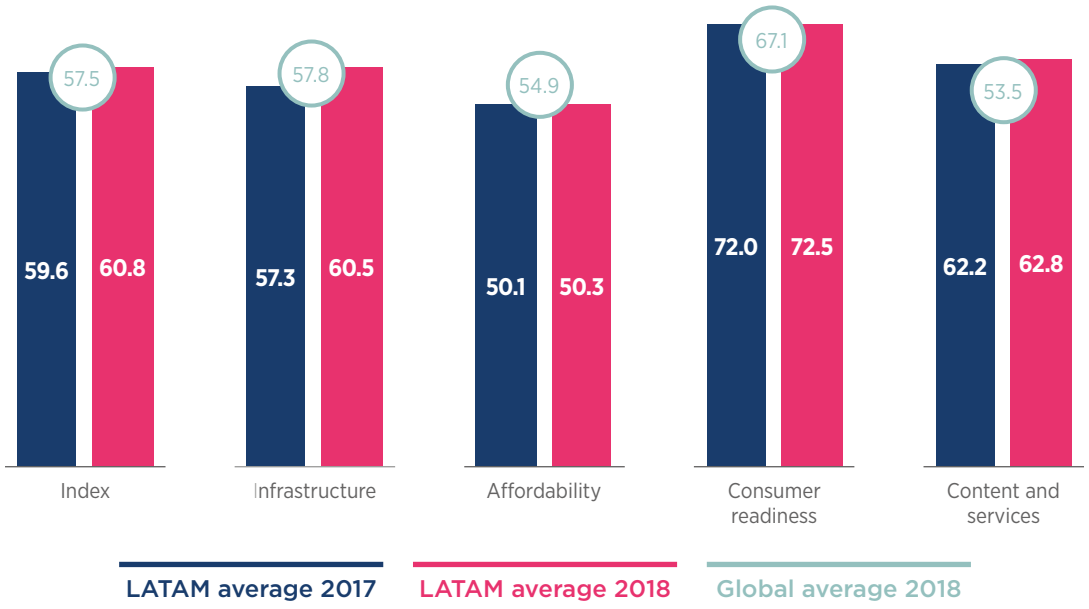
Latin America's score for infrastructure in the GSMA's Mobile Connectivity Index improved the most over the last year, largely because of significant investments in 4G infrastructure. The score for content and services also improved because of the proliferation of locally relevant content.

However, affordability is still a challenge in a handful of markets. For instance, Venezuela continues to experience economic volatility and instability, with hyperinflation expected to reach 200,000% by the end of 2019.[1] Affordability therefore remains the principal barrier to closing the usage gap.

Figure 18 Source: GSMA Intelligence

Modest improvements across the board in 2018, but affordability remains behind global average

GSMA Mobile Connectivity Index score



1. International Monetary Fund, October 2019

2.3
A big commitment to big goals

The mobile industry's progress on advancing the SDGs in Latin America

As the first industry to have committed to the UN SDGs, the mobile industry continues to have a substantial positive impact on lives, with tangible results. As testament to this, its scores across all 17 SDGs have been higher every year since 2015. According to the GSMA's 2019 report tracking this progress,[2] Latin America scores highest in SDGs 4 (Quality Education), 5 (Gender Equality) and 9 (Industry, Innovation and Infrastructure). The region has also seen significant improvements in SDGs 2 (Zero Hunger) and 3 (Good Health and Well-being) in particular over the last year.

Highest SDG Scores

Use mobile to improve education

130m 2017
180m 2018

Percentage of mobile subscribers

Most Improved SDG Scores

Use mobile to monitor health

90m 2017
130m 2018

Percentage of mobile subscribers

2. 2019 Mobile Industry Impact Report: Sustainable Development Goals, GSMA, 2019

Operators in Latin America join forces to build a better future

Launched in 2014, the GSMA's We Care initiative sets out the framework for industry cooperation in Latin America to achieve the SDGs. This has helped align operators on a local level in their commitments to facilitate mobile solutions for social problems. At the end of 2018, We Care extended beyond Latin America for the first time, as a number of Kenyan operators became signatories of a Child Online Protection industry charter. So far, We Care has had a direct impact on eight SDGs through 25 public commitments in Latin America.

We Care

Working together to provide a safer and more reliable mobile experience

1st
Campaign launched in February 2014

16
Country launches in the region

25
Public commitments of industry initiatives

8
SDGs impacted

10
Different areas of industry initiatives

55
Mobile network operators committed to a better sustainable future

Promoting gender equality through education initiatives

As part of the GSMA's Women4Tech programme, which aims to reduce the gender gap in the mobile industry, the GSMA launched Tech4Girls in 2018. This initiative comprises a series of educational workshops for young girls that are designed to foster self-confidence and interest in technology and encourage them to pursue careers in STEAM (science, technology, engineering, art and design, and mathematics). Having first been introduced in North America, Tech4Girls quickly expanded into Latin America where it was initially deployed in Buenos Aires. The initiative won the 2018 Corporate Citizen of the Americas Award from the Organization of American States in the category 'Technical Skills for the Future of Work'; it also led to the GSMA being recognised by the Women Economic Forum (WEF) as a recipient of the WEF's 2019 award in the category of 'Iconic Company Creating a Better World for All'.

Examples of operator initiatives in the region impacting the SDGs

América Móvil

In partnership with the Carlos Slim Foundation, América Móvil is removing barriers to education and training through the Aprende.org platform, which provides previously inaccessible material for personal development. The project aims to ensure inclusive and equitable quality education for all.

Telecom Argentina

Since 2015, Telecom Argentina has been developing the Nuestro Lugar (Our Place) programme to promote responsible, positive and creative use of technology.[3] This is achieved through a range of activities on digital literacy, safety and cyber-citizenship for children, parents and teachers.

Tigo

Tigo has collaborated with Sheva to launch Connected Women, a programme which aspires to improve women's access to mobile services.[4] This initiative provides girls and women aged between 15 and 40 with tools and knowledge about using mobile phones and mobile internet to improve their personal and professional lives.

Telefônica Brazil

In São Paulo, Telefônica Brazil has used mobile-network big data to track human mobility, assess air quality, and gauge the health and wellbeing of the city's inhabitants. Using mobility data, it has been able to predict pollution problems up to two days in advance, which has allowed the city to take precautionary measures to protect public health, for example by guiding traffic via alternative routes and advising vulnerable populations, such as those with respiratory conditions, in areas of high pollution.[5]

TIM Brazil

RoboLab is an educational initiative by Qualcomm, Instituto TIM and +Unidos Group Association, in cooperation with São Paulo State's Department of Education. It is a proposal for computer thinking and robotics to be part of the regular curriculum in public schools, using devices connected to a high-speed network. Instituto TIM provides connectivity to the schools participating in the project.

3. http://www.nuestrolugar.com.ar/index.php
4. See Expanding horizons for Guatemalan girls and women by narrowing the digital gender gap
5. Telefónica Case Study: Predicting air pollution levels 24 to 48 hours in advance in São Paulo, Brazil, GSMA, 2018

03
Key industry trends

The first 5G networks around the world have been deployed, and further rollout plans are gaining momentum. Spectrum auction consultations and 5G trials are likewise taking place in Latin America: for example, the first 5G-ready network was demonstrated for FWA services in Uruguay in April 2019. Latin America's journey to 5G will be defined by the completion of 4G deployments along with mobile IoT. These will lay a solid foundation for 5G rollouts in the region over the coming years, at which point we expect investment in local innovation to accelerate and the emergence of transformative technologies such as AI.

3.1
4G adoption rises alongside the potential for 5G

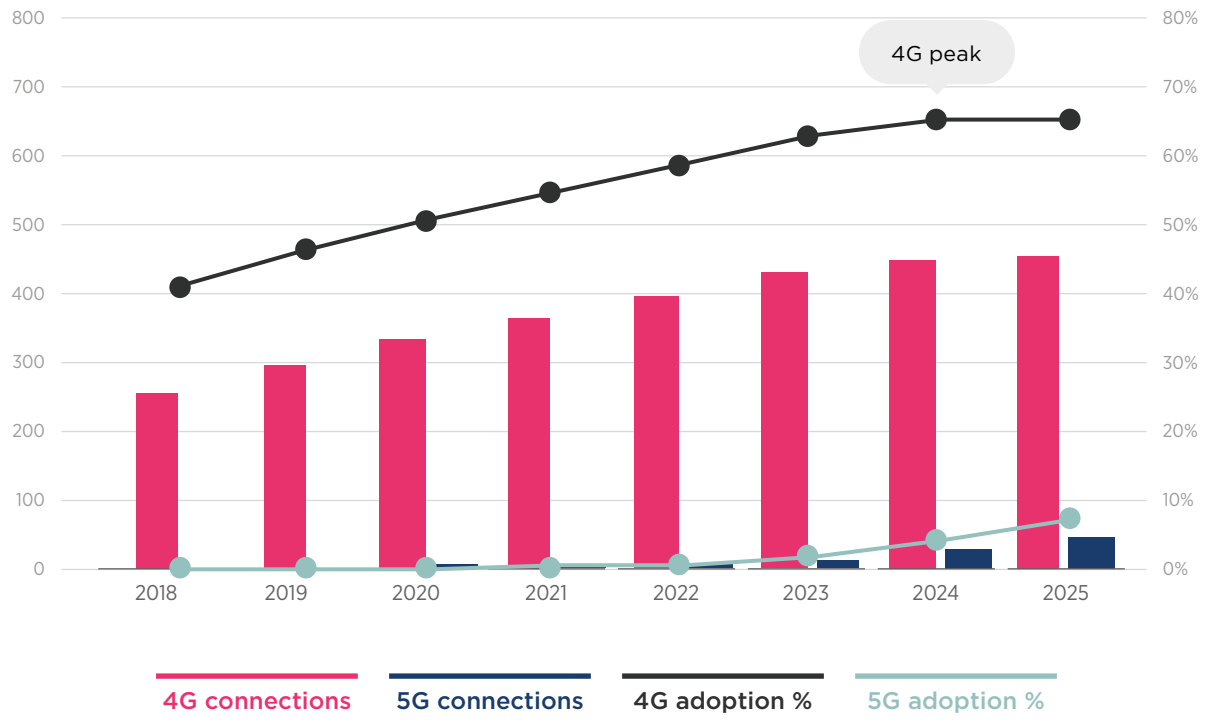
4G adoption in Latin America is growing rapidly because of a number of factors: a high smartphone adoption rate, strong mobile internet uptake, disappearing 3G tariffs and ongoing 4G investment.

4G adoption (as a percentage of total connections) is forecast to reach 67% by 2025, and it will remain the dominant technology long after 5G has launched.

Figure 19 Source: GSMA Intelligence

4G still has a long life ahead of it

Million



Spectrum is still being assigned - for example, in Colombia where auctions for the 700 MHz and 1900 MHz bands are planned for Q4 2019. Mobile operators also continue to upgrade their LTE networks with more than 30 LTE-Advanced and LTE Advanced-Pro deployments in the region to date, in addition to carrier aggregation and 4x4 MIMO deployments to optimise network performance. A number of Latin American operators are in the process of optimising their technology mix to improve their 4G networks and gain capacity.

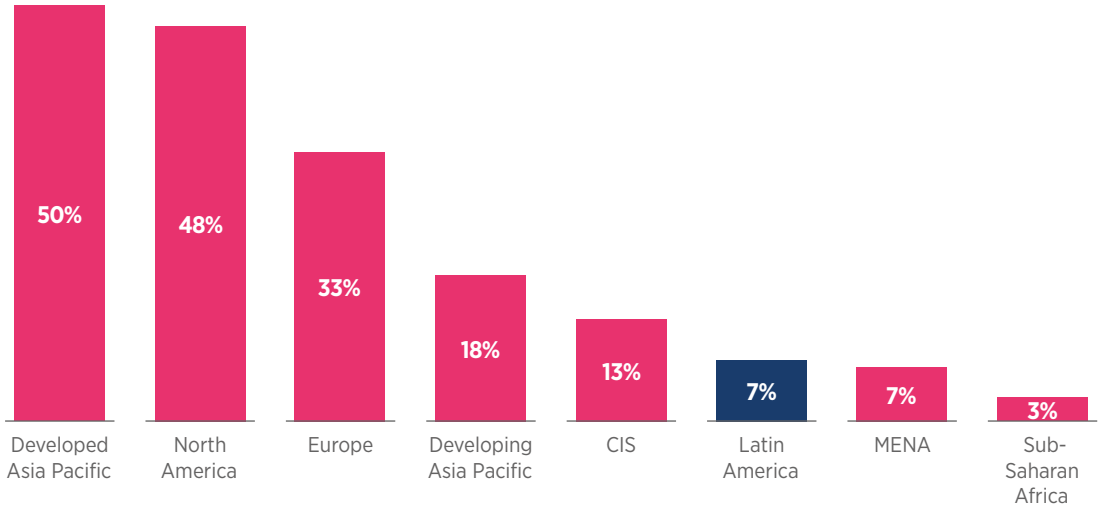
Given the long time lag between infrastructure investments and return, as well as the slow pace of handset replacements and the high initial cost of 5G-enabled mobile devices, 5G will be a longer-term opportunity in Latin America.

Because of ongoing operator investments in 4G, we expect 5G and 4G to coexist for a substantial period of time. 5G adoption rates are forecast to hit 7% by 2025, meaning that 5G adoption will increase at a slower pace in Latin America compared with other regions. However, there are outliers such as Mexico and Brazil, which will have above-average adoption rates, at 12% and 11% respectively in 2025.

Figure 20 Source: GSMA Intelligence

Latin America is in the bottom three for regional 5G adoption rates (excluding FWA) by 2025

% of total connections



Historically, markets with high 4G adoption rates (such as South Korea and the US, which both surpassed 60% by the end of 2016) have allocated spectrum early and with sufficient bandwidth per operator. As operators and policymakers in Latin America prepare to build 5G infrastructure, spectrum access needs to be a priority. Site acquisition, management of technology mix, coverage, rights of way and fibre backhaul are further aspects that need to be addressed early on.

5G has the potential to elevate the Latin American economy through enterprise services and FWA

As mobile continues to heavily influence the digital transformation of societies and impact key industry verticals, the transition from 4G to 5G will further strengthen productivity and GDP growth in Latin America.

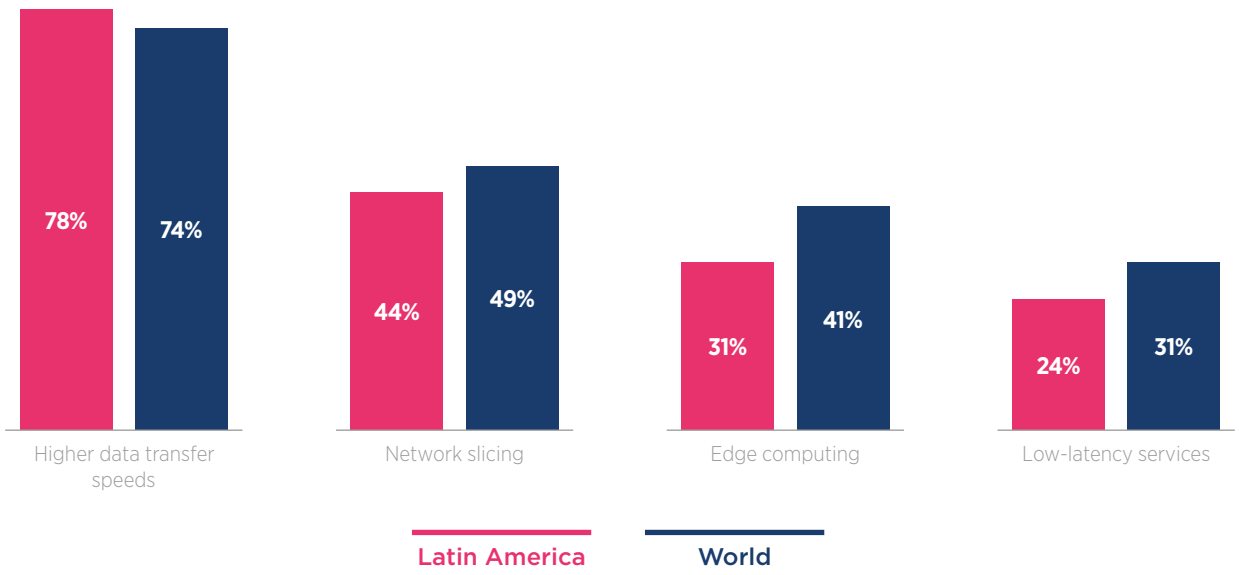
For the region to keep pace with the rest of the world, 5G must be adopted to power areas such as industrial IoT. Organisations in Latin America agree that the greatest opportunity for incremental revenue lies in enterprise use cases. Enterprises in the region have also identified higher data transfer speeds as the most important 5G capability. This feature is crucial for sectors relying on mMTC and certain industries, such as mining, logistics and manufacturing. Although LTE can address general connectivity needs, the advent of 5G allows enterprises to greatly augment their productivity. For instance, farmers, miners and the logistics sector will all benefit from enhanced predictive analytics for maintenance, improved access to cloud, smart monitoring of cargo in real time and greater efficiencies in the supply chain.

Operators in developed markets such as the US and South Korea have deployed 5G in urban areas with an initial focus on consumers, using enhanced mobile broadband (eMBB). If operators in Latin America concentrate on enterprises first, then they can more quickly realise the potential of 5G for verticals and earn a more sustainable return on investment in 5G new radio (NR).

Figure 21 Source: GSMA Intelligence Enterprise IoT Survey 2018

Latin American enterprises across all verticals find speed the most compelling 5G capability, in line with the world view

Which of the following 5G capabilities would make it compelling for your organisation to use 5G for future IoT deployments? (% of respondents)



Network slicing: requiring a specific network slice to meet defined SLAs on throughput, latency, security, speed, reliability etc.
Edge computing: requiring storage/computing resources at the edge (e.g. device, gateway)

Depending on spectrum bandwidth availability, 5G could also help address existing coverage issues in remote areas. For instance, the deployment of 5G for mines will also support connectivity for nearby villages that typically experience very poor to no fixed broadband. 5G-based FWA is therefore another area of opportunity.

FWA has much potential in Latin America, mainly in regions where the rate of fixed broadband penetration is low and ARPU is high relative to mobile broadband. Compared with fixed broadband, FWA can also reduce the cost per bit to connect households to broadband by 74%.[6] However, rather than replacing fixed broadband, FWA is a complementary solution to areas that are difficult to reach with fixed infrastructure. The region's first 5G FWA network was launched earlier this year by Antel, Uruguay's state-owned operator, in partnership with Nokia.

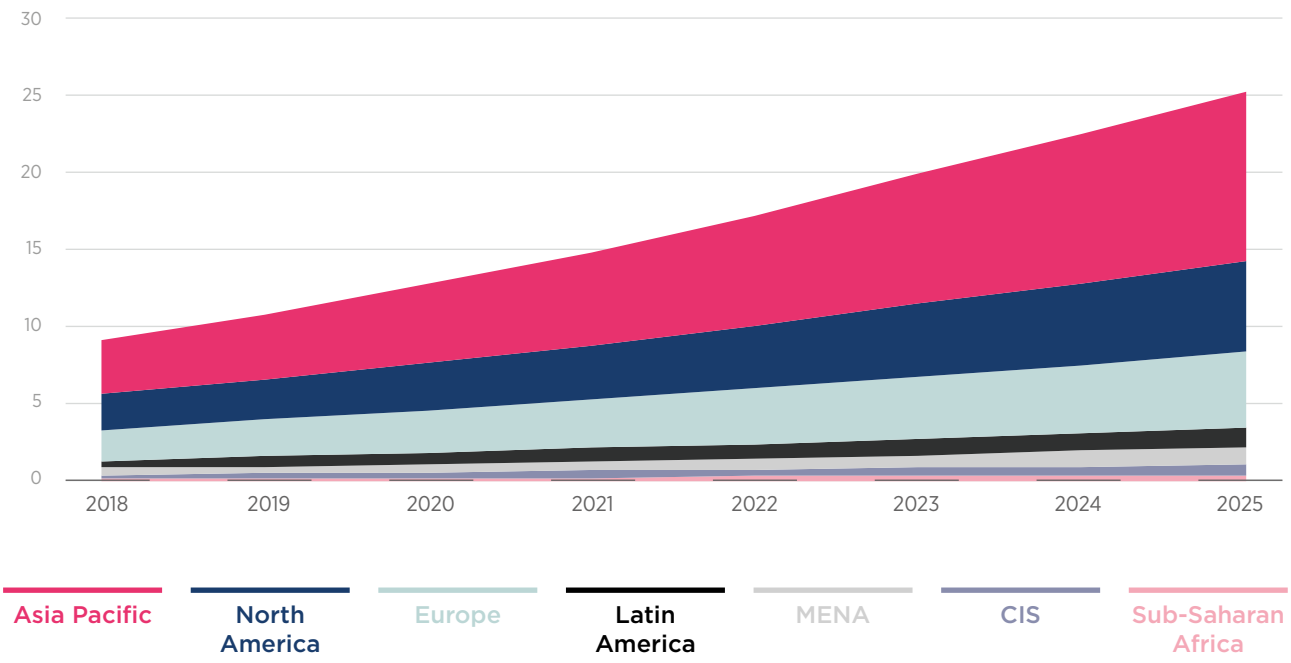
3.2
IoT: gauging the potential in key growth areas

By 2025, the total number of IoT connections in Latin America (1.3 billion[7]) is expected to account for 5% of global IoT connections. CAGR in the region will be on par with those of North America and Europe, at 14% between 2018 and 2025. However, some regions with a smaller connections base (e.g. Sub-Saharan Africa and the Middle East and North Africa) will have a higher annual growth rate. In the IoT space, Latin America is an attractive region for investment because of its strong smartphone adoption rates and improving infrastructure. For example, SoftBank launched a fund in 2019 to invest $2 billion in innovative companies in Latin America.[8]

Figure 22 Source: GSMA Intelligence

IoT connections growth: Latin America will reach 1.3 billion IoT connections by 2025

IoT connections (billion)



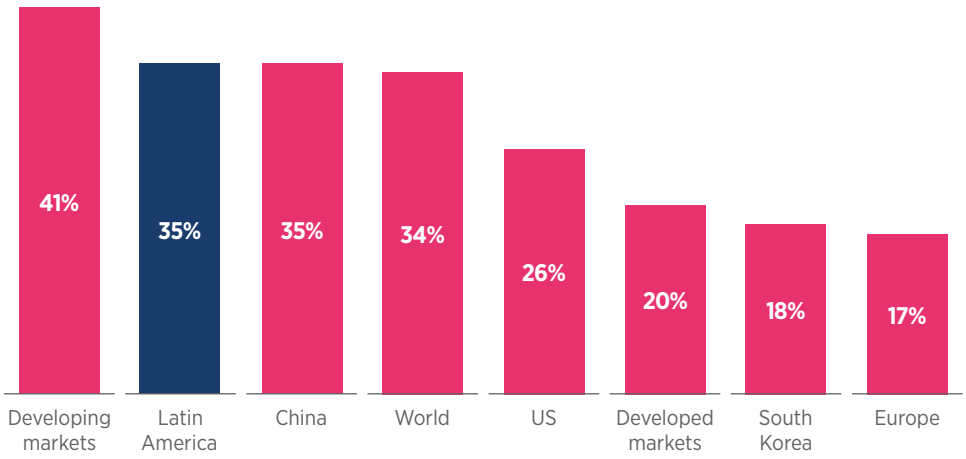
6. Fixed Wireless Access: economic potential and best practices, GSMA, 2018
7. Includes licensed cellular, as well as unlicensed low-power wide-area (e.g. SigFox, LoRa), short range (e.g. Wi-Fi, Zigbee), fixed, satellite and others.
8. "Sotbank Group corp. announces launch of new $5 billion technology growth fund for Latin America", SoftBank, 2019

While consumer IoT will account for the majority of IoT connections in Latin America in 2025 (56%), enterprise IoT will continue to gain momentum, with the number of connections almost tripling between 2018 and 2025 (see Figure 8). Enterprises in the region believe firmly in the impact that IoT-based solutions can have on productivity. This indicates an opportunity for global businesses to expand such services into the region.

Figure 23 Source: GSMA Intelligence Enterprise IoT Survey 2018

Latin American enterprises believe IoT deployment has a strong impact on productivity

How much impact has/would IoT have on your company's ability to do each of the following? (% of respondents who answered "Increase productivity")



Smart buildings and smart utilities are the largest industrial IoT verticals in the region; we estimate that they will take a 33% and 23% respective share of total industrial IoT connections in 2025. The initial operational benefits of deploying enterprise IoT-based solutions include outage management, bill forecasting, demand and home energy management, and revenue protection – the last of which is an especially pressing issue for the utility sector in Latin America.

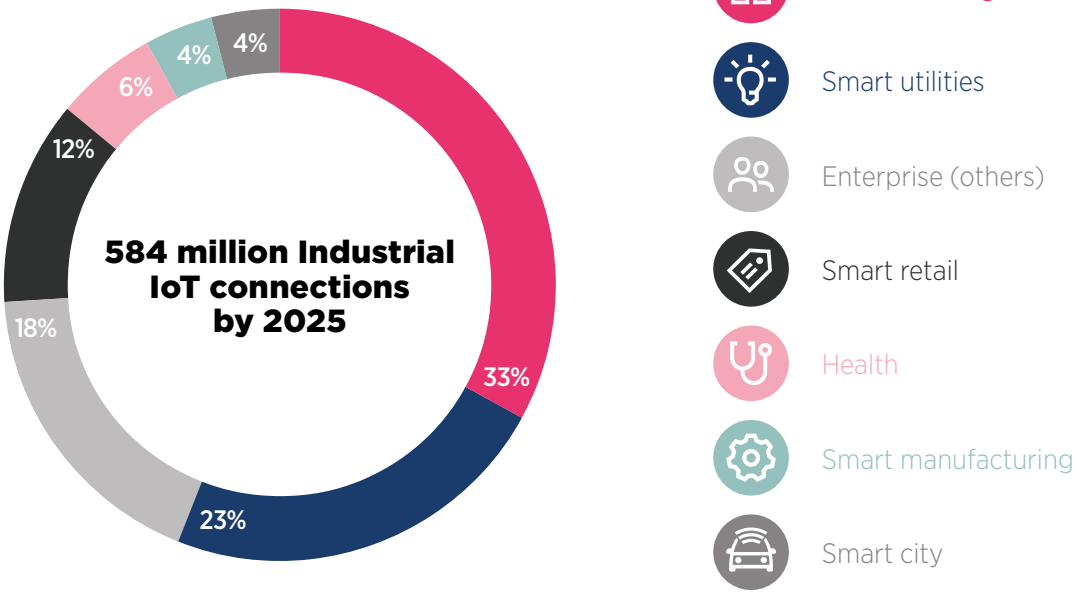
IoT deployments for agriculture are also critical. In many Latin American countries, agriculture makes up the core of the tradable sector. Deployments of more efficient solutions in this area will therefore have a direct impact on GDP growth.

Healthcare and smart cities are other areas that will have an effect on wider economic stability. For instance, improved city lighting can help reduce crime and energy consumption, while smart-city solutions, such as pollution monitoring, can help prevent health hazards.

Figure 24

Source: GSMA Intelligence

Smart buildings and smart utilities are key industrial IoT verticals



Enterprise (others): fleet management, oil, mining, construction and applications in agriculture

Examples of sector use cases

Smart buildings

Brazilian technology company Zoox offers an in-building solution to hotels for recording and generating customer information using data analytics and facial-recognition technology.

Smart utilities

Itron and Eletra are working to enhance energy efficiency and grid management. In November 2018, the companies signed a deal to support Elektro, a Brazilian energy distributor, and modernise electricity delivery in the country with an IoT network.

Health

Higia in Mexico has developed a non-invasive way to recognise warning signs of breast cancer by detecting abnormalities via a wearable device connected to a user's smartphone/smartwatch. Though still in its early stages, the company has raised $5 million from a private venture-capital firm and was named one of the 30 most promising companies in 2018 by Forbes.

Smart city

Signify – formerly Philips Lighting – is helping Belo Horizonte, one of Brazil's largest cities, to save 50% on electricity costs by upgrading 182,000 streetlights with new LEDs.

Agriculture

Argentina's LESS Industries assists farmers with crop management by monitoring heat, humidity, carbon dioxide and movement for crops in silo bags. Meanwhile, Neltume, a Chilean agritech startup, is implementing IoT solutions to help farmers optimise pesticide usage and manage moth infestations.

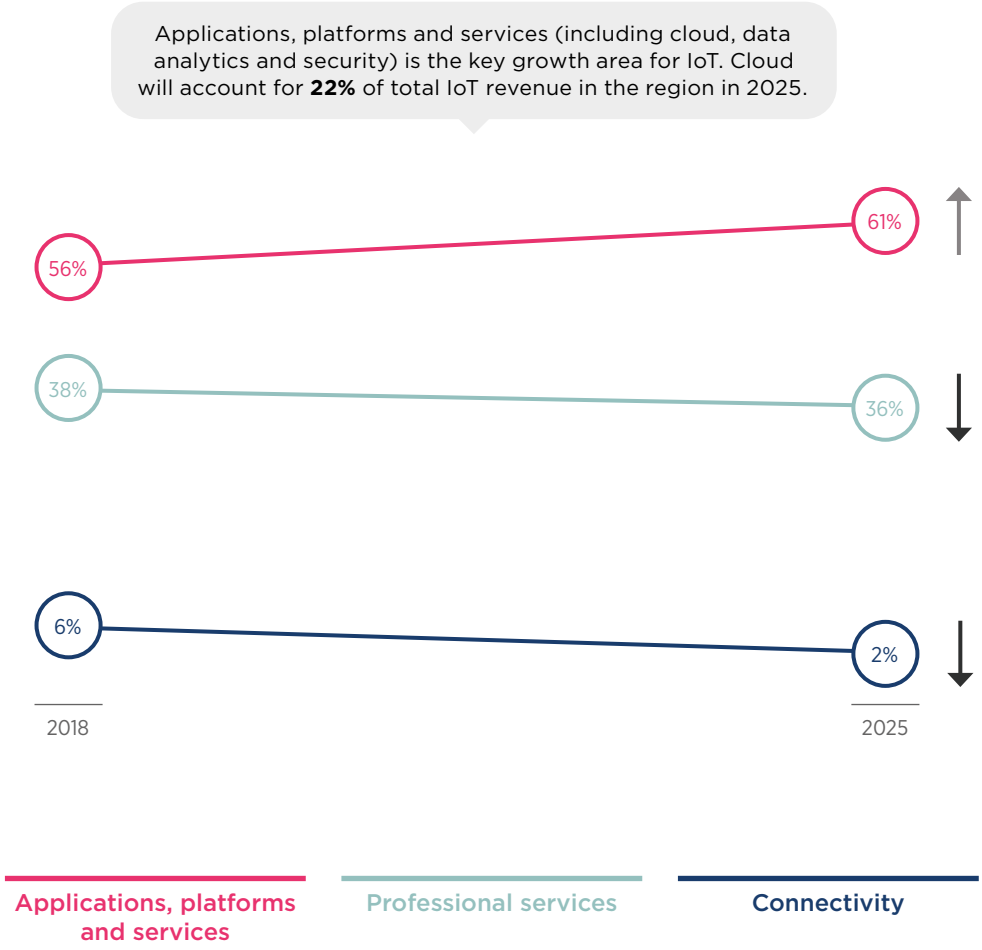
IoT revenue: an opportunity to expand beyond core connectivity to integrated platforms

IoT revenue in Latin America is projected to grow fourfold by 2025, reaching $47.2 billion with a CAGR of 21% between 2018 and 2025. This will be fuelled predominantly by applications, platforms and services. Although connectivity revenue will grow by almost 60%, its share of total IoT revenues will fall to 2% by 2025, down from 6% in 2018. Hence, pure connectivity will become unsustainable, as most of the value will be captured by those who can offer tailored vertical solutions that support business processes or improve productivity. Operators are therefore looking to expand beyond core and into adjacent segments such as cloud, analytics and end-to-end services.

Figure 25 Source: GSMA Intelligence

IoT revenue generation will be increasingly driven by applications, platforms and services

Share of IoT revenue



Examples of operator initiatives and partnerships in the IoT sector

América Móvil (Claro and Telcel)

Through its corporate brand Embratel in Brazil, Claro offers a range of connectivity systems and control panels for the agricultural sector using AI, sensors, cloud storage and machine learning. The platforms – Digital Agriculture, Connected Silos and Connected Forest – help farmers increase productivity and cut operational costs. In Argentina, Claro has formed a partnership with 15 IoT and cloud companies across several verticals. The operator joins the specialised knowledge from these businesses with its own connectivity, distribution, private access point names (APNs) and marketing solutions.

In Mexico, Telcel and Samsung have combined forces to offer smart-home and smart-office solutions. The operator provides connectivity, as well as a marketplace, systems integration, and big data and analytics services.

Telecom Argentina

Telecom Argentina has developed a portfolio of connectivity solutions. In agriculture it provides solutions for livestock identification and geolocation. For environmental monitoring, it uses sensors to measure air temperature, humidity, wind speed and direction, atmospheric pressure, and rainfall. The operator also utilises an automation and renewable energies connectivity platform that allows the automation of buildings to be controlled centrally and based on customer requirements.

Telefónica

Telefónica has a range of IoT platforms, connectivity services and off-the-shelf products that it has launched in multiple Latin American markets. For instance, the operator offers its mobility solution, Workforce Optimise, in Argentina, Chile, Peru, Colombia, Mexico and Ecuador. This is a real-time location service aimed at businesses which have a large number of field staff. The solution helps manage technical and security issues to improve the planning of field activities. Functions include personnel tracking, a panic button, business chat, and reception of internal news and communications. The operator also partners with local and global companies in Peru, including GPS Chile and Comsatel.

TIM Brazil

TIM Brazil uses Gilat Satellite Networks' backhaul solutions to enable 4G for machine-to-machine (M2M) connectivity in underserved areas of Brazil. The partnership focusses on crop-management solutions and improvement of productivity in agriculture.

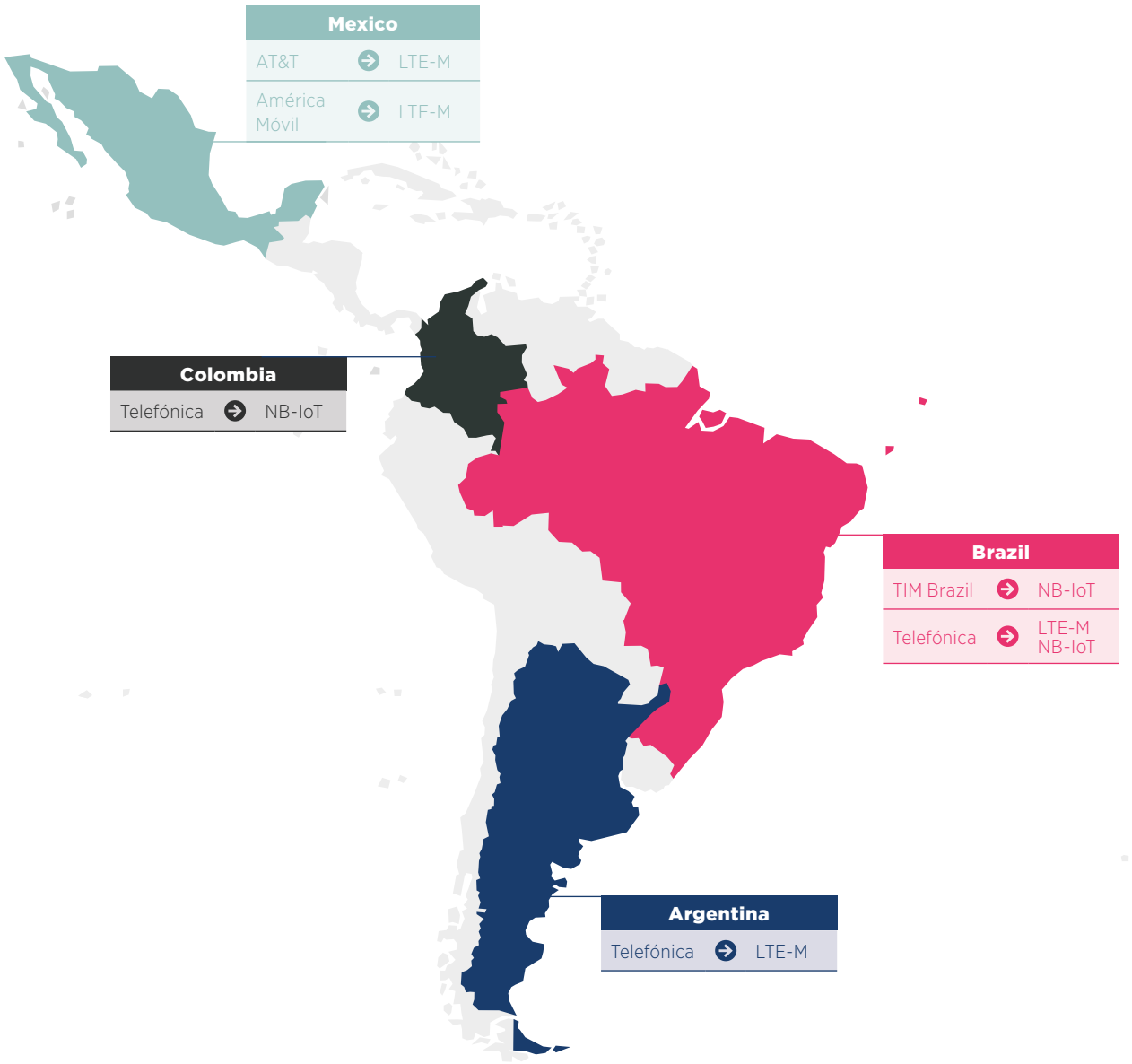
Network deployments of NB-IoT and LTE-M gain traction

Licensed cellular networks will serve 3.5 billion IoT connections globally by 2025, accounting for 14% of the total number of IoT connections. In 2018, licensed cellular IoT connections[9] made up 7% of total IoT connections in Latin America.

Despite challenges around revenue growth, operators continue to invest in infrastructure around the world. Cellular networks address the need for more secure, managed connectivity that can connect directly to the cloud (as opposed to the gateway), which will be one of the key drivers of growth. Low-power wide-area (LPWA) networks support devices requiring low-power consumption and longer-range coverage at low cost. With specifications for licensed LPWA networks completed in 2016, LPWA network rollouts are now picking up speed in Latin America.

Figure 26 Source: GSMA Intelligence

NB-IoT and LTE-M network deployments in Latin America



9. Cellular IoT connections include NB-IoT, LTE-M, and cellular M2M.

Cost of implementation could limit IoT growth opportunity

More than half of the organisations surveyed in the GSMA Intelligence Enterprise IoT Survey 2018 agree that implementation costs are the greatest barrier to the deployment of IoT-based solutions in Latin America. This is emphasised by enterprise payment preferences for IoT connectivity. For instance, 65% of enterprises in Brazil opt for monthly payments versus a global average of 46%, and 15% choose yearly payments compared with 28% globally. Similarly, 4% of enterprises in Brazil prefer revenue sharing, a favoured payment method in developing markets to mitigate initial investment risks, in comparison to a global average of 2%.

Figure 27

Source: GSMA Intelligence Enterprise IoT Survey 2018

Cost of IoT implementation is the main barrier according to Latin American enterprises

Which of these challenges does your organisation face in deploying IoT-based solutions? (% of respondents)

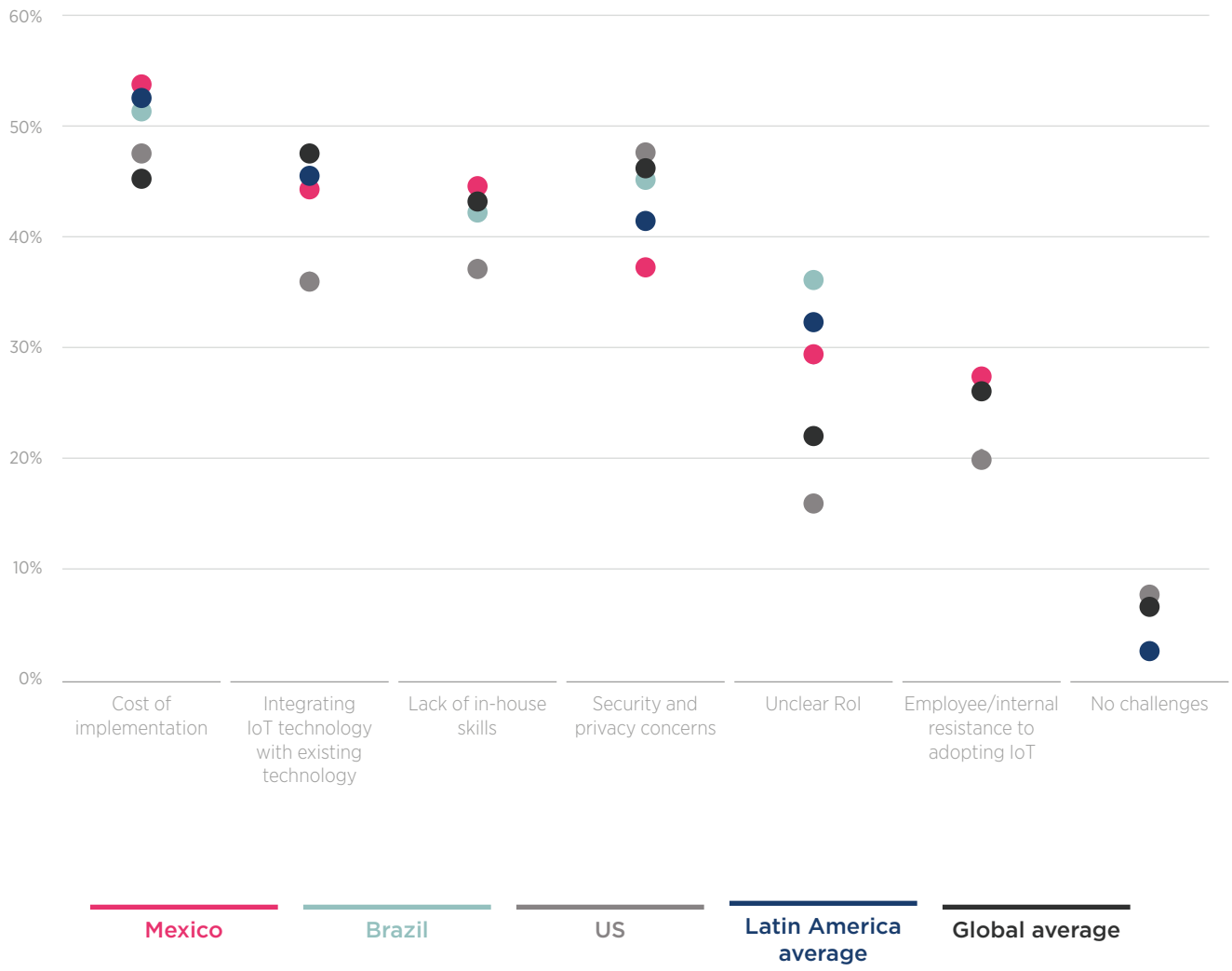


Figure 28 Source: GSMA Intelligence Enterprise IoT Survey 2018

Almost two thirds of enterprises in Brazil prefer monthly payments for IoT connectivity to mitigate initial risks of deployment

How do/would you prefer to pay for IoT connectivity? (% of respondents)

Global average		Brazil	Mexico	China	India	US	Italy	Germany
46%	Monthly	65%	45%	19%	45%	43%	46%	53%
28%	Yearly	15%	26%	52%	35%	23%	22%	18%
12%	Upfront (one-off fee at the start of contract)	3%	10%	19%	14%	17%	6%	5%
12%	Connectivity should be bundled in	12%	18%	8%	5%	15%	26%	19%
2%	Revenue share	4%	0%	3%	2%	1%	0%	0%

Governments take action to remove implementation barriers

Some governments in the region are looking to remove implementation barriers by enabling policies for enterprise IoT:

- Brazil's national IoT plan, set out in June 2019, directly addresses the cost challenge of implementation. The decree classifies IoT as infrastructure that integrates the provision of value-added services, thus potentially exempting IoT devices from the Brazilian sales tax (ICMS), which is applied to goods or services through all stages of sale, from manufacturer to consumer.
- In Mexico, the Ministry of Economy devised a strategic plan for the country to move towards a future defined by Industry 4.0. This includes an analysis of global trends and best practice examples that Mexico's manufacturing sector can adopt (which is especially important since the country has the largest high-tech sector in Latin America, manufacturing more than 80% of such products in the region).[10] Since 2016, when this vision was first laid out, the government has set up several initiatives to support the country's transition to Industry 4.0, such as the Mexico Alliance 4.0, a project that guides companies towards industrial re-conversion.

Governments have an important role to play in driving IoT adoption to improve the lives of citizens in areas such as security (e.g. prevention of utility theft), smart traffic (e.g. emergency response time), health (e.g. treatment and cost efficiency), smart cities (e.g. sustainable transport systems), and safer buildings (e.g. energy efficiency).

For example, the Colombian government invested over $100 million in smart-city initiatives, including an IoT-based system in Medellin to improve emergency response times and reduce traffic and accidents.

In mid-2019, the National Bank for Economic and Social Development of Brazil released the first fund of a total of BRL2 million ($520,000) for a pilot project on IoT solutions addressing health, smart cities, and rural and industry verticals.[11] The first sum of BRL1 million ($260,000) went towards a system developed by the Brazilian innovation centre to prevent the waste of medical oxygen and reduce treatment costs, including the cost of oxygen used in treatments for patients with chronic pulmonary diseases. This is the first funding phase of a total BRL16 million ($4,160,000) the bank has earmarked for IoT projects.

The Brazilian government is also encouraging IoT adoption for agriculture. The Ministry of Science, Technology, Innovation and Communication (MCTIC) and the Ministry of Agriculture, Livestock and Supply (MAPA) launched the 'Agro Chamber 4.0' group, an initiative to encourage conversations around connectivity deployment strategies and digital technologies focussed on IoT.

In Mexico, Guadalajara has begun the groundwork to become the first smart city in the country. For example, it has implemented advanced lighting and traffic-control systems. In addition to such upgraded systems, the city also offers a platform where citizens can report issues to local authorities through a mobile app.

10. Crafting the Future: a roadmap for Industry 4.0 in Mexico, Ministry of Economy, 2016
11. "BNDES aprova primeiro projeto-piloto de Internet das Coisas", BNDES, 2019

3.3
Innovation through investment: startups accelerating commercial opportunities

There have been a number of cross-country initiatives between operators, startups, and venture-capital firms to develop and invest in emerging technologies.

One example is an initiative by Entel Chile as part of the ChileGlobal Ventures challenge. The operator is aiming to accelerate startup growth by offering startups and entrepreneurs the chance to partner with it. Entel is seeking telecommunication solutions that will add value to its portfolio of products that target small and medium-sized enterprises.

Another example comes from Telefónica and its accelerator arm, Wayra. With seven of its 11 global tech hubs in Latin America, Wayra counts more than 100 startups in its portfolio, with plans to increase this to 200 startups over the next two years. Wayra and TheVentureCity, another accelerator, recently signed a global deal to invest in deep-tech startups, such as those operating in the AI, machine-learning and IoT spaces.

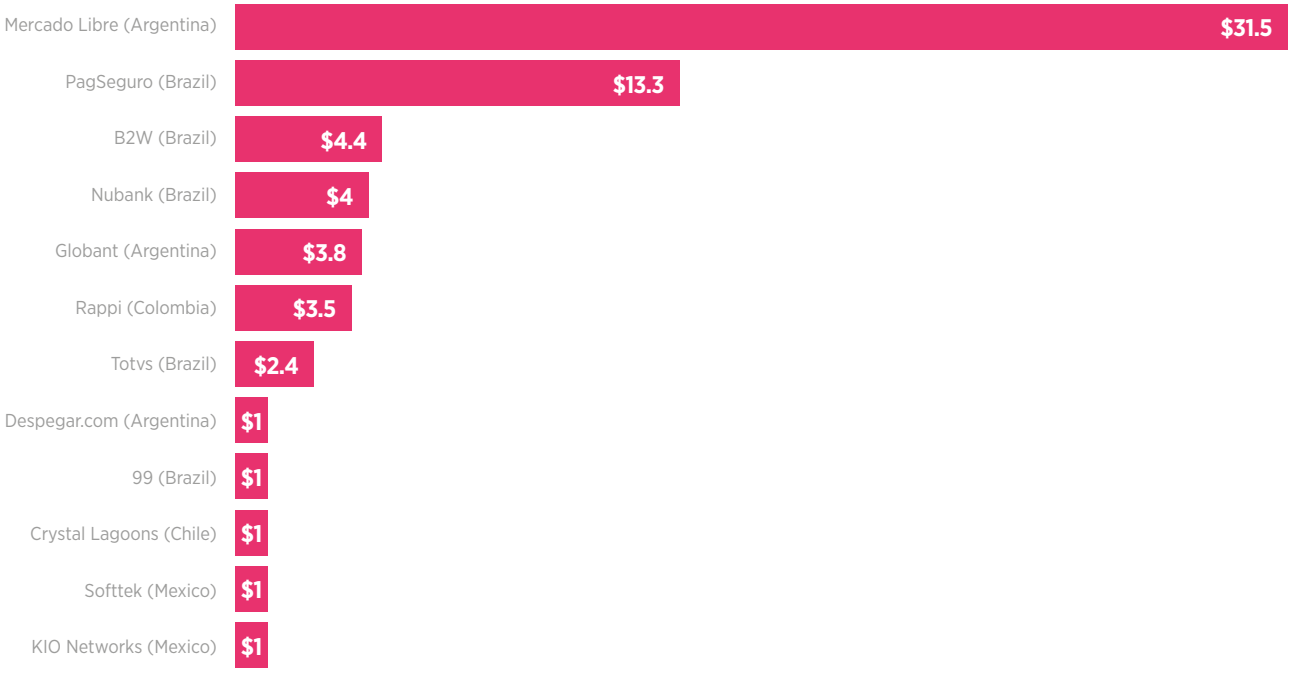
Japanese multinational conglomerate SoftBank intends to invest a total of $5 billion into Latin America's startup scene over the coming decade. So far, it has already committed $2 billion for Colombian delivery company Rappi, Brazilian lender Creditas, gym membership app Gympass and Mexican payments firm Clip, among others.[12]

Instituto TIM in Brazil supports innovation centres with resources and runs projects to educate teachers and young people in science and technology with a focus on mobile technologies.

Figure 29 Source: Statista, July 2019

Argentina's Mercado Libre leads the way among Latin American startups in market capitalisation

Market capitalisation (billion)



12. "SoftBank in talks to invest in Latam venture capital funds: sources", Reuters, 2019

Figure 30

Source: CB Insights, Q1 2019

The top 10 funded tech startups in Latin America have a combined value of over $2.5 billion

Equity funding (million)

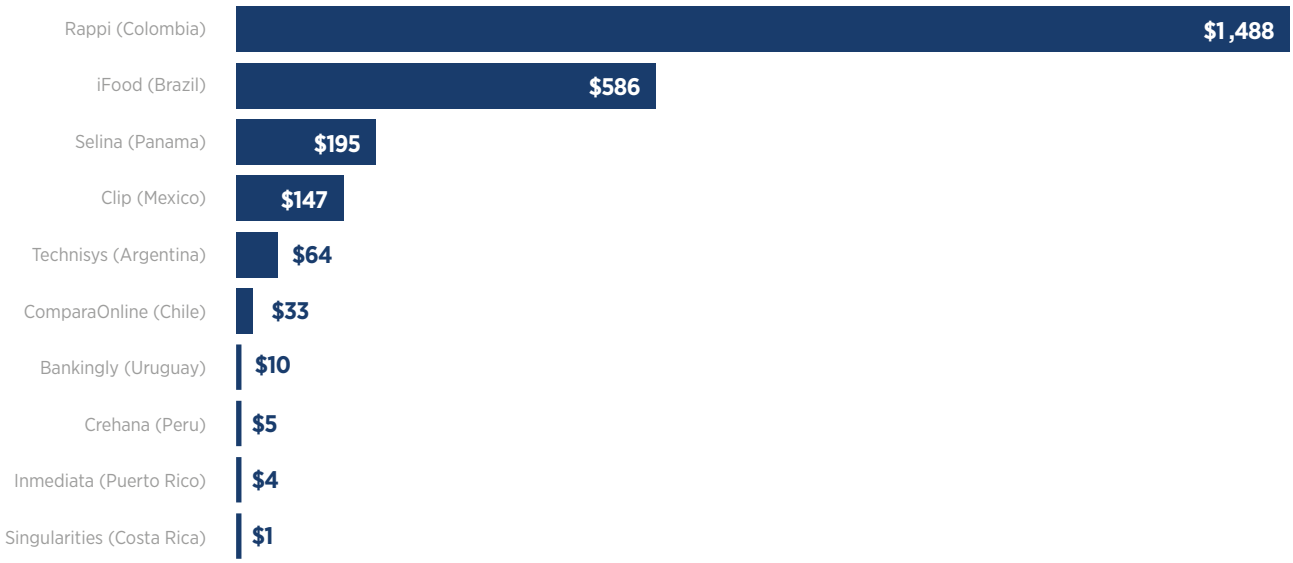


Figure 31

Source: StartupBlink, GSMA Intelligence

Top five Latin American tech hubs (global ranking)

3.4
Three markets prepare for AI in their digital agendas

Governments in Latin America need to prepare for emerging transformative technologies such as AI, which is forecast to contribute $15 trillion to the global economy by 2030.[13] Three countries in Latin America have started to formulate a strategy or framework to support AI development and implementation in the region: Mexico, Uruguay and Colombia.

Mexico is among the first 10 countries in the world to devise an AI strategy, with the Mexican government approving a 2018 white paper recommending ways to harness AI to benefit the economy and society.[14] The paper also identifies examples of best practice on implementation, which is especially pertinent in a country where it is predicted that 19% of jobs will be affected by automation in the next two years.

In April 2019, Uruguay's e-government body, Agesic, initiated a public consultation on implementing AI-driven digital services by 2020. A working group was created to outline a draft on this using nine principles that included ethical, technical, legal and transparency concerns of using AI in digital government. With this preparation underway, Uruguay may well be the second Latin American market to publish a full AI strategy.

In a similar vein, Colombia's Ministry of Information Technologies and Communications raised a public consultation for a national policy for digital transformation and AI strategy in August 2019. The aim is to foster the appropriate conditions in Colombia that will allow the country to reap the rewards (and tackle the challenges) of Industry 4.0.

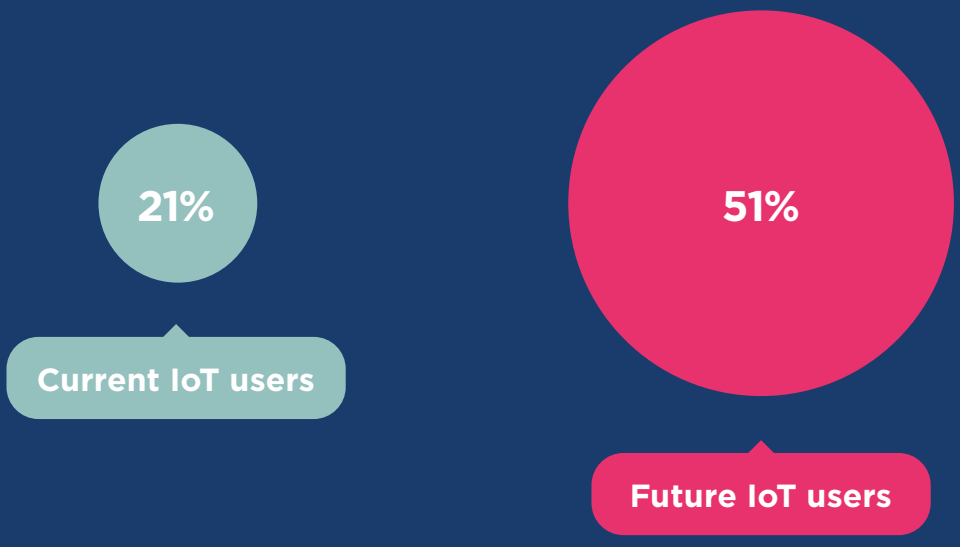
However, governments will need the support of businesses to nurture the growth of emerging technologies. Implementations of AI are currently limited, but most future users of enterprise IoT believe that AI and machine learning are the most relevant and important IoT components.

Figure 32

Source: GSMA Intelligence Enterprise IoT Survey 2018

Enterprise priorities will slowly but surely shift towards AI and machine learning in future

Which of the following IoT components are included in your current/future IoT solutions? (% of respondents who answered "AI" or "Machine learning")



13. Government Artificial Intelligence Readiness Index 2019, Oxford Insights
14. Towards an AI Strategy in Mexico: Harnessing the AI Revolution, British Embassy in Mexico, 2018

Recent and upcoming AI developments in Latin America

Operational expenses and customer touchpoints

- Available in Argentina, Brazil and Chile, Aura is Telefónica's AI-powered digital assistant. It provides an enhanced customer experience while also reducing operational expenses. Telefónica has also integrated Aura into its Movistar home service.
- Claro Colombia is working on a proof-of-concept project to explore how AI and machine learning can reduce the number of offers sent to prepaid customers and instead target digital customers with more personalised and relevant recommendations.[15]

Network automation

- Ericsson and Telefónica have signed a deal to enable AI-powered network operations in Colombia, Peru, Ecuador and Uruguay.[16] This will strengthen the operator's increasingly AI-focussed automation strategy for network operations.

Cloud

- IBM plans to launch an AI-driven IBM Cloud multizone region (MZR) in Brazil by 2020. The MZR will help IBM's Latin American customers with mission-critical applications. As demand grows for hybrid cloud environments that have access to AI, analytics and other transformative technologies, Brazil will become a key vantage point in Latin America for IBM, especially as regulation over data and privacy increases.

Research and Development

- Having raised more than $500 million in funding last year, iFood is one of the best-funded startups in Latin America. It plans to invest $20 million in an AI academy where the focus of research will be on machine learning, deep learning, behavioural science and logistics efficiency.[17]

15. "Driving digital engagement: Claro uses AI to prioritize quality over quantity", TM Forum, 2019
16. "Telefonica and Ericsson boost South American managed services", Developing Telecoms, 2019
17. "Brazil's iFood makes multimillion-dollar investment in AI", Forbes, 2019

04
Policy and regulation to advance digital society

Policies and regulatory frameworks in Latin American countries change often, either in response to political developments or to keep up with the rapid pace of technological growth. Policymakers should strive to create future-proof frameworks that enable simplification and regulation to pave the way for new services – but this is easier said than done. Below are some persistent drivers of the digital ecosystem, illustrated through success stories in Latin America.

Hierarchical and independent institutional frameworks to ensure legal certainty

An independent institutional framework that prioritises digitisation policy and ensures legal certainty will help establish clear guidance for the growth of the digital ecosystem.

Success story: Colombia passes ICT modernisation law in June 2019

Colombia's new law marks a paradigm shift towards implementing international best practice in areas such as spectrum policy, institutional frameworks, legislative simplification and digital inclusion. Changes include the creation of a single regulator that will regulate the functions of the National Television Authority (ANTV) and some functions of the Ministry of ICT.

Digital infrastructure deployment without barriers

Operators must engage in dialogue with provincial and state authorities – especially municipal bodies, which currently pose the main hurdle to network deployments – to enable the transition to next-generation connectivity, which includes connecting more people in Latin America and preparing for Industry 4.0.

Network deployment regulation in the region is complex because of the potential for regulation to be duplicated between federal/centralised governments and local governments. Local municipalities will often establish regulation on matters such as antenna deployments, which can cause inconsistency across a country.

However, we are beginning to see some progress in this regard. For instance, the Brazilian Ministry of Science, Technology, Innovation and Communications is already preparing for the country's 5G spectrum auction, which is expected in the first half of 2020, by ensuring that municipal laws regarding antenna deployments are aligned with national digital ambitions. The National Congress of Brazil is already discussing the approval of draft bills 4.566/2019 and 3.269/2019, to avoid lengthy delays in network deployment. The bills would allow deadlines to be established for municipalities to respond and enable deployments in the case of administrative silence.

Success story: Supreme Court of Argentina rules in favour of mobile infrastructure deployment

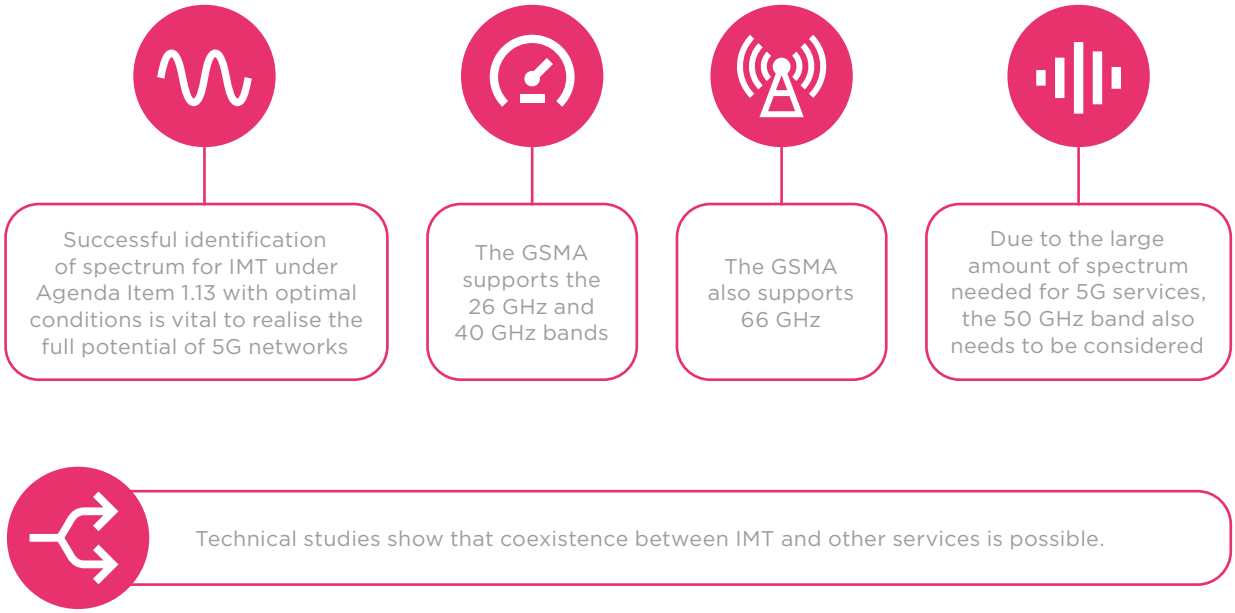
Argentina's highest court recently declared the unconstitutionality of a municipal bylaw in General Güemes, province of Salta, which ordered the removal of structures and antennas from the city centre. The Supreme Court confirmed that the regulation of mobile services fell under federal jurisdiction in the country's constitution and that the bylaw had contravened such regulation. The bylaw also hampered digital inclusion by limiting coverage and, by extension, social and economic progress.

Spectrum roadmaps for 5G development

Spectrum policies that maximise social welfare with efficient pricing and a predictable roadmap for future spectrum will be essential to protecting and encouraging investment. In particular, governments and regulators need to take 5G development into account and adopt national spectrum policy measures that encourage long-term heavy investments in 5G networks (e.g. long-term licences and a clear renewal process).[18] WRC-19 will also play a large role in this by determining the conditions and amount of spectrum for 5G.[19]

Figure 33 Source: GSMA

The GSMA's position on WRC-19 agenda item 1.13



18. 5G spectrum positions offer a roadmap for regulators, GSMA, 2019
19. WRC-19 Agenda Item 1.13, GSMA, 2019

Although 5G uptake is not expected to scale until 2025 onwards, consultations for future spectrum auctions are underway in preparation for 5G NR.

In May 2019, Anatel approved a decision to auction spectrum in the 700 MHz, 2.3 GHz, 3.5 GHz and 26 GHz bands, which could make Brazil the world's largest 5G spectrum auction market. The auction is currently set for H1 2020. In preparation for this, one of the challenges is to mitigate interference with satellite broadcasting services currently using the 3.5 GHz band. The regulatory office is discussing the auction methods to be adopted.

In Colombia, the national spectrum agency (ANE) published a consultation on 5G in April 2019 with the aim of establishing a general 5G roadmap for the assignment of low- and mid- band spectrum, as well as higher mmWave frequencies such as 24.25–27.5 GHz.

Other upcoming spectrum auctions include the 28 GHz, 35 GHz and, potentially, 700 MHZ bands in Chile, which are expected to be assigned in early 2020. In Mexico, the Federal Telecommunications Institute (IFT) plans to auction 600 MHz and 3.5 GHz spectrum in 2020. Arcotel, in Ecuador intends to auction the 600 MHz band in early 2022.

Mexico, Uruguay and Brazil are on course to be the first Latin American markets to launch commercial 5G services in 2020. In Mexico, this launch is expected to be led by all three of the country's mobile operators, while in Uruguay Antel will be the first to make a move. Mexico has also put in place a 5G roadmap and is aiming for nationwide coverage by 2024. The competitive mobile landscape in Mexico means that the country is forecast to have the fastest 5G adoption rate in the region, with 15 million connections (12% adoption) by 2025. The IFT has identified 11,190 MHz of spectrum for 5G.

Success story: a clear spectrum roadmap in Mexico

The IFT has a multiannual spectrum plan with targets that provide greater certainty for potential bidders. The plan allows for regular updates, giving the flexibility needed in the constantly changing mobile-ecosystem environment.

Tax policies to promote connectivity and affordability

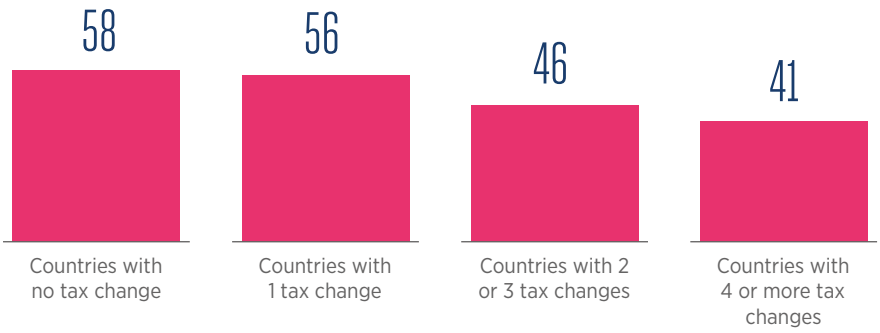
Mobile services and devices were formerly taxed as luxury goods because they were initially affordable only to higher-income consumers. Today, connectivity is widespread, and tax policy should seek to ensure greater affordability to further enable access to the benefits of connectivity.[20]

20. Rethinking mobile taxation to improve connectivity, GSMA Intelligence, 2019

Figure 34 Source: GSMA Intelligence

Markets with higher tax uncertainty score lower on infrastructure provision

2017 Infrastructure score from the GSMA Mobile Connectivity Index according to number of consumer tax changes (2011-2017)



Success story: Brazil establishes a national plan to foster IoT growth

Brazil issued a decree in mid-2019 that changed the classification of IoT devices, which will now be treated as infrastructure that integrates the provision of value-added services, rather than as communications equipment. This means they could be exempt from Brazilian sales tax (ICMS), which would help foster the development of IoT.

Data protection frameworks in line with international standards

Comprehensive data protection frameworks are a necessity for effective digital transformation. A successful data privacy law should apply horizontally to any personal data processing regardless of the sector or technology used and provide a baseline for all actors in the digital ecosystem. It should also offer governments an opportunity to review legacy privacy rules in sectoral laws, guidance or telecoms licence conditions and, where possible, to remove them.

Success story: Brazil passes a horizontal, general-purpose data protection law

Brazil has adopted a regulatory framework that is risk-based and technology neutral, which incorporates several methods of processing data. This regulation aims to strike a balance between the use of personal data to innovate and offer better services with the protection of users' fundamental rights and their trust in the digital ecosystem. The law also demonstrates that flexibility is possible in cross-border data flows without lowering the level of protection for consumers.

The consumption pattern of users is changing: demand for more data, improved speeds and better network capacity is increasing. For the enormous investments in high-speed networks needed to meet this demand, it is imperative that state policy provides legal certainty, clear rules for market players and a predictable spectrum roadmap. Public-private cooperation is also essential to cultivate investments in connectivity, and the telecoms industry can be a strategic ally for this.

gsma.com

GSMA HEAD OFFICE
Floor 2
The Walbrook Building
25 Walbrook
London EC4N 8AF
United Kingdom
Tel: +44 (0)20 7356 0600
Fax: +44 (0)20 7356 0601