



# Smartphones: worldwide trends and forecasts 2019–2024



Simon Lumb and Polytimos Kontos

## About this report

This report analyses the smartphone market and describes the key worldwide and regional trends that affect the sales and adoption of smartphones.

It is based on several sources:

- Analysys Mason’s internal research, including global and regional telecoms forecasts and the *Telecoms Market Matrix*
- secondary information from vendors, operators, regulators and other formal sources.

### WHO SHOULD READ THIS REPORT

- Operator-based strategy executives and mobile device managers who are interested in smartphone market trends and the role of operators as smartphone distribution channels.
- Device manufacturers that want to identify worldwide and regional opportunities in terms of smartphone unit sales growth and primary regional drivers.
- Smartphone distributors and wholesale executives who are interested in learning more about operator and vendor initiatives for smartphone sales, regional growth expectations and key trends.

GEOGRAPHICAL COVERAGE	KEY METRICS
<ul style="list-style-type: none"> <li>▪ Worldwide</li> <li>▪ Central and Eastern Europe (CEE)</li> <li>▪ Developed Asia–Pacific (DVAP)</li> <li>▪ Emerging Asia–Pacific (EMAP)</li> <li>▪ Latin America (LATAM)</li> <li>▪ Middle East and North Africa (MENA)</li> <li>▪ North America (NA)</li> <li>▪ Sub-Saharan Africa (SSA)</li> <li>▪ Western Europe (WE)</li> </ul>	<p><b>Worldwide</b></p> <ul style="list-style-type: none"> <li>▪ Unit sales of mobile handsets (smartphones and non-smartphones)</li> <li>▪ Mobile handset connections (smartphones and non-smartphones)</li> <li>▪ Sales of 5G-enabled mobile handsets (smartphones)</li> <li>▪ Connections from 5G-enabled mobile handsets (smartphones)</li> <li>▪ Smartphone sales by manufacturer (2015–2019)</li> </ul> <p><b>Regional</b></p> <ul style="list-style-type: none"> <li>▪ Unit sales of mobile handsets (smartphones and non-smartphones)</li> <li>▪ Mobile handset connections (smartphones and non-smartphones)</li> <li>▪ Sales of 5G-enabled mobile handsets (smartphones)</li> <li>▪ Connections from 5G-enabled mobile handsets (smartphones)</li> </ul>

# Contents

## 5. Worldwide trends

- 6. Worldwide: smartphones sales will increase moderately over the forecast period, and growth will be particularly strong in emerging markets
- 7. Worldwide: most of the increase in global smartphone sales will come from emerging regions such as EMAP and SSA
- 8. Worldwide: feature phones sales will continue to dwindle, and will account for just 12% of all handset sales worldwide in 2024
- 9. Worldwide: smartphones sales for the 'big four' Chinese brands have more than doubled over the past 4 years
- 10. Worldwide: 5G is set to be the key driver for boosting smartphone sales in developed markets

## 11. Western Europe

- 12. Western Europe: smartphone sales will continue to decline until 2020, at which point moderate growth is expected

- 13. Western Europe: key regional trends

## 14. Central and Eastern Europe

- 15. Central and Eastern Europe: the demand for budget smartphones is high
- 16. Central and Eastern Europe: key regional trends

## 17. Middle East and North Africa

- 18. Middle East and North Africa: first-time prepaid users will continue to drive sales over the forecast period
- 19. Middle East and North Africa: key regional trends

## 20. Sub-Saharan Africa

- 21. Sub-Saharan Africa: low smartphone penetration and the increasing demand for mobile broadband will drive growth in smartphone sales

- 22. Sub-Saharan Africa: key regional trends

## 23. Emerging Asia–Pacific

- 24. Emerging Asia–Pacific: smartphone sales will continue to increase steadily until 2024

- 25. Emerging Asia–Pacific: key regional trends

## 26. Developed Asia–Pacific

- 27. Developed Asia–Pacific: the launch of 5G will lead to an increase in smartphone sales by 2024

- 28. Developed Asia–Pacific: key regional trends

## 29. North America

- 30. North America: 5G should boost smartphone sales over the forecast period

- 31. North America: key regional trends

## 32. Latin America

- 33. Latin America: the improving economic output will lead to an increase in smartphone sales over the forecast period

- 34. Latin America: key regional trends

## 35. Forecast methodology and assumptions

- 36. Forecast methodology and assumptions

## 37. About the authors and Analysys Mason

- 38. About the authors

- 39. Analysys Mason's consulting and research are uniquely positioned

- 40. Research from Analysys Mason

- 41. Consulting from Analysys Mason

# List of figures

Figure 1: Mobile handset unit sales by type, and the smartphone share of connections, worldwide, 2016–2024

Figure 2: Smartphone unit sales by region, 2019 and 2024

Figure 3: Non-smartphone unit sales by region, 2019 and 2024

Figure 4: Smartphone unit sales by manufacturer, worldwide, 2015–2019

Figure 5: 5G-capable handset unit sales by region, 2021–2024, and the 5G-capable share of connections, worldwide, 2024

Figure 6: Mobile handset connections by type, and smartphone share of connections, Western Europe, 2016–2024

Figure 7: Smartphone unit sales and smartphone share of mobile handset unit sales, Western Europe, 2016–2024

Figure 8: Key regional trends in the handset market, Western Europe

Figure 9: Mobile handset connections by type, and smartphone share of connections, Central and Eastern Europe, 2016–2024

Figure 10: Smartphone unit sales and smartphone share of mobile handset unit sales, Central and Eastern Europe, 2016–2024

Figure 11: Key regional trends in the handset market, Central and Eastern Europe

Figure 12: Mobile connections by type, and smartphone share of connections, Middle East and North Africa, 2016–2024

Figure 13: Smartphone sales and smartphone share of mobile handset sales, Middle East and North Africa, 2016–2024

Figure 14: Key regional trends in the handset market, Middle East and North Africa

Figure 15: Mobile connections by type, and smartphone share of connections, Sub-Saharan Africa, 2016–2024

Figure 16: Smartphone unit sales and smartphone share of mobile handset unit sales, Sub-Saharan Africa, 2016–2024

Figure 17: Key regional trends in the handset market, Sub-Saharan Africa

Figure 18: Mobile connections by type, and smartphone share of connections, emerging Asia–Pacific, 2016–2024

Figure 19: Smartphone unit sales and smartphone share of mobile handset unit sales, emerging Asia–Pacific, 2016–2024

Figure 20: Key regional trends in the handset market, emerging Asia–Pacific

Figure 21: Mobile connections by type, and smartphone share of connections, developed Asia–Pacific, 2016–2024

Figure 22: Smartphone sales and smartphone share of mobile handset unit sales, developed Asia–Pacific, 2016–2024

Figure 23: Key regional trends in the handset market, developed Asia–Pacific

Figure 24: Mobile handset connections by type, and smartphone share of connections, North America, 2016–2024

Figure 25: Smartphone unit sales and smartphone share of mobile handset unit sales, North America, 2016–2024

Figure 26: Key regional trends in the handset market, North America

Figure 27: Mobile handset connections by type, and smartphone share of connections, Latin America, 2016–2024

Figure 28: Smartphone unit sales and smartphone share of mobile handset unit sales, Latin America, 2016–2024

Figure 29: Key regional trends in the handset market, Latin America

Figure 30: Main enablers and constraints for our smartphone forecasts



**Worldwide trends**

Regional trends

Western Europe

Central and Eastern Europe

Middle East and North Africa

Sub-Saharan Africa

Emerging Asia–Pacific

Developed Asia–Pacific

North America

Latin America

Forecast methodology and assumptions

About the author and Analysys Mason

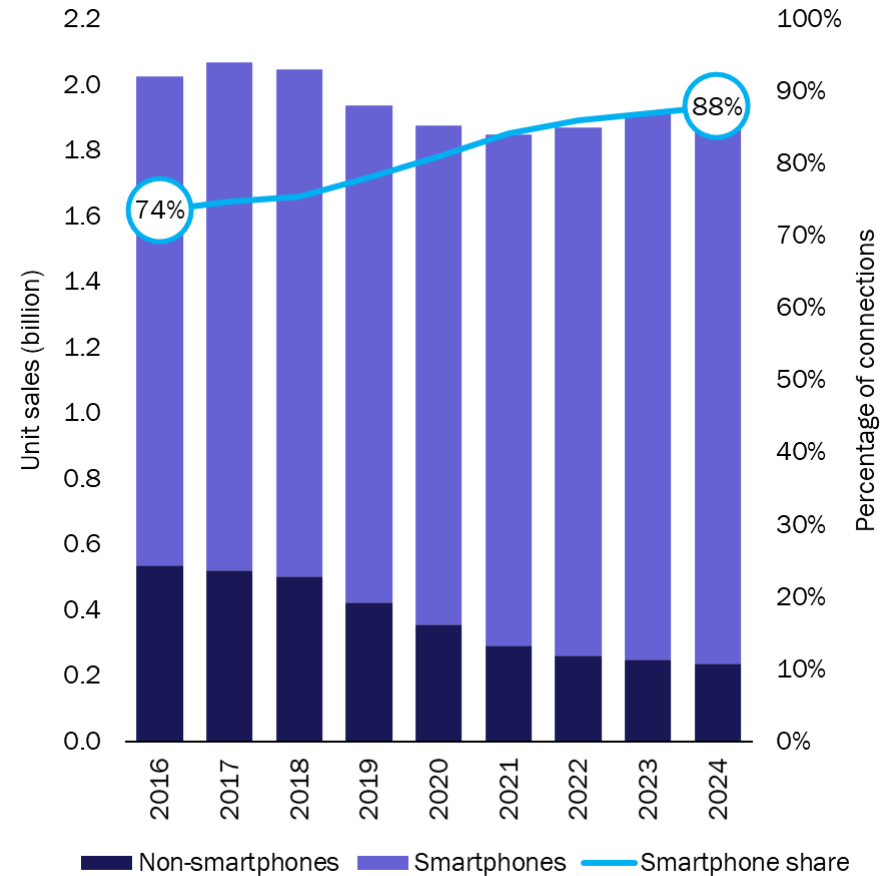
## Worldwide: smartphones sales will increase moderately over the forecast period, and growth will be particularly strong in emerging markets

Worldwide smartphone sales have declined for two consecutive years, due to the saturation of developed markets.

The mobile markets in North America (NA), Western Europe (WE) and developed Asia–Pacific (DVAP) are saturated. Smartphone sales in these regions increased rapidly until 2015; they then plateaued for 2 years and subsequently declined. Sales in China have also been falling since 2016, despite the country having the largest smartphone market in the world (over 27% of worldwide sales).

This decline is largely due to lengthening replacement cycles because a lack of design innovation has slowed the demand for new models. Moreover, the increased penetration means that there are fewer first-time customers, and migration to SIM-only plans has hindered device sales growth. The declining trend in developed markets is expected to continue until the end of 2020, at which point 5G technology is anticipated to lead to a small boost in smartphones sales because vendors such as Apple will launch new, 5G-compatible devices, and Chinese manufacturers will address the lower-value market with affordable devices. This boost will drive an overall increase in global handset sales from 2021 onwards, but the level of sales achieved in 2015 will not be reached.

Figure 1: Mobile handset unit sales by type, and the smartphone share of connections, worldwide, 2016–2024



Source: Analysys Mason

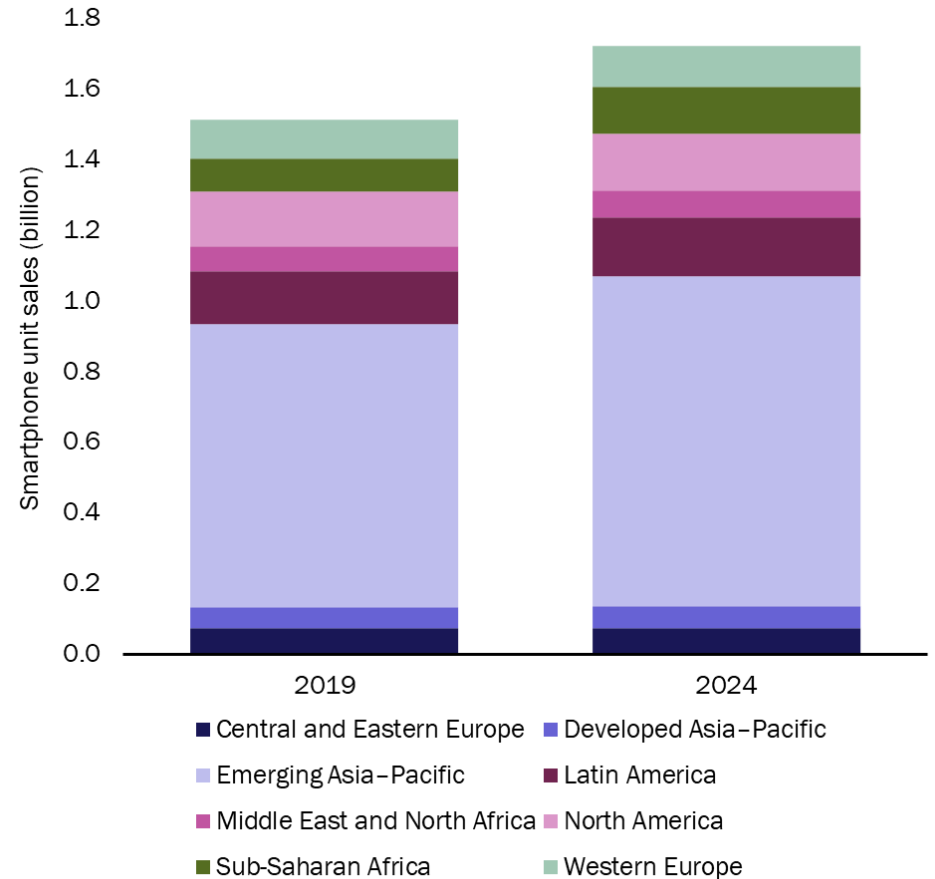
## Worldwide: most of the increase in global smartphone sales will come from emerging regions such as EMAP and SSA

Increasing smartphone affordability and network coverage will boost smartphone sales in emerging regions. We forecast that the total number of active smartphones in the key emerging regions of emerging Asia–Pacific (EMAP) and Sub-Saharan Africa (SSA) will exceed 3.3 billion by 2024.

The smartphone penetration will grow from 65% and 41% to 84% and 59% in EMAP and SSA, respectively, during the forecast period, and these two regions will have the highest levels of smartphone adoption worldwide. Indeed, the smartphone penetration in India will increase from 39% in 2019 to 78% in 2024. Many people currently use feature phones in these regions, but the increased demand for internet access, and diminishing smartphone retail prices will drive smartphone penetration between 2019 and 2024. The increasing coverage of 4G and 5G networks combined with cheaper data plans will also encourage consumers to switch to more-generous data tariffs, thereby further driving feature phone–smartphone substitution.

The middle-income regions (Central and Eastern Europe (CEE), the Middle East and North Africa (MENA) and Latin America (LATAM)) do not conform to the trends seen in either the developed and emerging regions. The smartphone penetration in MENA and LATAM will grow continually during the forecast period (albeit at a slower rate than that in EMAP and SSA) driven by first-time, low-income smartphone users. CEE will follow the trend seen in developed markets, but the boost from 5G will not come fully into effect until 2022.

Figure 2: Smartphone unit sales by region, 2019 and 2024



Source: Analysis Mason

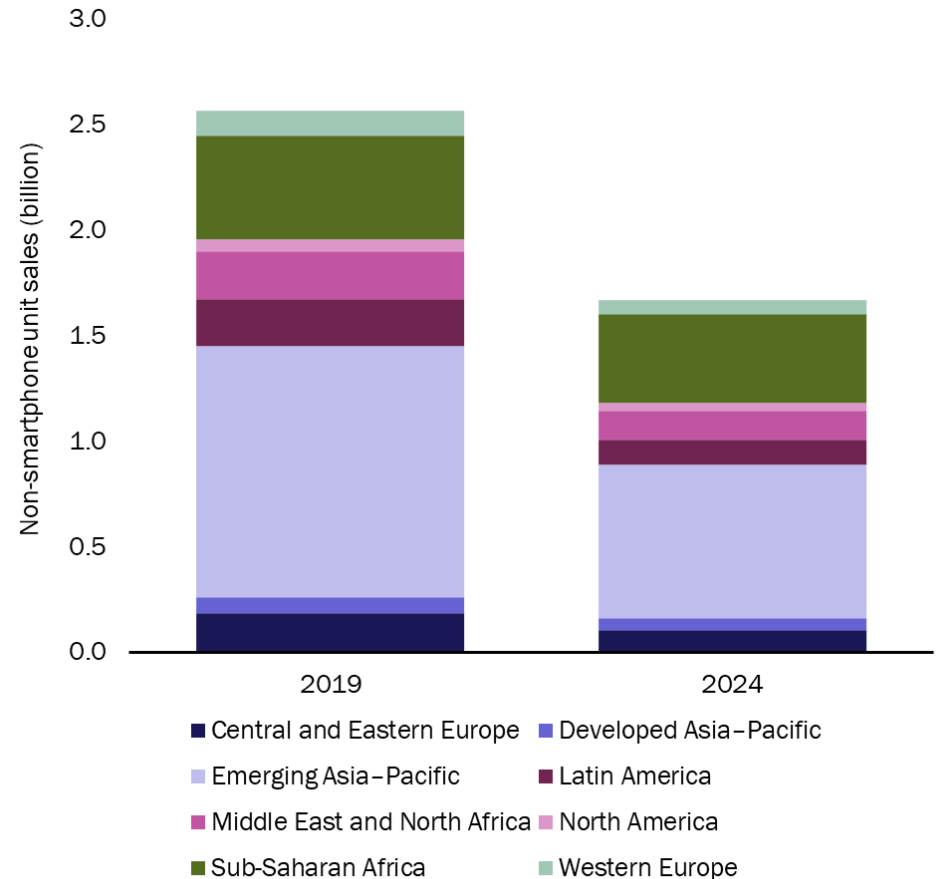
## Worldwide: feature phones sales will continue to dwindle, and will account for just 12% of all handset sales worldwide in 2024

Smart feature phones are a stepping-stone between feature phones and smartphones. We forecast that the total number of non-smartphone handsets will account for just 20% of all handsets by 2024.

Smart feature phones have been the key to connecting low-income users in emerging markets to the internet for the first time.<sup>1</sup> Jio in India released its JioPhone smart feature phone in 2017, which was effectively free to Jio subscribers. This resulted in an increase in feature phone sales in India in 2017 and 2018. Similar trends were noted in other developing markets where low-cost smart feature phones that were capable of basic internet access (generally using KaiOS) were available.

However, increased consumer spending power in these markets, combined with ever-lower smartphone retail prices will cause global feature phone sales to decline from 2020 onwards. Chinese manufacturers such as Transsion have started to manufacture smartphones locally in Africa to avoid import tariffs, thereby allowing device prices to continue to fall. The high degree of competition at the lower-value end of the market in SSA (particularly as operators such as MTN have begun to market their own devices) will ensure that cheaper smartphones grow in sophistication and that low-income consumers can afford smartphones with more computing power and features than smart feature phones have.

Figure 3: Non-smartphone unit sales by region, 2019 and 2024



Source: Analysys Mason

<sup>1</sup> We classify smart feature phones as feature phones that can connect to 3G or 4G networks and have a range of internet applications (commonly using Linux KaiOS). We do not consider KaiOS to be a smartphone operating system due to the limited availability of third-party applications, and we therefore classify smart feature phones as feature phones rather than smartphones.



## Worldwide: smartphones sales for the ‘big four’ Chinese brands have more than doubled over the past 4 years

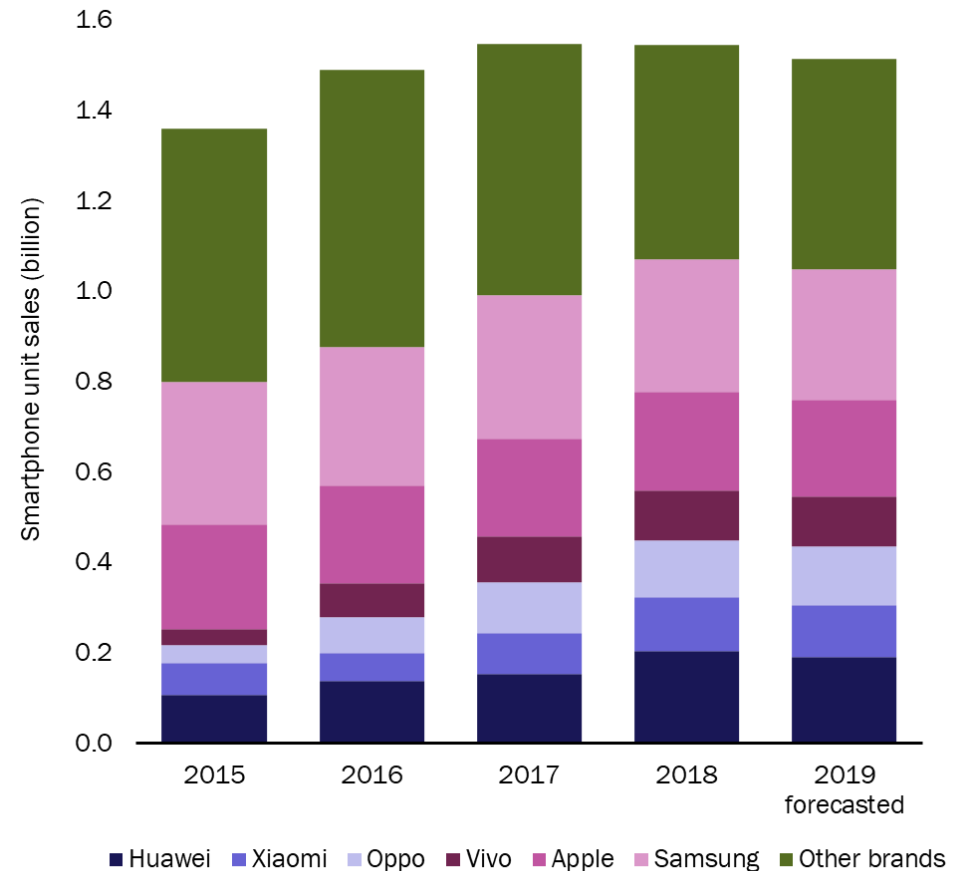
The ‘big four’ Chinese brands accounted for 559 million smartphones sales in 2018, and this performance represents a profound change in the smartphone vendor landscape.

The combined smartphone sales for Huawei, Xiaomi and the two BBK electronics brands (Oppo and Vivo) grow strongly between 2015 and 2018, at a CAGR of 30% year-on-year.

Huawei’s smartphone sales have increased significantly over the past 2 years. The vendor sold over 50 million smartphones in 2018 and achieved the strongest device sales growth (34% year-on-year) out of the six largest smartphone vendors worldwide. The key drivers of this strong growth are its well-balanced portfolio (that covers all segments of the market) and the expansion of its international presence in regions such as India, MENA and LATAM. However, recently published data suggests that Huawei’s smartphone sales declined in 2019 due to the negative public perception in regions such as NA and WE.

Smartphone sales for Oppo and Vivo grew by 57% and 48%, respectively, between 2016 and 2018. Their domestic success stems from their strong understanding of the Chinese market and their very competitively priced mid-range phones that have caused international brands such as Samsung to lose market share. The launch of 5G in China in 2019 allowed these operators to establish their 5G devices prior to the roll-out of 5G technology in other areas worldwide.

Figure 4: Smartphone unit sales by manufacturer, worldwide, 2015–2019



Source: Analysys Mason

## Worldwide: 5G is set to be the key driver for boosting smartphone sales in developed markets

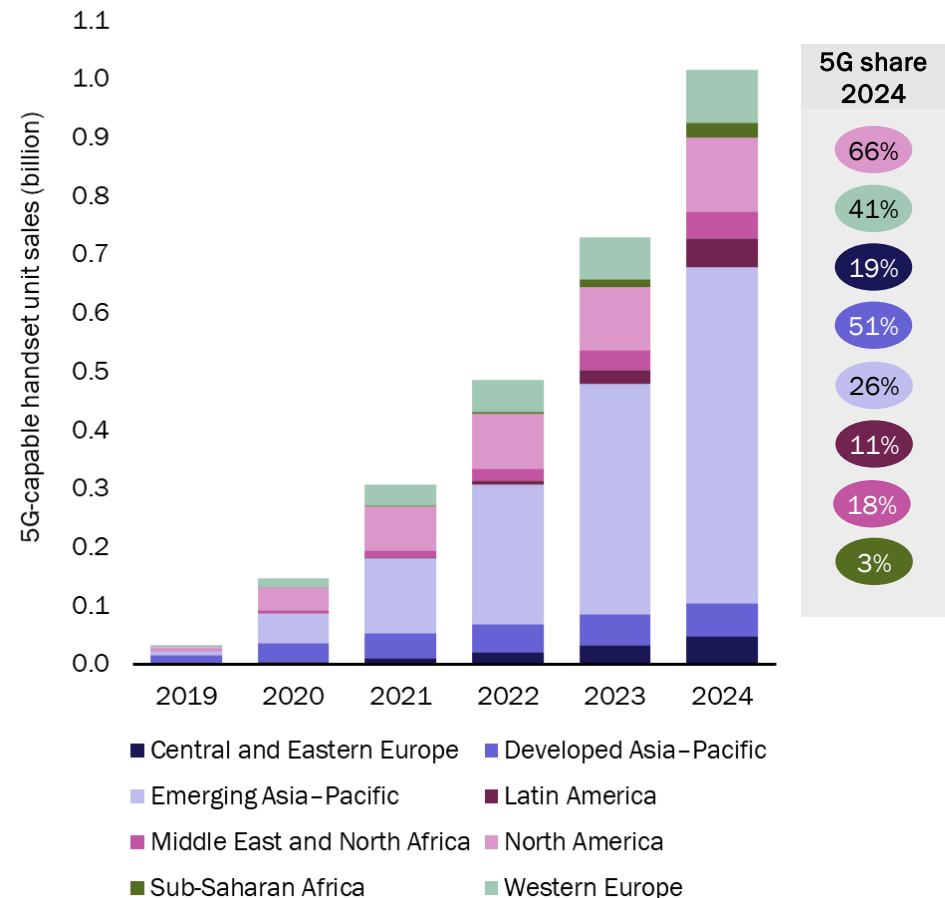
We forecast that the number of 5G-enabled smartphones worldwide will be more than 1.7 billion by 2024.

Most major developed markets should have active 5G networks by the end of 2020, representing a potential opportunity for smartphone vendors. However, unlike 4G, the mass-market consumer use case for 5G (beyond improved speeds and latency) is currently unclear. 4G's success was largely due to the support for mobile video, whereas much of 5G's potential for differentiation lies in the support for new types of content such as AR gaming. 5G adoption is already strong in South Korea, but the market in this country can be considered to be an outlier due to its advanced content ecosystem.

The established nature of smartphone vendors and the high level of competition means that 5G device development is evolving at pace, and fears over short battery life and unwieldy device sizes have been allayed. Most significant vendors launched devices in 2019 (although Apple is not expected to release its device until 2020). The launch of 5G gives mid-market brands such as Xiaomi, Oppo and Vivo the opportunity to increase their market share in developed markets because their initial 5G devices undercut the premium competition from Samsung. Xiaomi already sells a device for less USD300.

The buzz around 5G and increasing device innovation (such as folding phones) will temporarily shorten replacement cycles in most developed markets, and will lead to an increase in sales.

Figure 5: 5G-capable handset unit sales by region, 2021–2024, and the 5G-capable share of connections, worldwide, 2024



Source: Analysys Mason



Worldwide trends

**Regional trends**

**Western Europe**

Central and Eastern Europe

Middle East and North Africa

Sub-Saharan Africa

Emerging Asia–Pacific

Developed Asia–Pacific

North America

Latin America

Forecast methodology and assumptions

About the author and Analysys Mason

## Western Europe: smartphone sales will continue to decline until 2020, at which point moderate growth is expected

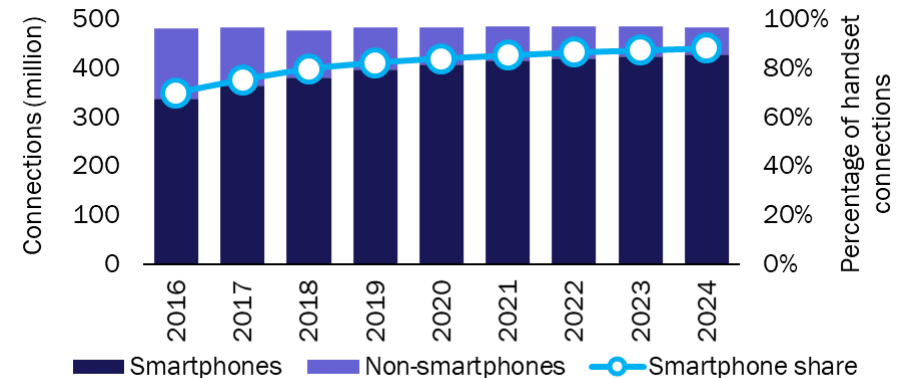
Smartphone sales in Western Europe peaked in 2016 and are expected to continue to decline year-on-year until 2020.

Smartphone sales will increase by an average of almost 1.0% per year in Western Europe from 2019 to 2024. Smartphones accounted for 92.0% of all mobile handset sales in 2019, and this figure is expected to reach 95.6% by 2024.

Most mobile markets in Western Europe are saturated. The increasing smartphone penetration and the growing expense for premium devices will lead to longer replacement cycles. Price inflation among premium brands has allowed Chinese vendors to penetrate the Western European market. Customers continue to move away from handset bundles, and instead choose third-party retail channels and SIM-only deals.

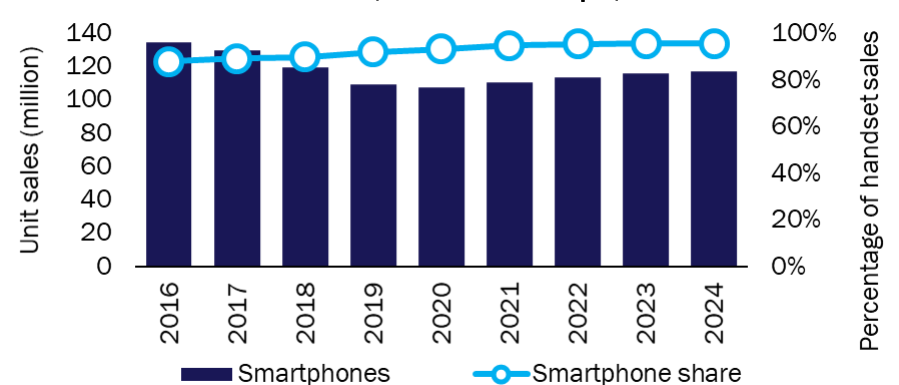
Smartphone sales are expected to continue to decline until the end of 2020, and the launch of 5G in Western Europe is expected to be the most important driver for improving sales. We forecast that more than 95 million 5G-capable smartphones will be sold in 2024, and that the increase in sales in Germany, Scandinavia and the UK will boost the overall smartphone sales outlook for the region. However, annual sales will not reach the levels seen during 2013–2018.

Figure 6: Mobile handset connections by type, and smartphone share of connections, Western Europe, 2016–2024



Source: Analysys Mason




Figure 7: Smartphone unit sales and smartphone share of mobile handset unit sales, Western Europe, 2016–2024



Source: Analysys Mason

## Western Europe: key regional trends

Figure 8: Key regional trends in the handset market, Western Europe

Trend	Description	Potential impact
 <p><b>Launch of 5G</b></p>	<p>Western Europe will be the third-most developed region in the world in terms of 5G handset penetration in 2024. Operators in Finland, Germany, Italy, Spain and the UK have already launched 5G services, and most other providers will be rolling out services during 2020. We forecast that there will be more than 195 million 5G-enabled connections in the region by 2024.</p>	<p>The high cost and current lack of a ground-breaking 5G use case means that 5G smartphone sales will only increase slowly in the short term. Operators in Western Europe will promote 5G with incentives such as unlimited data for social media, video gaming or video streaming purposes. We forecast that 5G smartphone sales will make up over 70% of all annual device sales by 2024.</p>
 <p><b>Continued increase in the popularity of SIM-only plans</b></p>	<p>Our survey results show that the number of consumers purchasing non-device mobile plans increased in the countries surveyed in Western Europe between 2017 and 2019. The recent IFRS changes to accounting standards mean that operators now have to separate equipment revenue from service revenue in their investor reporting, and can no longer ‘boost’ their service revenue using smartphone sales.</p>	<p>Device plans are no longer a key strategy for most operators, and the increasing presence of e-retailers means that the percentage of consumers purchasing equipment from third-party sources will continue to increase. Such third-party purchases are associated with lengthier replacement cycles because of the lack of upgrade options and the absence of subsidies. However, this may change as 5G becomes more-mainstream.</p>
 <p><b>Lengthening of smartphone replacement cycles</b></p>	<p>The smartphone share of handsets is around 90% (or above) in most countries in Western Europe, and most first-time smartphone users are children that have received their first phone.</p>	<p>Smartphone sales are now driven by replacement cycles instead of first-time users. Indeed, some consumers may move back to feature phones during the forecast period, as concerns over smartphone addiction, a lack of trust in big tech companies and expense drive people towards less-sophisticated devices.</p>



Worldwide trends

**Regional trends**

Western Europe

**Central and Eastern Europe**

Middle East and North Africa

Sub-Saharan Africa

Emerging Asia–Pacific

Developed Asia–Pacific

North America

Latin America

Forecast methodology and assumptions

About the author and Analysys Mason

## Central and Eastern Europe: the demand for budget smartphones is high

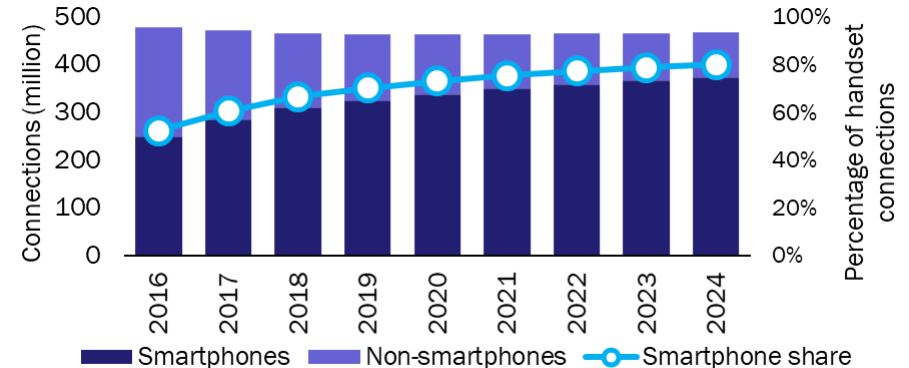
The high number of first-time smartphone users in several countries in the region combined with investments in improving the network quality is expected to drive growth in smartphone sales in CEE.

Smartphone adoption in CEE will increase by 2.8% year-on-year during the forecast period. Smartphones will account for 80% of mobile connections in the region by 2024, up from 70% in 2019.

The smartphone sales trend is non-uniform throughout Central and Eastern Europe. We expect that the annual smartphone sales will remain largely unchanged throughout the forecast period in countries with low smartphone penetration, such as Russia and Ukraine. Xiaomi has already entered these markets, and Oppo has announced plans to release ‘Find X’ and the ‘R-series’ in 2020. These, and similar, low-cost devices, are expected to increase the affordability and therefore penetration of smartphones during the forecast period.

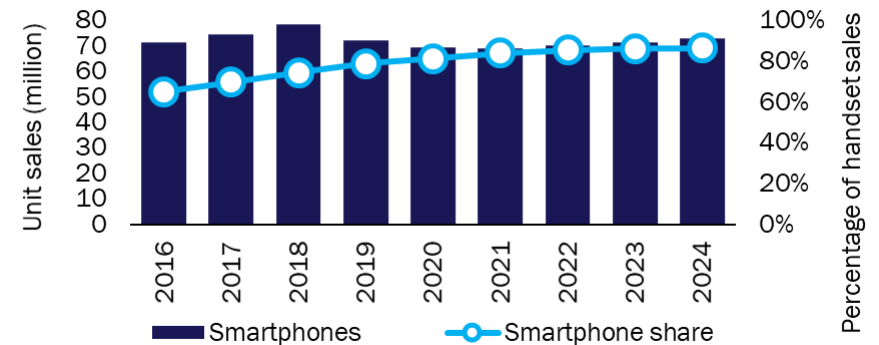
Russia has the largest number of smartphone sales in the region, and will account for 38% of all sales by 2024. Regulations limiting consumer credit will affect smartphone sales in Turkey and will cause them to fall to 9.2 million units in 2020. Operators in Estonia, Lithuania and Latvia are awaiting spectrum auctions and are ready to invest in building 5G base stations. The 5G outlook in these countries is similar to that in WE, and 5G-compatible device sales will account for more than 75% of all smartphone sales by 2024.

Figure 9: Mobile handset connections by type, and smartphone share of connections, Central and Eastern Europe, 2016–2024



Source: Analysys Mason


Figure 10: Smartphone unit sales and smartphone share of mobile handset unit sales, Central and Eastern Europe, 2016–2024



Source: Analysys Mason

## Central and Eastern Europe: key regional trends

Figure 11: Key regional trends in the handset market, Central and Eastern Europe

Trend	Description	Potential impact
 <b>Launch of 5G</b>	<p>5G trials are underway across CEE, and operators are aiming to launch 5G services commercially during FY2020. Governments and operators plan to reach the target set by the EC in its 5G Action Plan; that is, to launch commercial 5G services by 2020 in one major city in each member state. However, the take-up of 5G will be slower in CEE than in WE due to the limited availability of cheap 5G handsets and longer replacement cycles.</p>	<p>The increased coverage of 4G networks combined with cheaper data plans will encourage consumers to switch to more-attractive data bundles. Operators must evaluate their approaches if they want to accelerate customers' transitions to their 5G offerings. Data allowance increases may be enough of an incentive for customers to upgrade, but network congestion and spectrum allocation must be taken into account.</p>
 <b>Russia will maintain its status as a key market in the region</b>	<p>Russia is the largest smartphone market in the region in terms of the number of connections. Slow economic performance lead to a period of limited sales growth between 2014 and 2016, but growth resumed between 2016 and 2018. We do not expect that this growth will be sustained, but the number of smartphone sales will remain above that from 2017 during the forecast period.</p>	<p>Russia is seen as a key market for low- to mid-range smartphones due to the large urban population, relatively low smartphone penetration and high data usage (over 5GB per user in 2019). The competition between the main Chinese brands and the more-obscure national and international manufacturers (such as Vietnam's Vin Group) is high, which is driving down smartphone prices.</p>
 <b>Maturation of markets</b>	<p>Most countries in CEE can now be considered to have a mature smartphone market, and the smartphone share of devices is approximately 80%. Many markets have therefore already hit their peak annual smartphone sales.</p>	<p>Operators and vendors in most countries must prioritise shortening replacement cycles or increasing the demand for higher-value devices, as in other developed regions.</p>





Worldwide trends

**Regional trends**

Western Europe

Central and Eastern Europe

**Middle East and North Africa**

Sub-Saharan Africa

Emerging Asia–Pacific

Developed Asia–Pacific

North America

Latin America

Forecast methodology and assumptions

About the author and Analysys Mason

## Middle East and North Africa: first-time prepaid users will continue to drive sales over the forecast period

Smartphone sales will increase over the forecast period due to a large number of first-time smartphone users in some countries.

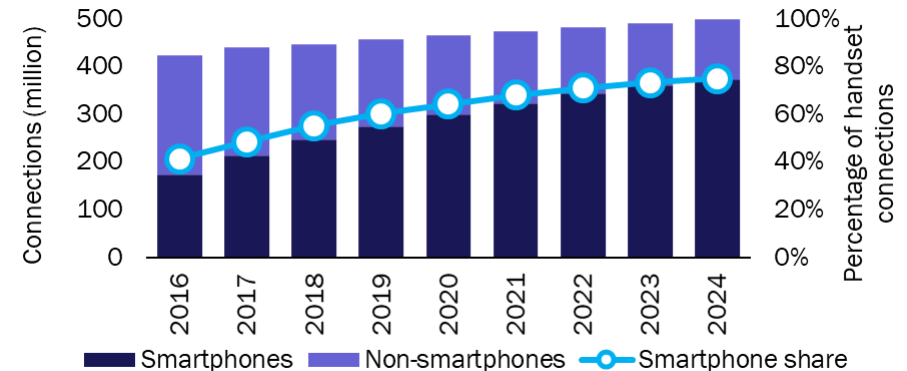
Smartphone penetration will increase by 6.4% year-on-year during the forecast period. Smartphones will account for 83% of all handset sales in the region in 2024, up from 72% in 2019.

Historically, the region has been highly segmented in terms of data usage and smartphone ownership between prepaid and contract subscribers. Prepaid connections accounted for the majority of all mobile connections in 2019 (81%), and this will not change significantly during the forecast period (79% in 2024). The prepaid segment has the highest growth potential in terms of smartphone sales due to the increasing affordability and availability of smartphones.

The countries in the Gulf Co-operation Council (GCC) have an unusually large high-income segment. The smartphone market in countries such as the UAE is nearing saturation, and we expect that smartphone sales will plateau between 2019 and 2024. Apple and Samsung have traditionally dominated the market in terms of sales, but Huawei and Xiaomi increased their market shares in 2018 by introducing new models at attractive prices.

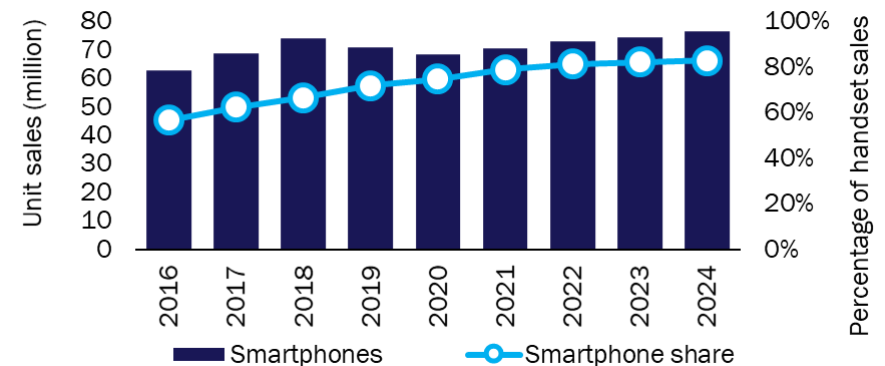
Economic factors may lead to significant changes in the smartphone market because fluctuation in oil prices may affect consumer spending power and credit availability.

Figure 12: Mobile connections by type, and smartphone share of connections, Middle East and North Africa, 2016–2024



Source: Analysys Mason




Figure 13: Smartphone sales and smartphone share of mobile handset sales, Middle East and North Africa, 2016–2024



Source: Analysys Mason

## Middle East and North Africa: key regional trends

Figure 14: Key regional trends in the handset market, Middle East and North Africa

Trend	Description	Potential impact
 <p><b>Launch of 5G</b></p>	<p>Operators in the GCC have invested in 5G trials and infrastructure since 2016. 10 operators in the GCC region have commercially launched the service as of October 2019. The technology is currently available as either fixed-wireless access (FWA) or mobile access in Kuwait, Qatar, Saudi Arabia and the UAE.</p>	<p>The adoption of 5G will follow different patterns across MENA. We expect that the take-up will be fast and strong in the GCC, but 5G is still in the trial stage elsewhere, and commercialisation will not take place before the end of 2020.</p>
 <p><b>Operators have a strong opportunity to offer mobile money</b></p>	<p>MENA is a middle-income region and as such, smartphone penetration is high, particularly in the richer countries in the GCC. However, banking penetration is still reasonably low in the region (48% in 2017 according to the global Findex report). Operators have a strong opportunity to introduce financial services such as mobile wallets.</p>	<p>Governments in the GCC have relaxed the constraints on financial partnerships between telecoms operators and banks since 2017, and several operators (such as STC) have launched mobile wallets. The results from our <i>Connected Consumer Survey</i> show that the take-up of mobile wallets has been moderate, and that there is potential for operators to grow their presence in this area, particularly given the high level of e-commerce in the region. Increasing smartphone penetration among lower-income segments (such as the immigrant workforce in the GCC) increases the potential for operators to launch mobile money and mobile wallet services.</p>
 <p><b>Customers are becoming less loyal to high-end brands</b></p>	<p>Our Connected Consumer Survey 2019 results show that the share of Apple smartphones in the region is declining. Operators have traditionally tailored postpaid plans towards high-end Apple customers, but have recently started to expand their product portfolios (introducing mid-range brands such as Huawei).</p>	<p>The share of customers purchasing smartphones from operators has been increasing since 2017, largely due to the improvement in their product portfolios. This is particularly evident in the postpaid segment, where subsidised plans can be effective. Operators can subsidise both their mid-range and premium offerings in order to drive mobile data usage and stickiness across the board.</p>



Worldwide trends

**Regional trends**

Western Europe

Central and Eastern Europe

Middle East and North Africa

**Sub-Saharan Africa**

Emerging Asia–Pacific

Developed Asia–Pacific

North America

Latin America

Forecast methodology and assumptions

About the author and Analysys Mason

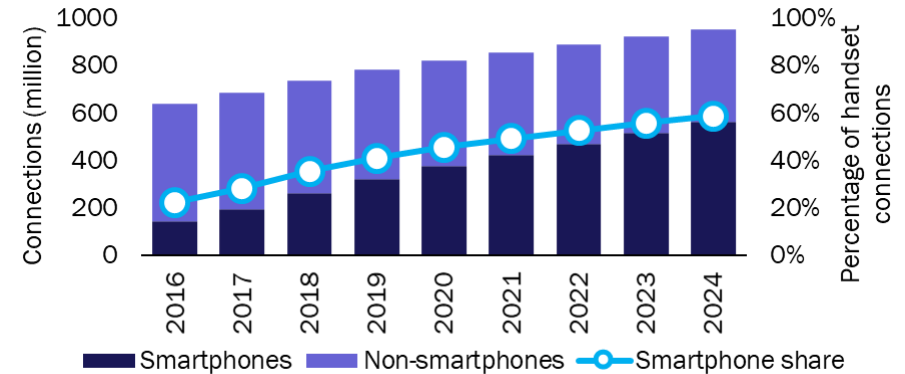
## Sub-Saharan Africa: low smartphone penetration and the increasing demand for mobile broadband will drive growth in smartphone sales

The growing availability of mobile data and the increased consumer spending power will drive smartphone sales growth in Sub-Saharan Africa.

The total number of smartphone connections in SSA grew to 322 million in 2019, representing 41% of total handset connections. We forecast that the smartphone share of handset connections will rise to 59% by 2024. 3G will overtake 2G to become the dominant technology in the region by 2020, and the 4G share of connections will increase at a CAGR of 30% during the forecast period.

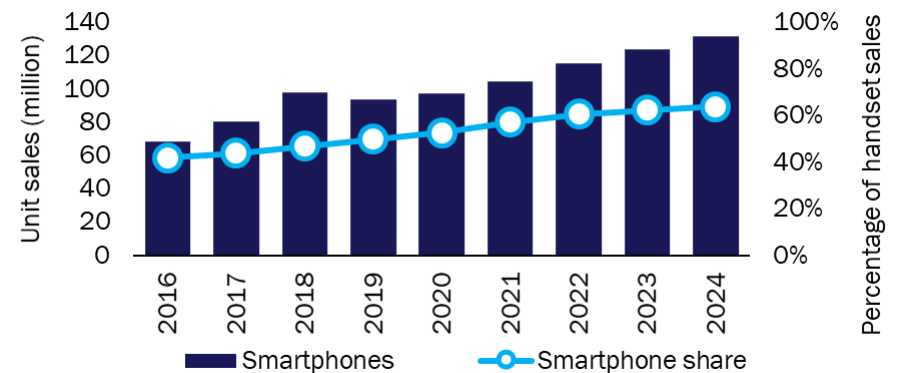
Smartphone sales will grow by 7.1% per year between 2019 and 2024. The smartphone market is dominated by Transsion (a Chinese-owned company that only operates in Africa and has introduced various handsets) and operators such as MTN that have launched their own low-cost smartphones in order to address the growing market. The increasing demand for online content and services will continue to drive smartphone innovation and competition, which will ensure that prices remain affordable and will further incentivise and enable new customers to purchase smartphones. Strong fintech growth prospects (low banking penetration) and poor fixed broadband coverage mean that the scope for smartphone penetration growth is the largest of any region in the world. International vendors are likely to establish multiple factories across SSA in order to evade import tariffs and ensure that they are able to offer the cheapest devices possible.

Figure 15: Mobile connections by type, and smartphone share of connections, Sub-Saharan Africa, 2016–2024



Source: Analysys Mason



Figure 16: Smartphone unit sales and smartphone share of mobile handset unit sales, Sub-Saharan Africa, 2016–2024



Source: Analysys Mason

## Sub-Saharan Africa: key regional trends

Figure 17: Key regional trends in the handset market, Sub-Saharan Africa

Trend	Description	Potential impact
 <p><b>Development of the 4G landscape</b></p>	<p>SSA has the lowest smartphone penetration of all regions worldwide. Orange and MTN have introduced smart feature phones that cost as little as USD20, and many African governments are encouraging local manufacturers to develop their own devices. These handsets use the 3G network and have smart applications such as Facebook, Twitter and Google Maps. They have proven to be very popular in the region. Customers that own a smart feature phone are expected to initially migrate to 3G-compatible, low-cost smartphones; in the long term, they will turn to affordable 4G handsets.</p>	<p>Network operators in SSA want to migrate customers from 2G/3G to 4G networks. There has been some success in achieving this as there were more 3G/4G connections than 2G connections at the end of 2019. Affordability remains the main barrier to this transition, so operators and vendors need to invest in R&amp;D and find ways to offer low-cost 4G-capable phones. Spectrum allocation is also critical to enable operators to offer attractive data allowances, which will drive the adoption of 4G, and in some countries, 5G.</p>
 <p><b>Handset affordability will be the key</b></p>	<p>The smartphone penetration was less than 30% in SSA at the end of 2019. There is therefore significant potential for smartphone sales growth, particularly as population levels continue to increase at a rapid rate. Smartphone affordability is the main barrier that operators and vendors must overcome.</p>	<p>Smartphone affordability is a challenge of supply chain economics, distribution networks and technology. Chinese vendor Transsion has become a key player in the region, and specialises in cheap smartphones (and smart feature phones) through its Tecno, Itel and Infinix brands. Transsion aims to stay ahead of the competition by establishing R&amp;D and manufacturing facilities in the region, and other vendors and operators may follow suit during the course of the forecast period. Operators such as Orange have launched smart feature phones (generally using KaiOS) in markets with low penetration.</p>



Worldwide trends

**Regional trends**

Western Europe

Central and Eastern Europe

Middle East and North Africa

Sub-Saharan Africa

**Emerging Asia–Pacific**

Developed Asia–Pacific

North America

Latin America

Forecast methodology and assumptions

About the author and Analysys Mason

## Emerging Asia–Pacific: smartphone sales will continue to increase steadily until 2024

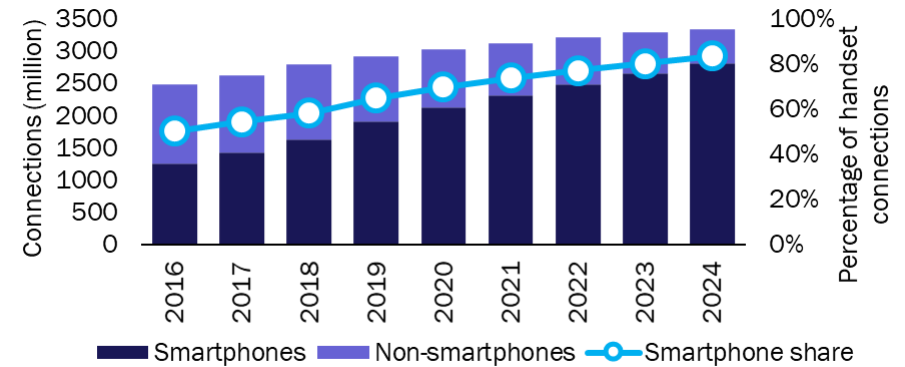
Smartphone unit sales in India will increase at a CAGR of 5.4% over the forecast period; this rate is twice that for the region overall.

Annual smartphone sales will increase across the region during the forecast period, and we expect that there will be an extra 130 million smartphones by 2024. There is substantial potential for penetration growth, especially in Pakistan, India and Bangladesh.

Smartphone sales in EMAP have historically been driven by the Chinese market, because it accounts for nearly 30% of the world’s smartphone connections. However, smartphones sales in China have declined by almost 10% since 2017 due to high penetration levels and long replacement cycles. We forecast that smartphone sales in China will continue to decline until 2020, at which point the widespread take-up of 5G smartphones and the introduction of integrated handsets (foldable devices) will restore sales growth from 2021 onwards.

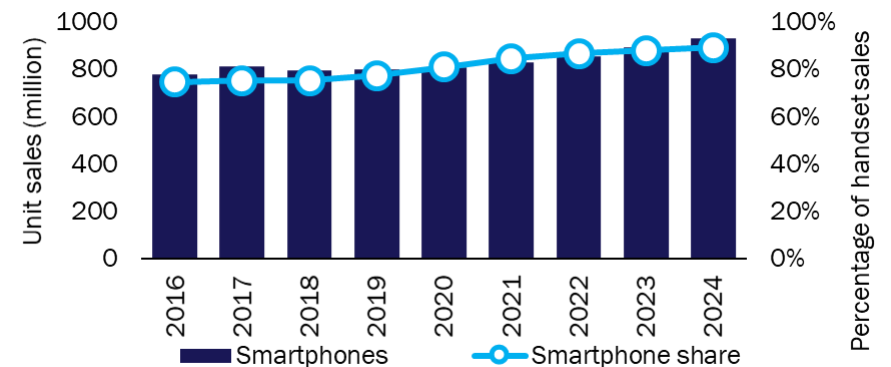
The ‘big four’ Chinese smartphone manufacturers are now focusing on the second-largest country in the world by population, India. Many first-time internet users in India are connecting to broadband using smart feature phones, and there are around 400 million active devices in the country. We expect that the increased demand for smart feature phones will limit smartphone sales in the short term.

Figure 18: Mobile connections by type, and smartphone share of connections, emerging Asia–Pacific, 2016–2024



Source: Analysys Mason

Figure 19: Smartphone unit sales and smartphone share of mobile handset unit sales, emerging Asia–Pacific, 2016–2024





Source: Analysys Mason



## Emerging Asia–Pacific: key regional trends

Figure 20: Key regional trends in the handset market, emerging Asia–Pacific

Trend	Description	Potential impact
 <p><b>Launch of 5G</b></p>	<p>The Chinese regulator released 5G licences to the three MNOs and one state-owned cable operator in June 2019. The world’s largest 5G deployment (as of November 2019) has been in China, and all three MNOs commercially launched 5G services. CBN plans to roll out the service during 2020. LTE-A smartphone penetration is still growing in India because many vendors have recently introduced cheap smartphones. 5G migration will therefore not take place in India until 2021, and will be confined to high-value customers. The Indian regulatory body has announced that it will conduct the 5G spectrum auction by April 2020.</p>	<p>China Mobile deployed 20 000 additional base stations at the end of 2019 (to reach a total of 50 000 base stations) in order to accelerate the adoption of 5G. Vendors such as Vivo, Oppo and Xiaomi are starting to offer ‘affordable’ 5G-capable devices. For example, Vivo offers the Nex-3 handset in both 4G and 5G versions, so as to generate interest from both existing 4G users and early adopters of 5G. We forecast that 5G sales will be driven by China’s performance, and that 5G will account for 70% of all smartphone connections in the country by 2024.</p>
 <p><b>India will drive regional smartphone sales growth</b></p>	<p>Chinese smartphone sales fell considerably in 2018 thanks to market saturation and lengthening replacement cycles. Sales growth has partially resumed, but smartphone sales will never again reach the peak seen in 2016 in China. Instead, India will be the country with the greatest growth in smartphone sales in EMAP due to its massive population, small initial user base and increasing network coverage.</p>	<p>Operators such as Jio have successfully driven mobile data growth in India using subsidised smart feature phones. Operators and vendors can take advantage of the virtuous cycle of mobile data supply and demand to increase smartphone sales and mobile data monetisation. Investing in networks to cover parts of the population that are not currently covered by LTE is also key to a sales growth strategy. A strategy that promotes and subsidises smart feature phones to connect first-time users should create demand for more-sophisticated smartphones in the long run.</p>



Worldwide trends

**Regional trends**

Western Europe

Central and Eastern Europe

Middle East and North Africa

Sub-Saharan Africa

Emerging Asia–Pacific

**Developed Asia–Pacific**

North America

Latin America

Forecast methodology and assumptions

About the author and Analysys Mason

## Developed Asia–Pacific: the launch of 5G will lead to an increase in smartphone sales by 2024

Smartphone sales decreased in each of the countries covered in DVAP in 2019 due to a limited number of first-time buyers. However, the introduction of 5G is expected to boost the market.

Smartphone sales will increase by an average of around 1.3% per year between 2019 and 2024. Smartphones accounted for 90% of mobile handset sales in 2019; we expect that this will grow at a steady rate to reach 94% by the end of the forecast period.

Smartphone replacement cycles have lengthened in DVAP (as in NA and WE), which caused smartphone sales to decrease between 2016 and 2019. All three South Korean mobile operators launched 5G in April 2019 (the first launch in the region), leading to an increase in smartphone sales. Japan is the largest market in DVAP (in terms of smartphone sales and the number of smartphone connections), and a fourth operator (Rakuten) is expected to join the market in 1H 2020, thereby intensifying competition. The Japanese government is aiming to make the country 5G-ready for the Tokyo Summer Olympics in 2020.

South Korea is the most-advanced 5G market in the world and 5G take-up has been rapid thanks to strong operator promotion (similarly to 4G). The number of total 5G connections exceeded 4.3 million by the end of November 2019, and we estimate that the share of 5G smartphones exceeded 9% by the end of 2019. We predict that almost 95% of all smartphone sales in South Korea will be for 5G-enabled devices by 2024.

Figure 21: Mobile connections by type, and smartphone share of connections, developed Asia–Pacific, 2016–2024

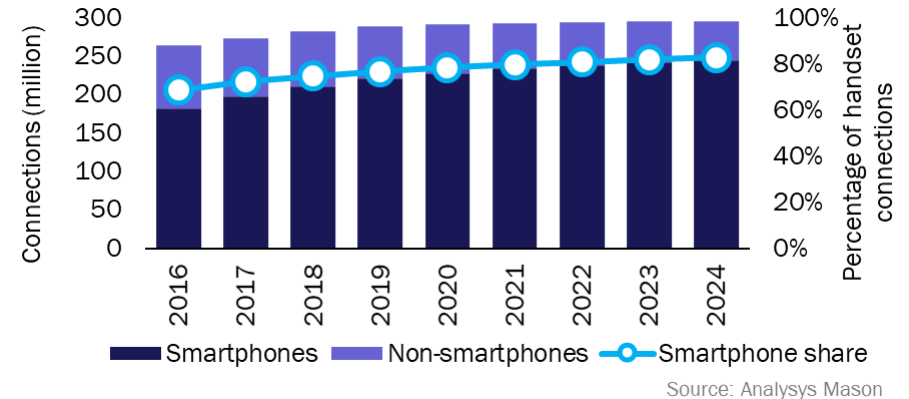
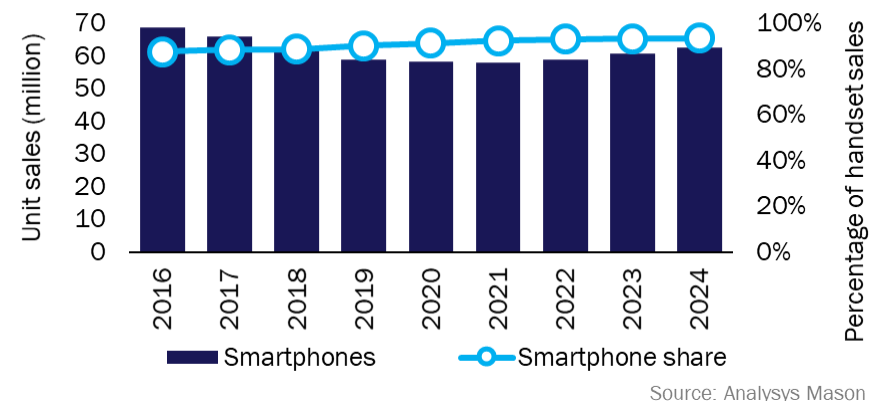





Figure 22: Smartphone sales and smartphone share of mobile handset unit sales, developed Asia–Pacific, 2016–2024



## Developed Asia–Pacific: key regional trends

Figure 23: Key regional trends in the handset market, developed Asia–Pacific

Trend	Description	Potential impact
 <p><b>Launch of 5G</b></p>	<p>DVAP is one of the most technologically advanced regions in the world. Mobile operators in South Korea were the first to launch 5G in April 2019, and this technology was expected to be available to more than 90% of the population by the end of 2019. The number of 5G connections in the country is expected to exceed 50 million by 2024. We also forecast that 5G smartphone sales in DVAP will grow to 56.5 million at the end of 2024.</p>	<p>Numerous vendors have already released 5G-compatible devices, including Samsung, Huawei and LG. However, only Xiaomi and Oppo sell handsets for less than USD1000. Operators are offering attractive incentives to upgrade to 5G: KT launched the ‘super change’ replacement programme in partnership with Samsung in South Korea, which subsidises 50% of the cost of an S10 5G handset if the device is returned and replaced with a new Galaxy smartphone after 24 months.</p>
 <p><b>Smartphone take-up will remain limited in Japan</b></p>	<p>We estimate that only 77% of handsets will be smartphones in Japan by 2024. Many Japanese consumers are uninterested in smartphones despite strong consumer spending power and good mobile network coverage; this may be due to Japan’s ageing population.</p>	<p>Operators and vendors must work to stimulate growth in the Japanese smartphone device market. Apple currently has a share of over 50%, suggesting that the Japanese market is still skewed towards premium devices. Chinese vendors that sell mid-range devices are attempting to take advantage of the absence of a competitive mid-market segment: Huawei and Oppo are gradually gaining market share, and Xiaomi is set to enter the market in 2020.</p>
 <p><b>Development of DVAP (specifically South Korea) as the main global testing ground for consumer 5G use cases</b></p>	<p>Operators in South Korea are offering a very wide variety of services to complement their 5G offer; specifically AR/VR (mainly gaming) apps.</p>	<p>It is likely that 5G applications will have a strong effect on South Korean consumers’ propensity to upgrade their smartphones, especially due to the existing high level of smartphone penetration and the country’s large e-sports penetration. Operators in other countries may consider bundling a range of data-intensive services, and 5G opens the possibility for bundling devices such as VR headsets with smartphones.</p>



Worldwide trends

**Regional trends**

Western Europe

Central and Eastern Europe

Middle East and North Africa

Sub-Saharan Africa

Emerging Asia–Pacific

Developed Asia–Pacific

**North America**

Latin America

Forecast methodology and assumptions

About the author and Analysys Mason

## North America: 5G should boost smartphone sales over the forecast period

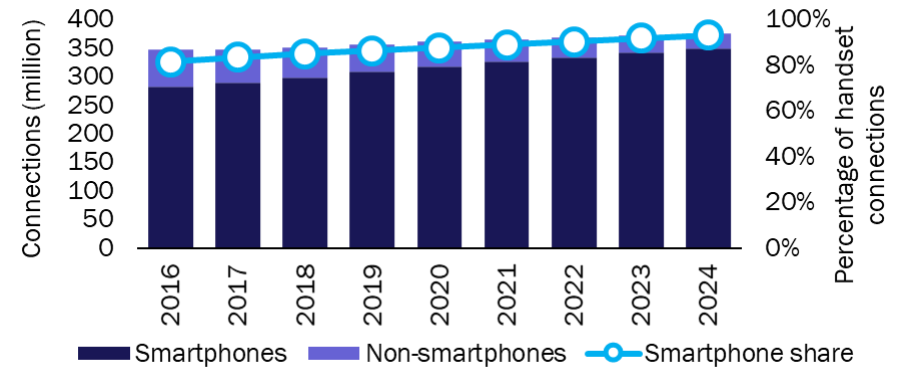
Annual smartphone sales in NA have been decreasing since 2016 because of the lengthening replacement cycles. However, moderate sales growth (at a CAGR of 1%) is expected during the forecast period.

The smartphone share of handset sales will continue to grow during the forecast period and will reach 98.3% in 2024. Smartphone sales will decrease until 2020 (falling to 157.3 million sales), at which point mass-market 5G sales will restore growth.

The average replacement cycle length has increased drastically, as customers either cannot afford or are unwilling to pay high prices for the marginal innovation offered by well-established brands such as Apple and Samsung. Operators have historically been the main sellers of smartphones and have bundled their services with new devices, but customers are increasingly choosing not to upgrade their smartphone every service cycle, and are instead purchasing SIM-only contracts.

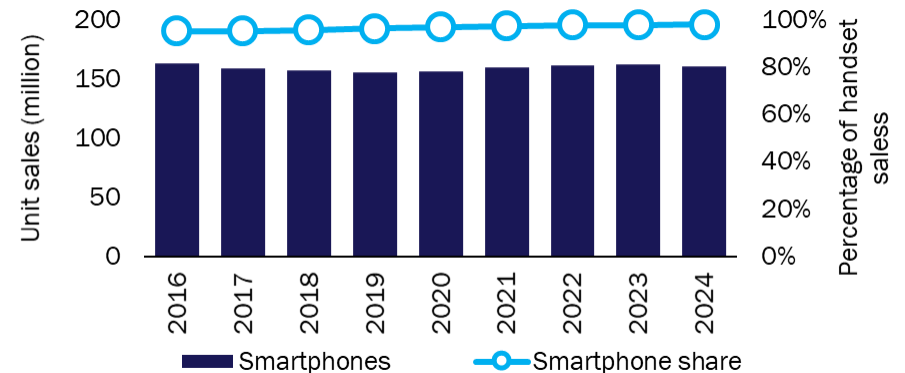
The launch of 5G should boost smartphone sales by 2020, and we expect that this will lead to sales growth by 2021. The introduction of Apple's 5G-capable device in 2020 should also boost smartphone sales. We expect that the demand for new innovative foldable devices will grow as these handsets become more affordable; these handsets currently cost approximately USD2000.

Figure 24: Mobile handset connections by type, and smartphone share of connections, North America, 2016–2024



Source: Analysys Mason




Figure 25: Smartphone unit sales and smartphone share of mobile handset unit sales, North America, 2016–2024



Source: Analysys Mason

## North America: key regional trends

Figure 26: Key regional trends in the handset market, North America

Trend	Description	Potential impact
 <p><b>Launch of 5G</b></p>	<p>US operators have been at the forefront of developing 5G-ready networks and all US operators launched 5G in 2019. Initially, 5G services were rolled out in approximately 30 cities (including New York and Boston); nationwide coverage is expected by the end of 2020. We forecast that almost 65% of mobile SIMs in NA will be 5G-enabled by 2024.</p>	<p>The pricing model for 5G services will play a key role in smartphone sales over the forecast period. Operators are evaluating their options: some prefer a speed-tiering model, while others are building price plans around content. The adoption of an attractive pricing scheme combined with the roll out of Apple's 5G-capable devices in 2020 will limit the decline in smartphone sales.</p>
 <p><b>Mid-market smartphone sales</b></p>	<p>The smartphone market in NA has become much more-transparent to consumers since 2015 because operators are obliged to explicitly split their bills into a device charge and a service charge. As a result, operators have moved away from bundling devices in mobile contracts, and less than 25% of US customers had a bundled device in our 2019 <i>Connected Consumer Survey</i>.</p>	<p>The move away from device bundling has put the power in customers' hands. The Trump administration's protectionist trade policy has all-but-banned Chinese phones in the US market, but customers are increasingly attracted to mid-market phones and are moving away from the premium Apple and Samsung handsets. Brands such as Motorola and LG can take advantage of this demand for non-premium handsets, and there is plenty of scope for growth in these areas.</p>
 <p><b>Apple will move in a new direction</b></p>	<p>Apple remains one of the most highly valued company in the world, and around 50% of its revenue comes from iPhone sales. However, its total revenue is showing clear signs of stalling: its revenue fell by 5% in 1Q 2019. A shift in demand away from premium phones and a saturated market threaten Apple's continued growth.</p>	<p>Apple intends to diversify its product portfolio beyond its smartphone core. It will be late to launch a 5G device (expected in 2020), but will double down on its video and streaming services. It still benefits from revenue growth from secondary smart devices (there are rumours of a launch of augmented reality glasses in 2020).</p>



Worldwide trends

**Regional trends**

Western Europe

Central and Eastern Europe

Middle East and North Africa

Sub-Saharan Africa

Emerging Asia–Pacific

Developed Asia–Pacific

North America

**Latin America**

Forecast methodology and assumptions

About the author and Analysys Mason



## Latin America: the improving economic output will lead to an increase in smartphone sales over the forecast period

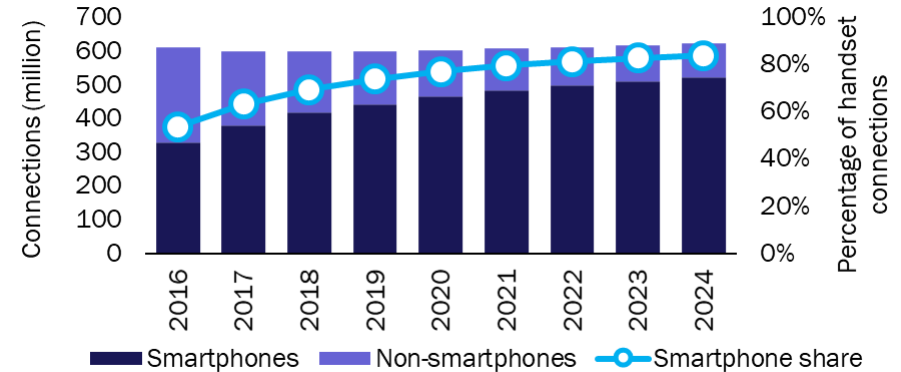
The improved economic conditions and the small smartphone user base means that there is potential for smartphone sales growth over the forecast period. However, the high cost for premium devices may limit growth.

Smartphone sales will grow at a CAGR of 2.4% between 2019 and 2024. Smartphones will account for 92% of all handsets sales in the region in 2024, up from 84% in 2019.

Improving consumer wealth and affordable data rates will drive smartphone take-up in 2024. The low level of fixed broadband penetration in LATAM has led to the increased adoption of mobile broadband. We forecast that smartphones will continue to be the access route to the internet and the predicted increase in mobile data usage per connection may boost the demand for premium smartphones. However, high import taxes in countries such as Argentina and Brazil may make premium smartphones unaffordable. Brazil is the largest market in the region (in terms of both smartphone sales and the number of connections), and 46.6 million smartphones were sold in the country in 2019. We expect that this figure will fall to 45.6 million in 2021, at which point, we predict that sales will grow again.

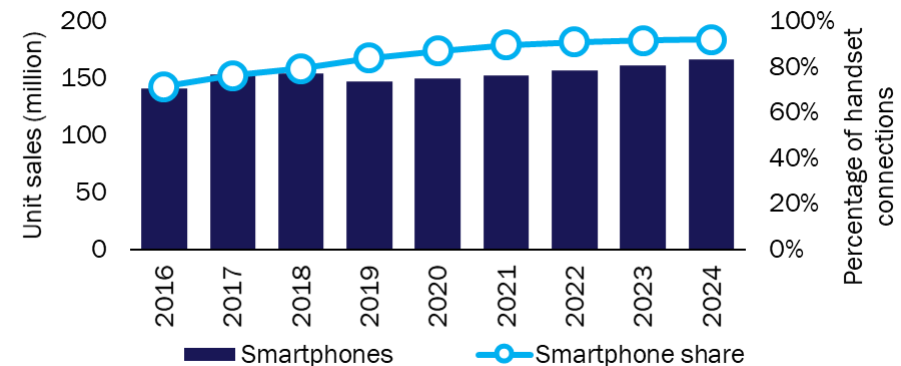
Samsung is the most-established brand in the region, but Motorola (Lenovo) has been successful and has developed strong brand loyalty. Chinese vendors (Xiaomi and Huawei) entered the market in 2017 because they consider LATAM to be a strategically significant region. The high level of competition in the market should ensure that prices remain affordable.

Figure 27: Mobile handset connections by type, and smartphone share of connections, Latin America, 2016–2024



Source: Analysys Mason



Figure 28: Smartphone unit sales and smartphone share of mobile handset unit sales, Latin America, 2016–2024



Source: Analysys Mason

## Latin America: key regional trends

Figure 29: Key regional trends in the handset market, Latin America

Trend	Description	Potential impact
 <p><b>Launch of 5G</b></p>	<p>4G technology is dominant in LATAM, and its penetration reached 59% in 2019. It has therefore not yet reached saturation point in LATAM, and we expect that its take-up will continue to grow until 2022. 78% of all handsets will be 4G-enabled by this point, and operators will be ready to commercially launch 5G. In October 2019, América Móvil announced that it will not be investing in 5G for the next 2 years, and the current uncertainty regarding the status of Telefónica's networks means that 5G smartphones will not be sold prior to 2022.</p>	<p>The 5G landscape in LATAM appears to be rather complicated due to a conflict between private investment and government intervention in the industry. The 'big four' Chinese vendors have entered the market because they recognise that there is strong potential for revenue growth. However, taxation on mobile devices is very high in the region: Argentina, Costa Rica, Nicaragua and Venezuela apply the heaviest tax rates. In Argentina, for instance, the tax rate for importing a smartphone can be as high as 35%. Governments and operators should therefore revise their approaches in order to increase the adoption of 5G.</p>
 <p><b>Opportunity for data growth</b></p>	<p>Fixed broadband penetration is low, but the average mobile data traffic per connection is also among the lowest in the world. Chile was the only nation in the region where the mobile data traffic per connection exceeded 2GB in 2018.</p>	<p>Operators have a strong opportunity to increase the mobile data spend due to the low baseline and high smartphone penetration (particularly in Brazil). Operators must make mobile data packages affordable, and ensure that networks have sufficient capacity. Low data usage (despite high smartphone penetration) suggests that users may not be taking advantage of applications such as video streaming. Operators are in a prime position to exploit this niche (Telefónica has rolled out Movistar Play, for example). If operators can successfully introduce a culture of high data usage in the region, there may be a secondary benefit of an increase in fixed broadband demand.</p>



Worldwide trends

Regional trends

Western Europe

Central and Eastern Europe

Middle East and North Africa

Sub-Saharan Africa

Emerging Asia–Pacific

Developed Asia–Pacific

North America

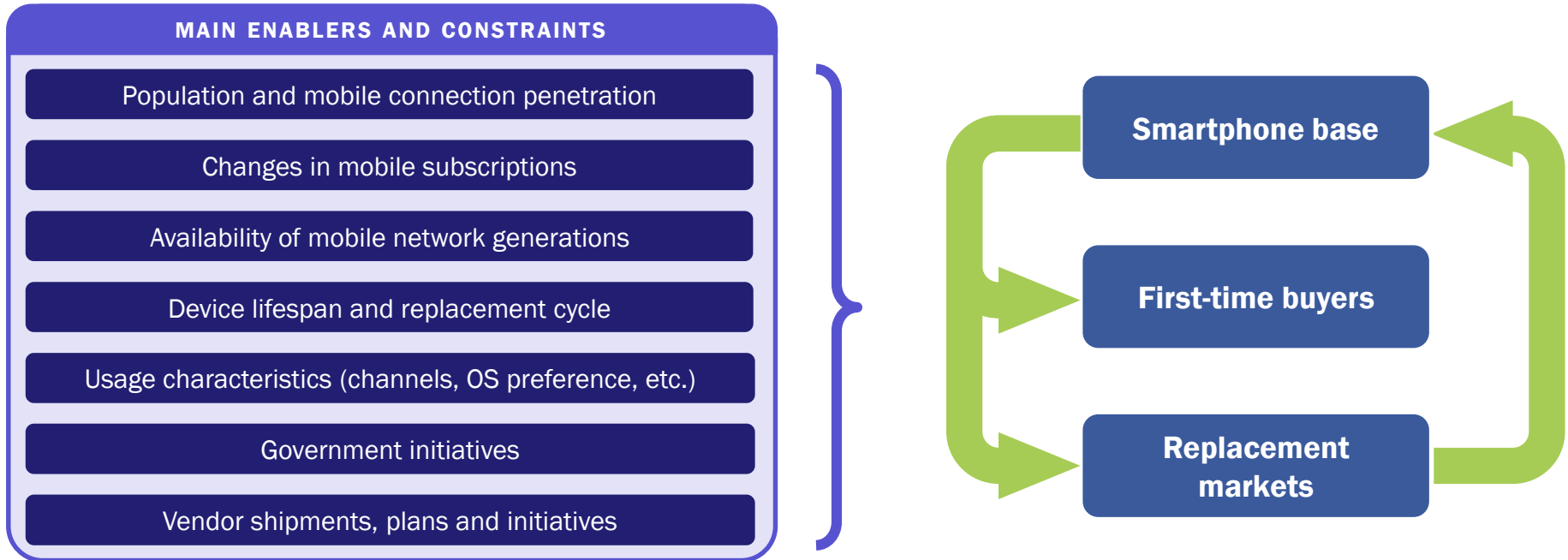
Latin America

**Forecast methodology and assumptions**

About the author and Analysys Mason

## Forecast methodology and assumptions

Figure 30: Main enablers and constraints for our smartphone forecasts



Our model is based on the interplay between the installed base of smartphones and smartphone sales. It uses replacement cycles and first-time buyers as its main drivers. These drivers are informed, and constrained, by trends and expectations about penetration rates, mobile subscriptions (for example, prepaid, postpaid, SIM-only) device lifespan, availability and launch of mobile network generations, usage characteristics (for example, channel preference, OS usage), government initiatives, and vendor shipments, plans and initiatives.



Worldwide trends

Regional trends

Western Europe

Central and Eastern Europe

Middle East and North Africa

Sub-Saharan Africa

Emerging Asia–Pacific

Developed Asia–Pacific

North America

Latin America

Forecast methodology and assumptions

**About the authors and Analysys Mason**

## About the authors



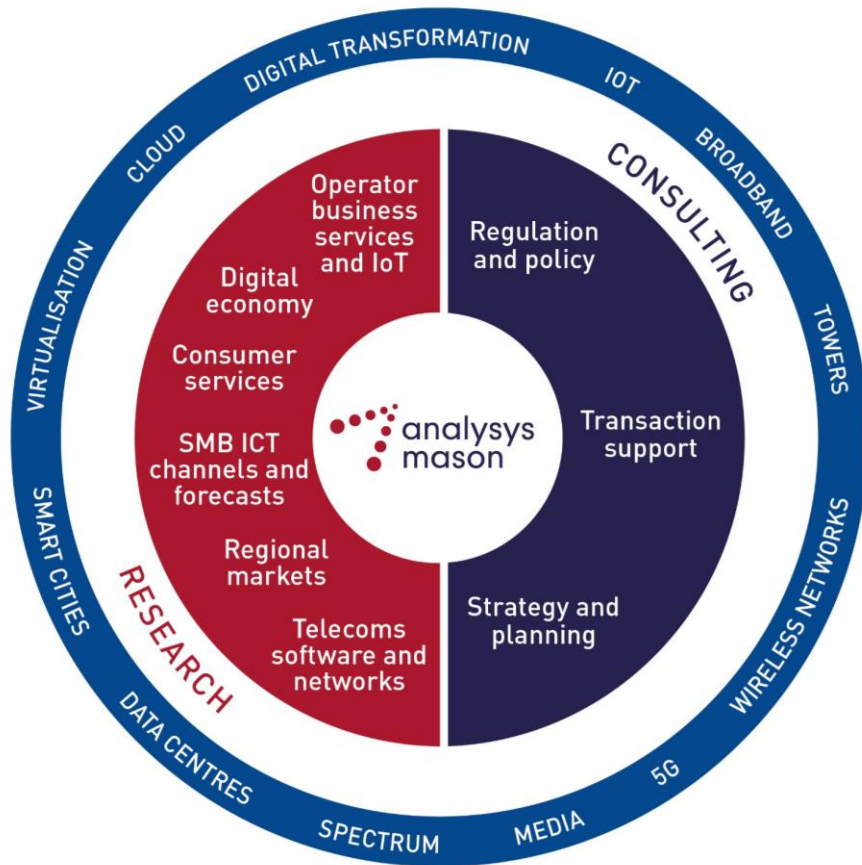
**Simon Lumb** (Analyst) is a member of the Consumer Services research team in London, contributing primarily to the *Convergence Strategies* research programmes. Simon holds a BSc in Physics from Durham University, and during his studies conducted research on the collision of galaxies and helped to develop a GPS tracking system for a start-up company.



**Polytimos Kontos** (Research Analyst) is a member of our data research team in London, contributing primarily to the *Telecoms Market Matrix*, *European Core Forecasts*, *European Country Reports* and *Global Telecoms Data* research programmes. He holds an MSc in Management from London Business School and an MEng in Civil Engineering from University of Patras.

# Analysys Mason's consulting and research are uniquely positioned

## Analysys Mason's consulting services and research portfolio



## Consulting

We deliver tangible benefits to clients across the telecoms industry:

- communications and digital service providers, vendors, financial and strategic investors, private equity and infrastructure funds, governments, regulators, broadcasters and service and content providers

Our sector specialists understand the distinct local challenges facing clients, in addition to the wider effects of global forces.

We are future-focused and help clients understand the challenges and opportunities new technology brings.

## Research

Our dedicated team of analysts track and forecast the different services accessed by consumers and enterprises.

We offer detailed insight into the software, infrastructure and technology delivering those services.

Clients benefit from regular and timely intelligence, and direct access to analysts.

# Research from Analysys Mason

## Consumer services programmes

- Mobile Services
- Mobile Devices
- Fixed Broadband Services
- Convergence Strategies
- Video Strategies

## Operator investment programmes

- Operator Investment Strategies
- Network Traffic
- Spectrum

## Telecoms software and networks programmes

- Software Forecast and Strategy
- Telecoms Software Market Shares

## Network-focused

- Next-Generation Wireless Networks
- Video and Identity Platforms
- Service Design and Orchestration
- Automated Assurance
- Network Automation and Orchestration
- Digital Infrastructure Strategies

## Customer-focused

- Digital Experience
- Customer Engagement
- Monetisation Platforms
- AI and Analytics



## Digital economy programmes

- Digital Economy Strategies
- Future Comms

## Operator business services and IoT programmes

- Large Enterprise Voice and Data Connectivity
- Large Enterprise Emerging Service Opportunities
- SME Strategies
- IoT and M2M Services
- IoT Platforms and Technology

## SMB ICT channels and forecasts programmes

- Managed Service Provider Strategies
- Cyber Security

## Regional markets programmes

- Global Telecoms Data
- Americas
- Asia-Pacific
- Middle East and Africa
- European Core Forecasts
- European Telecoms Market Matrix
- European Country Reports

## DataHub

- ~2500 forecast and 250+ historical metrics
- Regional results and worldwide totals
- Operator historical data



## Consulting from Analysys Mason

### REGULATION AND POLICY

- Policy development and response
- Ex-ante market reviews, remedies, costing...
- Universal Service Obligation (USO)
- Scarce resources: radio spectrum management, auction support, numbering...
- Ex-post/abuse of dominance
- Postal sector



[analysismason.com/consulting](https://analysismason.com/consulting)

### TRANSACTION SUPPORT

- Commercial due diligence
- Technical due diligence
- Mergers and acquisitions (M&As)
- Debt and initial public offerings (IPOs)
- Joint-venture structuring
- Mid-market financial sponsors

### STRATEGY AND PLANNING

- Commercial expertise
- Technology optimisation
- New digital frontiers

PUBLISHED BY ANALYSYS MASON LIMITED IN **FEBRUARY 2020**

Bush House • North West Wing • Aldwych • London • WC2B 4PJ • UK

Tel: +44 (0)20 7395 9000 • Email: [research@analysismason.com](mailto:research@analysismason.com) • [www.analysismason.com/research](http://www.analysismason.com/research) • Registered in England and Wales No. 5177472

© Analysys Mason Limited 2020. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, mechanical, photocopying, recording or otherwise – without the prior written permission of the publisher.

Figures and projections contained in this report are based on publicly available information only and are produced by the Research Division of Analysys Mason Limited independently of any client-specific work within Analysys Mason Limited. The opinions expressed are those of the stated authors only.

Analysys Mason Limited recognises that many terms appearing in this report are proprietary; all such trademarks are acknowledged and every effort has been made to indicate them by the normal UK publishing practice of capitalisation. However, the presence of a term, in whatever form, does not affect its legal status as a trademark.

Analysys Mason Limited maintains that all reasonable care and skill have been used in the compilation of this publication. However, Analysys Mason Limited shall not be under any liability for loss or damage (including consequential loss) whatsoever or howsoever arising as a result of the use of this publication by the customer, his servants, agents or any third party.