NOKIA

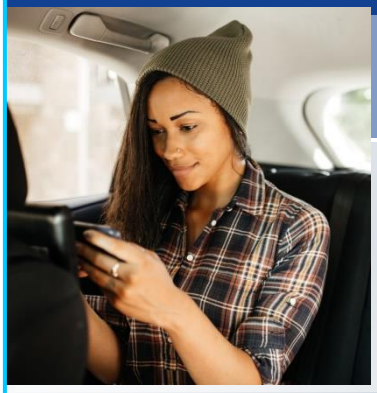
Middle East & Africa Broadband Index Report

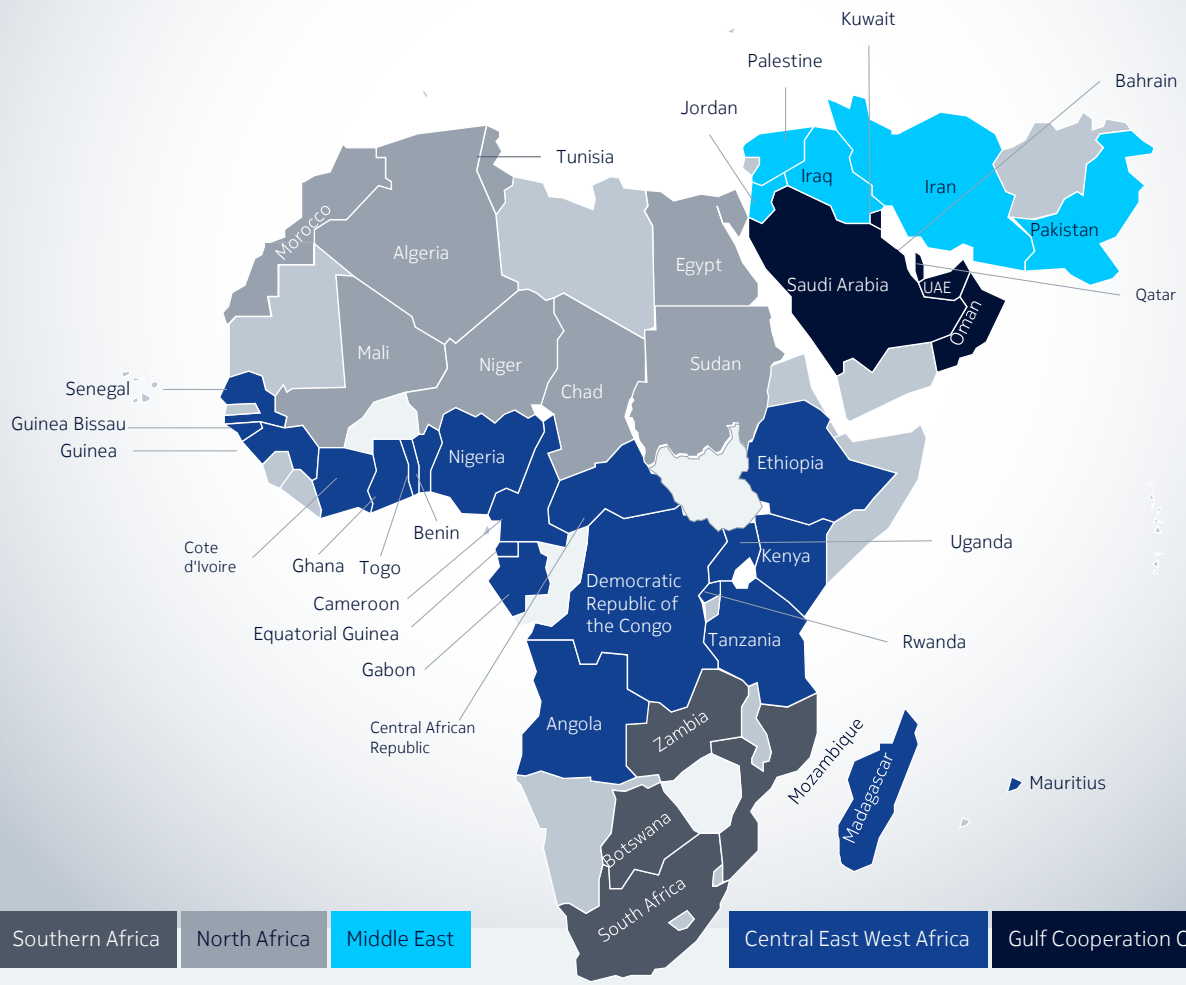
July 2022

About the report

Nokia's Middle East and Africa (MEA) Broadband Index report is on mobile broadband performance in MEA region. It aims to provide valuable insight, data and analysis on mobile broadband subscribers, coverage, ARPU and its traffic growth in MEA region as well its respective sub-regions (Southern Africa, North Africa, Middle East, Central East West Africa and Gulf corporation Council (GCC).

The report has been created based on Nokia's Intelligence and using data from various 3rd party sources. It analyses mobile broadband traffic trends only at a consolidated level and does not intend to provide a comparative analysis of data growth for different operators.





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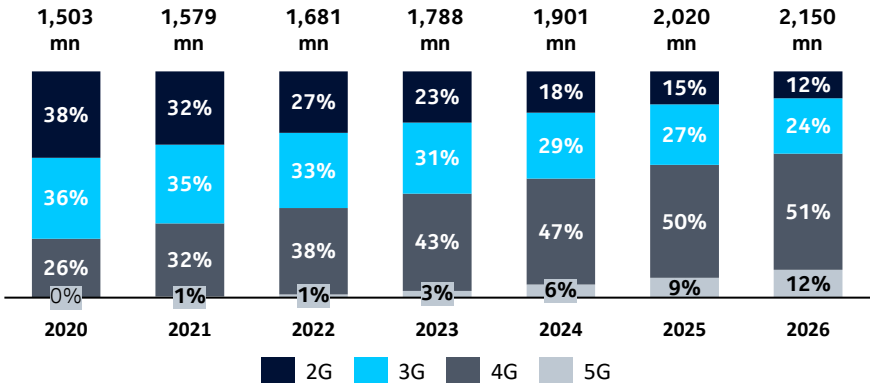
4G will dominate MEA till 2026; 5G is growing steadily

5G adoption is increasing marginally whereas 4G adoption is growing continuously

Subscribers share by technology across MEA



6.4% CAGR (2022 to 2026)

63% 4G + 5G Subscribers in 2026

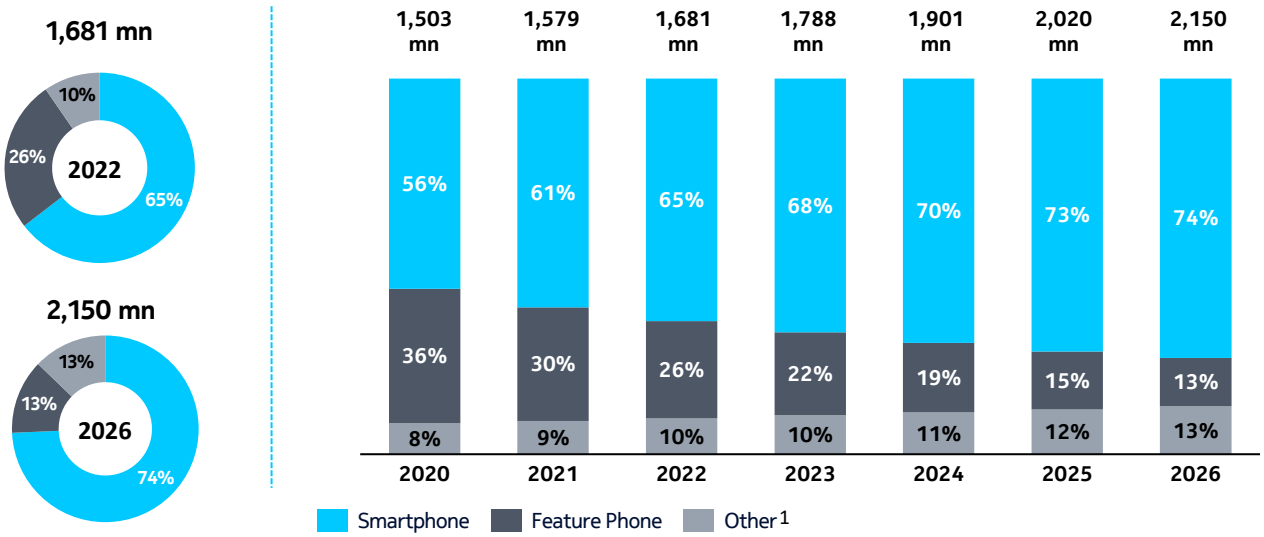
4G adoption to account for 51% of total subscribers by 2026.

5G adoption in is estimated to reach **263 mn (12%)** subscribers by 2026, majorly driven by GCC[2] **(64%),** Nigeria, North and south African[3] countries.

Currently, majority of operators are investing in expanding the coverage of their 5G networks.

Smartphone subscription to remain highest across subscription by type of device

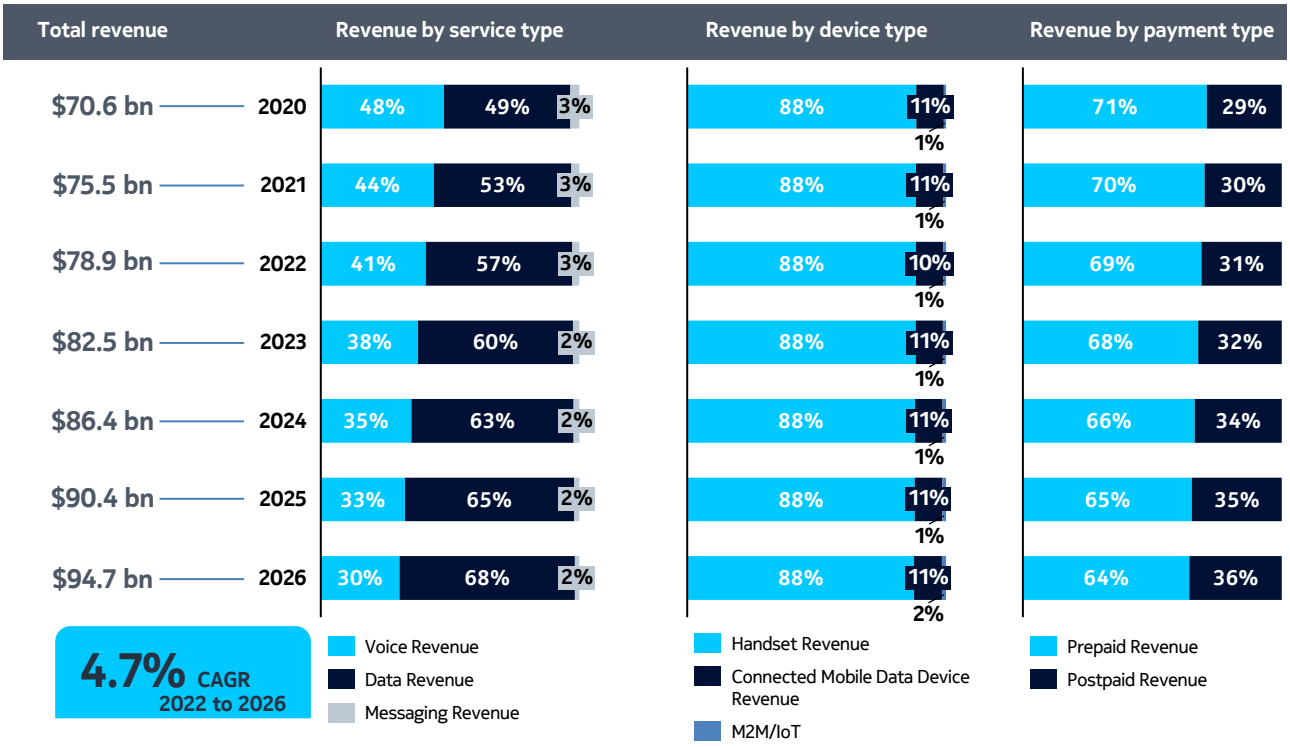
Subscription by type of device across MEA



Rising 5G adoption in MEA market is leading to mass production of more affordable 5G devices; subscription by feature phones is declining as operators are moving towards 4G and 5G.

Source: GlobalData **|** 1. Other includes data card, tablet and M2M/IoT | 2. GCC countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE | 3. North African countries: Algeria, Chad, Egypt, Mali, Morocco, Niger, Sudan, Tunisia
Note: Totals may not add up or exceeds due to rounding

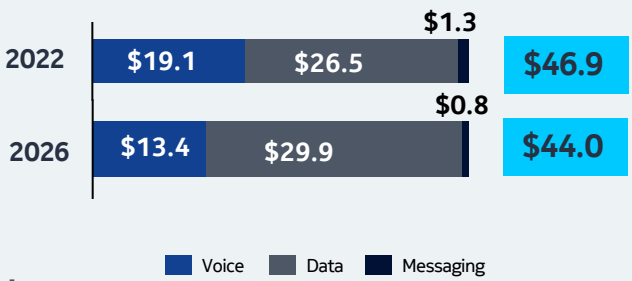
MEA's total mobile revenue is projected to grow at a CAGR of 4.7% between 2022-2026; ARPU is declining



Driven by rollout of high speed networks and increasing smartphone adoption, data revenue is estimated to reach **~$64 bn (68%)** by 2026.

Postpaid revenue is increasing and projected to reach **~$34 bn** by 2026.

MEA Average Yearly ARPU (In US Dollar)

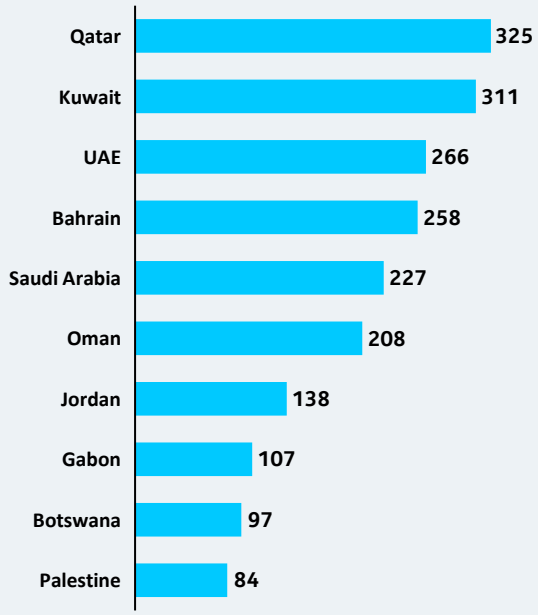


28% Increase in total subscribers from 2022 to 2026

20% Increase in revenue from 2022 to 2026

- Average yearly ARPU is expected to decrease by $3 in 2026, percentage change in revenue from 2020 to 2026 is less than change in subscribers for the same time period, leading to low ARPU in the region.
- Average yearly data ARPU is estimated to increase and will account for ~70% share in 2026 by revenue by service type.

Top 10 countries in MEA region
Average Yearly ARPU (In US Dollar), 2026

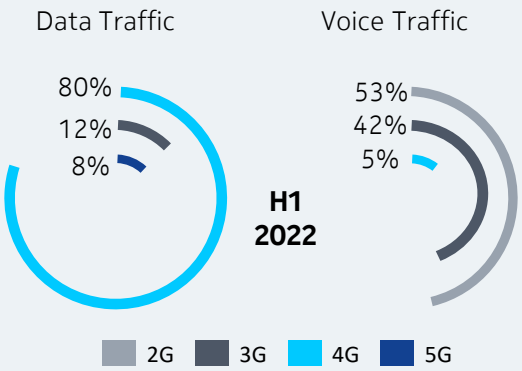


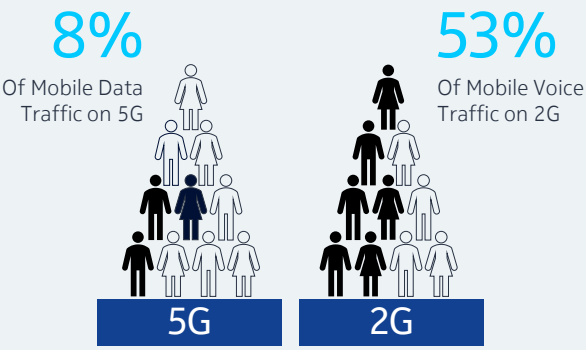
Source: GlobalData
Note: ARPU by service type is calculated based on voice/data/messaging revenue divided by total subscribers

H1 2022 : 4G carries 80% of MEA Mobile Data Traffic

2G still the main dominant layer for voice traffic while gradual shift toward VoLTE

Traffic share by technology across MEA





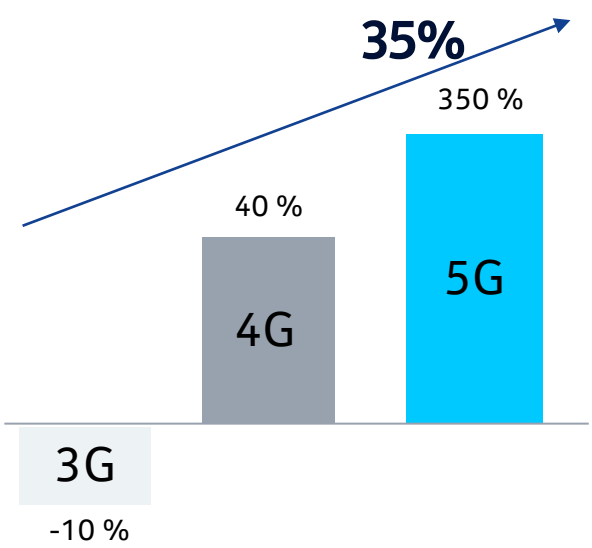
YoY decline in 3G data traffic volume. Total 3G traffic ratio in H1 2022 is about 12% of overall MEA traffic.

4G remain the main technology servicing data users. 80% of overall MEA generated data traffic carried by 4G.

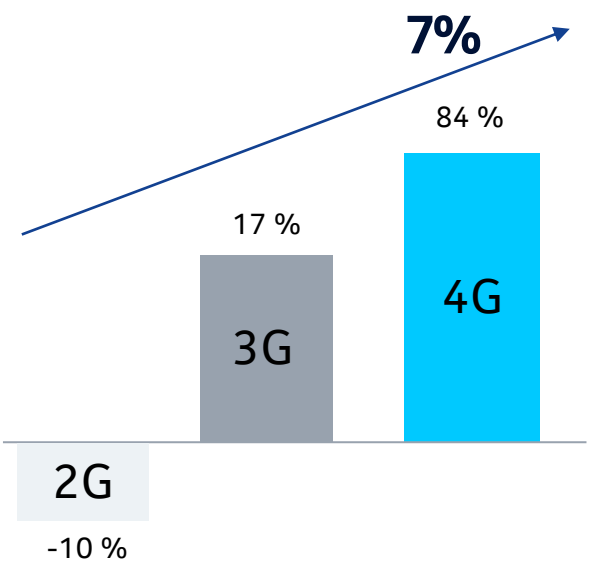
2G Voice Traffic ratio decline gradually with shift of traffic toward 3G and 4G VoLTE.

Average YoY increase of 35% in Data traffic. 7% increase in voice traffic in 2021

Data Traffic Increase in 2021



Voice Traffic Increase in 2021

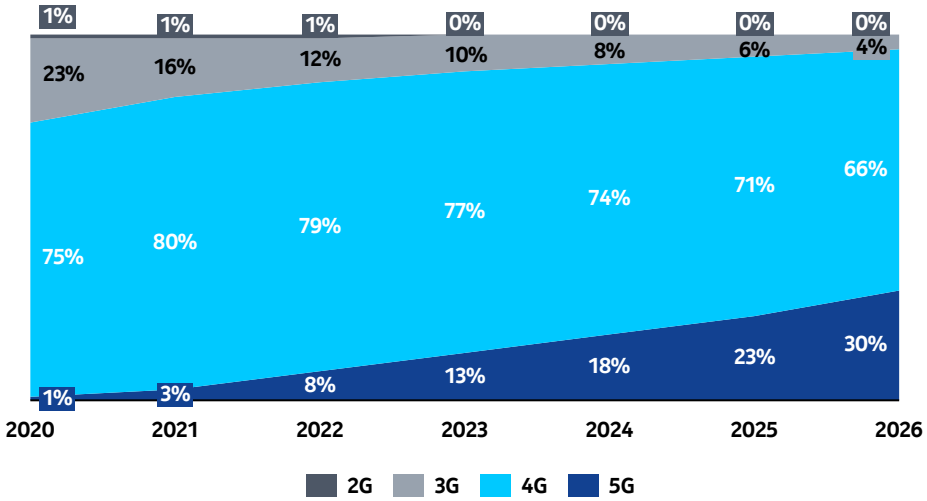


Declining traffic in 2G and 3G drive Spectrum re-farming toward advanced technologies of 4G and 5G.

Source: NOKIA Intelligence
Note: Totals may not add up or exceeds due to rounding

Total data traffic to increase significantly in the next 4 years with a CAGR of 35%; 4G and 5G to drive more than 90% of data traffic by 2026

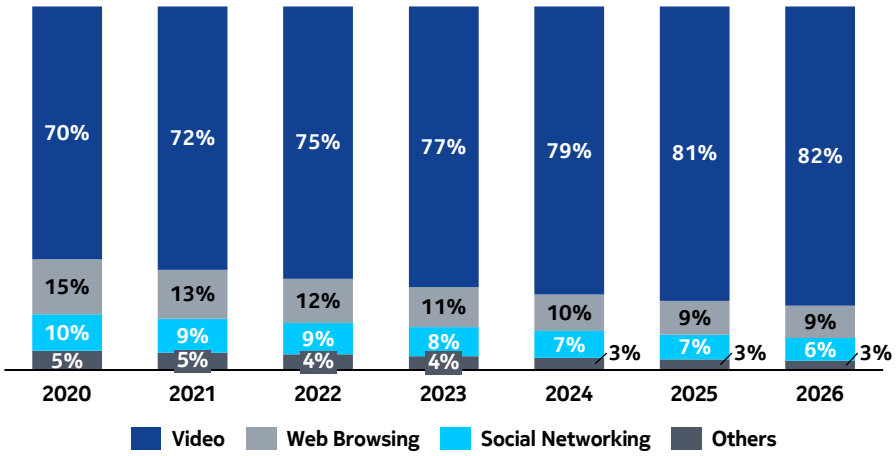
Forecasted Data Traffic Migration (By Technology)



3.3X Growth in total data traffic by 2026 from 2022

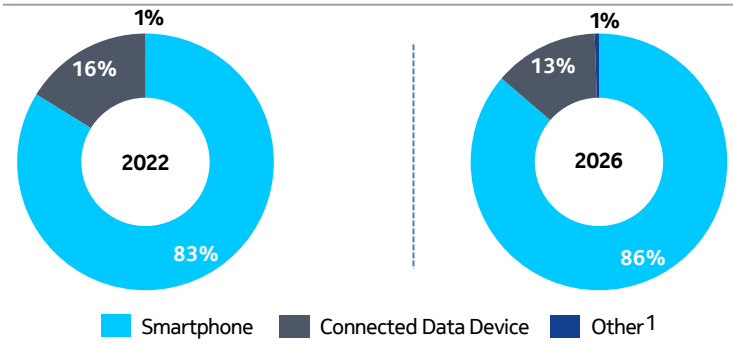
22% Increase in 5G data market share by 2026 from 2022

Total Data Traffic (By Application)



4X Video is the most used service with projected traffic share of 82% in 2026

Total Data Traffic (By Device Type)



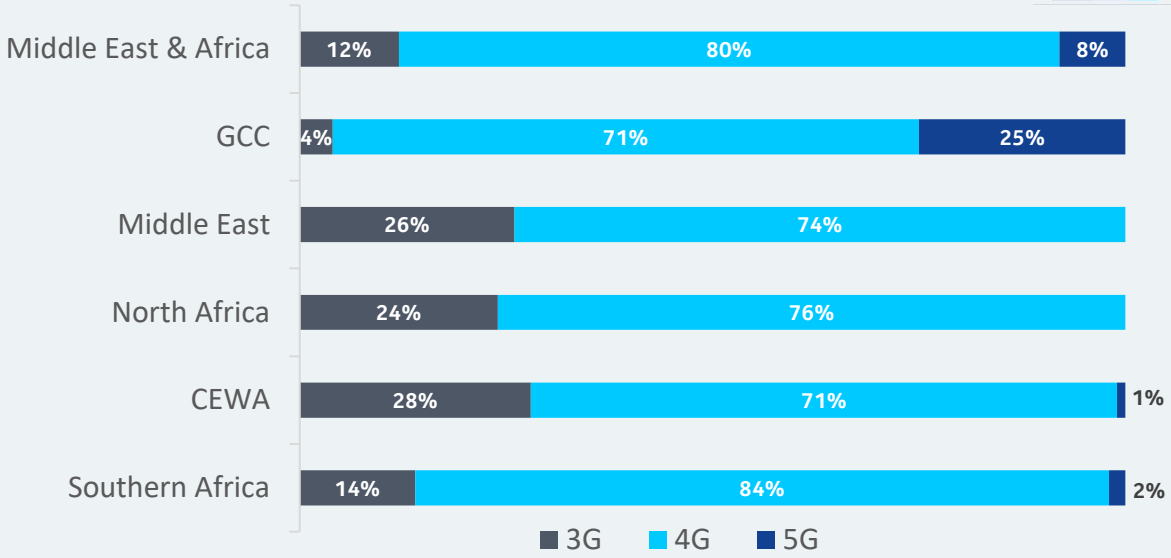
86% Smartphone Data Traffic (2026)

Smartphone will drive about 86% of MEA data traffic by 2026 driven by User Behavior shift to be always connected. Connected data device will represent 13% of MEA data traffic

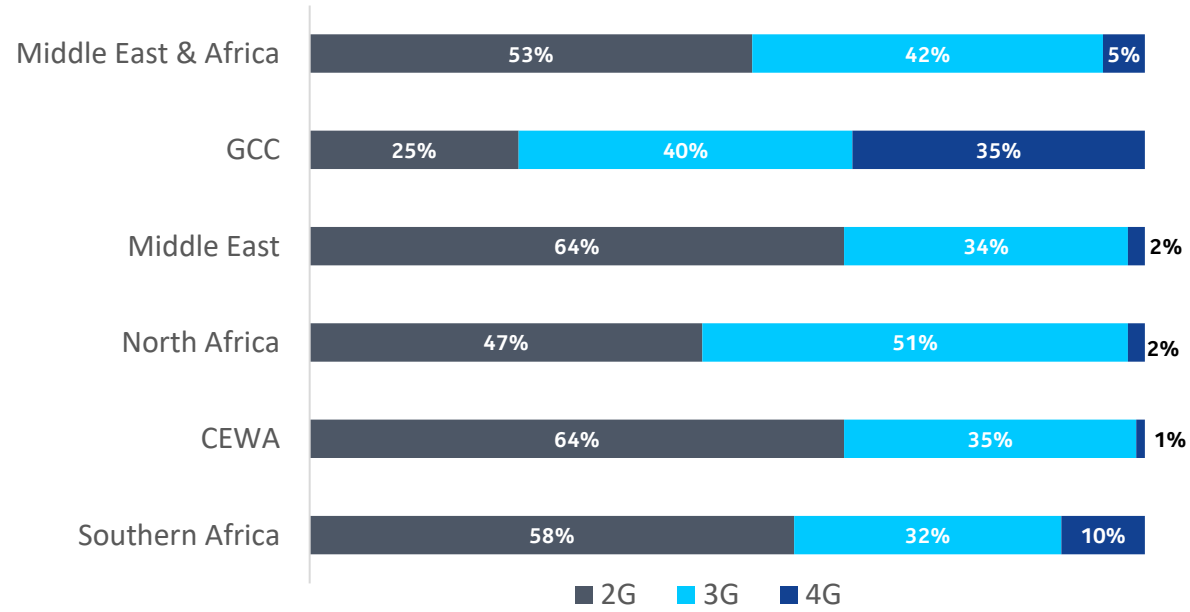
Source: GlobalData | 1. Other Includes feature phone and M2M
Note: Slightly adjustment made in total data traffic by generation share due to rounding off

Traffic split per region for voice and data (H1 2022)

Data Traffic



Voice Traffic



Faster adoption of 5G and VoLTE services observed in GCC countries as compared to rest of MEA.

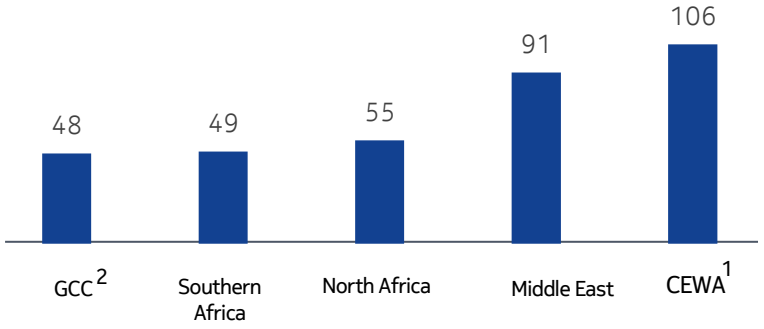
Source: NOKIA Intelligence
Note: Totals may not add up or exceeds due to rounding

Advancement and continuous investment in 5G put GCC region ahead of other MEA's region in latency, UL and DL throughput

Quality of Service Indicators

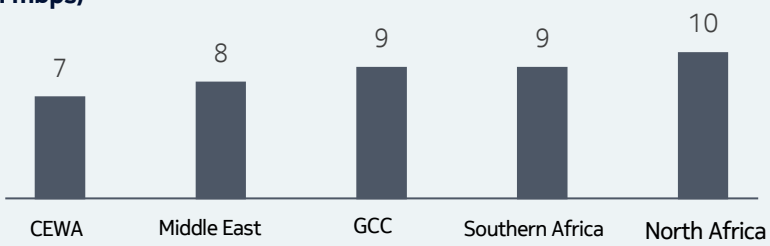
Latency* (2022, in ms)

66 ms
MEA region latency



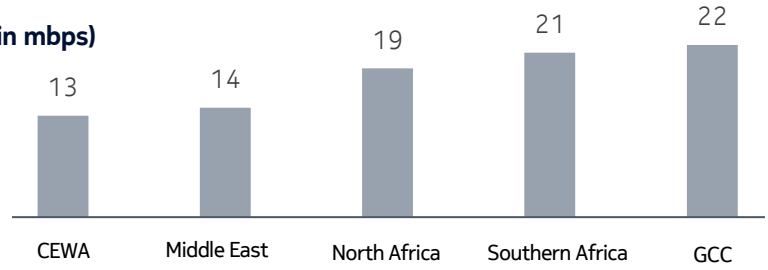
UL throughput* (2022, in mbps)

9 mbps
MEA region UL throughput

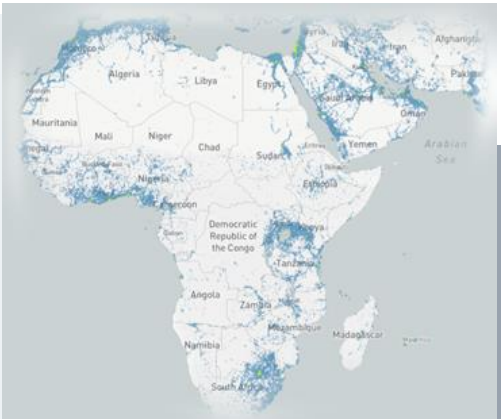


DL throughput* (2022, in mbps)

18 mbps
MEA region DL throughput



- High 5G adoption and large-scale investment in 5G in countries such as Saudi Arabia, Qatar, UAE and Bahrain result in low latency in GCC region across MEA.
- The ultra-low latency of 5G will open the way for new cases such as augmented and virtual reality and uncover new potential in digitising sectors like healthcare, manufacturing and education.
- Regions like Middle East "excluding GCC" and CEWA where 4G adoption is still rising have higher latency and lower throughput compared to other regions in MEA as 5G adoption is very low and current focus is to enhance 4G networks further.

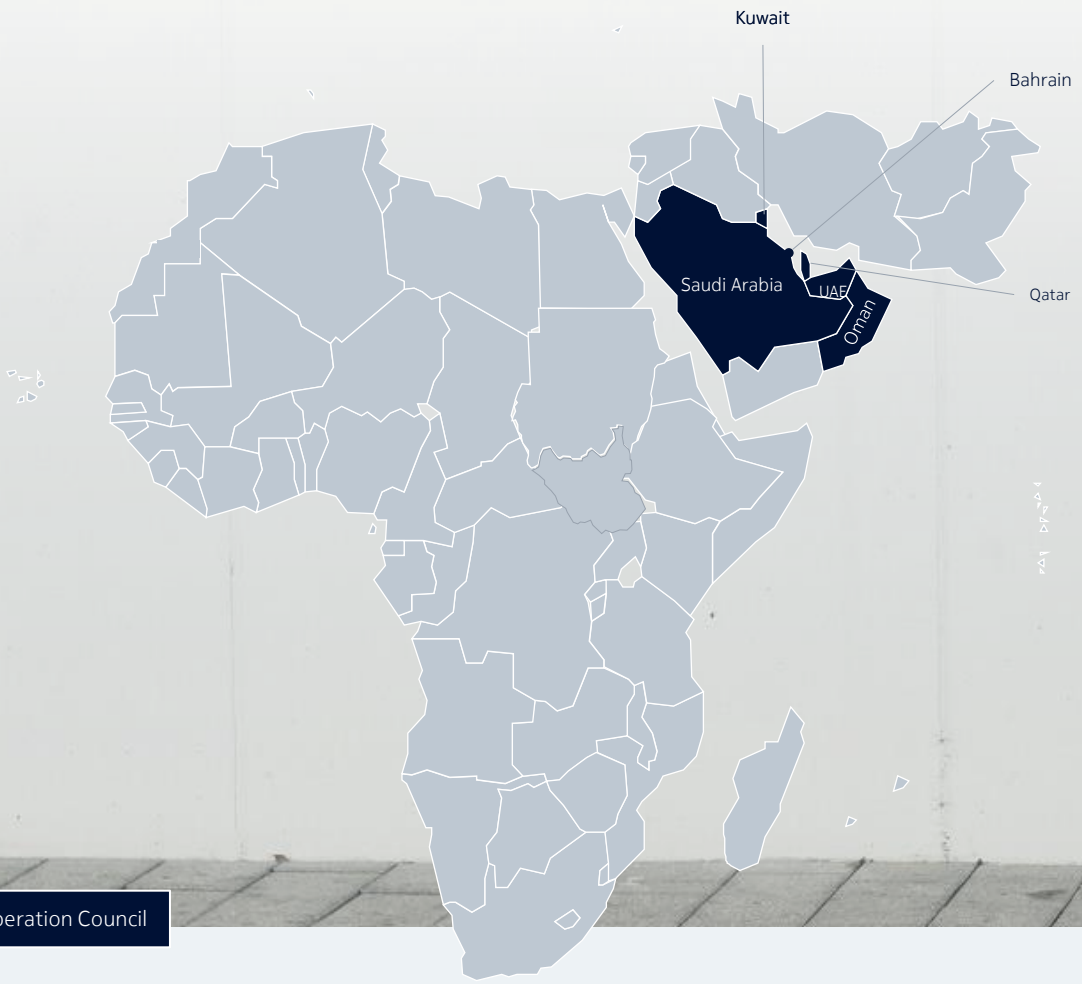


MEA Broadband Coverage

Source: Tutela (Weighted Average January – April 2022). *Connection type include 4G,5G and 5G NSA | 1.CEWA: Central East West Africa | 2.GCC: Gulf Cooperation Council

Gulf Cooperation Council

- Subscribers share by technology and type of device
- A look at the revenues and ARPUs
- Categorization of the total data traffic by generation, application and device type

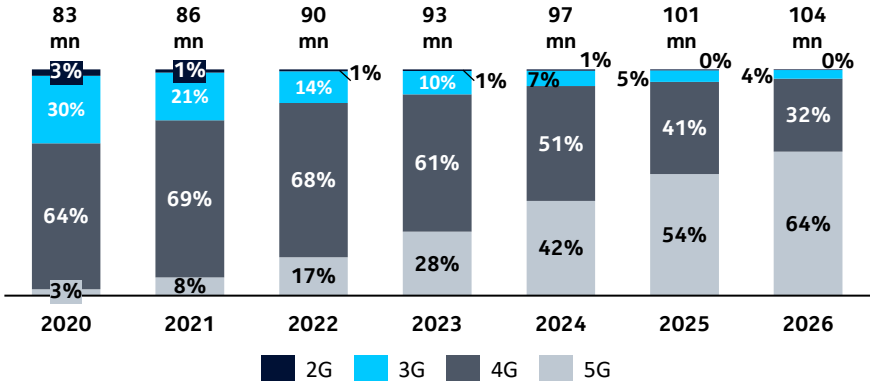


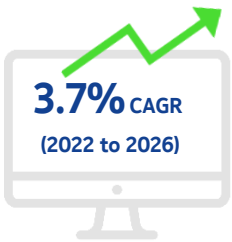
Gulf Cooperation Council

4G to dominate till 2024, 5G footprint increasing rapidly with a CAGR of 44.8% from 2022 to 2026

Mobile subscribers to grow by 14 mn by 2026 from 2022, Saudi Arabia to contribute more than 50% of new subscribers

Subscribers share by technology across GCC





96% 4G + 5G Subscribers in 2026

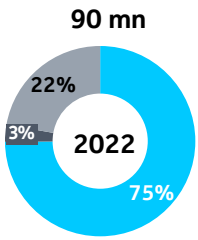
4G subscribers are decreasing while 5G subscribers are set to reach 66 mn by 2026 **(64% of total subscribers).**

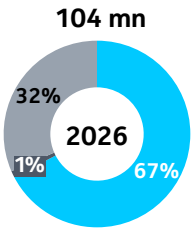
With focus on increasing 5G network coverage, 5G adoption is rising across the region; operators are promoting 5G incremental benefits as well.

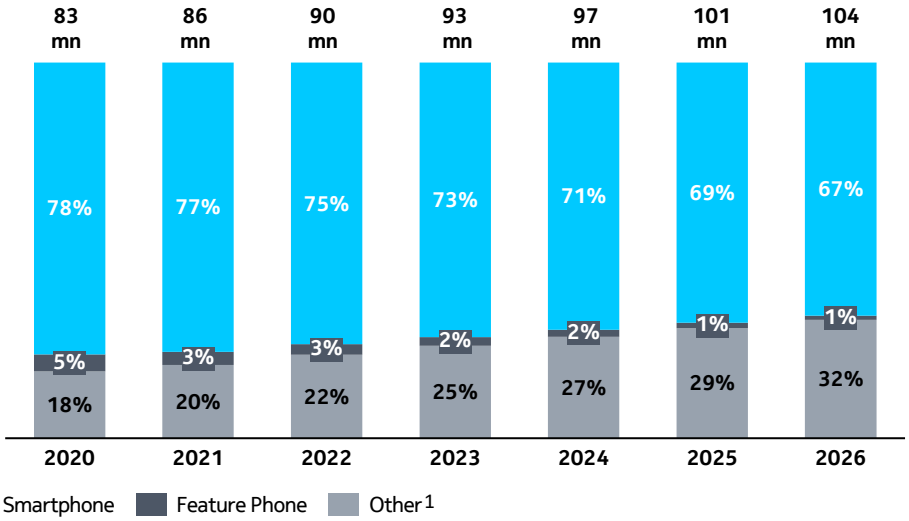
At the end of March 2022, all countries in the region had launched 5G services commercially, **Bahrain and Kuwait** have nationwide 5G coverage.

Smartphone subscribers share is declining across by type of device, however it will continue to dominate the market

Subscription by type of device across GCC



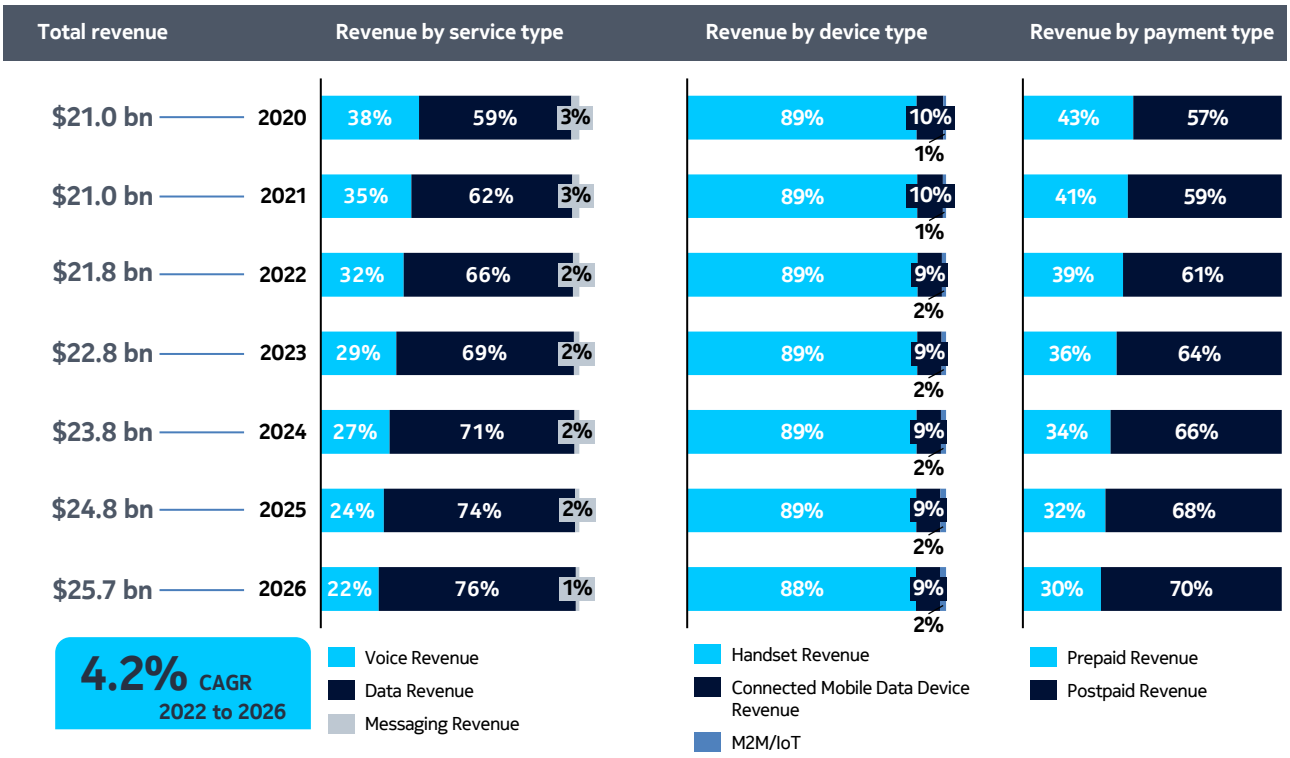




Smartphone subscribers to reach 70.3 mn by 2026; data card, tablet and M2M subscribers are projected to grow ~2X from 2022 to 2026.

Source: GlobalData
Note: Totals may not add up due to rounding | 1. Other includes data card, tablet and M2M/IoT

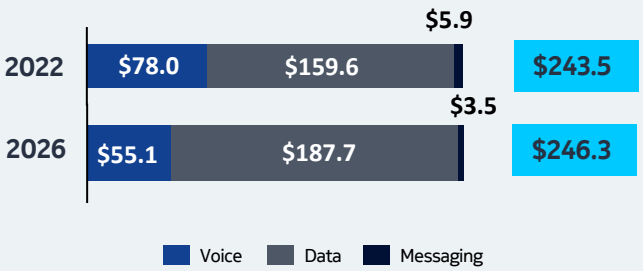
Mobile revenue to grow with a CAGR of 4.2% during forecasted period (2022-2026); ARPU is showcasing an increasing trajectory



By the end of 2026, data revenue is estimated to reach $19.5 bn **(76% of total revenue)** whereas voice revenue will stand at $5.7 bn.

Postpaid revenue is increasing and projected to reach **$17.9 bn** by 2026.

GCC Average Yearly ARPU (In US Dollar)

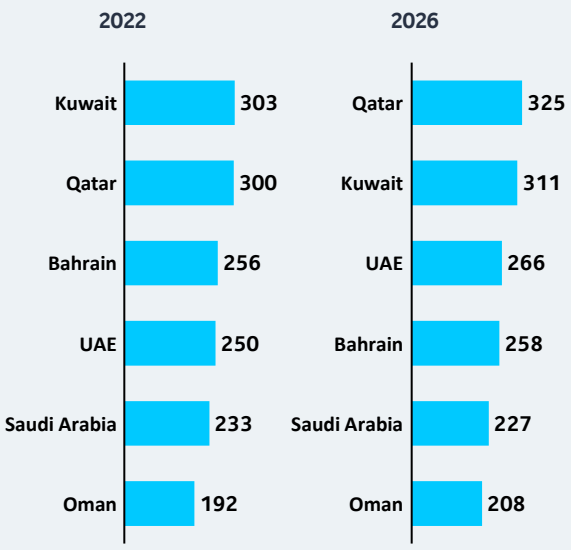


17% Increase in total subscribers from 2022 to 2026

18% Increase in revenue from 2022 to 2026

- Average yearly ARPU is expected to increase to reach $246 by 2026, Qatar, Kuwait and UAE have highest average yearly ARPU in 2026 in the region.
- Average yearly data ARPU to increase and account for 76% share in 2026 by revenue by service type.

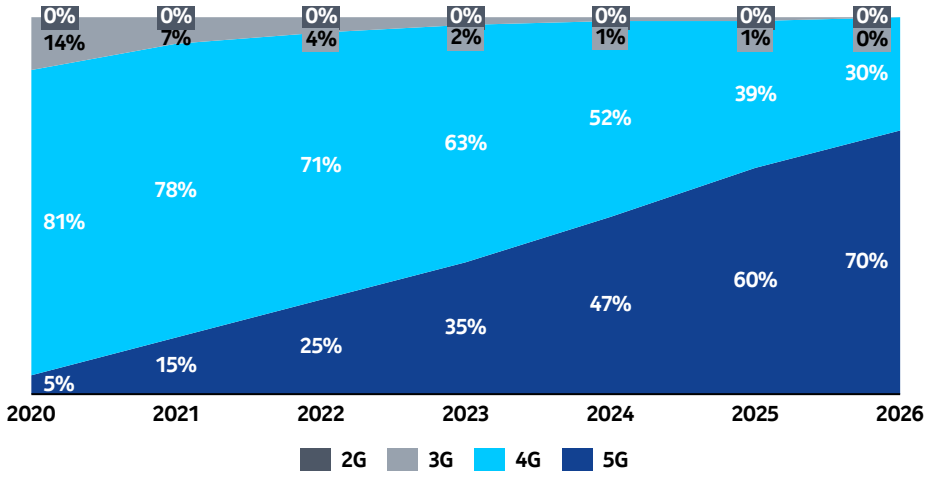
Countries in GCC region Average Yearly ARPU (In US Dollar)



Source: GlobalData
Note: ARPU by service type is calculated based on voice/data/messaging revenue divided by total subscribers

5G to drive majority of total data traffic by 2026, 6X growth in 5G data traffic from 2022 to 2026

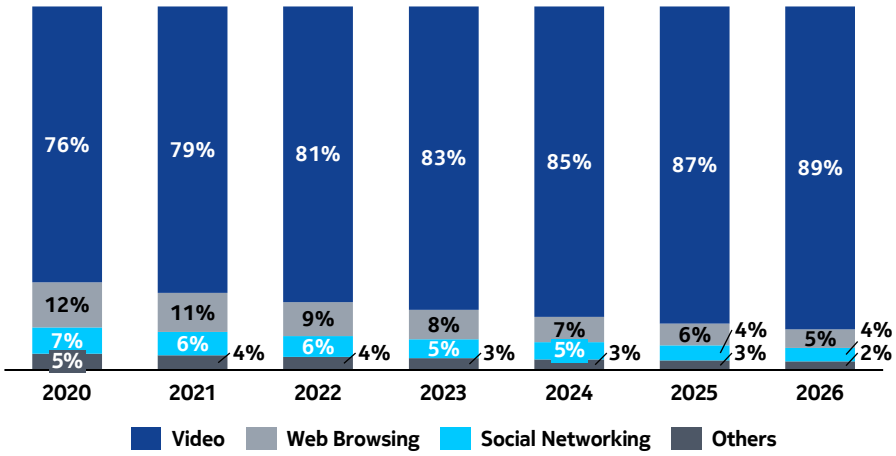
Forecasted Data Traffic Migration (By Technology)



2X Growth in total data traffic by 2026 from 2022

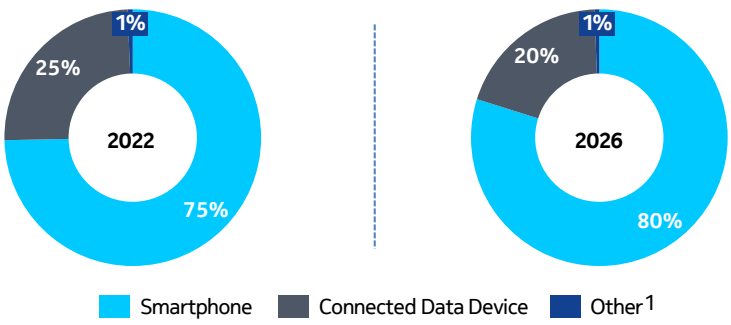
45% Increase in 5G data market share by 2026 from 2022

Total Data Traffic (By Application)



3X Increase in video data traffic (2022-2026)

Total Data Traffic (By Device Type)*



80%
Smartphone Data Traffic (2026)

Driven by high smartphone penetration, 80% of total data traffic in the GCC region is expected to be carried by smartphones in 2026.

Source: GlobalData | 1. Other Includes feature phone and M2M
Note: Slightly adjustment made in total data traffic by generation share due to rounding off
*Totals may not add up or exceed due to rounding

Southern Africa

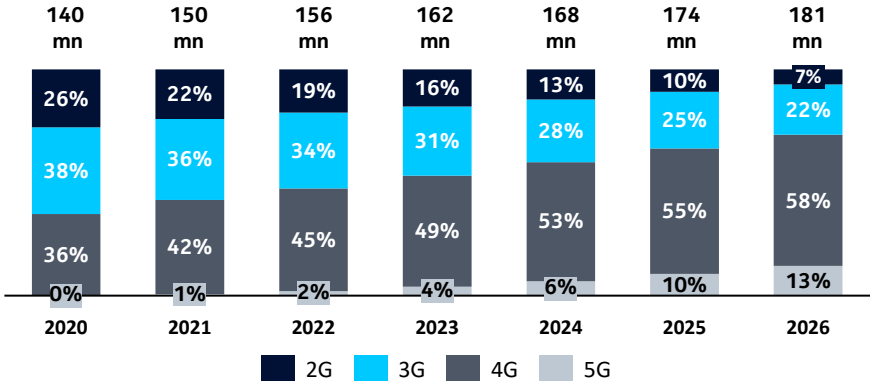
- Subscribers share by technology and type of device
- A look at the revenues and ARPUs
- Categorization of the total data traffic by generation, application and device type

Southern Africa

4G is still growing in Southern African region; South Africa dominating 5G market in the region

South Africa contributes more than 70% of subscribers in Southern Africa region, expected to reach 128 mn subscribers by 2026

Subscribers share by technology across Southern Africa



71% 4G + 5G Subscribers in 2026

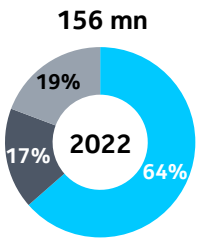
4G subscribers are dominating the Southern Africa region, projected to reach 105 mn **(58% of total subscribers)** by 2026 while 5G adoption increasing steadily.

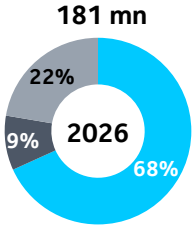
South Africa: Highest 4G and 5G subscribers across the region (2026).
4G - 82 mn **(78% of total 4G subscribers)**
5G - 22 mn **(94% of total 5G subscribers)**

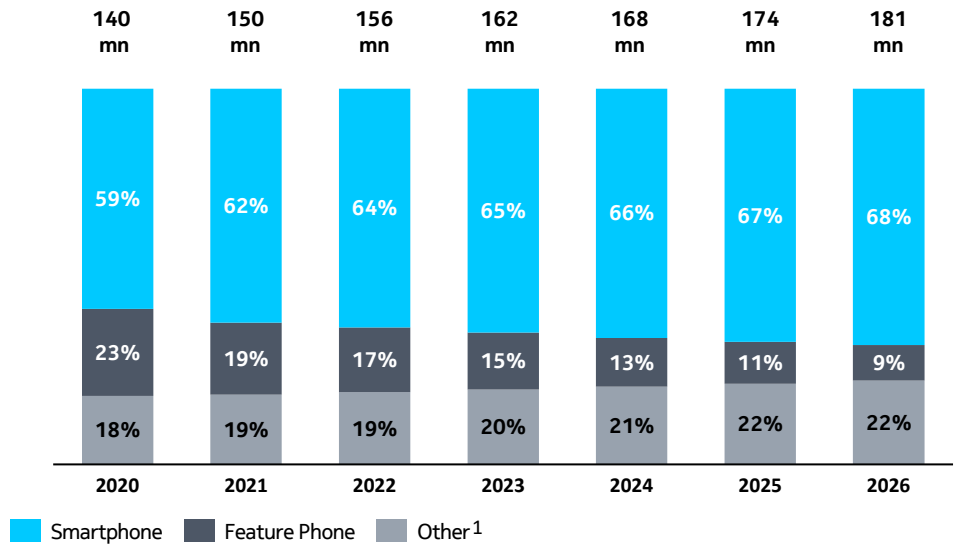
Operators across Southern African region are stepping up efforts to migrate existing 2G and 3G customers to 4G networks.

Smartphone subscription is projected to reach 124 mn by 2026, feature phone subscription are on a downward trajectory

Subscription by type of device across Southern Africa



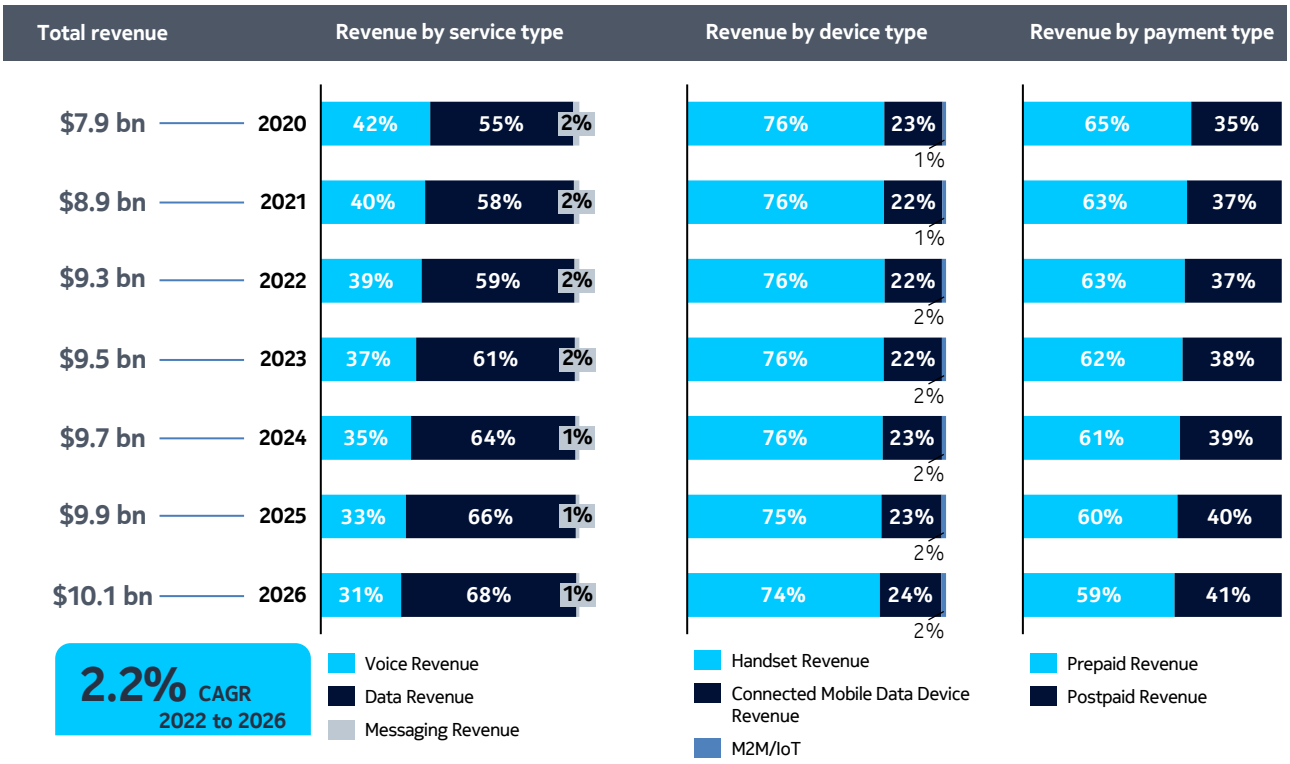




Smartphone subscribers increasing with a CAGR of 5.7% from 2022 to 2026.

Source: GlobalData
1. Other includes data card, tablet and M2M/IoT
Note: Totals may not add up due to rounding

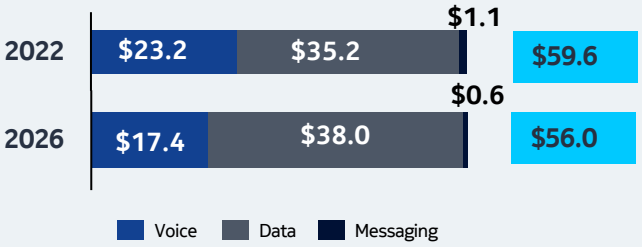
Southern Africa's mobile revenue to increase marginally in the next 4 years; ARPU is diminishing



Data revenue is estimated to reach **$6.8 bn (68%)** by 2026, voice revenue is projected to stand at **$3.1 bn** for the same time period.

Postpaid revenue is increasing and estimated to reach **$4.2 bn** by 2026.

Southern Africa Average Yearly ARPU (In US Dollar)

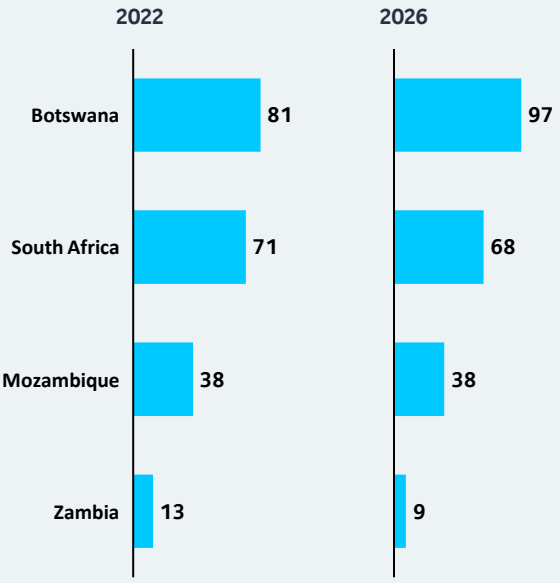


16% Increase in total subscribers from 2022 to 2026

9% Increase in revenue from 2022 to 2026

- By 2026, average yearly ARPU for Botswana will increase by $16 while for South Africa, average yearly ARPU will decrease by $3.
- Average yearly data ARPU is estimated to increase and will account for 68% share in 2026 by revenue by service type.

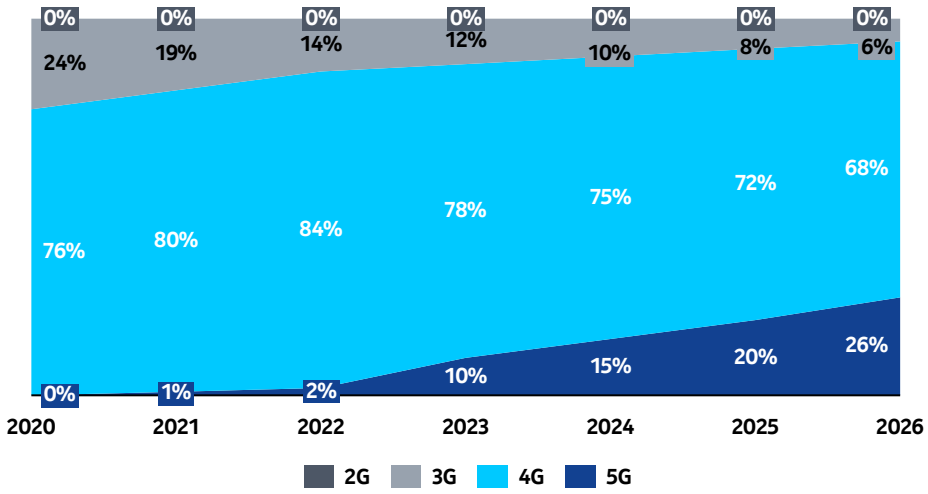
Countries in Southern Africa region Average Yearly ARPU (In US Dollar)



Source: GlobalData
Note: ARPU by service type is calculated based on voice/data/messaging revenue divided by total subscribers

Majority of data traffic is driven by 4G; 5G to contribute more than one-fifth of data traffic by 2026

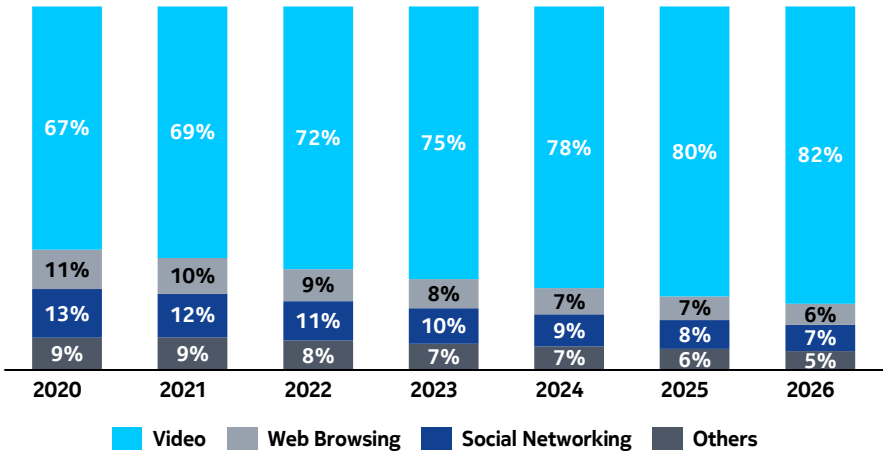
Forecasted Data Traffic Migration (By Technology)



2.8X Growth in total data traffic by 2026 from 2022

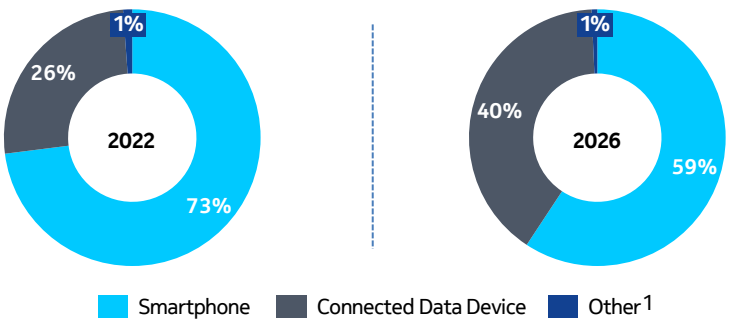
24% Increase in 5G data market share by 2026 from 2022

Total Data Traffic (By Application)



3X Increase in video data traffic (2022-2026)

Total Data Traffic (By Device Type)



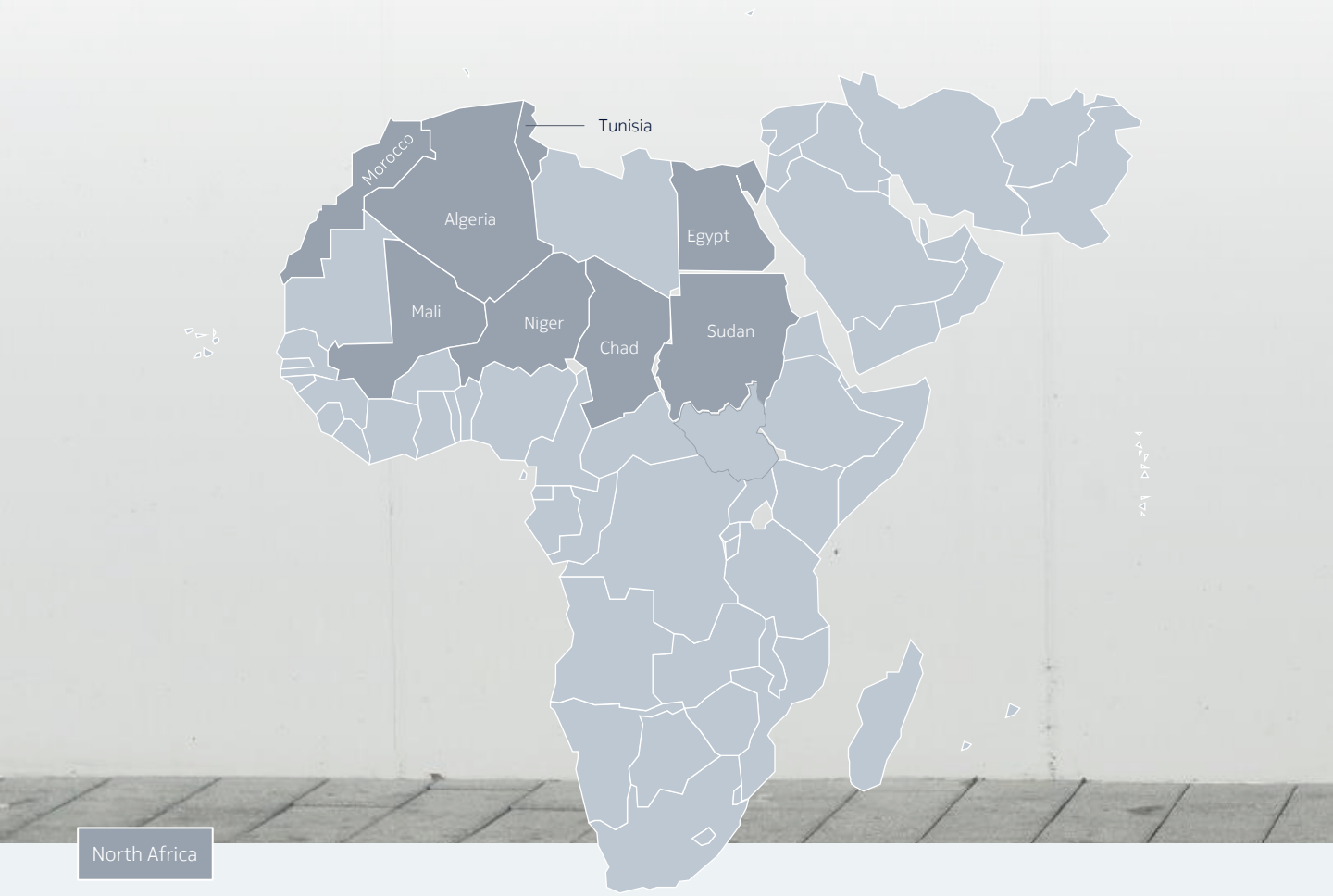
40% Connected data device Traffic (2026)

By 2026, data traffic is expected to shift from smartphones to connected data devices such as the internet of things (connected appliances, smart home, smart cities).

Source: GlobalData
1.Other Includes feature phone and M2M

North Africa

- Subscribers share by technology and type of device
- A look at the revenues and ARPUs
- Categorization of the total data traffic by generation, application and device type

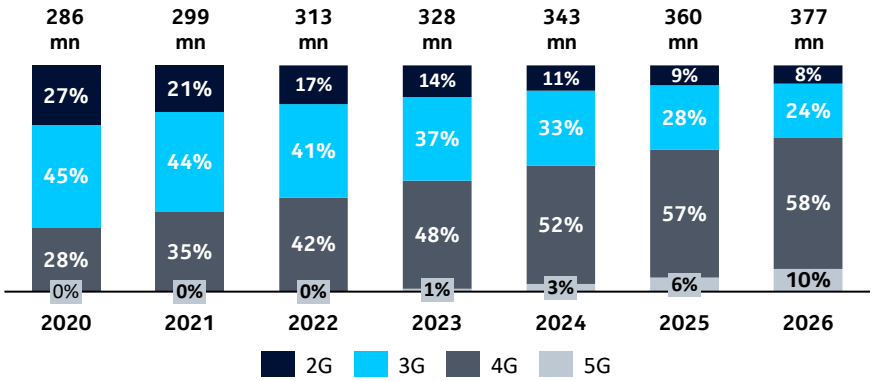


North Africa

4G to rule North Africa region till 2026 with a growth of ~2x from 2022 to 2026

North Africa region is mainly dominated by 4G network. However, efforts are being made to increase 5G footprints across the region

Subscribers share by technology across North Africa



68% 4G + 5G Subscribers in 2026

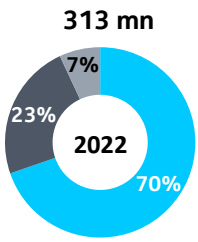
4G subscribers to reach 218 mn **(58% of total subscribers)** by 2026; 5G subscribers estimated to reach ~38 mn **(10% of total subscribers)** for the same time period.

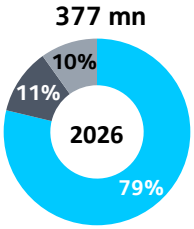
By 2026, **Egypt** will have majority of subscribers **(31%)** followed by **Morocco (16%)** and **Algeria (15%)** in the region.

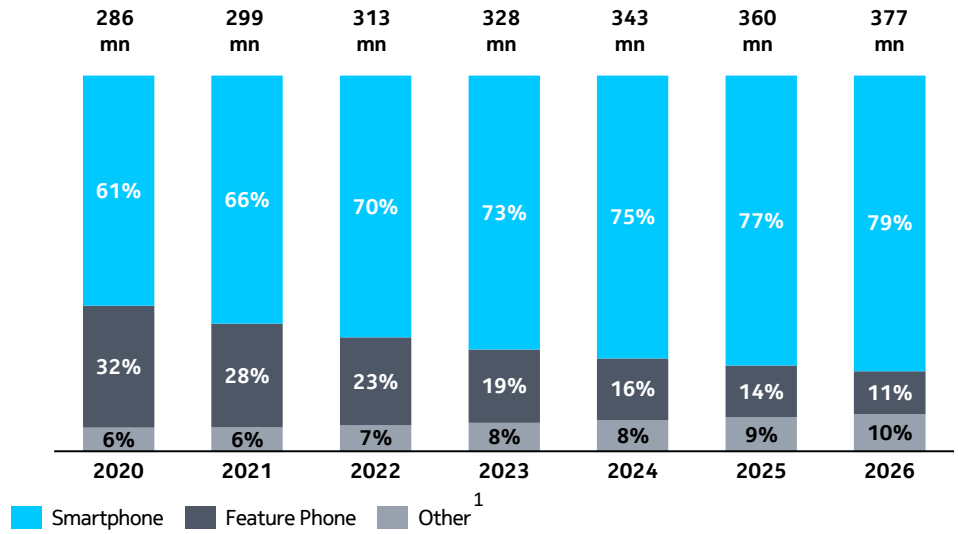
5G development has been slow in the region, governments and operators are making efforts to expand 5G network.

Across subscription by type of device, Smartphone subscription to remain highest in the North Africa region

Subscription by type of device across North Africa



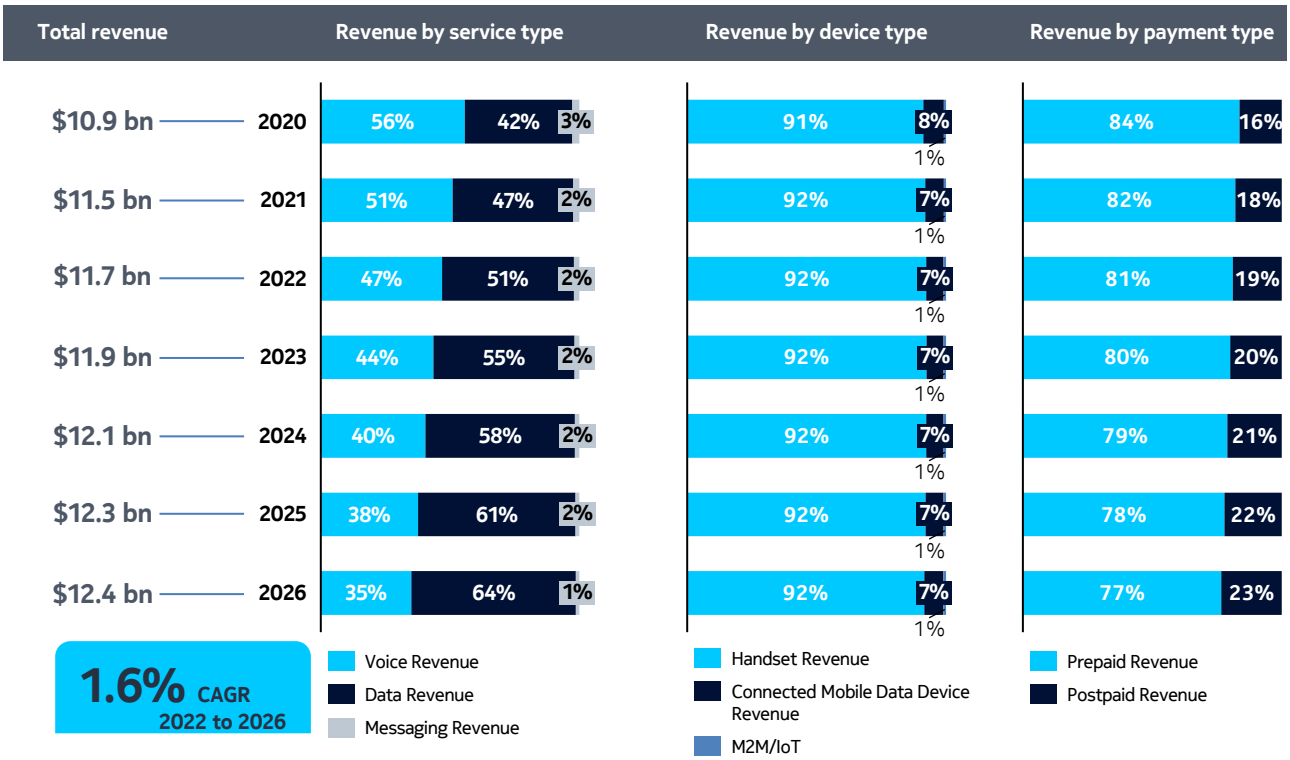




Top 3 countries in North Africa by smartphone subscriptions (2026)	Egypt	Morocco	Algeria
	105 mn	54 mn	50 mn

Source: GlobalData
1. Other includes data card, tablet and M2M/IoT
Note: Totals may not add up or exceed due to rounding

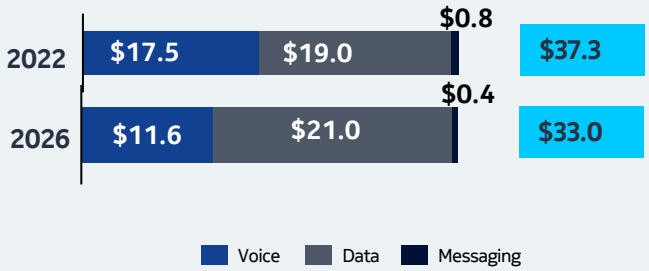
Between 2022 to 2026, total revenue to increase by 7%, however, ARPU to decline by $4.3



Total revenue to increase marginally to reach $12.4 bn by 2026, **1x** growth in total revenue from 2022 to 2026.

Postpaid revenue is increasing steadily and projected to reach **$2.9 bn** by 2026.

North Africa Average Yearly ARPU (In US Dollar)

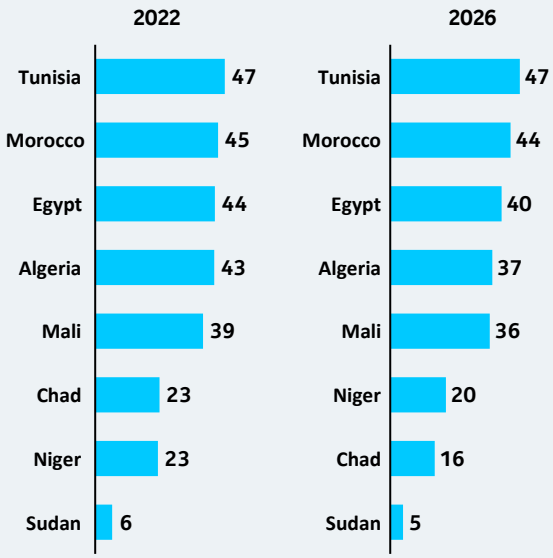


20% Increase in total subscribers from 2022 to 2026

7% Increase in revenue from 2022 to 2026

- Average yearly ARPU is expected to decrease to reach $33 (down $4.3 from 2022) by 2026.
- Tunisia, Morocco and Egypt have highest average yearly average ARPU across the region.

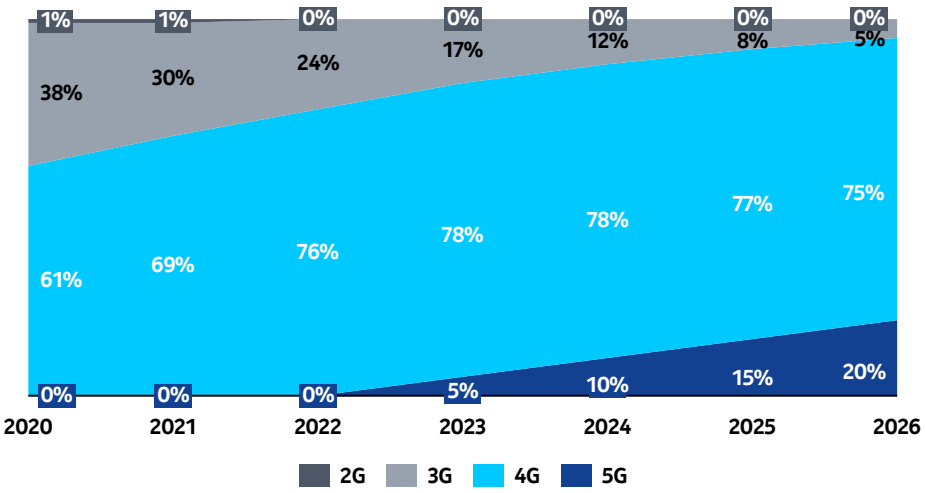
North Africa region countries Average Yearly ARPU (In US Dollar)



Source: GlobalData
Note: ARPU by service type is calculated based on voice/data/messaging revenue divided by total subscribers

Total data traffic to increase considerably in the next 4 years with a CAGR of ~42%; 4G to drive 75% of total data traffic by 2026

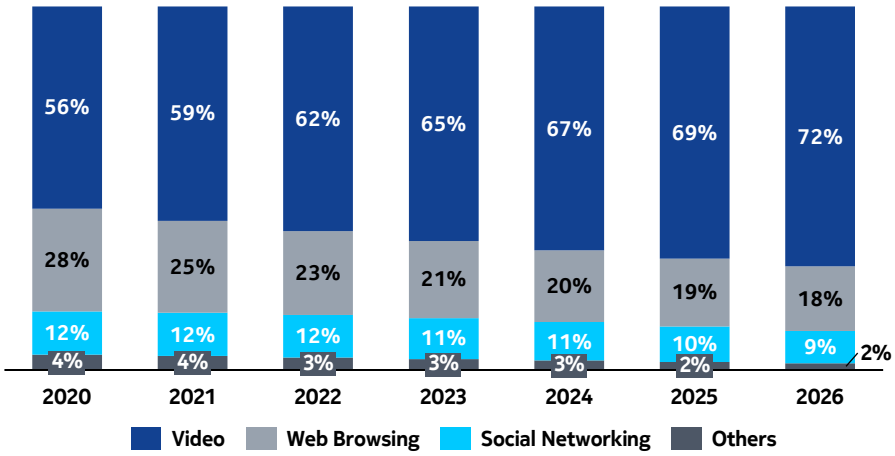
Forecasted Data Traffic Migration (By Technology)



4X Growth in total data traffic by 2026 from 2022

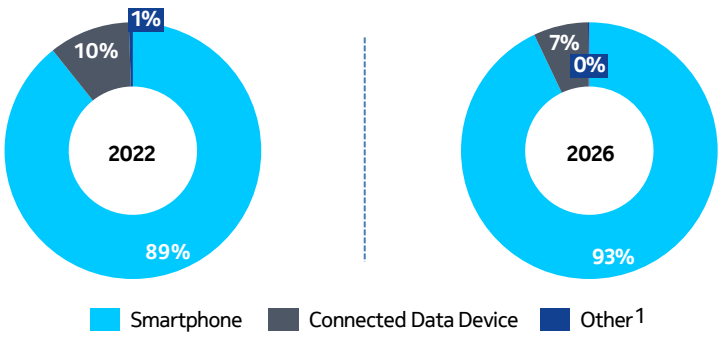
20% Increase in 5G data market share by 2026 from 2022

Total Data Traffic (By Application)



5X Increase in video data traffic (2022-2026)

Total Data Traffic (By Device Type)



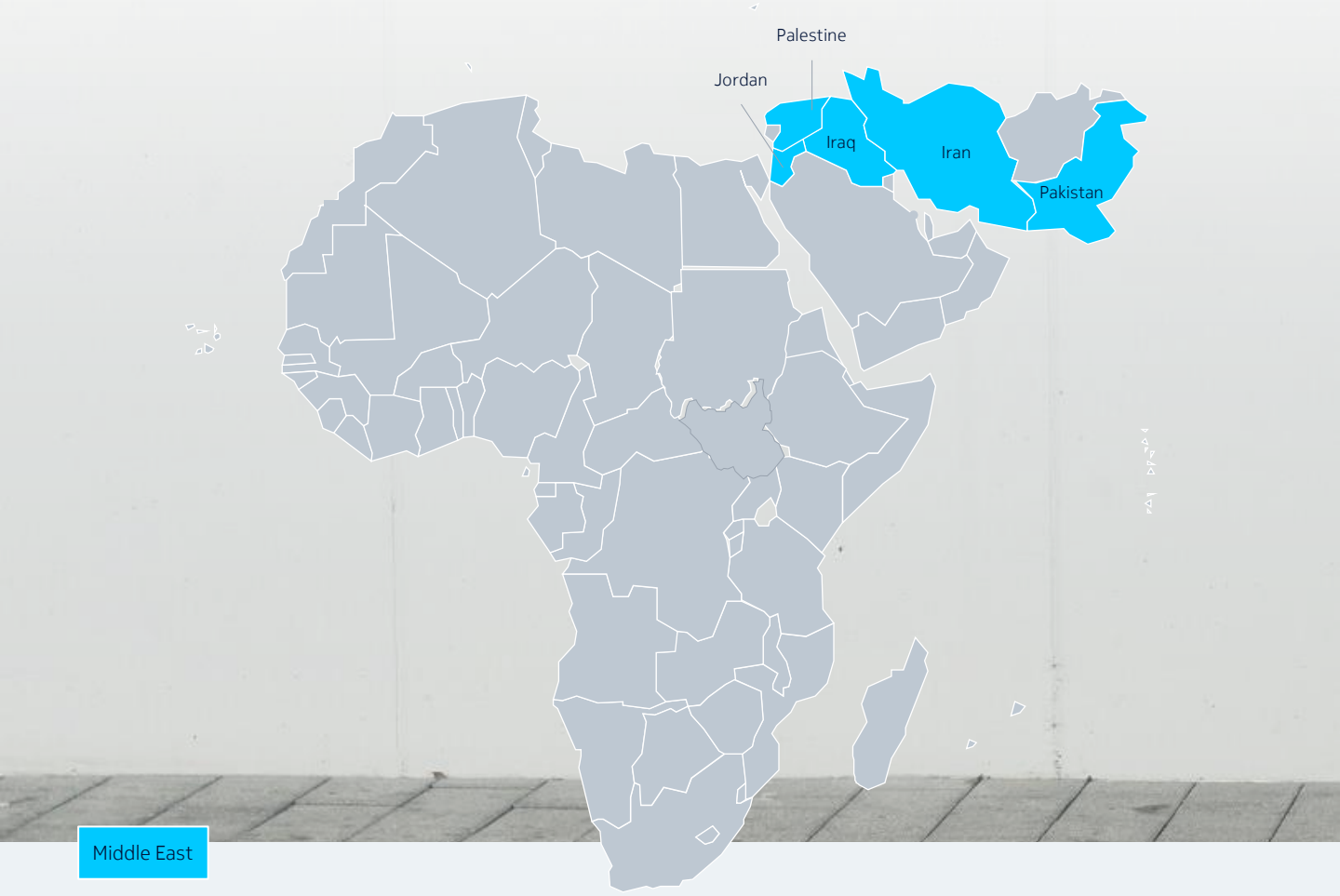
93% Smartphone Data Traffic (2026)

Smartphone data traffic to grow 4x from 2022 to 2026 and will account for more than 90% of total data traffic by 2026.

Source: GlobalData
1. Other Includes feature phone and M2M

Middle East

- Subscribers share by technology and type of device
- A look at the revenues and ARPUs
- Categorization of the total data traffic by generation, application and device type

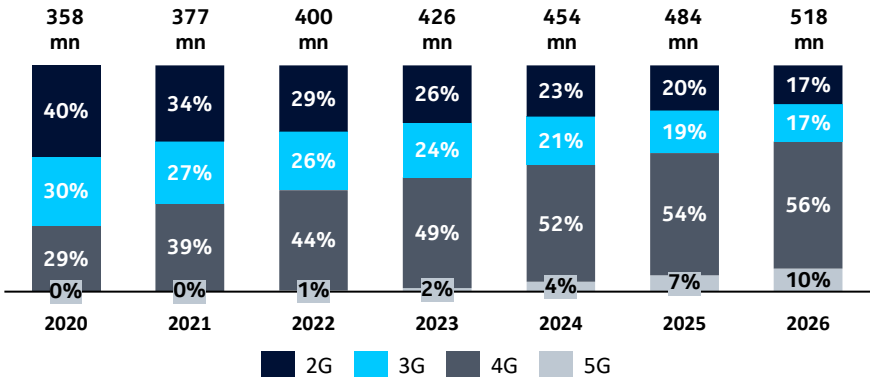


Middle East

4G to dominate middle east region until 2026 with a ~2x increase in subscribers from 2022 to 2026

Growth in total subscribers has been led by the increase in 4G subscribers

Subscribers share by technology across Middle East



66% 4G + 5G Subscribers in 2026

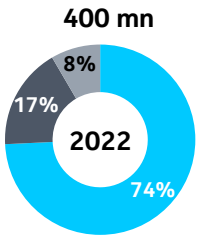
By 2026, 4G subscribers will account for more than half of total subscribers **(290 million)**; 5G subscribers will rise at a CAGR of **123%** from 2022 to 2026.

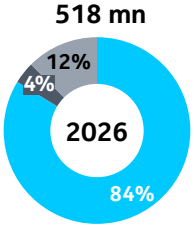
Pakistan will account for **55%** of total subscribers in the region by 2026 (up 4% from 2022), with Iran coming in second **(31%)**.

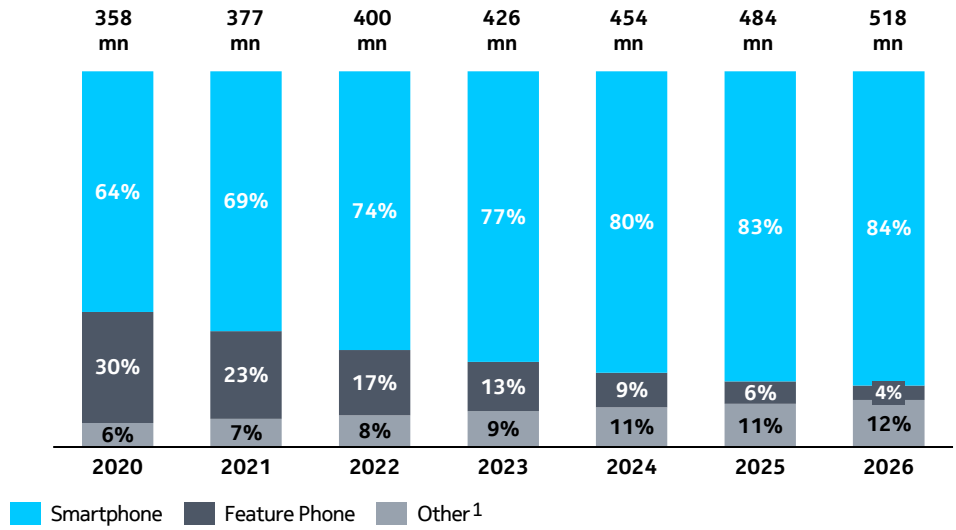
Pakistan's broadband market is driven by 4G because only a small portion of the population can buy a 5G handset, whereas Iran has already begun commercial 5G services.

In terms of subscriptions by device type, the middle east region will continue to have the highest smartphone subscriptions

Subscription by type of device across Middle East



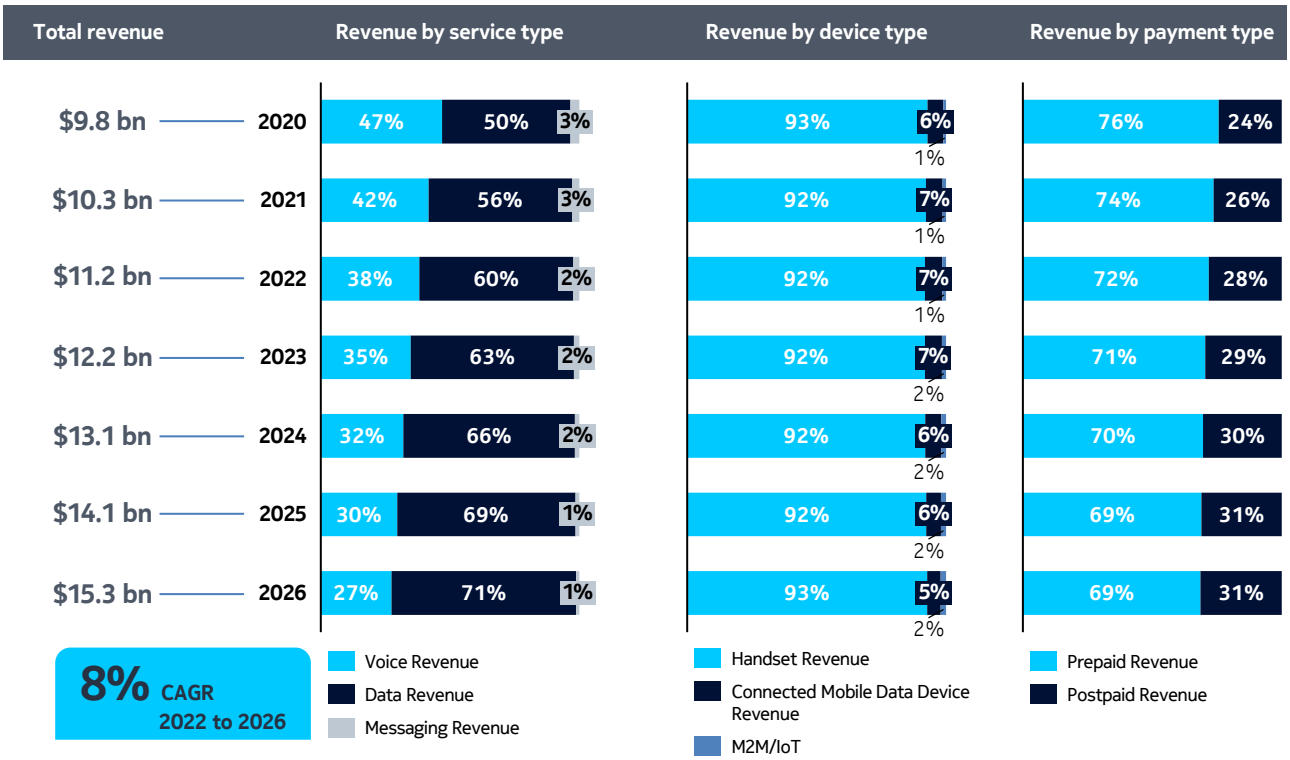




Top 3 countries in Middle East by smartphone subscriptions (2026)	Pakistan	Iran	Iraq
	235 mn	135 mn	52 mn

Source: GlobalData
1.Other includes data card, tablet and M2M/IoT | **Note:** Totals may not add up/or exceed due to rounding

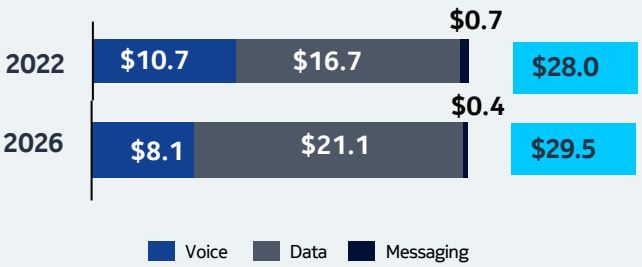
Mobile revenue will grow at a CAGR of 8% during the forecasted period (2022-2026); ARPU to rise



By 2026, data revenue is estimated to reach **~$11 bn (71%),** voice revenue is declining to reach **$4.2 bn**.

Postpaid revenue to see an increase of **1.5x** from 2022 to 2026 and projected to reach **~$5 bn** by 2026.

Middle East Average Yearly ARPU (In US Dollar)

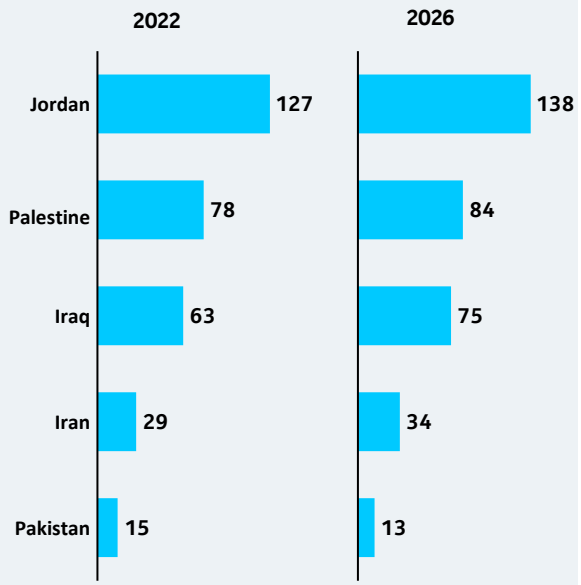


29% Increase in total subscribers from 2022 to 2026

36% Increase in revenue from 2022 to 2026

- Average yearly ARPU is expected to rise to $29.5 by 2026, with Jordan and Palestine having the highest average yearly ARPU in the region in 2026.
- Average yearly data ARPU is expected to increase and account for 71% of revenue by service type in 2026.

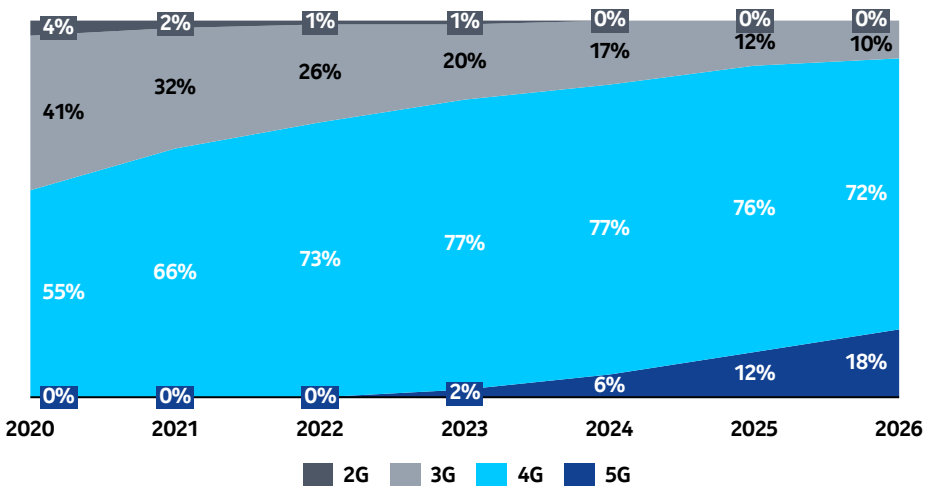
Middle East region countries Average Yearly ARPU (In US Dollar)



Source: GlobalData
Note: ARPU by service type is calculated based on voice/data/messaging revenue divided by total subscribers

Total data traffic is expected to grow at a CAGR of 31% over the next four years with 4G driving 72% of total data traffic by 2026

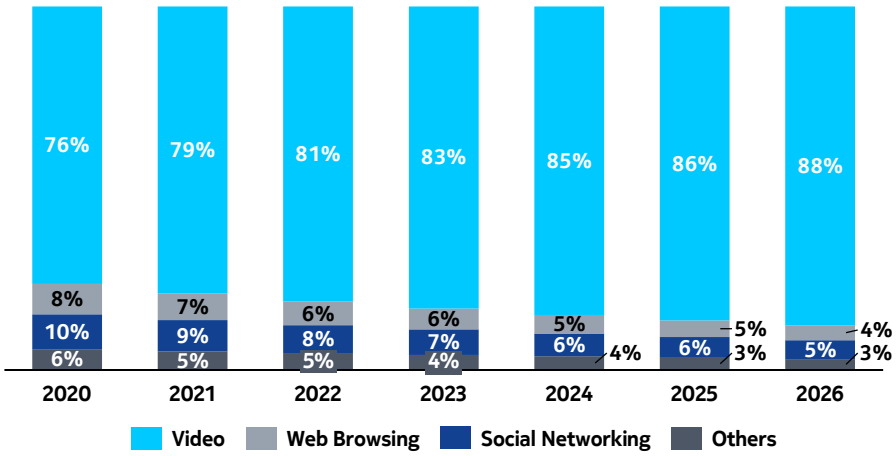
Forecasted Data Traffic Migration (By Technology)



2.9X Growth in total data traffic by 2026 from 2022

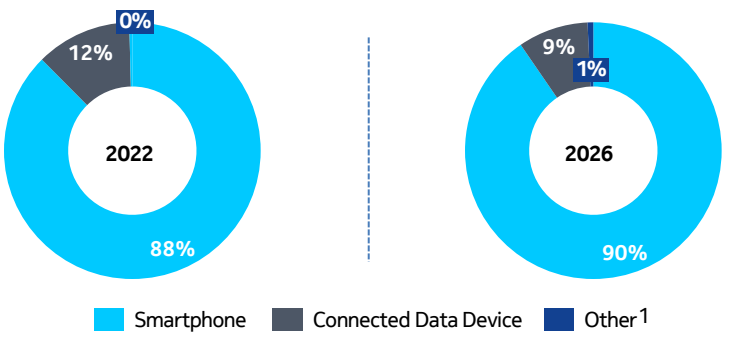
18% Increase in 5G data market share by 2026 from 2022

Total Data Traffic (By Application)



3X Increase in video data traffic (2022-2026)

Total Data Traffic (By Device Type)



90%
Smartphone Data Traffic (2026)

From 2022 to 2026, smartphone data traffic is expected to expand threefold, accounting for 90% (up 2% from 2022) of overall data traffic by 2026.

Source: GlobalData | 1. Other Includes feature phone and M2M

Central East West Africa

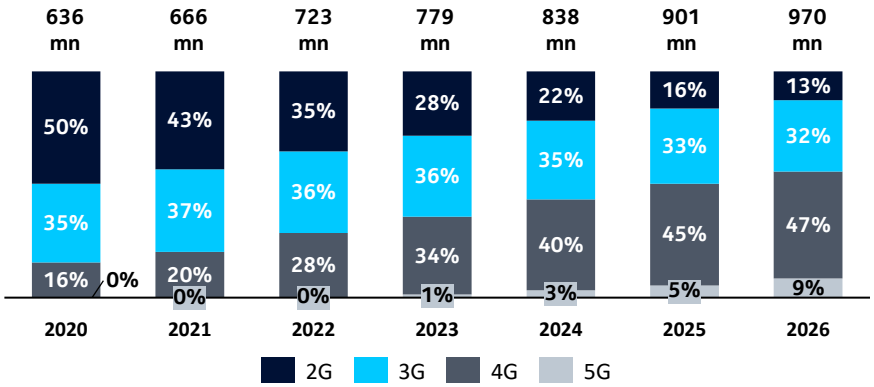
- Subscribers share by technology and type of device
- A look at the revenues and ARPUs
- Categorization of the total data traffic by generation, application and device type

Central East West Africa

4G to remain a crucial area for development and expansion in the mobile broadband space

4G adoption continuing on its upward trajectory whereas 5G remains at a nascent stage

Subscribers share by technology across Central East West Africa



56% 4G + 5G Subscribers in 2026

Operators primary goal is to get people to switch from 2G to 4G and onboard more people.

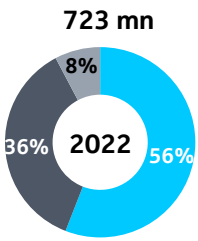
5G adoption is expected to accelerate over the next 4 years, accounting for nearly a tenth of total mobile subscribers by 2026

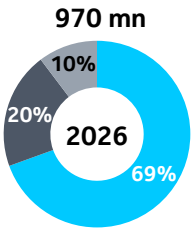
.

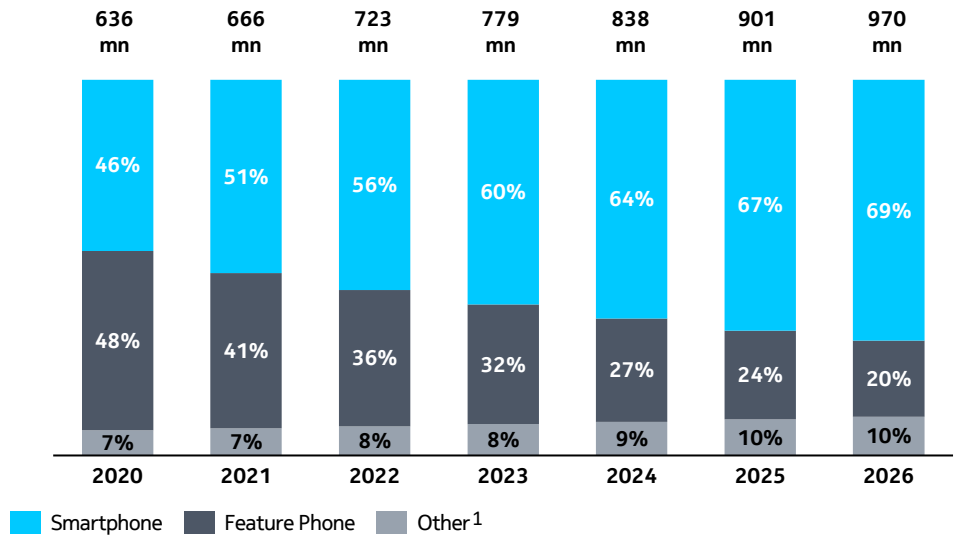
To capitalize on the 5G opportunity, forward-thinking spectrum policy, well-designed assignment spectrum roadmaps, fair prices and technology neutral licenses will be required.

Smartphone adoption is accelerating, with 674 mn subscriptions expected by 2026

Subscription by type of device across Central East West Africa



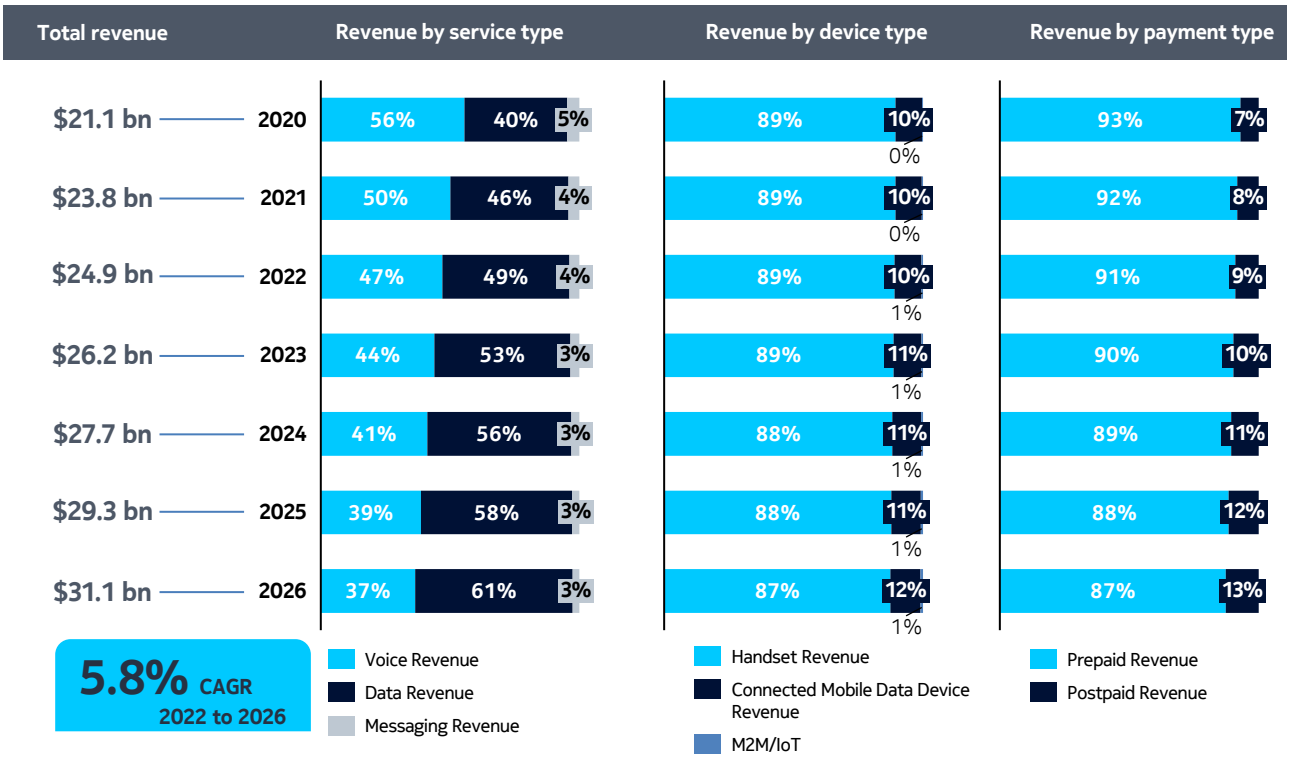




Smartphone usage is accelerating, with strong growth forecasted through 2026, thanks to sustained operator network investment, special phones built for the market and the growing popularity of mobile money.

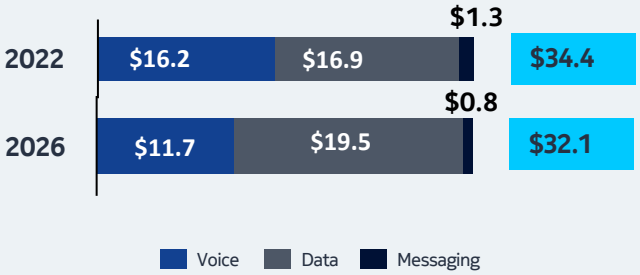
Source: GlobalData **|** 1. Other includes data card, tablet and M2M/IoT | **Note:** Totals may not add up or exceed due to rounding

Mobile revenue to continue its upward trajectory with Data and mobile money as the main drivers; ARPU is diminishing



In 2021, voice represented the majority of revenues . However, Data and mobile money will drive revenue growth, with adoption as well as usage of both services continuing to rise rapidly.

Central East West Africa Average Yearly ARPU (In US Dollar)

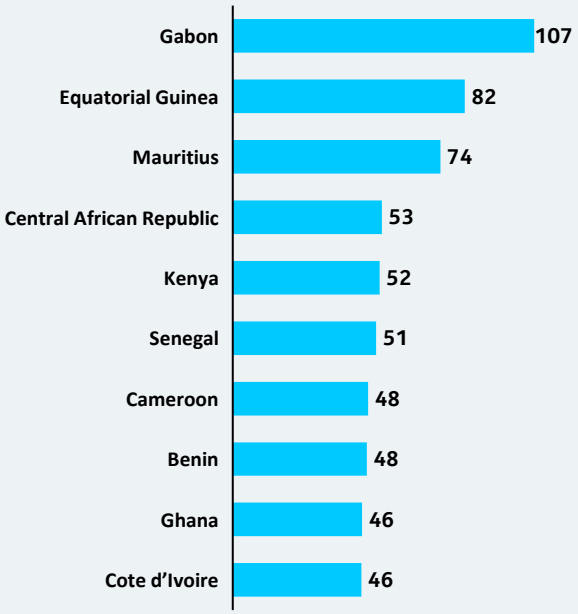


34% Increase in total subscribers from 2022 to 2026

25% Increase in revenue from 2022 to 2026

- Average yearly ARPU is expected to decrease by $2.3 in 2026, percentage change in revenue from 2020 to 2026 is less than change in subscribers for the same time period, leading to low ARPU in the region.
- Average yearly data ARPU will increase and account for ~61% in 2026 by revenue by service type.

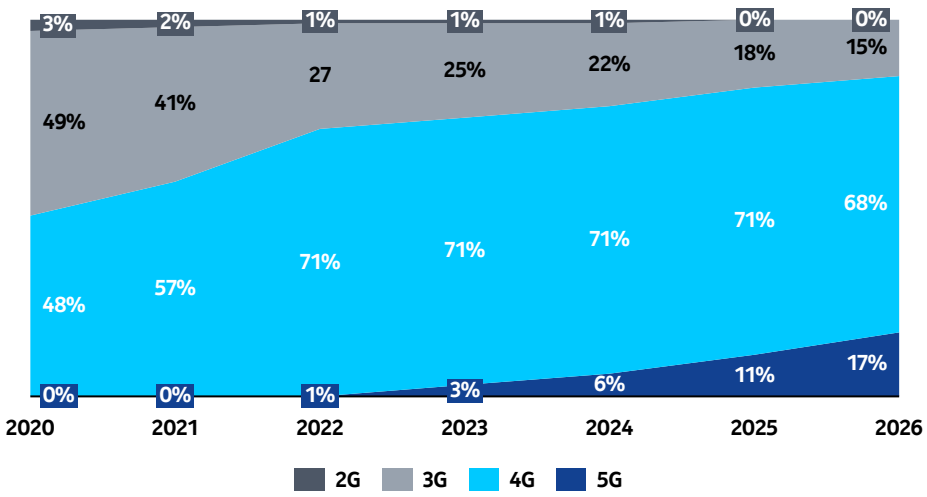
Top 10 countries in Central East West Africa region Average Yearly ARPU (In US Dollar), 2026



Source: GlobalData
Note: ARPU by service type is calculated based on voice/data/messaging revenue divided by total subscribers

Smartphone adoption and increasing digital content to spur increase in data traffic

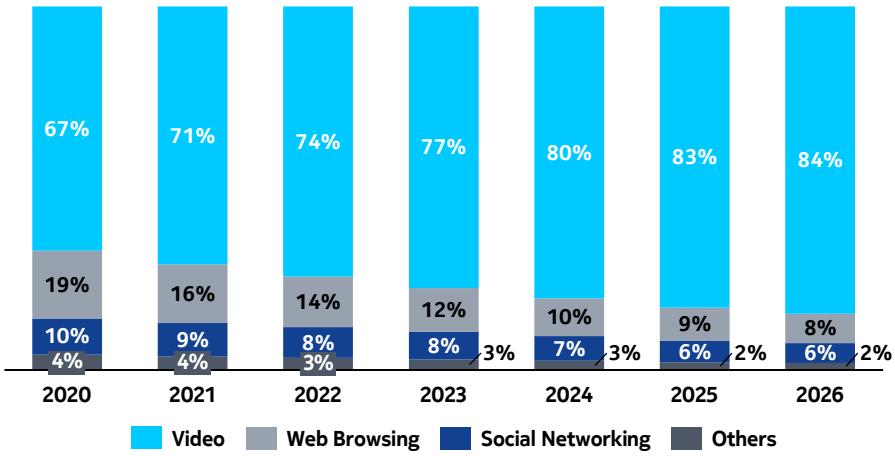
Forecasted Data Traffic Migration (By Technology)



4.4X Growth in total data traffic by 2026 from 2022

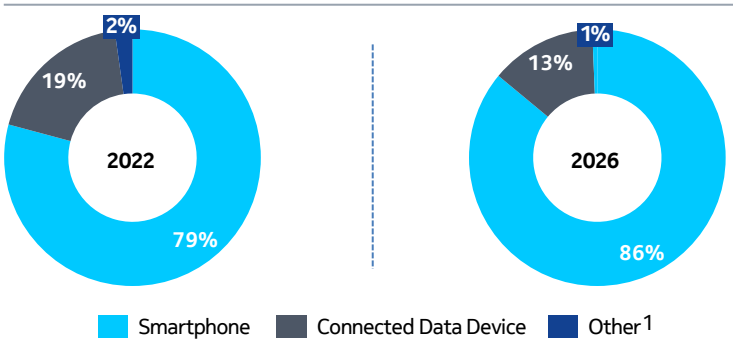
17% Increase in 5G data market share by 2026 from 2022

Total Data Traffic (By Application)



5X Increase in video data traffic (2022-2026)

Total Data Traffic (By Device Type)



86%
Smartphone Data Traffic (2026)

Smartphone data traffic is expected to grow five times and account for 86% (up 7% from 2022) of overall data traffic by 2026.

Source: GlobalData
1.Other Includes feature phone and M2M

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About Nokia

We create the critical networks and technologies to bring together the world's intelligence, across businesses, cities, supply chains and societies.

With our commitment to innovation and technology leadership, driven by the award-winning Nokia Bell Labs, we deliver networks at the limits of science across mobile, infrastructure, cloud, and enabling technologies.

Adhering to the highest standards of integrity and security, we help build the capabilities we need for a more productive, sustainable and inclusive world.

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