STRATEGY

FOR TELECOMMUNICATION TECHNOLOGY OF MOVITEL FROM 2024-2035

MAPUTO, 3/2024

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01 TECHNOLOGY TRENDS

I. TECHNOLOGY TRENDS

1. GENERAL INFORMATION:

01 | TECHNOLOGY TREND

The main technology in the world in the upcoming period is **4G + 5G**, accounting for **93%** of subscribers by **2028**. In Africa by 2028, subscribers for **4G + 5G** will be around **80%**, and for **2G** about **18%**.

5G NSA first, then upgrade to 5G SA. The trend of 5G SA deployment is still slow, currently there are only 41 5G SA/NSA operators.

According to statements from 147 operators in 69 countries: 3G off (57) is more popular than 2G (40). In Africa, only South Africa has announced to turn off the 3G network (2025).

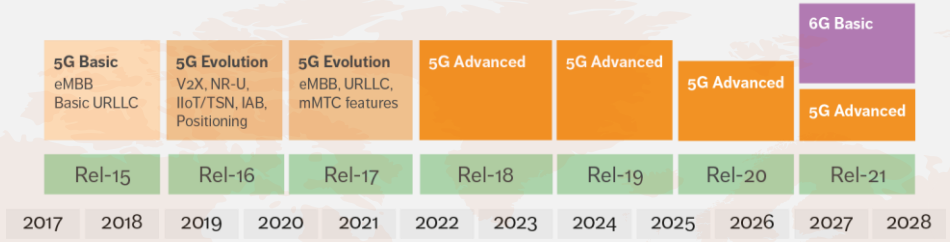
02 | SPECTRUM TREND

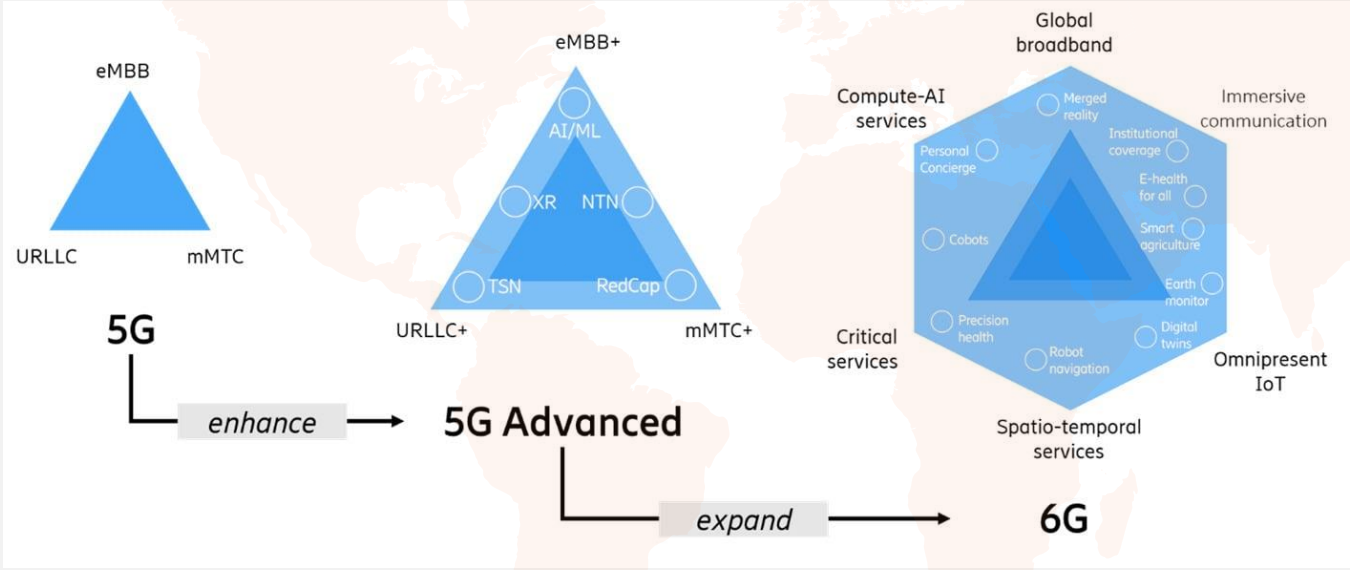
Most operators have low bandwidth to deploy 4G and 5G: 581/826 (~70%).

Most operators want more 4G bandwidth to increase capacity.

I. TECHNOLOGY TRENDS

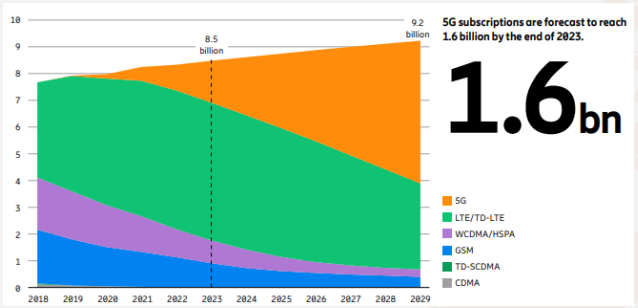
2. MAIN SERVICE OF 5G:

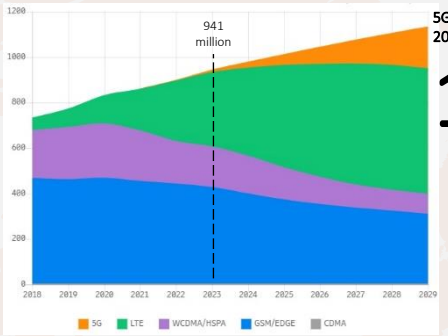


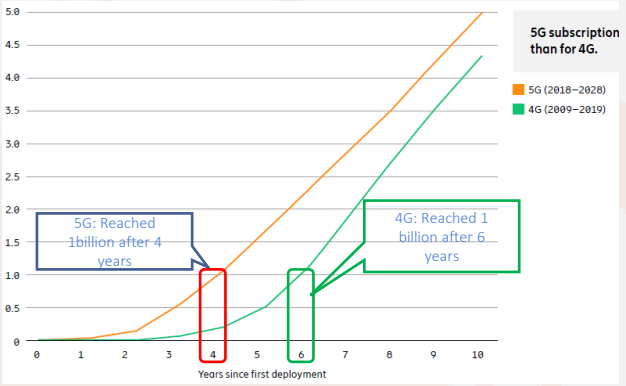


I. TECHNOLOGY TRENDS

3. TREND OF SUBSCRIBER







All over the world:

- 2023 has 8.5b subscribers, 5G has 1.6b subscribers (18.6%)
- 2029 has 9.2b subscribers, 5G has 5.3b subscribers (58%)
- 4G subscribers are still increasing, reaching 5.1b (61%) in 2023 and will decrease to 3.2b (35%) by 2029. 2G and 3G subscribers continue to decrease.

Sub-Saharan Africa region:

2023: has 941m subscribers, 5G has 11m subscribers (1.1%).

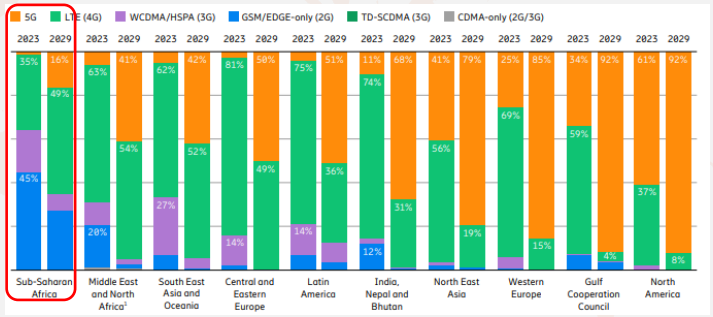
2029: has 1.1b subscribers, 5G has 184m subscribers (16.2%).

4G is growing strongly, reaching 327m (34.7%) in 2023 and will continue to increase to 552m subscribers (48.8%) by 2029. 2G, 3G decreased, 2G trend decreased slightly.

- 5G subscribers grow faster than 4G, reaching 1 billion after 4 years and 2 years earlier than 4G.

Identify trends :

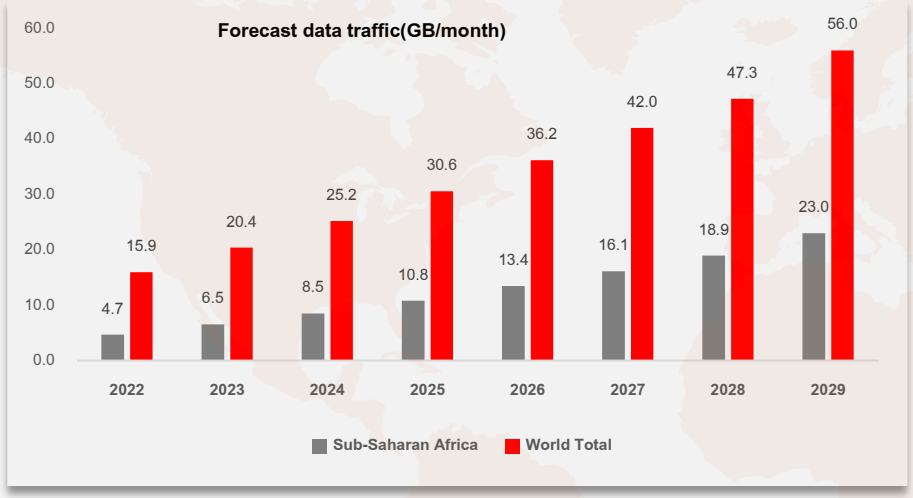
- Subscribers in the period 2023-2029 increase from 8.5b to 9.2b, so the main trend of shifting subscribers from 2G, 3G to 4G, 5G. 2G decreased from 10.5% to 4.2%, 3G decreased from 10.1 to 3%, 4G decreased from 61% to 35%.
- For Sub-Saharan Africa , the trend is moving later than in the world, 4G is still the main driver of strong growth.
- The telecom sector in Sub-Saharan Africa remains resilient, even though the region is facing funding challenges and high inflation. Connectivity has become a basic need for voice and data communications, as well as for enabling services such as banking, which have traditionally had low penetration. By 2029, 4G subscriptions will account for 49% of the total, as access to lower-priced smartphones and data services increases across the region. While 5G will be the fastest-growing subscription type between 2023 and 2029 at 60 % annually, it will account for 16% of mobile subscriptions at the end of this period.

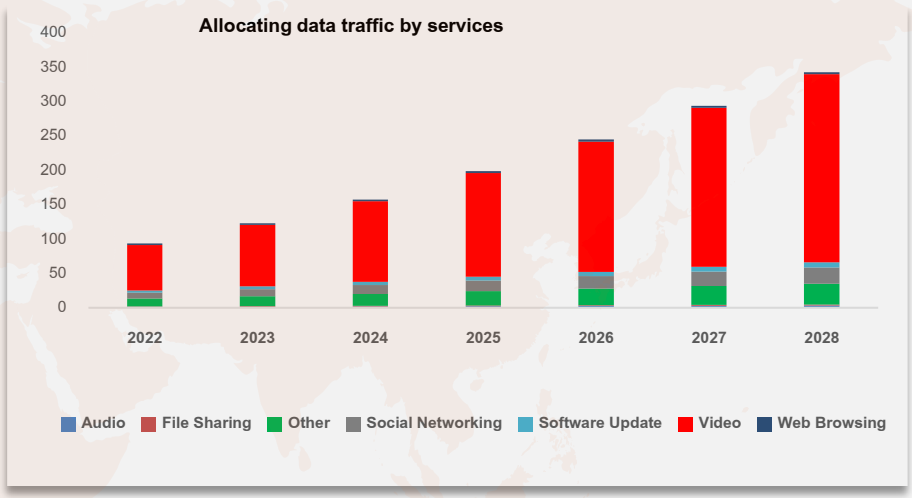


Source: Ericsson Mobility Report 11/2023

I. TECHNOLOGY TRENDS

4. MOBILE NETWORK DATA

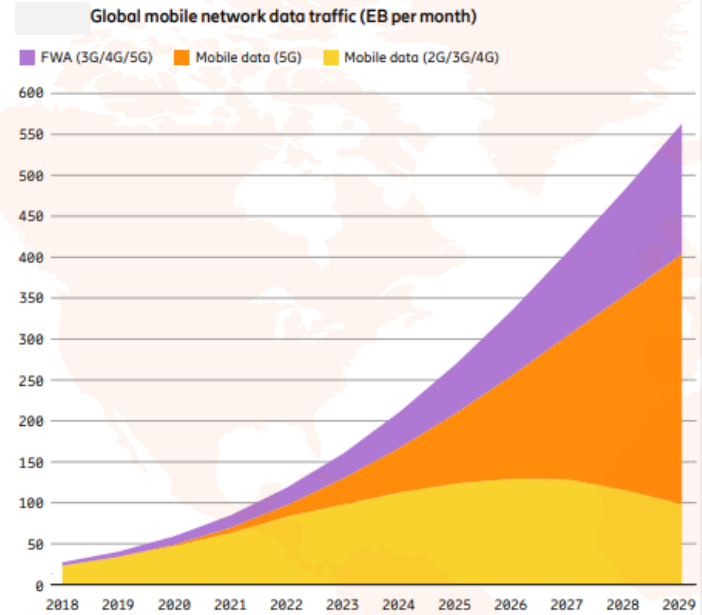


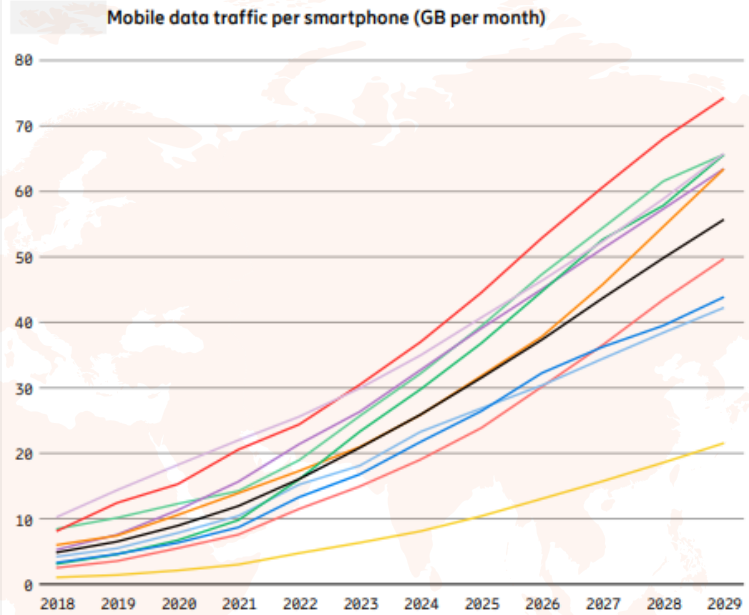


- Sub-Saharan Africa, data demand will grow ~ 33%/year in the next 5 years and is expected to reach ~ 19GB/sub/month by 2028 and 23GB/sub/month
- Video services dominate with ~73% of total traffic.

I. TECHNOLOGY TRENDS

4. MOBILE NETWORK DATA



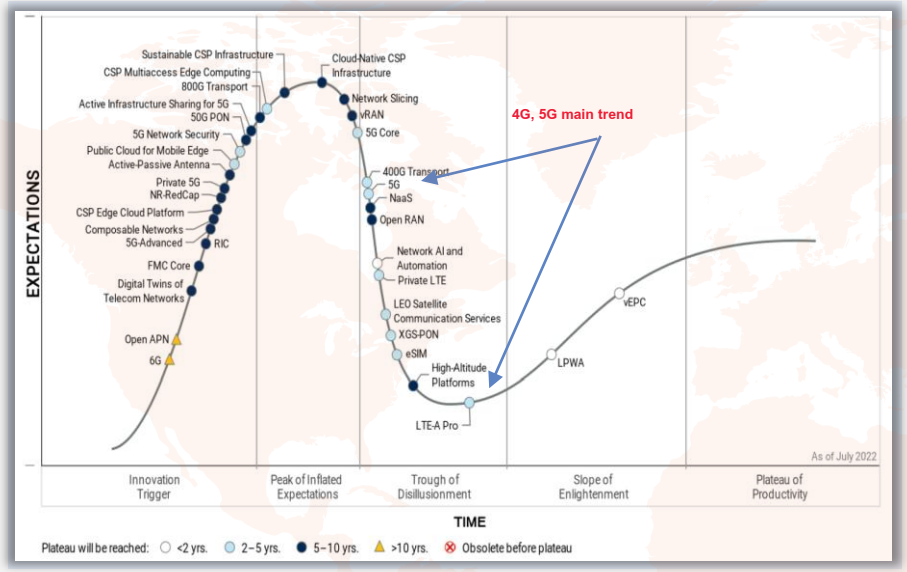


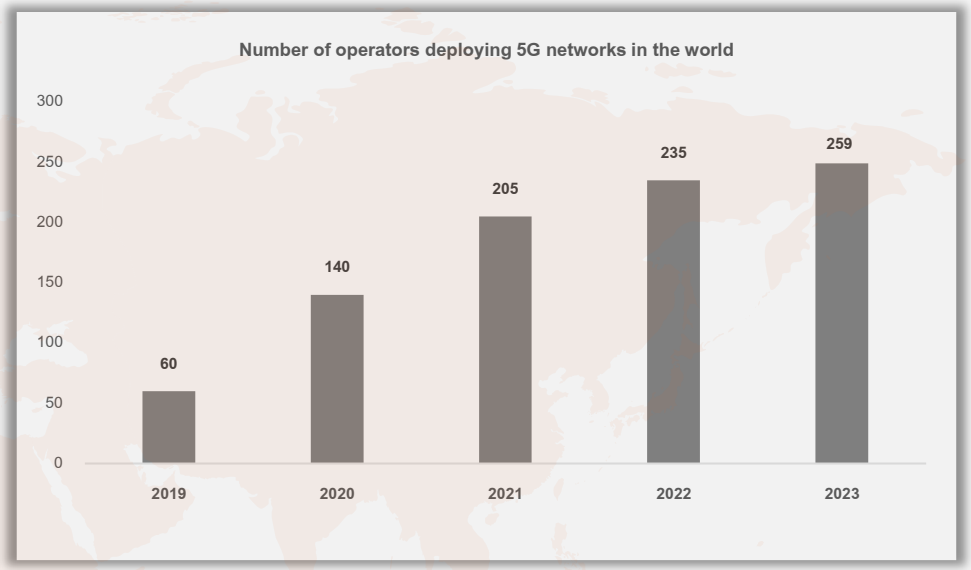
Regions	2023	2029	CAGR 2023–2029
India, Nepal, Bhutan	31	75	16%
GCC	30	66	14%
North America	26	66	17%
South East Asia and Oceania	24	66	19%
Western Europe	27	64	16%
North East Asia	21	64	20%
Global average	21	56	18%
Latin America	15	50	22%
Middle East and North Africa[1]	17	45	17%
Central and Eastern Europe	19	43	15%
Sub-Saharan Africa	6.7	23	22%

- Sub-Saharan Africa is poised to remain the region with the highest growth in total mobile data traffic, with a CAGR of 33 percent anticipated between 2023 and 2029. This growth will be driven by the expansion of 4G network coverage across the continent and the increasing affordability of data and smartphones.
- Smartphone traffic is expected to be the primary contributor to total mobile traffic, with average data usage per smartphone reaching 23 GB by 2029.
- Populous markets that launch 5G early are likely to lead in terms of traffic growth over the forecast period. 5G's share of mobile data traffic is estimated to be 25 percent at the end of 2023. This share is forecast to grow to 76 percent in 2029

I. TECHNOLOGY TRENDS

5. MOBILE NETWORK DATA: 4G and 5G networks are still the main trend in the near future (Gartner and GSMA)

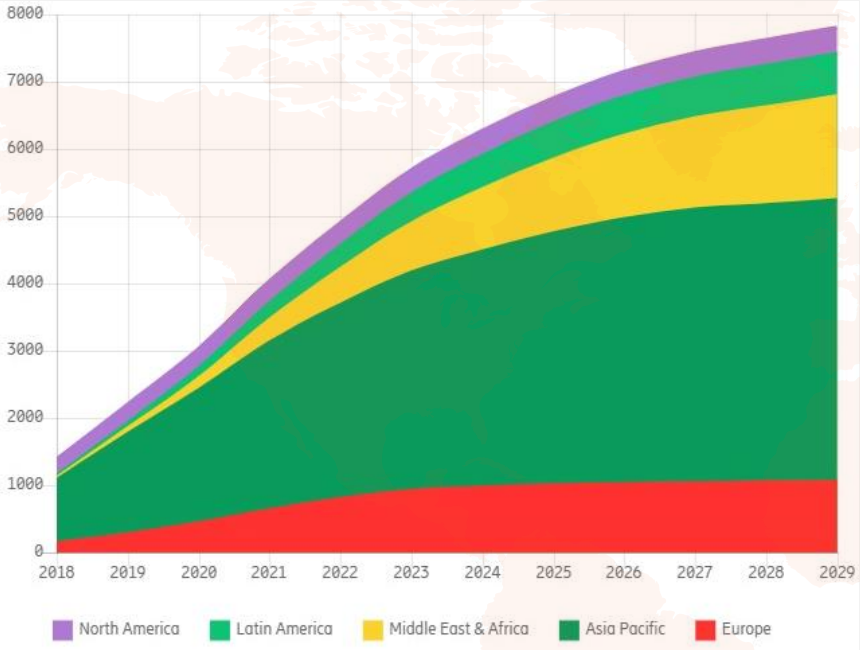




By the end of 7/2023, the world will have **259** commercial 5G operators in **102** countries (~ 30% of total), popular frequency band: C-band (n77,78), and after that are 700, 2600Mhz bands. In Africa, there are a number of countries that have deployed 5G: South Africa, Nigeria, ... Movitel success trial 5G in 3/2023.

I. TECHNOLOGY TRENDS

6. VOLTE



- Operators continue to use IMS (IP Multimedia Subsystem) to provide voice for 4G and 5G.
- Currently, there are 280 operators that have deployed VoLTE/860 total providing mobile services.
- The number of VoLTE subscribers by the end of 2023 is 5.7b/8.5b (67%) and will reach 7.8b/9.2b by 2029 (84.7%).
- Middle East and Africa currently has 730m Volte subscribers/1.68b subscribers (43%), accounting for 12.8%/total volte subscribers of the world.
- Currently, MVT is deploying Volte. This is the right time to deploy Volte according to the general world trend.

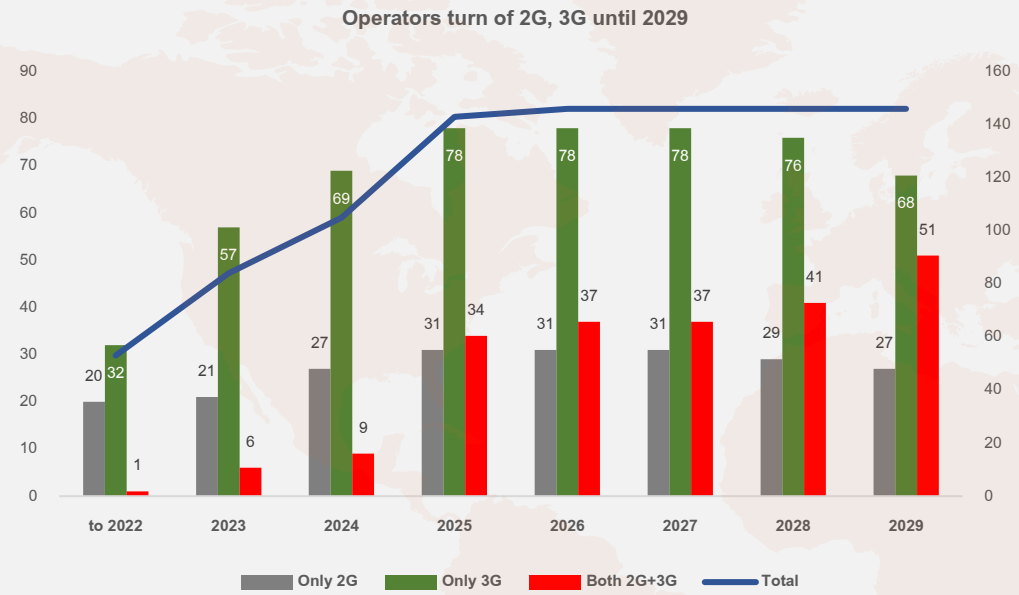
I. TECHNOLOGY TRENDS

6. 5G: Movitel will follow the 5G NSA direction at the first stage

- 5G deployment in Africa is still slow compared to the world: By the end of Q1.2023, there were only 13/203 (~ 6%) commercial operators providing 5G NSA services, concentrated in large operators in South Africa and Nigeria.
- 4G services will mainly service in Africa in the next 5 years. Therefore, Movitel should continue to maintain the 4G network and deploy 5G according to market business signals.
- 5G SA eMBB was standardized in 2019; Basic uRLLC and mMTC will also be standardized by the end of 2021, however, to date, only 4 operators in > 20 countries have deployed 5G SA commercially. There are 6 operators deploying 5G SA from the beginning, 18/24 operators deploying SA after 2-3 years of 5G NSA.

I. TECHNOLOGY TRENDS

7. TREND OF TURN OFF 2G AND 3G NETWORKS: Turn off 2G and 3G networks at Movitel cannot do before 2032



Statistics on 143 operators/89 countries :

- By the end of 2023, 6 operators have turned off 2G + 3G, 21 operators (25%) have turned off 2G, 57 operators (68%) have turned off 3G.
- Accumulated by the end of 2025, the number of operators in the world turn off 3G is ~1.7 times the number of operators turn off 2G, with 34 operators (23%) turn off 2G+3G, 31 operators (22%) turn off 2G, 78 operators (55%)) turn off 3G.
- In the Africa area, only MTN and Vodafone in South Africa have announced to turn off the 3G network by 2025.

I. TECHNOLOGY TRENDS

8. NEW SPECTRUM:

World:

- End of Q3/2022 (Ovum): 581/826 operators in the world have low band (~70%); 346 operators deploy for 4G and, 48 operators deploy for 5G.
- Ratio operators have low band with bandwidth 10MHz: 75%, 20MHz: 48%, 30 Mhz: 33%;
- Ratio operators have 1 low band: 66%, 2 low bands: 27% , 3 low bands: 7%.

Mozambique:

- Have 2 low bands: 10MHz Band 800MHz and 35MHz Band 900MHz.
- Have 2 high bands: 75MHz Band 1800MHz and 60MHz Band 2100MHz.
- Will auction new spectrum: 30MHz Band 700MHz, 190MHz Band 2600MHz, 200MHz band 3500MHz and 2500MHz band 26GHz.

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CURRENT STATUS OF MOVITEL

II. CURRENT STATUS OF MOVITEL

1. COVERAGE: Movitel have a round >1800 stations: Urban: 45%, rural 55%

2G Network

Coverage of population: all network: 92% pop.

Center of province/district: 96% pop, Village: 91% pop

3G Network

Coverage of population: all network: 60% pop.

Center of province/district: 94% pop, Village: 52% pop.

4G Network

Coverage of population: all network: 70% pop,

Center of province/district: 97% pop, Village: 65% pop

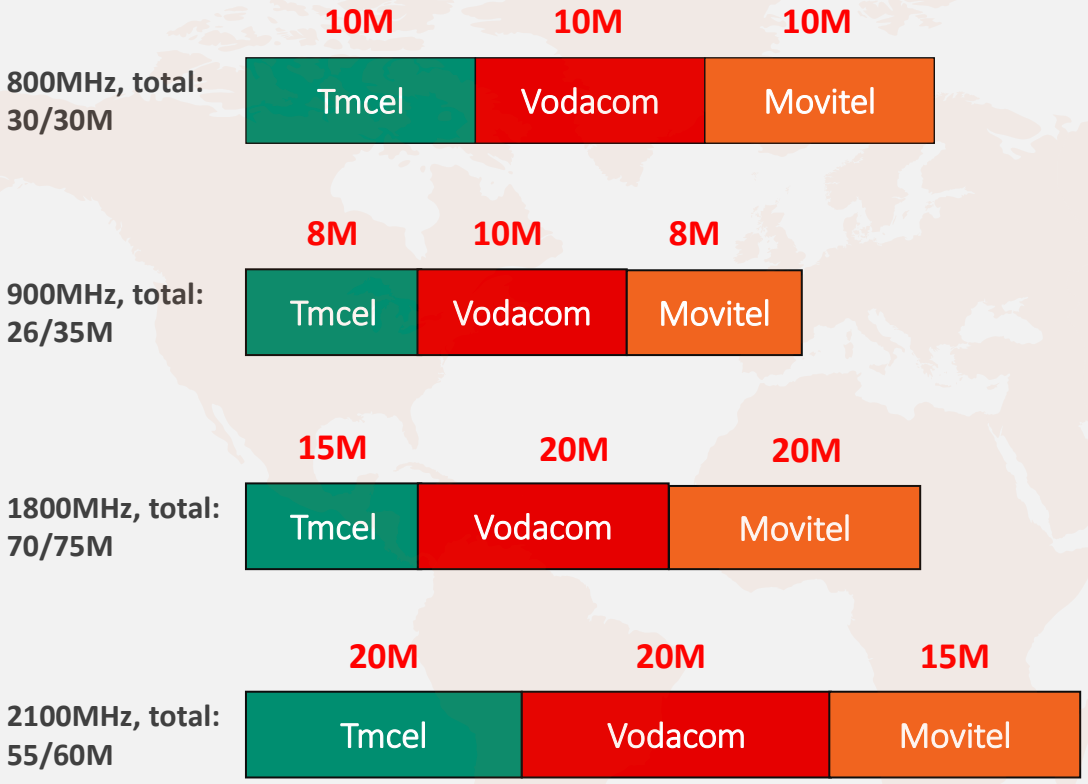
5G Network

Successful trial 5G in 2023.

Network	% Population		
	All	center province	Village
2G	91.6%	96.4%	90.5%
3G	59.7%	93.7%	52.3%
4G	70%	97%	65%

II. CURRENT STATUS OF MOVITEL

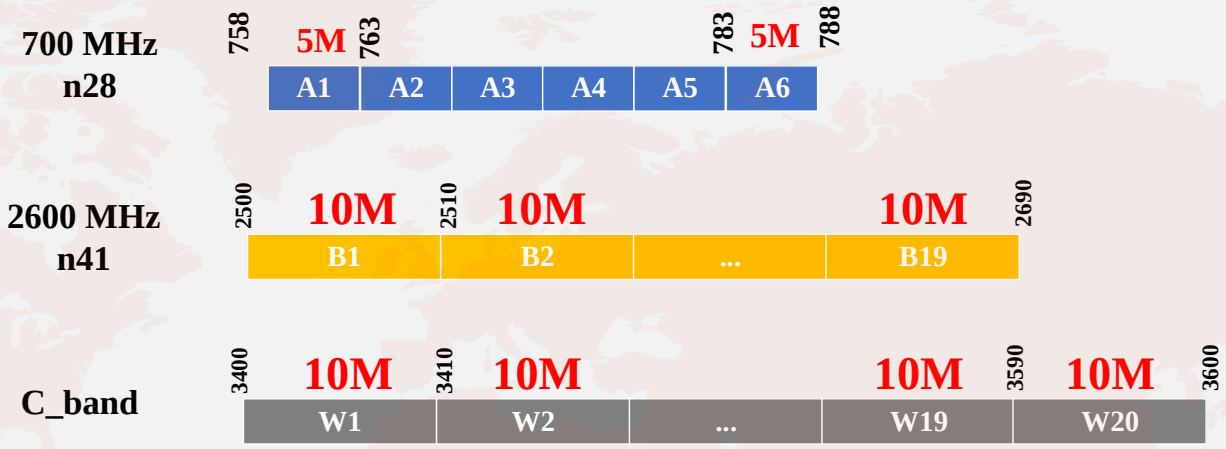
2. FREQUENCY:



- Mozambique plans standard frequency bands according to the European region (ITU - Region 1).
- July 2023 The Government officially announces the planning and licensing plan for the 700Mhz, 2.6GHz, 3.5GHz bands.

II. CURRENT STATUS OF MOVITEL

2. FREQUENCY: Auction planning



Q2.2023 INCM issued an auction notice for 5G frequency bands: 700MHz, 2600MHz, C-band and mmWave, specifically:

- 700Mhz band: Divided into 6 blocks, each block is 2x5Mhz
- 2600Mhz band: Divided into 19 blocks, each block is 10Mhz
- 3500Mhz band: Divided into 20 blocks, each block is 10Mhz
- 26GHz band: Divided into 25 blocks, each block is 100Mhz

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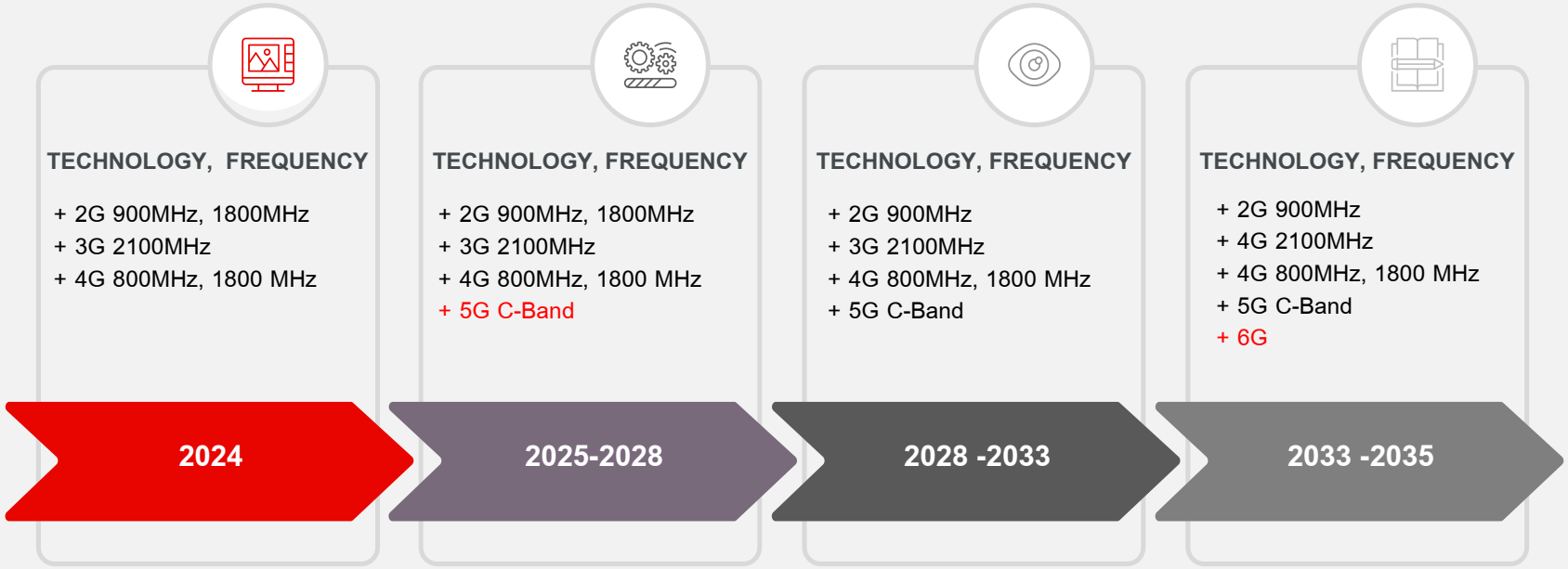
III. STRATEGY FOR TELECOMUNICATION FROM 2024-2035



BBU: SRAN and MRAN

RRU:

+ Single band: 800/900/1800/2100

Antenna:

+ Multiport (6p, 12p): 800, 1800

BBU: SRAN

RRU:

+ Single band: 800/900/1800/2100
+ AAU 32T32R/ 64T64R_3600

Antenna:

+ Multiport (6p, 8p): 800, 1800
+ Antenna TDD 8T8R

BBU: SRAN

RRU/AAU:

+ Multi - band: 800/900/1800/2100
+ AAU 32T32R/ 64T64R_3600

Antenna:

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+ AAU 32T32R/ 64T64R_3600

Antenna:

+ Multiport (6p, 8p): 800, 1800
+ Antenna TDD 8T8R

III. STRATEGY FOR TELECOMUNICATION FROM 2024-2035

NETWORK DESIGN 2024 -2035

- **2G Network**:
  - Don’t deploy new location has 2G only (except in special cases)
  - Deploy 2G+4G to improve coverage.
- **3G Network**: Limit the expansion of new 3G coverage areas, only for capacity, turn off 3G in 2033.
- **4G Network**: Expansion 4G both coverage and capacity, especial in rural area where place still many areas with low signal, mobile service is not widely available. The goal is 4G coverage reach to 2G coverage.
- **5G Network**: Select NSA network architecture, and deploy cosite on available locations, with priority given to high-load 4G locations.
- **6G Network**: Based on the trends of technology, 6G will be deployed when the technology is mature.

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SUGGESTION

IV. SUGGESTION

NETWORK DESIGN 2024 -2035

1) The world economic situation is still difficult, Mozambique's area is large, while the population distribution is sparse, the proportion of people with mobile access is still low, investment costs for telecommunications infrastructure are high, and risks. Therefore, the government needs to support network operators (including policies and taxes/fees, possibly budget for capex) and work with network operators to develop telecommunications, with the goal being that all people have the opportunity to use the mobile service.

2) In process, the frequency auction project will begin, but Mozambique's GDP/people assessment is still low compared to the world, the proportion of people using data is low, so the government needs to carefully evaluate the estimate auction price. To ensure that network operators have the opportunity to use new frequencies and invest in network infrastructure to serve the people, with the goal of universalizing internet services to everyone.


Movitel
thank you