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KENYA ICT ACTION NETWORK

5G Policy Brief

Which way for Kenya?

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01 Executive Summary

The objective of this study is to establish Kenya's preparedness to deploy fifth-generation wireless networks (5G). The study reviews the historical progression of mobile networks through to the current 5G mobile technologies. It then highlights the technical properties and use-cases that 5G technologies have under the three categories, namely, the enhanced Mobile BroadBand (eMMB), the massive Machine Type Communications (mMTC), and the ultra-Reliable Low Latency Communications (uRLLC).

The study then reviews the global 5G state of play and contrasts that with a situational analysis for Kenya. It finds that whereas the Kenyan legal, policy, and regulatory frameworks are quite advanced, there is no specific, national 5G Strategy in place. This disadvantages Kenya's ability to attract 5G investments while hampering its ability to stake a claim within the new digital value chain commonly known as the Fourth Industrial Revolution (4IR)[Sutherland, 2020]

The study has established that the country is still not ready to effectively deploy and benefit from 5G technologies - particularly from a strategic, policy, and regulatory perspective. It proposes practical steps that need to be taken to address this and summarises them under the following

5 KEY RECOMMENDATIONS: 5

Set up a 5G Advisory Working Group:
This would be preferably convened by the National Communication Secretariat (NCS) and comprise of various key stakeholders including but not limited to regulatory, operators, ICT enterprises, academia, and civil society

Publish Harmonized 5G Spectrum Roadmaps:
The 5G ecosystem of investors, operators, equipment manufacturers, and others cannot make investment decisions unless a given country's spectrum plans are clear and published. It is therefore imperative that the regulator takes the necessary steps including spectrum refarming and reallocation in order to publish an internationally harmonized 5G Spectrum roadmap

Adopt Affordable 5G Auction Prices:
Governments have realized huge amounts of revenues from auctioning previous 2G, 3G, and 4G spectrum. However, this may not automatically apply to 5G spectrum. This is because of the high risk of investments that arise from the uncertainty, high capital expenditure, and technical complexity of 5G technologies with yet to be proven return on investment business cases. The government and the regulator may be better of offering affordable auction prices as an incentive to attract players while reducing their investment risk profile. In other words, the
governments and regulators should assign 5G spectrum to support their digital connectivity goals rather than as a means of maximizing state revenues.

Adopt a Shared 5G Spectrum and or Infrastructure:
In line with the proposed Draft National Spectrum Policy (2020), the study agrees that spectrum sharing should be promoted as long as interference is controlled. This can be implemented based on geography, time, or frequency separations. Additionally, in the event there are no subscribers to the auctioned spectrum, the government may consider jointly investing in a common and shared core 5G infrastructure as a way of reducing the investment risks and stimulating uptake.

Enforce Common Wayleave Agreements:
5G small and macro-cell configurations imply that operators will rely more heavily on public infrastructure to host network equipment. Access to road furniture, electric poles, shared ducts will become increasingly critical to 5G deployments and it will be better to centrally streamline and manage Wayleave Agreements rather than leave them open to different County-level managers who tend to have exorbitant, punitive, and prohibitive approaches to granting wayleaves to operators.

These proposed recommendations are not expected to be prescriptive or exhaustive. They are instead designed to provide a baseline for rigorous conversations between stakeholders to determine the best way for Kenya in terms of the 5G Agenda. KICTAnet further believes this is a conversation that Kenya should have sooner rather than later to avoid the risk of missing out on the next cycle of innovations as promised by the 5G technologies.

02 Introduction

At the highest level, 5G is an opportunity for policy-makers to empower citizens and businesses. [ITU and UIT, 2018] states that 5G will play a key role in supporting governments and policy-makers in transforming their cities into smart cities, allowing citizens and communities to realize and participate in the socio-economic benefits delivered by an advanced, data-intensive, digital economy.

5G promises to deliver an improved end-user experience by offering new applications and services through gigabit speeds, and significantly improved performance and reliability. It is expected to build on the successes of 2G, 3G, and 4G mobile networks, which have transformed societies, supporting new services and new business models. It is also projected to provide opportunities for wireless operators to move beyond providing connectivity services, to developing new solutions and services for consumers and industry across a range of different sectors.

Many countries, particularly in Asia, Europe, and the US are competing to be the leaders in 5G technologies and deployments with the expectation of exploiting the first-mover advantages.

Thus, it is most helpful for policymakers in low income and low middle-income countries to have a practical understanding of motivations, and the approaches taken by the early 5G investing countries, despite their being in the high GNI category.
Many developing countries, including Kenya, are at the early stages of the 5G conversation and can learn from the advanced nations while being wary of the 5G challenges[Forge and Vu, 2020]. 5G technologies are characterized by a mix of business case uncertainty, high capital expenditure, and technical complexities that need to be taken into account when developing 5G policy and strategies.

This policy paper seeks to contribute key discussion points and that should be considered and hopefully shape or enrich the 5G policy conversations in Kenya. It reviews the 5G state of play at a global level and compares that with the Kenya situation. It then makes strategic policy recommendations that Kenya may consider in order effectively participate in the upcoming 5G ecosystem.

03 5G and its historical journey

The first generation of mobile networks or 1G was launched by Nippon Telegraph and Telephone (NTT) in Tokyo in 1979. By 1984, NTT had rolled out 1G to cover the whole of Japan. In 1983, the United States of America approved the first 1G network. Other countries such as Canada and the United Kingdom rolled out their 1G Networks a few years later

The second generation of mobile networks or 2G was launched under the global system for mobile telephony standard (GSM) in Finland in 1991. 2G took mobile telephony a notch higher by introducing encryption on calls thus making them more secure. Digital voice calls became clearer with less static and background noise. 2G was much more than telecommunications; it helped lay the ground for a revolution in mobile telephony globally. For the first time, people could send short text messages (SMS) and multimedia messages (MMS) on their phones. There was a significant increase in data transfer speeds. When 2G was launched transfer speeds were around 9.6 kbits/s. Operators invested in new infrastructure such as mobile towers which resulted in speeds of 40 kbit/s by the end of the era.

The 2G era saw an introduction of the General Packet Radio Service (GPRS) whose maximum theoretical data rate was 171 Kbps and the Enhanced Data rates for GSM Evolution (EDGE) whose maximum theoretical data rate was 473.6 kbps.

3G or the third generation of mobile networks was launched by NTT DoCoMo in 2001 and aimed to standardize the network protocol used by vendors. This meant that users could access their data from any location in the world as data packets making international roaming a reality.

3G's increased data transferring capabilities (4 times faster than 2G) led to the rise in new services such as video conferencing, video streaming, and Voice over Internet Protocol (VoIP).

4G, the fourth generation of mobile networks was first deployed in Stockholm, Sweden, and Oslo, Norway in 2009 as the Long Term Evolution (LTE) Standard. It was subsequently introduced throughout the world and made high-quality video streaming a reality for millions of consumers. 4G offers fast mobile web access (up to 1 gigabit per second for stationary users) which facilitates gaming services, high definition (HD) Videos, and high quality (HQ) video conferencing.

Transitioning from 2G to 3G was as simple as switching SIM cards. For 4G, mobile devices needed to be specifically designed to support 4G which called for more investments in addition to extensive research and development of new products and services. Whereas 4G continues to be the primary standard for mobile communications around the developed world, countries in the developing world are mainly on 3G networks with 4G network deployments limited in urban centers.

3G broadband internet speeds are quite restricted within the context of delivering on the 4th Industrial Revolution (4IR) [Mauro, 2019]. Whereas 4G may try to deliver some of the 4IR services, 5G technology is considered the minimum quality standard for mobile broadband required to deliver 4IR services as can be seen from the comparative performance below.

Capability	Definition	Unit		Perfomance Target	
			4G/LTE	5G	Enhancing Factors
1. Peak Data Rate	Max. achievable data rate under ideal conditions per device/user.	Gbits/s	1	20	20
2. User	Achievable data rate available ubiquitously across the coverage area to device/user.	Mbits/s	10	100	10
3. Mobility	Max. Speed at which seamless transfer between radio nodes can be achieved.	Km/Hr	350	500	1.4
4. Connection Density	Total number of connected devices per unit area	Device s/km2	105	106	10
5. Area Traffic Capacity	Total traffic throughput served per geographic area in square metres	Bit/s/Hz	1x	3x	3
6. Spectrum Effeciency	Average data throughput per unit of energy	Bit/Joule	1x	100x	100
7. Latency	Contribution by the radio network to the time when the source sends to when the destination receives it.	Ms	60-98	<1	~100

Source: ITU(2015);ITU(2018)

Table 1: A comparative view 5G vs 4G Performance Characteristics

5G and its historical journey

5G mobile technology extends and outperforms 4G technologies on all the eight performance parameters listed above. As an example, 5G peak data rates are twenty times higher than 4G, while the user devices can experience 100 Mbps on 5G networks as compared to the 10 Mbps on 4G networks. The Australian 5G Strategy [Dept of Communications, 2017] summarises the technical specifications for 5G as including the Following:

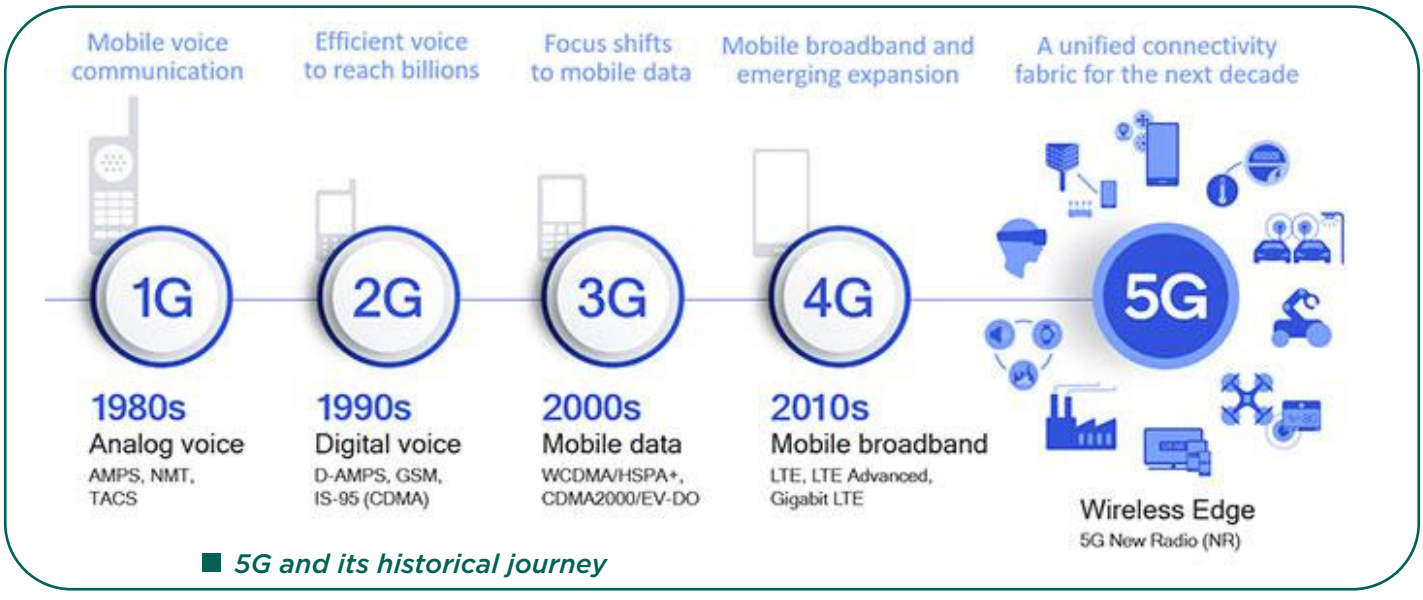
High Reliability
(99.999% for mission-critical 'ultra-reliable' communications)

Ultra-low Latency
(1 millisecond)

Massive Connectivity
(1 million connections per square kilometer)

Mobility At High Speed
(up to 500 (km/h i.e. high-speed trains)

High Data Rates
(1 Gbps for hotspots, 100 Mbps download, and 50 Mbps upload for wide-area coverage)



5G and its historical journey

04 5G Technology and Use Cases

5G simultaneously supports three technical performance types namely the enhanced Mobile Broadband, massive Machine Type Communications, and the ultra Reliable Low Latency Communications as summarised below.

This is the key difference between 5G technologies and its predecessors. The ability of the mobile network to automatically switch and support the three very different types of network requirement without the need to change the physical radio equipment.

eMBB	mMTC	uRLLC
■ Peak data rate: 10 to 20 Gbps Minimum data rate: 100 Mbps	■ Peak data rate: 0 to 20 Gbps Minimum data rate: 100 Mbps	■ Peak data rate: 10 to 20 Gbps Minimum data rate: 100 Mbps
■ Increases traffic capacity by 100 times	■ Supports long range and low data rate (1 to 100 Kbps)	■ Offers less than 1 ms air interface latency
■ Supports macro and small cells	■ Leverages benefits of ultra-low cost M2M.	■ Ultra-reliable and available wit 'five nines'(99.999% of the time)
■ Supports high mobility of about 500 Km/h	■ Ensures a battery life of 10 years for IOTs	■ Provides low to medium data rates 50 kbps to 10 Mbps
■ Improves network energy savings by 100 times.	■ Provides asynchronou access	■ Offers high speed mobility

Table 2: 5G Performance Categories, Source RF Wireless World, 2019

Key usage scenarios for 5G include the enhanced mobile broadband support for home broadband and television, enhanced mobile media, ultra-reliable low latency communications that support industrial automation, and self-driving vehicles. Others include the massive machine-type communications that support smart homes/buildings, logistics, and smart cities. 5G will go beyond facilitating communication among human beings and will enable intelligent internet of things as discussed in the next section.

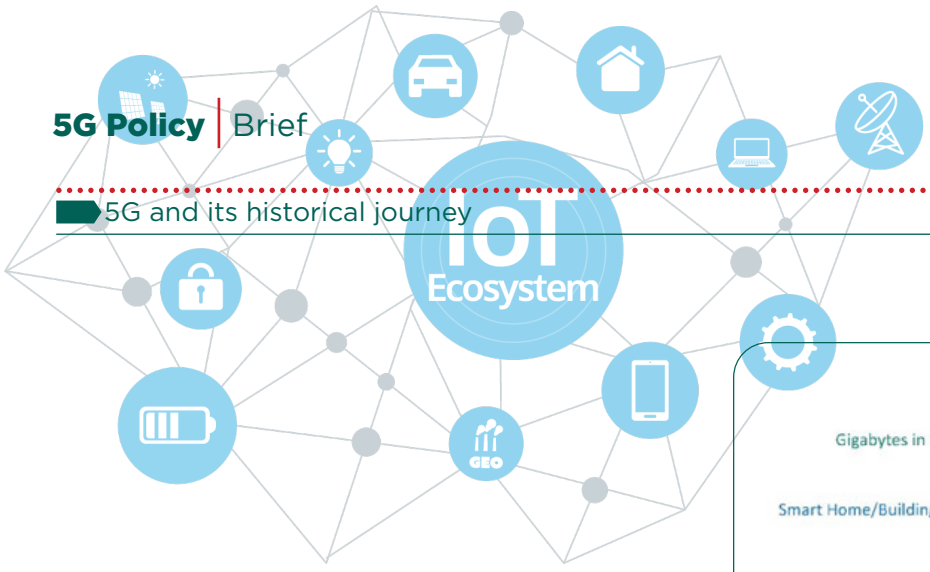
4.1 Enhanced Mobile BroadBand - eMBB

Enhanced Mobile Broadband (eMBB) speeds provide extremely high broadband speeds, sustainable even within high-speed vehicles like bullet trains. They can introduce new services and user experiences such as Virtual Reality (VR) with applications in Games, Sports, Real Estate, and Tourism. Ultra-High Density Broadcast, 3D video can be useful in enhancing the Media entertainment and Education sector. However exciting this may sound, it is considered just the first stage of the other transformative use cases envisioned under the Fourth Industrial Revolution (4IR).

5G supports two other 'later-stage' transformative use cases that developed economies are leveraging to unleash their next cycle of innovations. These include the massive Machine Type Communications (mMTC) as well as the Ultra Reliable Low-Latency Communications (uRLLC) 5G attributes whose use cases are described next

4.2 Massive Machine Type Communications or Internet of Things (mMTC/IoT)

Massive Machine Type Communications is commonly marketed as the Internet-of-Things (IoT) service where any device can connect to any other devices – through wireless technologies. Whereas the earlier editions of mobile communication 3G/4G can support IoT, they do so under very inefficient energy and spectrum circumstances. 5G technologies enable IoT operators to efficiently connect millions of devices within a given unit radius. Smart meters to communicate status or control various devices such as water meters, street lighting maintenance, irrigation systems come to mind. Additionally under the Smart city concepts, one can use IoTs for monitoring of air & water quality, transport traffic, and trash bins, management of traffic lights amongst others.

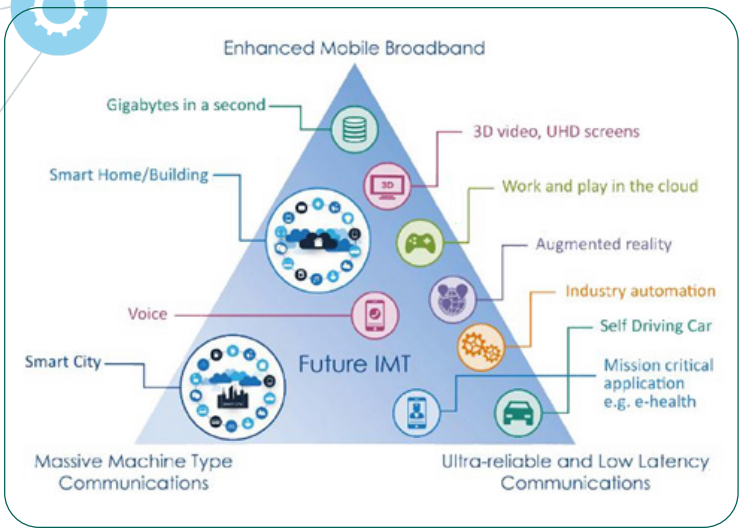


4.3 Ultra Reliable Low Latency Communications - uRLLC

The third transformational 5G characteristic is its Ultra Reliable, Low-Latency Communications (uRLLC) capabilities. The keyword is reliability and low latency - which means that 5G infrastructure will allow for the execution of very time-sensitive operations to take place with no or very minimal transmission errors.

Applications that come to mind include remote surgery, smart factory controls, autonomous vehicle, or drone control amongst others. Using 5G uRLLC capabilities one can have medical specialists stationed in Europe or India and perform a heart operation in real-time. This would avoid the flight and accommodation costs that would have otherwise been incurred by the patient.

Under the smart factory concept, the manufacturing sector would be transformed and managed wirelessly due to industrial automation capabilities. Self-driving cars, drone control, and other remote control capabilities



4.4 Spectrum Requirements

5G technologies are expected to deliver improvements in spectral efficiency (the data rate that can be supported per unit of spectrum). The 5G use cases above require a mix of low, medium, and high frequency spectrum to meet different scenarios relating to coverage, connectivity, and latency [ITU and UIT, 2018]

Low frequency (less than 1GHz)

Providing widespread coverage across urban, suburban, and rural areas and supporting IoT for low data rate applications.

Medium frequency (1–6GHz

providing good coverage and high speeds, and including the expected initial 5G range of 3.3–3.8GHz which has been identified as the most likely band for launching 5G globally.

High frequency (above 6GHz)

Providing ultra-high broadband speeds for advanced mobile broadband applications, and most suitable for applications in dense traffic hotspots.

05 5G Technology and Use Cases

[*Forge and Vu, 2020*] selected seven advanced economies and reviewed their 5G Policies and strategies. We select two sets of countries from this study and review their 5G policies and strategies to learn lessons that may inform Kenya's 5G Policies and strategies going forward.

5.1 Case for South Korea & Germany

Country	Strategic Positioning and Guiding principles	Key Targets	Regulatory Interventions
South Korea	Embracing 5G to make the next economic leap for high tech exports, based on 5G network and peripherals, especially smart-phones making Korea a global ICT power house.	5G penetration will reach 5% of total mobile connections by 2020; 90% by 2026; Claiming 15% of the global 5G market estimated to reach $1.02 trillion by 2026	Assisting the 5G-enabled top 10 strategic industries and five key services.
Germany	Making Germany a lead market for 5G applications. Promoting the development of sustainable and competition oriented market Boosting innovative capacity (Fostering user-friendly diversity of applications and services; promoting start-ups and SMEs)	5G coverage will reach 98% of households by 2022	Promoting the collaboration between operators and user industries Support Research on 5G (creating a database of projects, clustering the research areas, linking up research establishments, diffusing research findings to verticals) Funding basic research projects for evaluating the impact of 5G and promoting its adoption. Organizing 5G competition among cities to find and support the best 5G-enabled solutions to urban management problems.

5G Policy and Strategies - South Korea and Germany, *Source Forge & Vu 2020*

5.1.1 Policy and Strategic Direction

The overarching 5G policy and strategic direction for South Korea and Germany is export-oriented. Specifically, South Korea considers 5G as the generation technology for its high-tech export industry. Its government policy and corresponding regulatory stance are therefore geared towards making it a global 5G powerhouse. Germany has a similar stance with the additional objective of including and developing the 5G related software or application export markets.

5.1.2 Regulatory Environment

In spectrum allocation, South Korea auctioned not only mid-band frequencies (3.4-3.8 GHz) but also a sizable bandwidth of frequencies in the high-band range (26-28 GHz) in managed auctions among three Mobile Network Operators (MNOs). Korea also gave the operators a fairly brief term for spectrum license with 10-year durations for mid-bands and 5 years for the high-bands. Germany has similarly auctioned a large amount of mid-band frequencies (480 MHz) to four operators but given a longer license duration of 20 years. Its regulators were however criticized by MNOs for a lack of effective consultation with the industry, an inflated auction price, and an onerous imposition of coverage targets.

5.1.3 Deployment Objectives and Targets

Country	Strategic Positioning and Guiding principles	Key Targets	Regulatory Interventions
Switzerland	Taking advantage of the digital developments to improve the wellbeing of inhabitants. Developing its Strengths as an innovative and cosmopolitan national economy. Creating the basic condition for innovation and digital business models in such a way that value creation, economic growth and prosperity can be achieved in the best possible way.	**N/A**	Strengthen the fundamentals underlying Digital transformation, including education and research, infrastructure and cyber security, public participation and digital government. Development of new business models and innovative capacity, data and analytics and international collaboration.
Singapore	Being at the forefront of the 5G developments Ensure a thriving 5G ecosystem Having at least two operators for 5G networks.	The coverage of 5G SA networks will exceed >50% of population within 24 months from the obtaining of the 3.5 GHz spectrum. Ensure the mmWave spectrum will be in use within 12 months from its assignment.	Deepen the links with industry especially via consultation Embrace the whole of government approach to facilitating 5G deployments support 5G trials in the enterprise segment to leverage Singapore's existing strengths.

5G Policy and Strategies - Switzerland & Singapore, *Source Forge & Vu 2020*

5.2.1 Policy and Strategic Direction

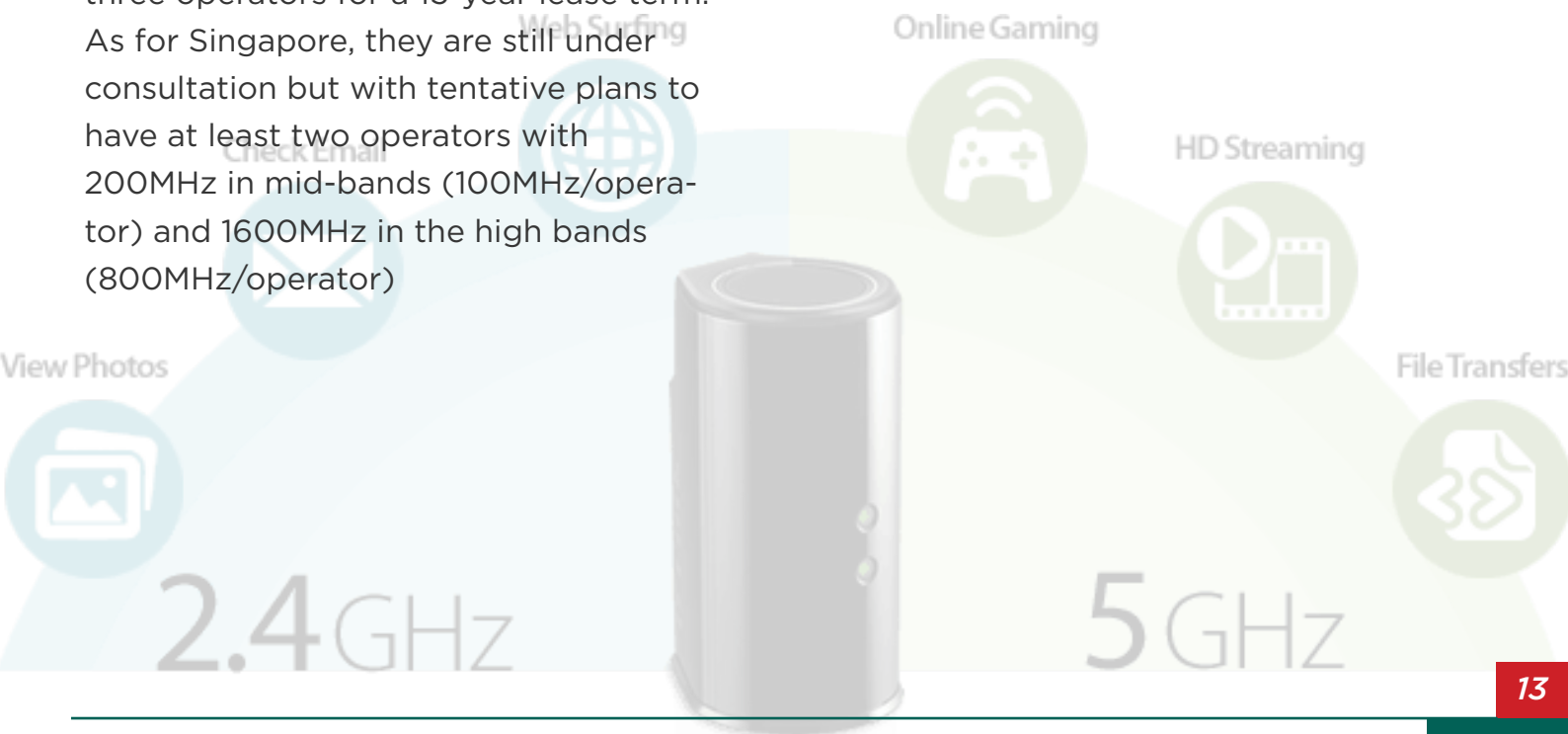
[Forge and Vu, 2020] further found that Switzerland's main focus is embracing 5G opportunities to improve the well-being of its inhabitants and the prosperity of its economy, with a special focus on promoting innovation capacity and new business models. On the other hand, the Singapore government's vision is to be at the forefront of the 5G developments and to thrive with 5G, with an aim to embracing 5G to leverage Singapore's existing strengths in logistics, healthcare, advanced manufacturing, and tourism.

5.2.2 Regulatory Environment

Switzerland is among the few countries that have auctioned not only mid-band frequencies but also the low-band to its three operators for a 15-year lease term. As for Singapore, they are still under consultation but with tentative plans to have at least two operators with 200MHz in mid-bands (100MHz/operator) and 1600MHz in the high bands (800MHz/operator)

5.2.3 Deployment Objectives and Targets

Singapore expects that its mobile network operators will have provided 5G signals to over 50% of its population within the first 24 months of obtaining the 3.5 GHz spectrum and that the high-band mmWave spectrum will be in use within 12 months of its assignment. Switzerland is one of the few countries that opted not to give hard deployment targets to its MNOs and instead puts emphasis on strengthening the fundamentals underlying digital transformation, including education and research, infrastructure and cybersecurity, and public participation.



06 5G State of Play A Kenyan Perspective

Whereas Kenya has not yet developed its 5G policy and strategy, several strategic documents do touch on emerging technologies and how they would be integrated into the socio-economic fabric of the nation.
These include but not limited to the Kenya Digital Economy Blueprint (2019) [Min of ICT, 2019a], the National Broadband Strategy of (2018) [Min of ICT, 2019b], the Draft National Spectrum Policy (2020) [Min of ICT, 2020b] and the Communication Authority Quarterly Sector Statistics(Q4, 2019/2020)[Min of ICT, 2020a] and the national ICT Policy (2019)Min of ICT, 2020c].
Our understanding of the Kenyan state of play, from a 5G perspective is taken from these and other sources and discussed within a SWOT context in the next sections.

6.1 Strength

Apart from the above policy and strategic documents, Kenya has had a comprehensive legislative and regulatory framework that includes Cybercrime, Data Protection, Electronic Transactions amongst other laws that promotes the digital economy. This has led to a favorable and predictive investment climate that has seen a robust ICT sector whose central thrust revolves around the rapid development of its mobile services that include voice, data, and mobile money services.

Apart from the above policy and strategic documents, Kenya has had a comprehensive legislative and regulatory framework that includes Cybercrime, Data Protection, Electronic Transactions amongst other laws that promotes the digital economy. This has led to a favorable and predictive investment climate that has seen a robust ICT sector whose central thrust revolves around the rapid development of its mobile services that include voice, data, and mobile money services.

6.2 Weakness/Challenges

However, 5G technologies require much more investments and their use cases expect a much more advanced digital economy and community of users without which most operators seem to hesitate to take the investment risks. [*Forge and Vu, 2020*] identified some challenges common in developing countries that may hinder the faster uptake of 5G Technologies. These include but not limited to:-

- Weaker governance institutions
- Sparser & poor technical infrastructure
- Lower-skilled workforce
- Lower capital availability, investment levels, and savings
- Lower labor and capital productivity
- Unemployment and Minimal disposable incomes of citizens
- Significant informal economy and non-monetary economy

Kenya as a developing country does share most of the above realities that present challenges to 5G deployments and uptake. The National Broadband Strategy (2018) [Min of ICT, 2019b] did also acknowledge these challenges under its broadband gaps section.

6.3 Opportunities

Despite the identified weaknesses, Kenya can explore how to use the 5G technologies to intervene or resolve some of the weaknesses. For example, the use of smart metering (IoT) in agriculture could improve productivity and food security, while the use of enhanced mobile broadband for training or educational purpose may address the gaps of the low-skilled workforce. The idea is to have 5G policies, strategies, and technologies that are cognizance of the challenges. That way one ensures that the 5G investments have a higher chance of success in terms of execution, deployment, and sustainability.

6.4 Threats

The biggest threat facing Kenya and other emerging economies are that 5G gives developed nations another leverage to extend their economic dominance with exponential proportions. Each new wireless generation has given enterprises worldwide opportunities to introduce new products and services, optimize operations, and boost productivity to drive growth. 5G technologies are at the heart of the 4IR where Cloud, AI, IoT, and other new technologies converge to drive new growth potential. Not having a 5G Strategy and policy puts Kenya in a very disadvantaged position in terms of its ability to effectively participate and benefit from the new digital order.

07 | The Kenyan Policy, Regulatory & Deployment Options

Having reviewed global trends and done the SWOT Analysis we now suggest possible 5G options for Kenya. The key lesson from the global 5G pioneers is that their policy and regulatory stance is derived and aligned to their national 5G strategic objectives. Specifically, the overarching strategic decision revolves around determining which stage in the 5G value chain does Kenya intends to play. Does Kenya want to be a producer or consumer of the 5G Technologies?

7.1 Strategic and Policy Options

Considering our relatively weaker R&D capabilities, particularly in the high-tech industries, Kenya's stance cannot be one of being a producer of 5G technologies at this point. We however propose that Kenyan adopts the Singapore and Switzerland strategy that starts off as consumers of 5G technologies but with the long-term objective of being software producers in their niche markets such as tourism or agriculture.

7.2 Regulatory Options

The [*Min of ICT, 2020b*] Draft National Spectrum (2020) policy rightly states that the convergence among telecommunications, media, and computing is breaking down the traditional association of spectrum to specific applications, such as the distinction between broadcasting and telecommunications spectrum, and is changing the demand for spectrum among services, such as between fixed and mobile voice communication. This has resulted in major technical and economic inefficiencies, the excessive regulatory burden on all parties, and obstacles to technological innovation.

7.2.1 Spectrum Re-farming

To address these challenges, the proposed policy rightly recommends the releasing of spectrum held back by the regulatory authorities, allowing greater flexibility of spectrum use, separating spectrum and operating authorizations, reallocating spectrum to improve current use. Frequencies, particularly in the high premium lower bands (less than 1GHz) will need to re-farmed and put to better use in line with the proposed spectrum policy.

7.2.2 Affordable Spectrum Auctions

Additionally, as stated by the Kenya Digital Economy Blueprint (2018), the regulator should avoid high auction prices since this can limit successful bidders' ability to make the capital investments that are necessary to put their newly acquired purchases to use, turning a scarce resource into a wasted one.

7.2.3 Shared Spectrum

Furthermore, a shared spectrum space may be cheaper to deploy and provide test-platforms for non-core mobile operators wishing to venture into the 5G software application space. Since the Kenyan regulator is yet to publish their 5G Spectrum plans and regulations, it may be useful to put these issues into consideration as a way of providing incentives for potential 5G investors and other actors

7.3 Deployment Objectives and Targets

Since no operator has so far been licensed to offer 5G services it is a good time to discuss the available deployment license conditions. Assuming our 5G strategy is one of being initially consumers, with the hope of being producers later, it may be advisable to offer long-term spectrum leases (15-20yrs) within the lower and mid-band frequencies. Additionally, it may be advisable to avoid giving aggressive penetration targets as has been the case historically, because the focus would be on incubating and maturing 5G applications for the Kenyan niche markets.

08 Recommendations & Way Forward

In light of global trends, the Kenyan situational analysis, and suggested policy and regulatory options for Kenya, we summarise the following as the proposed strategic policy recommendations for consideration.

8.1 Strategic Policy Recommendation 1 -5G Advisory Working Group

The government should institute a multistakeholder 5G Advisory Working Group with membership from policy (NCS), regulators (CA) mobile operators, academia (CS/IT/Eng), private sector, civil society, media amongst others. Their task will be to promote and develop amongst others: 5G National Strategy, 5G Testbed, 5G Application Development.

8.2 Strategic Policy Recommendation 2 -Harmonized 5G Spectrum Plans

The regulator should consider urgently publishing their 5G Spectrum Roadmap with input from stakeholders and in light of the recommended ITU WRC 2019. Most of Europe has adopted the following pioneer **5G bands:-**

- 700 MHz band for sub 1 GHz spectrum; (low-band frequency)
- 3.6 GHz band for spectrum between 1 GHz and 6 GHz; and (mid-band frequency)
- 26 GHz band for above 6 GHz spectrum. (high-band frequency)

8.3 Strategic Policy Recommendation 3 -Affordable 5G Auction Prices

The government and regulator should avoid inflating 5G spectrum prices (e.g. through excessive reserve prices or annual fees) as they risk limiting network investment and driving up the cost of services.

8.4 Strategic Policy Recommendation 4 -Shared 5G Spectrum and/or Infrastructure

If by end of 2021 no operator has shown interest in the 5G Auction, then government and regulator should consider having a single shared 5G spectrum or even network among operators of all types, rather than having infrastructure competition. This will reduce the individual operator investment risk and provide a faster, more complete roll-out with higher quality.

8.5 Strategic Policy Recommendation 5 -Common Wayleave Agreements

5G deployments will happen a lot on urban infrastructure such as electric poles, road furniture, common ducts amongst others.

The national government and regulator should consider publishing standardized Wayleave agreements that apply across all the 47 Counties.

09 Conclusions

This study reviewed the 5G Agenda for the case of Kenya. It found that whereas Kenya has a robust ICT policy, legal and regulatory framework, it is yet to have a 5G specific strategy and its related policy. The study contributes to creating awareness and setting the stage for a robust 5G Strategy and policy conversation. It is not designed to be prescriptive but rather proposes and highlights key discussion points that would form a working-paper for those who will eventually come up with the 5G Strategy and Policy for Kenya.

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