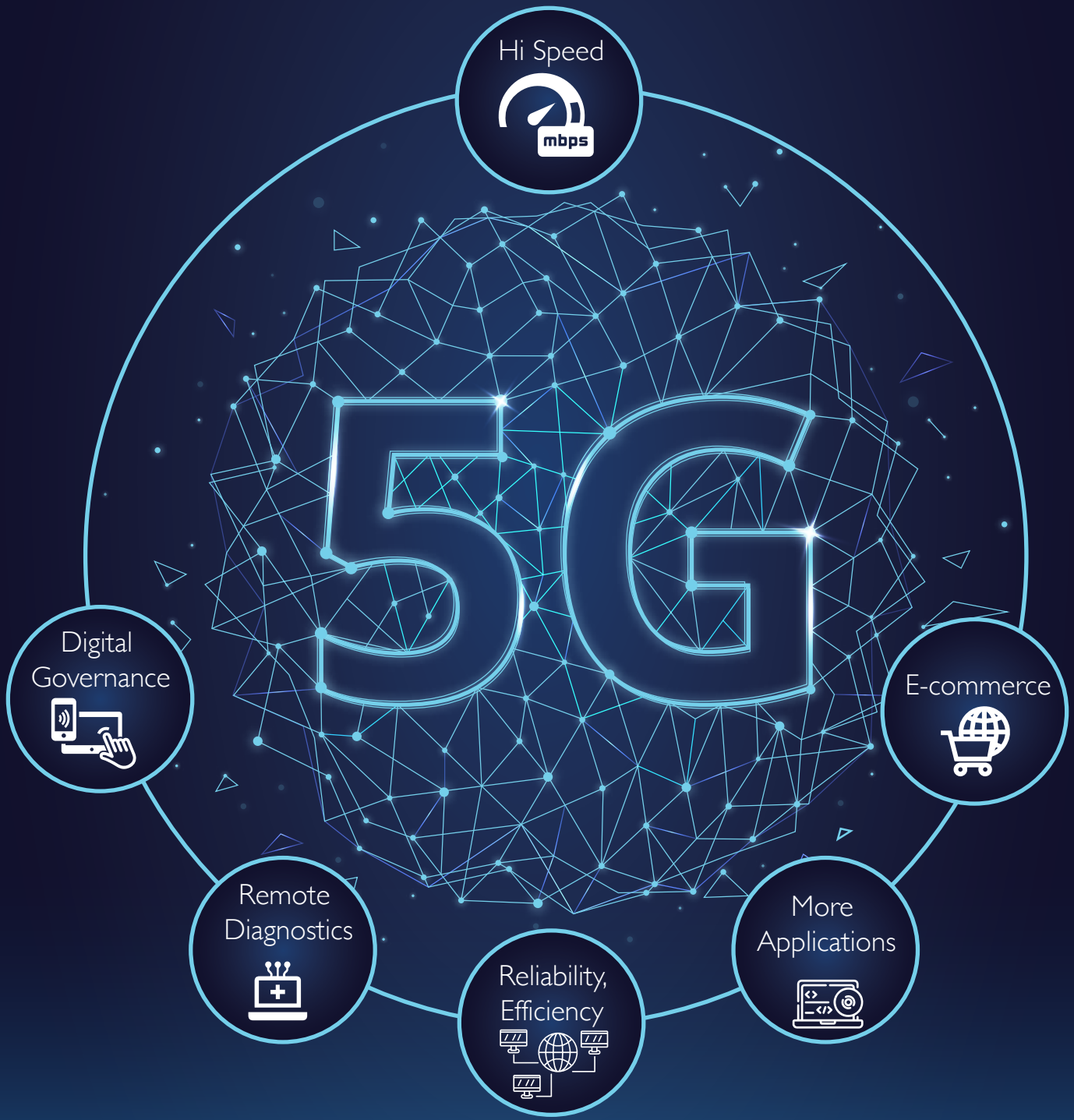
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THE Regulator

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Quarterly magazine of the Tanzania Communications Regulatory Authority



5G is here!

TANZANIA COMMUNICATIONS REGULATORY AUTHORITY

ISO 9001:2015 CERTIFIED

Consumer Education series (1)
Extracts from the Electronic and Postal Communications Act (EPOCA)

Duty to report theft, loss of mobile telephone or SIM card

Section 100
Where a mobile telephone or detachable SIM card is lost, destroyed or stolen, the owner of that equipment or detachable SIM card shall report such loss, theft or destruction in person or through a person duly authorized by him to police and to the application service licensee or to whose network the owner subscribed.

Section 128
Any person who fails to report the loss, theft or destruction of a mobile telephone or SIM card commits an offence.

Any person who commits an offence under this section shall on conviction be liable to a fine of three hundred thousand but not more than five hundred thousand Tanzanian shillings or to imprisonment for a term of six months or to both.

Tampering with mobile telephones and SIM card

Section 129
Any person who, intentionally and unlawfully in any manner (a) tempers, modifies, alters, reconfigures or interferes with mobile telephone or SIM card or any part thereof; and (b) reverse engineers, decompiles, disassembles or interferes with mobile telephone or SIM card, or any part thereof, commits an offence and shall be liable on conviction to a fine of thirty million Tanzanian shillings

Using or causing the use of unregistered SIM card

Section131
Any person who knowingly uses or causes to be used an unregistered SIM card commits an offence and shall be liable on conviction to a fine not exceeding five hundred thousand Tanzanian shillings or imprisonment for a term not exceeding three months.

Penalty for transmission of obscene communication

Section118.
Any person who- (a) by means of any network facilities, network services, applications services or content services, knowingly makes, creates, or solicits or initiates the transmission of any comment, request, suggestion or other communication which is obscene, indecent, false, menacing or offensive in character with intent to annoy, abuse, threaten or harass another person; (b) initiates a communication using any applications services, whether continuously, repeatedly or otherwise, during which communication may or may not ensue, with or without disclosing his identity and with intent to annoy, abuse, threatens or harass any person at any number or electronic address …. commits an offence and shall, on conviction, be liable to a fine not less than five million Tanzanian shillings or to imprisonment for a term not less than twelve months, or to both and shall also be liable to fine of seven hundred and fifty thousand Tanzanian shillings for every day during which the offence is continued after conviction.

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The Regulator is published quarterly by the Tanzania Communications Regulatory Authority (TCRA). The Authority's functions and duties include enhancing public knowledge, awareness and understanding of the regulated goods and services, and disseminating information about matters relevant to its functions.

TCRA is an independent Government agency established under the Tanzania Communications Regulatory Authority Act No. 12 of 2003 to regulate electronic and postal communications in Tanzania.

Specifically, the Authority is responsible for enhancing the welfare of Tanzanians through:

- Promoting effective competition, economic efficiency
- Protecting consumers
- Promoting the availability of regulated services
- Licensing and enforcing licence conditions of broadcasting, postal and telecommunications operators
- Establishing standards for regulated goods and services
- Regulating rates and charges (tariffs)
- Managing the radio frequency spectrum
- Monitoring the performance of the regulated sectors
- Monitoring the implementation of ICT applications.

TCRA has offices in Zanzibar and in five zones - Northern (Arusha), Lake (Mwanza), Central (Dodoma), Southern Highlands (Mbeya) and Eastern (Dar es Salaam).

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COVER PHOTOGRAPH

The fifth generation wireless technology for digital cellular networks - 5G will be faster, more efficient and reliable.

It will enable the introduction of new applications and adoption of emerging technologies such as the internet of things and (IoT) and artificial intelligence.



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Letter from the Editor

New technologies, closing the digital divide

Our coverage in this edition include the arrival of the much anticipated fifth generation of mobile communications technology, which is faster, more efficient and reliable than ever before. Five G (5G) will give a big push to Tanzania's agenda for a digital economy.

We also report on the outcome of the 2022 edition of the quadrennial World Telecommunications Development Conference (WTDC) held in Kigali, Rwanda and the proposed strategies to close the differences in coverage, access and applications of information and communications technologies within countries.

We have a commentary on the need for enhanced consumer consumer awareness and education on digital mobile money services; specifically addressing issues of safety and security and customer care in such multi-player service.

Five G will give a big push to Tanzania's agenda for a digital economy by the end of this decade. It can be used on any digital device that requires an internet connection to access digital technologies.

This technology employs higher frequency waves than previous mobile networks. Its higher bandwidth will simultaneously connect multiple users and devices to the internet.

The major elements of a digital economy - internet access, machine learning and data and electronic applications across the economy will be facilitated by 5G. These include services such as smart health applications, agriculture, mining, manufacturing, financial services and distant education and virtual meetings.

Vodacom Tanzania, one of the licenced mobile network operators recently launched products based on 5G. They demonstrated the power of high resolution Virtual Reality, with the Minister for Information, Communications and Information Technology, Hon. Nape M. Nnauye addressing participants via hologram.

The company's 5G services will be on a limited scale; with services initially through fixed wireless data networks.

Cellular technologies have been classified by their capabilities and data speeds. The first generation (1G) was analogue and could only enable voice communication.

The second generation (2G), a digital standard ensuring better quality voice calls and short messages (SMS) was launched in 1993. It could transfer data at the speed of 5 kilobytes a second.

Three G is 30 times faster than 2G and was launched in 2001. Third generation (3G) combines aspects of the 2G network with new technologies. It enables users to send and receive large emails.

This is the dominant technology in Tanzania. According to GSMA, an international institution representing, the interests of mobile operators worldwide, 3G will remain Africa's most dominant technology in the region for at least the next seven years, and will account for 60 percent of Sub-Sahara Africa's connections by the end of 2025.

The fourth generation has two standards - 4G and 4G LTE, the short form of 'long term evolution'. 4G supports voice, interactive multimedia, video,high-definition mobile TV, video conferencing and much more. LTE is capable of delivering a very fast and secure internet connection.

Call for articles

THE Editor invites articles and other contributions, including comments in all areas of electronic and postal communications and related fields. Material should be in font size 12 Times New Roman, single-spaced, up to four A4 pages. Photographs should be in JPEG format. Articles must be original and should have references, where sources are quoted. Contributions should be submitted to the Editor, Regulator Magazine, Tanzania Communications Regulatory Authority, Mawasiliano Towers, 20 Sam Nujoma Road, P.O. Box 474, Postcode 14414 Dar es Salaam. Email: regulator.magazine@tcra.go.tz.

We pay a reasonable honorarium for published contributions.

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Tanzania's sound infrastructure, policies highlight readiness for more ICT investments

Tanzania is currently implementing programmes to mainstream information and communications technologies in all sectors of the economy, as an enabler and tool of socio-economic development. The objective is to develop a digital economy in the country within this decade. Coincidentally most of the strategies in the Digital Tanzania drive involve cooperation with Tanzania's neighbouring countries.

The country is bordered by eight countries – Democratic Republic of Congo, Kenya, Uganda, Rwanda, Burundi, Zambia, Malawi and Mozambique on the African continent mainland and the Indian Ocean islands of Mauritius, Comoro and Madagascar. It works with these countries through many multilateral arrangements.

Tanzania has become the hub of international transit traffic through its national ICT fibre optic cable network which is being expanded to reach more neighbouring countries.

The cable is connected to three international submarine cables that have landed on the eastern coast; namely Eastern Africa Submarine System (EASSy), SEACOM and Seychelles to East Africa System (SEAS). A fourth submarine cable known as '2Africa', is expected to be operational by 2024.

Policy, legal and regulatory framework

The country's sound ICT and postal sector policies, reliable and stable, forward-looking and predictable regulatory framework, supportive infrastructure and compliance with international communications standards make it an ideal investment destination.

Additionally, the country is second in Africa for its commitment to cybersecurity, according to the 2020 Global Cybersecurity Index published by the International Telecommunication Union in 2021.

The achievement is attributed to Tanzania's cyber security strategies, including having a Computer Emergency Response Team (CERT). Cooperation with international and regional communications institutions has also contributed to this performance.

Tanzania's framework for licencing service providers in the communications sector has four categories, all with national and international market segments. These are for the development of network facilities, for provision of services using own or other investors' networks, application services and content – broadcasting.

It is designed to ensure regulatory flexibility, address market and technology developments and efficient utilization of network resources including numbering resources and spectrum and encourage the entry of new operators into the market.

Data protection and privacy are paramount in the country's digital programmes. Tanzania is finalizing the process of enacting data protection and privacy law as part of protecting consumers and enhancing investor confidence.

Spectrum Auction and 5G technology

As part of managing spectrum, TCRA has identified blocks of spectrum in the 700 MHz, 2300 MHz, 2600 MHz and 3500 MHz bands for assignment through an auction this year. A roadmap has been developed, including the publication of a public consultation document and timelines for each activity.

The auctioned spectrum will accelerate Tanzania's move to deploy 5G technology by 2025. This will greatly increase data speeds, thus meeting the demands for better and faster communication.

New licence categories have been introduced for internet exchange points to encourage their use to reduce the international transit of local internet traffic.

The Digital Tanzania Programme will create more opportunities for investments in ICT and the postal services value chain. One example is in areas that support electronic commerce.

Tanzania wants to become the region's hub for the latter. TCRA has introduced a licence category for electronic commerce.

UPDATE

Renewed drive to digitize Africa

Differences in coverage, access and applications of information and communications technologies have remained permanent agendas in international policy, oversight and operational meetings partly due to the very nature of the technology.

Even the latest such meeting- the World Telecommunication Development Conference (WTDC), in Kigali, Rwanda in June 2022 focused on action to bridge the five main differences or divides in ICT coverage and uptake in a respective country. These are classified in terms of income, geography, gender, generation and education.

Countries experience differences in usage due to income disparities. For example, internet usage is lower in rural areas compared with towns. The International Telecommunication Union (ITU), the United Nations specialized agency on ICT says urban internet users are double those in rural areas.

"One-third of the world remains offline, and the majority are women in developing countries", the WTDC final report noted.

Although internet penetration averages 50 per cent in Tanzania, most users are in urban areas. The July 2022 statistics by the Tanzania Communications Regulatory Authority show at least 20 per cent of owners of the 56,137,000 SIM cards registered nationwide are in the mainly cosmopolitan Dar es Salaam region.

Studies have also shown that fewer women access ICTs, compared to men and 72 per cent of people aged between 15 and 24 use the internet compared to older generations. Internet use rates are also higher for those with more education.

WTDCs are held every four years. The Kigali conference, held under the theme: Connecting the unconnected to achieve sustainable development, adopted a declaration and an action plan aimed at addressing these divides to ensure meaningful internet connections to more users.

The Kigali Declaration and Action Plan emphasized partnerships and resource mobilization to implement projects in specific priority areas.

The conference resolved to assist African ITU member states to promote the deployment of broadband infrastructures so they can leverage the full benefits of high-speed and high-quality connectivity and the impact of emerging technologies.

"Africa should be assisted to reap the full benefits of digital transformation by addressing the existing policy and regulatory challenges and formulating strategies to encourage the development and use of digital technologies in various sectors of the economy and foster innovation", the WTDC report says.

Member countries presented their priorities at the conference.



Permanent Secretary, Ministry of Information, Communications and Information Technology, Dr. Dkt. Jim Yonazi (right), TCRA Director General Dr. Jabiri K. Bakari and the Authority's Director Industry Affairs Dr. Emmanuel Manasseh at the recent World Telecommunication Development Conference (WTDC) in Kigali, Rwanda.

Targeting 5G deployment, rural connectivity

Tanzania has outlined its priority areas in the ICT sector between now and 2025, including providing ICT services to 718 currently unconnected villages and harnessing the potential of 5G technology.

The Minister for Information, Communication and Information Technology, Hon. Nape M. Nnauye to the June 2022 World Telecommunications Development Conference (WTDC) in Kigali, Rwanda, that the government will promote the creation of more financial technologies startups to improve service delivery and value creation in mobile money.

The Minister outlined action to improve digital skills among the citizens, create more jobs in ICT, expand the national broadband backbone (NICTBB) network, and ensure that individuals and businesses have physical addresses by the end of this year.

The strategy for the deployment of 5G, the fifth generation of mobile networks with an extremely high speed, includes allocating the related spectrum to operators for rollout.

The objective is to reap the benefits of this technology and foster the adoption of emerging technologies, including the internet of things(IoT), Cloud Computing, Artificial intelligence and machine-to-machine (M2M), he said.

The availability of local content will be encouraged to promote internet usage among all Tanzanians, which has been growing fast and with a countrywide penetration of 50 per cent.

"The government will also ensure the sustainability of the implemented Internet Exchange Points (IXPs) in the country to facilitate the increase of online local content creators from 500 to 2,000 by 2025", the Minister said.

The deployment of 3G and 4G services in all major townships has facilitated internet access, including broadband services, he noted.

The government is committed to expanding network infrastructures and services to reach 80 per cent of broadband internet users by 2025.

"This is planned to include the extension of 3G and 4G network coverage to the people living in remote, unserved and underserved areas through upgrading existing 2G networks to 3G, and 4G networks and facilitating the deployment of affordable emerging technologies to enable usage of broadband internet services".

Tanzania waived value-added tax on smartphones and mobile internet-enabled devices, including tablets and modems, in 2021 to reduce their costs and enable the penetration of broadband services in the country.

The NICTBB network will be expanded to connect all regional and district centres and all bordering countries and fulfil Tanzania's aim of achieving 80 per cent of access to broadband connectivity by 2025.

The NICTBB is connected to three international submarine cables that have landed on the eastern coast; namely Eastern Africa Submarine System (EASSy), SEACOM and Seychelles to East Africa System (SEAS).

The Minister disclosed that the landing of the fourth submarine cable namely 2Africa is underway and expected to be operational by 2024.

Hon. Nnauye said mobile financial services and the financial technologies ecosystem in the country have been growing fast; with more than 12 million mobile money transactions per day.

The government is committed to ensuring that network connectivity and access to digital financial services are improved and secured, thus enabling digital transformation and financial inclusion for all.

He explained that Tanzania is ranked 88th in the 2020 Global Innovation Index. "This creates opportunities for financial technology start-ups and a significant number of jobs for many Tanzanians including those living in rural areas", he said.

"To this end, the government is committed to improving the regulatory framework, in particular, to promote and enable the creation of more financial technologies startups to improve service delivery and value creation", he added.

The other priority areas in the report are the establishment of a Digital Skills and Professional Development Centre by 2025 for developing digital literacy and advanced digital skills.

Five (5) digital innovation centres for promoting digital innovation and entrepreneurship for youths

will be established by 2025.

The country is implementing the 'Digital Tanzania Project' to promote digital development as a key enabler of economic growth and transformation, job creation and service delivery.

"The government is committed to establishing and ensuring the sustainability of more than 490 ICT Clubs by 2025 in Colleges, Universities and other training institutions to increase digital skills, create a knowledge-based society and achieve community involvement in meaningful use of ICT services", the Minister said.

He added that this arrangement complements the ongoing community empowerment programs by the Tanzania Communications Regulatory Authority (TCRA) and TCRA Consumer Consultative Council (TCRA CCC).

According to the Minister, more than 30 million US$ will be spent to provide subsidies to telecommunication operators to expand their infrastructures in rural, unserved and underserved areas characterized by difficult terrain coupled with unreliable or unavailable sources of commercial power.

Tanzania has developed programmes and strategies to ensure that special groups are included in the ongoing digital transformation. The involvement of girls and disadvantaged groups in the digital transformation will also be promoted.

"The government continues to ensure that marginalized groups, people with special needs, young women and girls benefit from the ICT services. ICT packs comprising of computers and internet connectivity are provided to selected schools for girls and groups with special needs", he further explained.

The communications sector in Tanzania has grown exponentially over the last five years. There are more than 55 million mobile phone subscriptions and the penetration of telecommunication networks has reached 90 per cent.

World Telecommunications Development Conferences are held every four years. They are organized by the International Telecommunication Union (ITU).

Tanzania leads EA in quality data services, lower tariffs

There media in a neighbouring country has lately been disseminating false and misleading information on the quality and cost of data in East Africa, claiming Tanzania and the Democratic Republic of Congo have low quality and high prices for the availability of data services, which is not only false but also misleading information.

In reality, studies by global organisations like the largest network in the world (www.cable.co.uk),(www.visual.capitalist) and (www.allafrica.com) September, 2022 have reported that Tanzania is the first country in East Africa to be the best quality and the lowest cost of internet, according to worldwide mobile data pricing.

One could debate, for whose benefit are some of the Kenyan media disseminating this fabricated, false information.

No other country in the East African region has greater quality data services and lower costs than Tanzania.

The Worldwide Mobile Data Pricing Report for 2021/22, reveals that Tanzania is the cheapest in East Africa as Somalia is no longer offering the most affordable mobile internet in Africa, moving to third, as Sudan and Algeria take the first and second places respectively.

"In Sudan, the cost of mobile internet is $0.27, cheapest in Africa and fifth in the world. Algeria is second at $0.51 and Somalia third at $0.60. Tanzania has the cheapest data in East Africa at $0.75 for every gigabyte of data," says the survey.

The data collected and analysed by the British firm between December 8, 2020 and February 25, 2021 shows that Tanzania is followed by Rwanda at $1.25, Uganda ($1.56) and Burundi ($2.10) while Kenya, which was second in East Africa last year charging $1.04, now charges $2.25 per gigabyte (GB).

Dan Howdle, a Consumer Telecoms Analyst at Cable was quoted recently by the Daily Monitor saying that many countries with cheap data have excellent mobile and fixed broadband infrastructure, enabling service providers to offer a large amounts of data, and bring down price per gigabyte.

Tanzania has installed some of the state-of-the art and most efficient communication infrastructures that are enabler to its leading in providing best quality and lowest data charges, contrary to the false, unfounded and misleading information fabricated by some of the foreign media.

Bridging connectivity gaps



Faster action to ensure universal communications within countries has been underlined by the Broadband Commission and the 2022 Global Connectivity Report.

At its meeting in Kigali, Rwanda in June, the Broadband Commission for Sustainable Development outlined steps for accelerating progress towards universal meaningful access to digital networks and services.

Commissioners urged countries to introduce programmes to raise digital and media literacy skills to promote accessibility and adoption of emerging technologies.

The Commission was founded in 2010 by the International Telecommunication Union (ITU) and the United Nations Education, Scientific and Cultural Organization (UNESCO) to promote the global expansion of broadband access.

It is jointly chaired by its co-founders, Rwanda President Paul Kagame and Mexican businessman and a prominent philanthropist, Carlos Slim Helu.

The ITU 2022 Global Connectivity report outlines strategies to overcome barriers to universal service, including funding options and how to overcome affordability barriers. It calls for 'effective and large scale programmes to overcome digital illiteracy, and close the usage divide. Digital literacy should be part of school curricula. A sub-section of the report, on what governments can do to improve affordability, is produced below.

Governments can resort to direct and indirect policy interventions to reduce the price of telecommunication services. Policies stimulating competition in the retail market are important indirect measures. There is a range of options for more direct measures.

Governments may choose to condition regulatory approval on the availability of low-priced plans or services targeting specific regions or segments of society.

A State-owned service provider, in countries where it exists, can directly assume the responsibility for delivering affordable access. The availability of free or low-priced services at public-access locations can help lower telecommunication prices.

This may be achieved by governments negotiating with

BROADBAND COMMISSION
FOR SUSTAINABLE DEVELOPMENT
ITU UNESCO

operators on the provision of such services in exchange for licenses or directly funding free public access (e.g. Wi-Fi hotspots in libraries, schools, hospitals, and other public administration facilities).

Businesses can also assume the cost of providing such services, capitalizing on opportunities to advertise services and gain market share. Subsidizing service usage or access to devices (through, for instance, tax refunds or cash transfers) can further help lower the relative costs for a target population.

Many of these policy interventions may build on the shared interest of governments and telecommunication operators in having affordable prices that enable the expansion of the subscriber base. The challenge is curbing retail prices in selected or all market segments without restraining investments.

Successful interventions depend on, among others, local market conditions and dynamics, and are typically part of more comprehensive broadband strategies.

Tanzania ready for 5G

It has been observed that following the initial development of the first and second generations of mobile communications, every 10 years witness the entry of a new generation. The industry is now in its fifth, also known as 5G, and expected to transform mobile communications in many aspects, including deployment, usage and quality. As Tanzania readies for the 5G experience, TCRA Director-General, Dr. Jabiri K. Bakari (PhD) discusses the impact of this technology on many sectors in Tanzania



What is 5G and why is it drawing a lot of excitement?

5G is the fifth generation of cellular technology. Cellular technology has evolved from 1G (which was pure analogue, providing voice services only), 2G which was digital providing voice and SMS service only, 3G proving voice, SMS, data (internet) and video streaming service, 4G providing high-speed internet service, data, SMS. 5G is the technology standard for broadband cellular networks, which began to be deployed in 2019.

The 5G standard is defined by ITU as IMT-2020. It is designed to increase speed, reduce latency, increased connectivity and improve the flexibility of wireless services. 5G/IMT-2020 will power substantial improvements to wireless broadband networks, going beyond a faster version of 4G to enable a new kind of network, supporting a vast diversity of devices with unprecedented scale, speed, and complexity.

The introduction of 5G/IMT-2020 will not only help to meet current market demands, but will also bring the potential to connect new industries and devices, empower new services, open up new business models, and bring new levels of cost savings and energy efficiency.

The full deployment of 5G/IMT-2020 can power applications across the economy and society — in our homes, communities, and businesses, and across industries, like transportation, manufacturing, agriculture, and healthcare.

Mobile technologies standardization bodies (i.e. ITU (International Telecommunication Union), 3GPP (Third Generation Partnership Project), ETSI (European Telecommunications Standards Institute) etc.) have identified several potential use cases or applications for 5G networks, which are categorized into three usage scenarios. Some of them require high connection density, others low latency and others high speed. These usage scenarios are: -

i. Enhanced Mobile Broadband (eMBB) including use cases such as enhanced indoor and outdoor broadband, enterprise collaboration, and augmented and virtual reality.

ii. Massive Machine Type Communication (mMTC) including use cases such as Internet of Things (IoT), asset tracking, smart agriculture, smart cities, energy monitoring, smart home, wearables, and remote monitoring.

iii. Ultra-Reliable and Low Latency Communication (uRLLC) including use cases such as mission-critical autonomous car driving, smart grids, remote patient monitoring, telehealth, and industrial automation.

iv. Unlike other previous technologies, 5G will increase the speed at which data is transferred, improve response times and provide enough capacity for the millions of devices that will be connected. It will also pave the way for a wide range of innovative new technologies and services for different use cases.

This is why 5G is drawing a lot of excitement.

How will it's launching in Tanzania impact mobile communications in terms of; for example; broadband penetration, uses, accessibility, quality of service and innovation?

(a) Broadband penetration

Initially, 5G will have little contribution to broadband penetration as deployment is expected to start in major cities targeting corporate customers and vertical industries. Operators are more likely to start with use cases such as Fixed Wireless Access (FWA). For several years to come 4G will continue to play a big role in broadband penetration in most African countries for the mass market.

(b) Efficiency spectrum use

Radio Frequency Spectrum is a scarce resource which is like the bloodstream for wireless communication. Wireless technology effectiveness is measured in how it can efficiently utilize the radio spectrum. Spectral efficiency compares the maximum number of bits of information that can be put in one cycle of radio wave (hertz).

5G is more spectral efficient as compared to previous technologies. The spectral efficiency for 5G is twice as compared to 4G for example. This means with the same amount of spectrum 5G can pass more information as compared to previous technology hence high data speeds.

(c) Data speeds

5G promises more data speed as compared to 4G LTE. In ideal conditions i.e. all resources are assigned to a single Mobile Station and there is no bit error, the maximum achievable speed (peak data) is 20 Gb/s for downlink and 10 Gb/s for uplink. For normal conditions, the target downlink "user experienced data rate" is 100 Mb/s and the uplink speed is 50Mb/s. Achieving this speed depends on many factors including the transport network. To get optimal 5G, the base station has to be linked with the core network using an optic fibre network.

(d) Industrialization

All mission-critical applications such as industrial automation, autonomous driving, robotic surgery etc. require a highly responsive network nearly to real-time. Previous technology could not accommodate such kinds of applications because of latency (delay) in the network. One usage scenario for 5G is Ultra-Reliable and Low Latency Communication (uRLLC) to increase machine productivity in factories and conduct remote diagnosis and remote surgery.

It will also improve electricity distribution/ personnel protection, and manage traffic more efficiently in the areas of manufacturing, energy transmission, transportation and healthcare. 5G can provide a minimum latency of 1ms as compared to 4G which was able to provide minimum latency of 10ms. The low latency for 5G makes it suitable for many mission-critical applications.

(e) Agriculture

Transformation to smart (modern) agriculture requires the use of sensors to connect everything from irrigation systems to soil and animal production. These devices will allow farmers to better measure things on a day-to-day basis. Sensors will communicate moisture, fertilization and nutrition levels as well as report on current and predicted weather patterns to allow for improved crop management and livestock analysis. Monitoring livestock maturity and nutrition, again using sensors to connect and transmit data to a central hub and allow farmers to know exactly when livestock is ready for processing.

Connecting such a large number of devices requires a network that provides a very large connection density. 5G offer a use scenario known as massive machine type communication (mMTC) which allows connection of up to 1,000,000 devices per square kilometre compared to 100,000 devices per square kilometre offered by the 4G network.

With this use case scenario, a lot of applications that require remote sensors will be realized. 5G will see transformation in other sectors like wildlife management etc. as many animals can be connected and monitored.

(f) Service delivery

5G will enable newer services such as virtual and augmented reality, as well as higher speeds for existing services such as fixed wireless access (FWA). Some of the benefits include -entertainment (enhanced video (4K, 8K and formats like 360-degree video), live sports streaming, music and gaming (mobile and cloud), in-car entertainment and connectivity, and digital advertising).

Others are e-health (remote

surgery, remote consultations and monitoring), e-government (birth certificates, identification documents, tax services), e-agriculture (animal tracking, soil moisture monitoring and access to market prices), e-commerce (online shopping, access to stock exchanges, digital financial services) etc. 5G rewrites consumer expectations and provides reliability. A lower cost per bit will assist in making limitless mobile data more affordable for consumers.

(g) Businesses

5G provides opportunities for people and enterprises to transform their businesses. The increase in bandwidth, reliability, improved latency and speeds available with 5G will enable businesses to utilize the full capabilities of advanced data-driven technologies like IoT, artificial intelligence (AI) and machine learning.

One of the features of 5G is the concept of network slicing. Network slicing allows network providers to divide a single common network into multiple tailored virtual networks known as slices. These tailored networks offered by network operators will allow enterprise clients to ramp up digitalization efforts throughout their businesses. This will allow them to customize their services based on the specific needs of their businesses (education, health service, production industries, agricultural, mining services etc.).

(h) Range and quality of service

In 5G, new classes of users will take advantage of the infrastructure; for example humans (smartphone use cases), automotive (connected, autonomous driving, (vehicle-to-X), industry (smart manufacturing, private 5G networks), IoT, mMTC (Smart City, Connected Energy).

Each class will cause individual traffic patterns and has individual requirements for the network, i.e. a network optimized for human users may not deliver the best performance for cars or industry. Therefore, TCRA is in the process of reviewing the quality of service regulation to take into consideration requirements from different use cases.

(i) Social networking

Social networking generates huge amounts of data. As time goes on social media is hosting a range of content from pictures to long video clips. The longer it takes for a video to load, the more likely one will ignore the content. 5G will improve the download and upload speed and the way people interact on social media will change.

(j) Innovations - new applications

We are in a new era of all things 'smart' and 'connected' i.e. smart city, smart grid, smart water management system, smart transport, connected wildlife etc. This era is led by innovation. What enterprises and startups need today is the freedom to truly innovate and break new ground.

They need a space with the liberty to exchange ideas and collaborate to co-create future-ready solutions and deliver high impact, profitability, and superior customer experience. The arrival of 5G makes all of this possible and more because of its inherent nature of supporting massive connectivity and the possibility of using millimetre waves that provide high bandwidth.

Could you describe the envisaged consumer experience in terms of accessibility, usage, affordability, quality of service and migration/transition?

5G will initially be accessible to corporate customers and enterprises as most of the use cases are tailored or intended for them. The only use case that will target individual consumers is enhanced mobile broadband. In areas where 5G sites will be deployed to serve the mass market, we envisage high-speed internet and live streaming good quality services.

Deployment of sites to serve the mass market will depend on the availability of mobile handsets that support 5G. However, 4G will continue to provide broadband service in many areas of the country.

One of TCRA's roles is to ensure that consumers get affordable and quality services for all regulated goods and services, and this will be ensured in 5G as well.

Accessibility

5G will initially be accessible to corporate customers and enterprises as most of the use cases are tailored or intended for them. Other consumers will access the service as it mature and more use cases come into play, with more terminals in the market.

Usage

The only use case that will target individual consumers is enhanced mobile broadband.

The historic mission of 5G is to empower the industries and drive their digital transformation, hence corporate users and those from vertical industries on the application of massive machine type communication(mMTC) and critical mission applications will reap the full benefits of 5G usage.

Affordability

The affordability of 5G service is expected to be hardly affordable at the beginning, however, is envisaged to increase as the technology matures with more terminals in the market.

Migration/transition

5G will co-exist with other technologies for some time. TCRA is not planning to impose any migration or switching off the legacy networks (2G, 3G or 4G). This is left for the market to decide.

TCRA believes that letting the market decide is the best way of automatically phasing out legacy networks without impacting users

Please outline the national road map toward 5G. What are its key elements in terms of infrastructure deployment, spectrum, technology standards, the requisite guidelines, legal and regulatory issues

Infrastructure deployment

Infrastructure sharing (passive and active networks) will play a critical role in the uptake of 5G in the country. It will enable licensed operators to minimize both CAPEX and OPEX and fasten the deployment of 5G networks across the country and provide the needed services for different use cases

The requisite frequencies to support 5G

The availability of the radio frequency spectrum is important for the rollout of 5G networks. While some of the spectrum currently in use for 2G/3G/4G can be re-farmed for 5G, it is important to ensure sufficient spectrum is available to accommodate the rising demand for enhanced mobile broadband and new services.

In a bid to support the deployment and rollout of 5G, all the millimetre wave bands globally allocated for IMT-2020 in WRC-19 (World Radiocommunication conference of 2019) and other frequencies in the existing lower and mid-bands will be released for IMT services, mostly 5G at different stages based on the 5G ecosystem.

TCRA has reviewed the radio frequency band plan for IMT to facilitate the timely availability of sufficient spectrum for 5G and other technologies. TCRA is in the process of auctioning four (4) blocks of 1 x 40 MHz in the 3500 MHz band expected to be used for 5G.

Two (2) blocks of 1 x 35 MHz in the 2300 MHz band; Three (3) blocks of 2 x 15 MHz and one block of 1 x 20 MHz in the 2600 MHz band will also be auctioned.

The auction is expected to be conducted in October 2022 and the auction Information Memorandum (IM) has already been published for public consultation.

Technology standards, safety and security

TCRA has adopted the 5G standard as developed by standards bodies such as ITU and 3GPP. This is to ensure that the 5G networks deployed in the country meet globally-accepted interoperability and security requirements.

5G deployment will consist of many small cells that may raise public concern about exposure to EMF radiation. 5G service providers shall be required to ensure that their 5G networks are compliant with the guidelines issued by the International Committee for Non-Ionizing Radiation Protection (IC-NIRP) on limiting exposure to Electro Magnetic Field (EMF). TCRA shall enforce compliance through type approval tests and field EMF monitoring.

The evolving nature of connected services and the expected significant increase in the number and types of devices connected, increase the importance of cyber security, including the ability to detect threats, authenticate users and practice good operation.

5G provides better security by design with more enhanced security requirements based on network evolution and adapting learning from earlier technologies. Nevertheless, the advanced technology and use of new architectures and features such as network slicing, virtualisation and cloud computing will introduce new threats that require new types of controls to be implemented.

Following industry best practices and effective supply chain risk management practices limit vulnerabilities and ensure that the 5G ecosystem is secured.

TCRA is adopting approved international standards developed by ITU and other standard bodies to ensure interoperability and security of 5G mobile systems.

TCRA guidelines on IoT and M2M communications (5G and IoT applications)

5G is considered an enabler of the Internet of Things, helping it to become ubiquitous. On account of this, TCRA has prepared the

guidelines on the management of applications of machine-to-machine (M2M) communication and internet of things numbering resources.

The guideline aims to provide the procedures and requirements for providing the M2M communication services where the connectivity is through a mobile communication network, and where Sub-scriber Identity Module (SIM) and numbering resources are required. The parties to M2M communications are the M2M Service Providers (M2M SP), Network Operators and end users.

Legal and regulatory issues, including licensing and regulations

Tanzania has a licensing framework which is technological and service neutral, meaning that one does not need to apply for another license when to provide the same service using different technology.

Our framework is ready to accommodate 5G technology without a need for incumbent operators to apply for a new license.

Stakeholder engagement, (particularly public awareness)

To fully reap the 5G benefits, capability and services, end-users and businesses need to be informed of the 5G use cases and services. Therefore, TCRA will support the dissemination of relevant information to consumers on the benefits and capabilities of 5G, including the potential for access to high-speed connectivity, low latency, and massive device connections as well as the possibility for the different use cases for various sectors of the economy such as education, health care, manufacturing, and transportation.

TCRA will also provide regular updates on the results of RF-EMF radiation measurements taken from different parts of the country where 5G will be deployed to inform the public that they are safe.

TCRA will also consider awareness campaigns to prevent misinformation about 5G. Education will also be provided to consumers and will address digital literacy.

When will 5G be deployed in Tanzania?

The time when 5G will be deployed will depend much on the demand and use cases. However, it is expected that by the end of 2022 operators will start to deploy 5G sites in a few areas of major cities. Initial deployment will target corporate customers.

TCRA's role is to provide a conducive environment for faster uptake of the service. Our licensing framework does not tie radio frequency spectrum to a specific technology so licensees with spectrum can use some of their spectra to start providing 5G service.

The radio frequency spectrum auction in October 2022 is expected to add more spectrum for our licensee.

5G will widen the digital divide in terms of coverage, access, usage, affordability, device ownership and literacy. How will these be addressed?

Coverage

Consultations will be carried out with different stakeholders to address different barriers to infrastructure deployment and sharing considering that 5G will require a large number of towers/ infrastructure due to the nature of frequency used.

Access, usage and affordability

Access to the 5G services will depend on the availability and affordability of terminals or devices. The issue of availability will be resolved as technology gets matured and the issue of affordability by considering tax relief on imported 5G-enabled mobile phones

What is the status of the TCRA-managed sandbox programme? Have there been any breakthroughs in tests, trials, or pilots?

TCRA, in collaboration with the Tanzania Commission for Science and Technology (COSTECH) came up with a framework to support innovation in digital services by ensuring innovators can access communications resources such as spectrum, numbering, domain names etc. free of charge to enable them to test the viability of their solutions. Mobile operators have also put in place mechanisms to support this initiative.

Is there anything you would like to add?

5G is already here. Global operators started launching new 5G networks in early 2019. Also, all major phone manufacturers are commercializing 5G phones.

Consumers are very excited about the high speeds and low latencies. But 5G goes beyond these benefits by providing the capability for mission-critical services, enhanced mobile broadband and massive IoT.

While it is hard to predict when everyone will have access to 5G, we as a country need to prepare the environment for stakeholders, businesses and other vertical industries so that when they want to realize these benefits they can do so.

Spectrum auction for universal broadband by 2030

Tanzania, through the Tanzania Communications Regulatory Authority, will in October 2022 auction spectrum in four frequency bands with conditions designed to ensure high-speed internet access to 95 per cent of the country by 2030.

The spectrum to be auctioned, assigned and licenced are in the 700 MHz, 3500 MHz, 2300 MHz and 2600 MHz bands. The first two, to which coverage obligations are attached, are preferred in the deployment of the fifth generation of mobile communications – 5G; which is faster and more efficient.

Licensees of the 700 MHz spectrum will be obliged to cover 90 per cent of the country with broadband services by the end of 2025 and 95 per cent by 2030.

Conditions for the 3500 MHz spectrum are coverage of at least six (6) administrative regions by 2025, all cities by 2028 and all regional headquarters by the end of 2030.

No coverage obligations have been attached to the 2300 and 2600 MHz bands since these are intended to improve the capacity of existing networks, TCRA explains in its information memorandum on the auction.

Vodacom Tanzania PLC, which has announced limited 5G services in the country, was assigned frequencies in the 700 MHZ band in a similar auction in June 2018 with conditions to roll out broadband services to at least 60 per cent of Tanzanians by the end of 2021 and 90 per cent by 2024.



"High-speed internet and live streaming of good quality services are envisaged in areas where 5G sites will be deployed to serve the mass market".

TCRA says the current auction will promote effective competition in the telecommunications market and enhance consumer welfare, investment and innovation.

It will also advance Tanzania's mobile and fixed broadband infrastructure and capability; ensure universal service, facilitate the deployment of ICT services and technologies and promote the delivery of digital services in many sectors. These are education, health, agriculture, manufacturing, commerce and finance.

The spectrum auction is expected to generate revenue for the government.

The reserve prices in US dollars are 17 million for a 2×10 MHz Block in the 700 MHz band; eight (8) million for a 1x40 MHZ block in the 3500 MHz band; and six (6) million for a 1×35 MHz Block in the 2300 MHz band

The price of a 2×15 MHz Block in the 2600 MHz band is five (5) million dollars and 3.3 million for a 1x20 MHz block in the same band.

In June 2018, the 2x10 MHZ spectrum block in the 700 MHZ band was auctioned for a total of more than 20 million US dollars, and were bought by Vodacom Tanzania PLC and Azam Telecom

Numbering Resources

What are Communication Numbering resources?

Numbers are useful resources in providing services to end-users and promoting competition and innovation in telecommunications services. Network operators require numbers to provide telecommunications

services to end-users. The services include:

(1) Fixed telephony;

(2) Mobile telephony;

(3) Internet-based telecommunications services;

(4) Shortcodes, including those for emergency service (e.g. 112 for police) and consumer services (e.g. 100);

(5) Value-Added Information Services, financial services, and government services;

(6) Premium Rates Services (PRS);

(7) Toll-Free numbers; and

(8) Machine-to-machine communications and the internet of things applications.

Why are numbering resources needed?

- Naming and addressing, i.e. routing calls or messages to a particular subscriber or particular termination point within a network;
- Providing callers with an indication of the likely costs of calling a number, e.g. geographic-significant information and On-net versus off-net calls.

They enable operators to calculate retail billing rates and wholesale (i.e. inter-connection) call charges.

- Providing call tracing, malicious calls identification and fraud prevention and detection.
- Branding e.g. particular types of services (e.g. toll-free services or information services) and particular operators or networks.

How do I get Communication Numbering resources (e.g. VAS SMS and VAS USSD shortcodes) from TCRA?

All applications for communication numbering resources are done online using the Numbering Management System (NMS) available at TCRA's website - https://www.tcra.go.tz/.

How do I access Numbering Management?

The numbering management system is accessed via TCRA's website https://www.tcra.go.tz/ or through a direct link https://nms.tcra.go.tz:32443/nms/

Who should apply for VAS SMS and VAS USSD shortcodes?

Any Electronic Communications licensee (e.g. Mobile

Networks Operator) or unlicensed entities such as companies, Government institutions and NGOs

Can an Individual be assigned VAS SMS and VAS USSD shortcodes by TCRA?

No, you must be a company, NGO, Government or a holder of an Application Service License from TCRA.

What are the procedures for new applicants applying for Numbering resources in NMS?

The following are procedures for applying for Numbering

resources through NMS:

i. Create an account by registering on the Numbering Management System.

ii. Fill in the Company / Organization profile and upload relevant documents e.g. certified copy of Certificate of Incorporation, TIN and Memorandum of understanding and Articles of Association of the Company.

iii. Proceed with the application by selecting the relevant application (i.e. new, renew or relinquish applications).

iv. Fill in an online application form and submit and follow instructions from the NMS through notification via your registered emails.

What are the fees for the communication numbering resources (e.g. VAS SMS, USSD short Codes)?

All fees for communication numbering resources have been defined in the application guidelines document found on the Numbering Management System home page https://nms.tcra.go.tz:32443/nms/auvit/Application_Guidelines_and_Fees_for_Numbering_Resources.pdf

How long does it take to get the numbering resource after fulfilling all the application requirements?

Within 14 working days.

Smartphone Operating System Updating

Your smartphone is a valuable and versatile tool. Keeping it up to date with the latest operating system and security is an essential part of making sure it continues to deliver the best possible performance for you.

Updating your smartphone's operating system when notified to do so helps patch security gaps and improve your device's overall performance.

However, there are steps to take beforehand to protect your device and any photos or other personal files that are stored on it.

Before you update your OS

Before you start an OS update or upgrade, take a few steps to help avoid problems:

- Charge your phone: Avoid having your phone power down during an update by making sure the device has at least a 70 per cent charge.
- Back up your files: OS upgrades and updates should not affect the data stored on your smartphone, but backing up files is still a good idea, just to be safe.
- Make sure your device is compatible with the OS upgrade: A new OS may not be designed for all older devices.
- Delete apps you no longer use: A new OS may need a significant amount of your device's memory. Clear out apps that are just taking up space.
- Check your remaining bundle and the size of data required to update the OS: Make sure you have sufficient data package for OS upgrades and/or updates absence of enough data package will deplete your bundle and the update/upgrade will not be successful.

After you update your OS

Sometimes the new OS will have different pre-installed settings than the ones you have chosen and will default to the new settings over your old ones. After you install the new OS, there are settings you should check to ensure your phone is not running functions or sharing data in ways you may not want.

- Check your settings for Wi-Fi: Most smartphones include a function that automatically switches to your data plan when Wi-Fi connectivity is weak. If left on, this may cause data usage when you do not expect it. Decide if you want that function switched on or off.
- Check for automatic app updates, which are sometimes found under mobile data usage settings: If you turn this function off, apps can only be updated using a Wi-Fi connection. This can help prevent excess data usage, particularly for apps that you do not use often.
- Check the privacy settings for your device and network connections: Make sure your location services, Bluetooth sharing, ad tracking and social media settings are set to the preferences you want.
- Check for OS compatibility for your most important apps: A new OS sometimes may be incompatible with one or more of your existing apps until a patch is issued.

Make sure your device is compatible with the OS upgrade: A new OS may not be designed for all older devices. Check for upgrades for any apps that aren't functioning properly. Also, you may wish to contact your device manufacturer or service provider to share feedback on app compatibility. Look for contact information on your bill, on your device or online.

Consumer Help Centre

For more information on consumer issues, call the TCRA toll-free number 0800008272.



STATISTICS

Kagera, Kigoma trail in telecommunications spread

By Hango, J.M, Tanzania Commnications Regulatoty Authority. *(jumahango@gmail.com)*

Although telecommunications services are spread all over Tanzania, there are places where the uptake is still low. The overall average subscription is 1.9 million per region. Twenty regions are below average. Kigoma and Kagera have the lowest ratio of registered SIM cards per population in Tanzania Mainland while all the regions of Zanzibar and Pemba are below 40 per cent, according to the June 2022 communications statistics by the Tanzania Communications Regulatory Authority. The penetration is 48 per cent in Kagera, which is placed 24th and 45 per cent in Kigoma, which is 25th. Unguja North, Unguja South and Urban West have a penetration of 38. It is 33 per cent in Pemba South and Pemba North.

Map 1: Telecom Subscriptions by Region



Table: SIM card registration status and penetration per region					
No.	Region	Population (2020 estimates)	Registered SIM cards	Penetration (%)	National ranking
1	Arusha	2,104,074	3,263,398	155	2
2	Dar es Salaam	5,401,814	9,267,313	171	1
3	Dodoma	2,647,410	2,864,302	108.2	8
4	Geita	2,434,800	2,050,124	84	17
5	Iringa	1,149,481	1,439,098	125	4
6	Kagera	3,238,347	1,562,050	48	24
7	Katavi	805,887	668,800	83	18
8	Kigoma	2,800,919	1,257,318	45	25
9	Kilimanjaro	1,951,252	2,211,867	113	6
10	Lindi	1,025,800	1,081,612	105	11
11	Manyara	1,873,105	1,447,498	77	21
12	Mara	2,391,845	1,557,804	65	22
13	Mbeya	2,204,543	2,961,516	134	3
14	Morogoro	2,730,058	2,945,790	107.9	9
15	Mtwara	1,478,874	1,649,664	112	7
16	Mwanza	3,826,572	3,376,530	88.23	15
17	Njombe	837,557	897,453	107	10
18	Pwani	1,325,852	1,630,142	123	5
19	Rukwa	1,141,742	1,009,200	88.39	14
20	Ruvuma	1,655,443	1,510,261	91	13
21	Shinyanga	1,993,589	1,641,547	82.34	19
22	Simiyu	2,304,228	1,297,523	56	23
23	Singida	1,705,182	1,397,359	81.94	20
24	Songwe	1,278,850			
25	Tabora	3,081,263	3,000,849	97	12
26	Tanga	2,449,235	2,098,929	86	16
27	Kaskazini Unguja	232,480	414,760	38	26
28	Kusini Unguja	138,589			
29	Mjini Magharibi	733,914			
30	Kaskazini Pemba	294,267	186,369	33	27
31	Kusini Pemba	272,348			
Source: National office of statistics, Ministry of Finance and Planning, Dodoma June 2021. Takwimu za Msingi, Tanzania 2020. Maoteo kwa mwaka 2020. https://www.nbs.go.tz/nbs/takwimu/references/2020_Tanzania_in_Figure_Kiswahili1.pdf www.tcra.go.tz					

Arusha at the helm

Arusha is Tanzania's leading region in terms of access and usage of telecommunications, postal and broadcasting services, according to statistics and survey findings.

The region is the second in terms of the penetration of basic telecommunications, i.e the ratio of registered SIM cards to its population, subscriptions to pay television and leads in awareness of the use of physical addresses and postcodes.

Arusha, with a population of 2,104,074 has 3,263,398 registered SIM cards, compared to Dar es Salaam; with 9,102,203 SIM cards and a population of 5,401,814.

The Tanzania Communications Regulatory Authority June 2022 quarterly statistics show that Arusha accounts for 10 per cent of the direct-to-home pay television subscriptions in Tanzania. The services are mainly provided by Azam, DSTv, Zuku and Star Times.

Arusha is also second for the number of decoders for free-to-air television broadcasts access. With 314,395 devices; it is behind Dar es Salaam where 1,230,485 decoders were active in June 2022. The penetration in the two regions is respectively 15 and 23 per cent.

A 2020 TCRA survey on postcodes and physical addresses use found that Arusha was ahead in terms of awareness of the system.

Arusha also hosts the Pan African Postal Union (PAPU), the African Union's specialized agency for postal matters. The Union and TCRA are jointly finalizing a 19-storey multipurpose building expected to change the skyline of the northern Tanzanian city.

Data prices now below voice tariffs

There is a significant increase in the number of mobile money accounts, transactions and the value of the transactions in Tanzania, indicating a firm move towards financial inclusion, according to the latest communications sector statistics.

The June 2022 statistics published by the Tanzania Communications Regulatory Authority also show that data continues to be the cheapest among the three key telecom services offered by mobile network operators in Tanzania.

It is estimated that more than one-third (41 per cent) of Tanzanians use mobile money services. There were approximately 24.9 million users of mobile money with active mobile money accounts.

The estimate is based on the number of active accounts and the average number of accounts per subscription. The average number of accounts per registered SIM card (subscriptions) is estimated to be 1.5; according to a study carried out by TCRA in 2018.

Some 37.4 million mobile money accounts were active in Tanzania by June 2022. These conducted a total of 343.6 Million transactions; with a value of about 11.6 trillion shillings.

There were 35.7 million mobile money accounts; conducting 330.1 million transactions worth 10.7 trillion shillings in the quarter ending March 2022.

A comparison of the two quarters shows an improvement towards financial inclusion within a short period. The number of accounts, transactions and value of the transactions have significantly increased over the quarter.

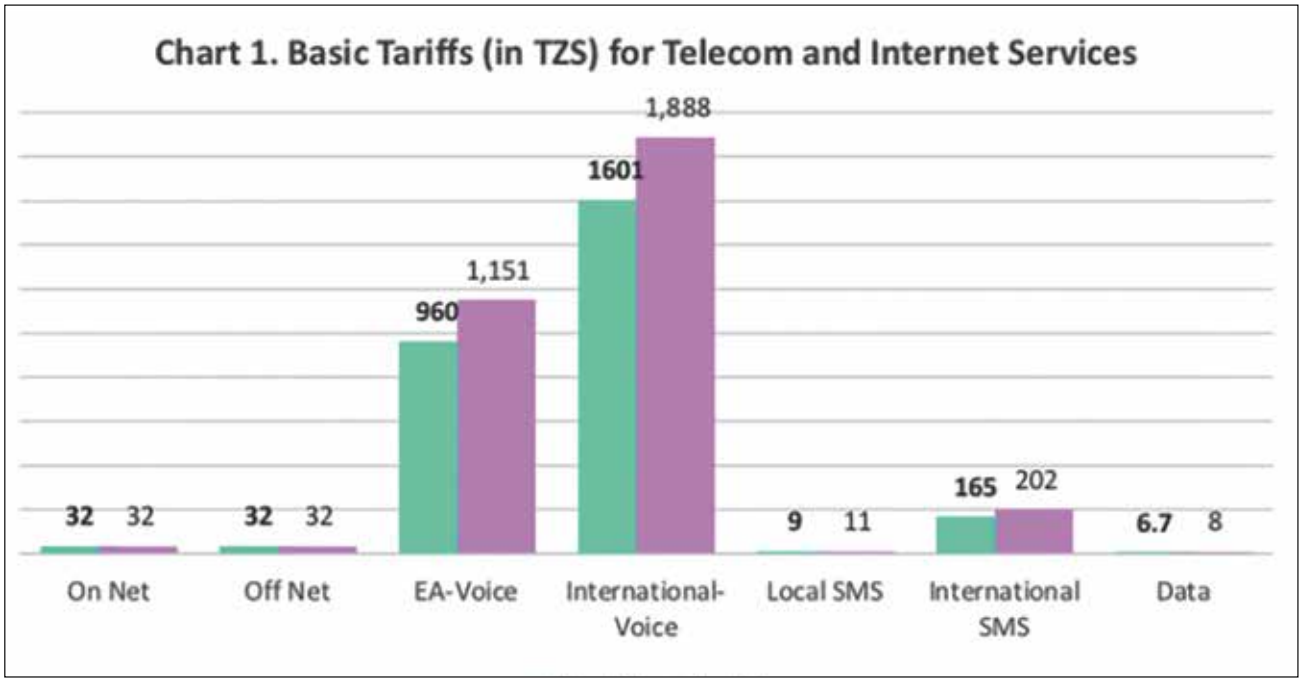
Details are presented in Table 1.

On data tariffs, the statistics show that bundled and unbundled data services are the cheapest compared to voice and short messages (SMS).

One MB was sold unbundled for eight (8) shillings (TZS) compared to 32 shillings for voice calls on the user's network (on-net) and another network (off-net). Eleven (11) shillings were charged for local SMS. One minute of voice is more expensive than a unit of SMS and data. The price is detailed in chart 1.

Table 1: Accounts, Transactions, Value of transactions

Item	Quarter 3 (March 2022)	Quarter 4 (June 2022)
Accounts	36,749,298	37,407,233
Transactions	330,148,997	343.639,879
Value of Transaction	10,703,041,422,029	11,608,009,983,537



International calls continued to cost more than in the previous quarter (March 2022). One minute was 1,888 TZS compared to 1,601 TZS; an 18 per cent increase.

Calling neighbouring countries (East Africa) cost 1,151 TZS a minute; It was slightly cheaper (than in the previous quarter (960 TZS).

According to the statistics, people talk and send SMS across networks (off-net) than within their networks (on-net), dispelling the belief that more calls, hence minutes, were made within networks.

The price difference between On-Net and Off-Net calls has changed this. More talk time is now witnessed across networks than within networks. Table 2 presents details of the average talking time per subscription.

The total average talk time per subscription was 470 and 527 minutes for the third and fourth quarters of 2022 respectively. This shows the talk time has increased significantly; by 12 per cent.

Off-Net knocked down On-Net by having more average talking time per subscription. The average talking time across the network consists of slightly more than half (50.1 per cent) of talking time for all destinations. This is true for quarters ending March 2022 and June 2022.

On the other hand, people sent more SMS across networks than within their networks; as shown in table 3. An average of 664 SMS per subscription were sent during the quarter ending June 2022 and 619 during the quarter ending March 2022. More than half (57%) were sent across networks in both quarters.

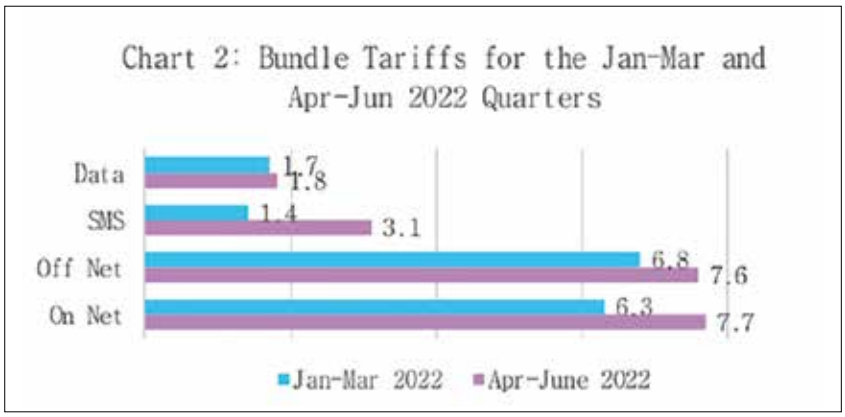
This has corrected the belief that people talk more within networks because it was by then cheaper than across networks. This suggests that the choice of SIM cards does not depend anymore on the price of service within or across a network. They are now the same. The shift is now on the quality of services.

Table 2: Average number of minutes per subscription

Item	Quarter 3 (March 2022)	Quarter 4 (June 2022)
On-net traffic	232	260
Off-net traffic	237	266
Traffic to East Africa	0.04	0.04
Traffic to International	0.06	0.13
TOTAL	470	527

Table 3: Average number of SMS per subscription

Item	Quarter 3 (March 2022)	Quarter 4 (June 2022)
On-net SMS	262	280
Off- local SMS	357	384
Off net to East Africa	0.01	0.01
Off net to other International	0.01	0.2
TOTAL	619	664





Teachers of Ukombozi Secondary School, Urambo Tabora region comparing notes on how to use mobile phones to access educational content on the internet.

The statistics further show that telecommunications and internet subscriptions slowed down as pene-tration approached 100 and 50 per cent respectively.

By June 2022, there were 56.2 million active SIM cards; of which 52 per cent are online. While the number of registered SIM cards increased by two (2) per cent; from 55.4 million in March 2022 to 56.2 million in June, internet subscriptions dropped by the same percentage during the period; from 29.6 million to 29.1.

The two per cent drop in internet subscriptions is insignificant, and cannot be attributed to anything, and can be taken as a normal adjustment after some few subscribers failed to use the service for the pre-vious three months. The same applies to telecom subscriptions. which has increased by two per cent in the quarter ending June 2022.

In June 2022, telecom and internet penetration - the proportion of subscriptions compared to a country's population - stood at 92 and 48 per cent respectively.

Penetration is used as an indicator when measuring improvements in the industry.

The telecom and internet penetration for the last three years are as shown in table 4.

While telecom penetration increased by one (1) percent each year from 2019; internet penetration portrays ups and downs; levelling between 46 and 49 per cent. This signifies that subscription is not growing as fast as they used to be in the last 10 years preceding 2018.

Table 4: Telecommunications and internet penetration between 2019 and June 2022. In Percentage

2019	88%	46%
2020	89%	45%
2021	91%	49%
By June 2022	92%	48%

Simiyu leads in Cable TV Subscriptions

Pay television (direct to the home-DTH) services are available in every region; with Simiyu having the least subscriptions in Tanzania Mainland (less than one per cent (0.3%). However, the region has close to one quarter (22 per cent) of all cable TV subscriptions, which is the highest. Dar es Salaam has the highest DTH subscriptions (39 per cent); followed by Arusha (10 per cent).



Map 2: Cable television subscriptions by June 2022



Map 3: Distributin of active decoders by June 2022



Postal sector resilience

Despite major advances in electronic communications, postal and courier communication still has a share in communications.

An average of 783 domestic items are posted daily. Internationally, 144 and 1,216 are posted daily to East African countries (EAs) and the Rest of the world (RoW) respectively.

The chart below shows posted items for the last three quarters and the daily average for the quarter ending June 2022.

Items posted from EA and RoW are presented in chart 8.2, which shows that 1.4 times more items were delivered to Tanzania from abroad than those posted from the country to EAs and RoWs.

Items delivered from EAs are almost three times more than those delivered to East Africa from Tanzania. The daily average shows Tanzania posts 1,360 items to international destinations and receives 1,958 items from international.

TCRA collects communications statistics from all Communications Service Providers (CSPs); namely, telecommunications, internet, mobile money, broadcasting the national postal operator and courier companies.

Aggregated statistics are used by Authority, the Government and its associated institutions, researchers and academia and the public. They are also shared with regional and international institutions of which Tanzania is a member. These include the Southern African Development Community (SADC), the African Telecommunications Union (ATU), the International Telecommunication Union (ITU), the Universal Postal Union (UPU) and the Pan African Postal Union (PAPU).

Table 5: Domestic and international posted items

	Domestic	East Africa	Rest of the world
October - December 2021	6,666	228	891
January - March 2022	26,592	17,989	40,720
April - June 2022	70,464	12,979	109,453
Daily (April -June)	783	144	1,216

Table 6 Items posted to and delivered from East Africa and the Rest of the World

	East Africa	Rest of the world	Rest of the world
Posted to	12,979	109,453	122,432
Delivered rom	35,525	140,724	176,249
Daily Posts	144	1,216	1,360
Daily (April -June)	783	144	1,216