NATIONAL COMMUNICATIONS AUTHORITY

Ensuring and Enhancing

Consumer Satisfaction

In Ghana's Communications Industry – **2019**

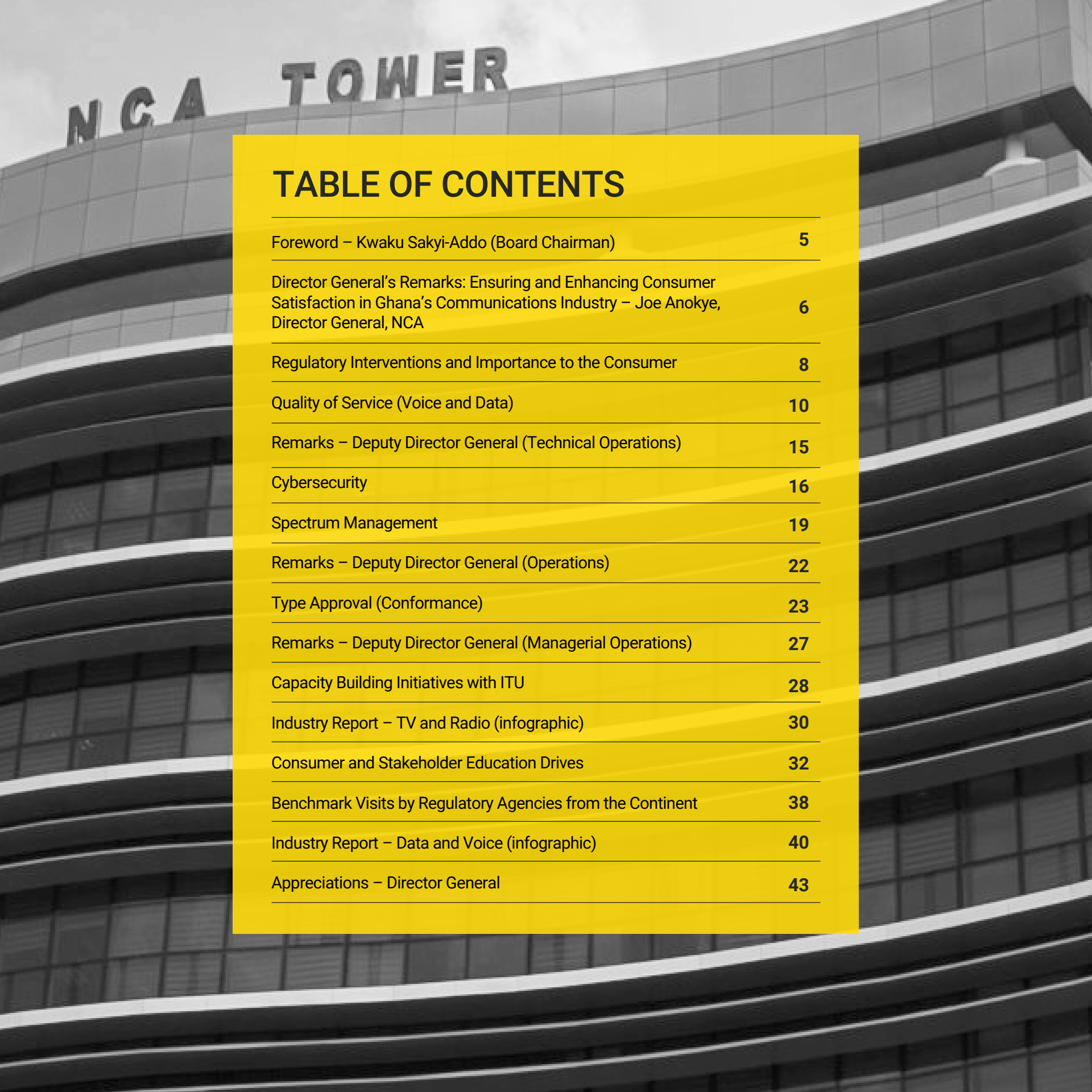


TABLE OF CONTENTS

Foreword – Kwaku Sakyi-Addo (Board Chairman)	5
Director General's Remarks: Ensuring and Enhancing Consumer Satisfaction in Ghana's Communications Industry – Joe Anokye, Director General, NCA	6
Regulatory Interventions and Importance to the Consumer	8
Quality of Service (Voice and Data)	10
Remarks – Deputy Director General (Technical Operations)	15
Cybersecurity	16
Spectrum Management	19
Remarks – Deputy Director General (Operations)	22
Type Approval (Conformance)	23
Remarks – Deputy Director General (Managerial Operations)	27
Capacity Building Initiatives with ITU	28
Industry Report – TV and Radio (infographic)	30
Consumer and Stakeholder Education Drives	32
Benchmark Visits by Regulatory Agencies from the Continent	38
Industry Report – Data and Voice (infographic)	40
Appreciations – Director General	43

Who are we?

The National Communications Authority is the central body mandated to license and regulate electronic communication activities in Ghana.

Services Regulated

The Authority currently regulates 27 services.
These include;

1. Cellular mobile services/2G
2. Radio FM Broadcasting
3. TV Broadcasting License
4. 4G/BWA
5. Mobile Virtual Network Operations
6. Submarine cable
7. Fixed Licence
8. Terrestrial Fibre Optic Infrastructure Licence
9. International Wholesale Carrier Licence
10. Value Added Services Licence
11. Dealership Licence
12. Infrastructure (Masts and Towers)
13. UMTS-900 Authorisation
14. 3G Licence/UMTS
15. Interconnect Clearing House
16. International Inbound Traffic
17. DTT Conformance Certification
18. Internet/Public Data Service Provision
19. VSAT Licences
20. Numbering (SIM, M2M, Short Codes etc.)
21. Type Approval
22. Microwave Authorisation
23. Public Radio Equipment (PRE) or Land Mobile Services
24. Landing Rights Licence
25. Amateur Radio
26. Communications and Managed Support Services Licence
27. Aeronautical Radio Services

FOREWORD

Kwaku Sakyi-Addo
Board Chairman

The Board of Directors of the National Communications Authority (NCA) is delighted with the enormous progress made by the Authority in key areas it has been expressly mandated to oversee.

We are aware of the expectations of consumers, industry and government. In this regard, the NCA strives to ensure that operators in the industry are adequately rewarded for their investments, consumers derive maximum value from services, and the State receives appropriate tax revenue with which to deliver public goods for all.

The Board will continue to support the management and staff to implement government policies, and design guidelines and regulations that balance the competing interests of all our stakeholders and deliver outcomes that benefit everyone fairly and equitably.

Advances in technology mean that equipment become outdated rather quickly and key performance indicators of various attributes change just as rapidly. These therefore make it imperative that as the Regulator of the telecommunications industry, the NCA's capacity is world class, abreast and familiar with global trends and able to adapt to change nimbly and with ease. We believe we have been up to this task.

On behalf of the Board, I congratulate the Director General, management and staff of the NCA for their professionalism and dedication, in placing Ghana at the high table of regulators globally. Your stellar performance is recognised and appreciated by the International Telecommunications Union as well. The Board will continue to support the Director General, management and staff in achieving the NCA's mandate, as we strive together to become a truly world class regulator. We are happy to showcase to consumers and the public, the successes we have chalked especially in 2019.

ENSURING AND ENHANCING CONSUMER SATISFACTION

IN GHANA'S COMMUNICATIONS INDUSTRY

Joe Anokye
Director General, NCA

Consumer satisfaction, creating a fair and efficient sector for the various players, playing our role in Government's Digital Economy Agenda, and helping develop Africa's telecommunication's sector are some of the key priorities that drive the work we do here at the National Communications Authority (NCA).

We have over the years continued to demonstrate our commitment to living our Values, Vision, and Mission and above all mandate as enshrined in Act 769 – the establishing Act of the NCA. The Authority has continued to do these through 2019 by strengthening its protocols when it comes to enforcing various regulatory compliance.These mechanisms put in place serve multi-purpose benefits to the state, industry and consumers.

For us to achieve the optimum consumer satisfaction and to ensure that other stakeholders are gaining the maximum benefits from the Authority's work, we have over the past years initiated some new regulatory interventions in some cases and also improved others to bring them to global standards.

Some of the regulatory interventions we have improved on for the benefit of consumers include the following;

1. *Integrated Communication Monitoring Strategies: This has allowed the Authority to strengthen the following areas of its operations;*
- *Quality of Service (Voice and Data)*
- *Cybersecurity*
- *Spectrum Management*
2. *Type Approval (Conformance)*
3. *Capacity Building Initiatives with the International Telecommunications Union (ITU)*

INTEGRATED COMMUNICATION MONITORING STRATEGIES

A. Quality of Service (Voice and Data):

This is a very important addition to our enforcement tools. Consumers' legitimate demands for improved quality of service and experience has meant that the Authority takes the needed step to ensure that we are able to scientifically measure the output of telecommunications services. This way, the regulator is able to call defaulting mobile network operators to order whiles ensuring that consumers get the best of what they pay for. Ghana's progress in this direction has seen us collaborating with the International Telecommunications Union to offer quality of service training to professionals within the ITU fraternity.

B. Cybersecurity:

Cybersecurity incidents in the telecommunications sector have heightened the urgency of securing this sector by building cybersecurity capability, reducing vulnerabilities, reducing malicious activity, proactively dealing with cybersecurity issues, cooperating towards cybersecurity, responding and recovering from cybersecurity incidents. As the National Cybersecurity Secretariat intensifies its work through the various sectoral Computer Emergency Response Teams (CERT), the NCA is proud to have made some useful strides in this direction. We are not where we want to be yet, but we surely are on the right path. Unknowingly to the telecommunication consumer in Ghana, the NCA-CERT has prevented a number of potentially malicious activities which would have had dire consequences on their internet usage.

C. Spectrum Management:

One of the most fundamental mandates of the National Communications Authority is the management of spectrum. It is also one of the most critical and finite resources. Therefore its management is one that requires tact, thoughtfulness and a combination of attributes that satisfy the State, Industry and Consumers. The Authority has strengthened the various mechanisms to monitor Ghana's spectrum to ensure that it is put to maximum use. These are state of the art tools which have made our engineers better equipped to deal with their mandate.

TYPE APPROVAL (CONFORMANCE)

The issue of standardisation is one that regulators on the continent and across the world take very seriously. The potential effects of sub-standard equipment on the population and industry is one that cannot be ignored. One of the often misconstrued 'perceptions' about this industry has got to do with emissions and its impact on consumers. We are happy as the Regulator to have installed a set of laboratories that can allow us monitor and enforce regulations on this. Additionally, Ghana is proud to join the elite group of countries that have this facility globally – indeed we are the only ones with this in West Africa.

CAPACITY BUILDING INITIATIVES WITH THE INTERNATIONAL TELECOMMUNICATIONS UNION (ITU)

It is important to take cognisance of the fact that, in ensuring and enforcing Regulatory Compliance in Ghana's Communications Industry, the NCA has equipped its staff with the requisite trainings to execute this mandate. The verve and determination shown by the hardworking men and women of this Authority is what has resulted in the recognition of the staff and indeed Ghana at various international platforms including the International Telecommunications Union, Africa Telecommunications Union, among others. The Authority will continue to execute its mandate to the full, as it continues to help shape the digitisation plan of the country. Two international training programmes were concurrently ran in association with the ITU;

A. Quality of Service Training Programme
B. Conformance and Interoperability Testing Training Programme

REGULATORY INTERVENTIONS AND IMPORTANCE TO THE CONSUMER

The Ghanaian communications consumer has experienced the effects of various regulatory decisions undertaken by the National Communications Authority (NCA) in a number of ways. The NCA takes into cognisance the views of the consumer in its work. Through the various complaints processes available to consumers, the Authority is able to gather some of the views and expectations that eventually flow into regulatory decisions. The Authority also takes into consideration the rate of evolution and development of various technologies within the space in taking decisions.

The objective of the NCA as enshrined in Act 769 (2) is to regulate the provision of communications services in the country. The Act also adds in section three (Functions of the Authority) that for the purpose of achieving its objective, the Authority shall among others grant communication licence, regulate and monitor licensees, holders of frequency authorisations in consultation with the National Media Commission where appropriate and also ensure fair competition amongst licensees, operators of communications networks and service providers of public communications. The Authority has over the years delivered on this mandate to cover the twenty-seven (27) services that it regulates.

The communications industry remains one of the most vibrant in the world. This vibrancy has meant that there is the need to have updated equipment/tools to measure compliance to regulatory interventions.

Beginning January 2019, the NCA upgraded a number of these regulatory tools and also operationalised new ones.

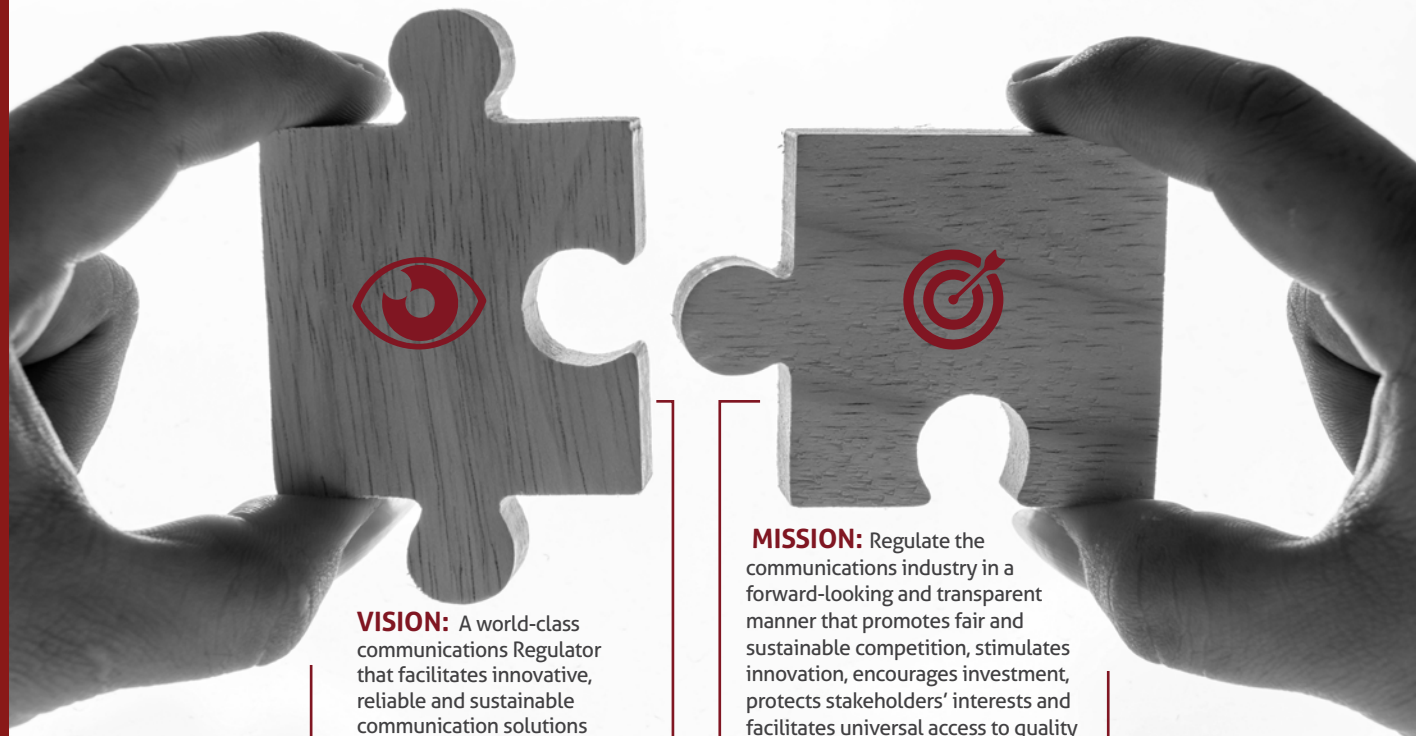
The key areas of interests are worthy of reporting presently;
These can broadly be placed under the following:

1. Integrated Communication Monitoring Strategies: This has allowed the Authority to strengthen the following areas of its operations;
   - Quality of Service (Voice and Data)
   - Cybersecurity
   - Spectrum Management
2. Type Approval (Conformance)
3. Capacity Building Initiatives with the International Telecommunications Union (ITU)

NCA - the Drive towards a World Class Regulator

Formation of NCA

The National Communications Authority (NCA) was set up in **1996** as the central body to license and regulate communications activities and services in Ghana and to provide for related purposes.



VISION: A world-class communications Regulator that facilitates innovative, reliable and sustainable communication solutions to meet stakeholders' expectations.

MISSION: Regulate the communications industry in a forward-looking and transparent manner that promotes fair and sustainable competition, stimulates innovation, encourages investment, protects stakeholders' interests and facilitates universal access to quality communications services for national development.

Core Values

- Accountability
- Teamwork
- Consistency
- Trust
- Innovation
- Transparency

Our Staff *Our most valued resource*

With human resource at the centre of its work, the NCA commits itself to training staff to equip them in the delivery of its mandate. These have seen staff of the Authority receiving various trainings

- ***Internal training***
- ***External training***
- ***Professional training***
- ***Academic training***

INTEGRATED COMMUNICATION MONITORING SYSTEMS

QUALITY OF SERVICE (VOICE AND DATA)

The NCA has state-of-the-art equipment used to determine if consumers are enjoying good Quality of Service or not.

Background:

Quality of Service (QoS) refers to all the requirements a telecom service needs to meet consumers' implied and stated expectations of a service they are receiving. QoS is characterised by the combined effect of the service, network elements, terminals and infrastructure.

Quality of Service is one of the most important consumer-facing attributes that Mobile Network Operators have to deal with. It essentially has to do with consumers being able to complete calls, have calls set up on time, avoiding call drops, congestion and similar attributes applicable to their voice and data experiences.

The National Communications Authority (NCA) regularly monitors the performance of service providers alongside the extensive benchmarks for the QoS parameters stated in their licence conditions. This performance monitoring exercises are conducted quarterly to enhance communications services.

The Authority tests all networks to measure compliance with stated QoS indicators for voice and data services. This is important because the NCA as a referee must ensure that consumers get value for money, and that the services provided by operators measure up to appreciable standards.

Mandate of the NCA on Quality of Service (Voice and Data):

The NCA is mandated to ensure that telecommunications operators deliver the required quality of service to enhance quality of experience of users. The National Communications Authority Act, 2008, mandates the Authority to regulate and monitor licensees and holders of frequency authorisation. Also, section 6, subsection 2(b) of the Electronic Communications Act, 2008 (ACT 775), provides that the Authority shall specify the means to enforce a licensee's compliance with its stated quality of service standards.

Previous Approach to Measuring Quality of Service (Voice and Data):

The Authority by its mandate used the following approaches as the means to monitor and enforce their compliance with stated Quality of Service obligations:

- Submission of monthly QoS reports by Mobile Network Operators (MNOs) and Broadband Wireless Access Service Providers (BWAs)
- Field Test (Drive Test) Monitoring of 2G and 3G services in all district capitals with system inability to test CDMA technology used by a previous operator.

The Network Monitoring Centre

Gaps Which Required the Authority's Action:

With this approach, a gap analysis of the aforementioned approaches presented certain deficiencies which necessitated the need for further intervention, and other complementary solutions for that matter.

The following deficiencies and gaps were noted and had to be curbed;

1. The Authority's reliance on reports from operators and complaints from service users to ascertain service performance.
2. Network performance reports from the monthly QoS reports were purely declarative and in most cases did not reflect experience of users in a geographical area.
3. Inability of the Authority to independently verify monthly QoS reports from Mobile Network Opera - tors (MNOs).
4. Inability of the Authority to have near real-time oversight of MNOs' perfor mance.
5. Having holistic or full visibility of MNOs' network with regard to their network availability and reliability.
6. Inadequate decentralisation of drive test systems as means of service performance assessment in given geographical location.
7. Drive tests were previously done randomly.

Staff of the NCA setting up the Drive Test equipment

One of the Testing vans of the NCA

The Current Approach to Quality of Service (Voice and Data):

The existing approach presented the need for additional solutions and augmentation of existing solutions, which can best address the challenges that affect the monitoring regime.

The under listed are the interven- tions/new approaches adopted by the Authority to improve QoS monitoring and compliance:

1. Improved Field Drive Test Systems

Hitherto, field test monitoring in the regions were performed with equipment allocated to the Accra, Kumasi, Takoradi and Tamale offices. Irrespective of the above, there was the need to decentralise monitoring to unmonitored areas and also upgrade the existing Drive Test system with better functionalities to test 4G services. The Authority therefore acquired seven (7) NEMO Drive Test equipment as an upgrade and also to cater for other regions with the objective of effectively decentralising monitoring.

Seven (7) NEMO Drive Test equipment are effectively deployed in ***Accra (2), Kumasi (1), Takoradi (1), Tamale (1), Sunyani (1) and Bolgatanga (1).***

Unlike the existing drive test systems, NEMO offers the Authority a single interface for full CDMA testing, the capability to test technologies (i.e. 2G, 3G & 4G) across all spectrum, support testing for up to 21 devices simultaneously, as well as a user-defined customised reporting template functionality. There are plans to resource all NCA zonal offices with adequate testing equipment and trained officers for scheduled and emergent field testing. The existing equipment can also be upgraded to test Over-the Top (OTT) services.

2. Network Monitoring System (NMS)

The NCA has acquired the Regulators Performance Management (RPM) system as the QoS Network Monitoring Solution.
RPM is the novel NMS solution that handles the task of interfacing all the Operators or Service Providers Operations Support System (OSS) irrespective of the equipment vendor, collects performance data records and creates KPI reports that renders a given network performance against Licence obligations. The NMS uses counters from the OSS to provide a realistic vision of the Operator's performance from network perspective on near real time basis from all MNOs and also Surfline Communications Limited. It complements the consumer perspective measurements from the Drive Test monitoring system. It gives a continuous monitoring (24x7) oversight with cost savings advantage to the Authority. So now the NCA has the capacity of measuring the KPI of any service provider. The Authority is also able to generate reports on network performance within minutes as compared with the previous regime.

3. Billing Verification System (BVS)

The Billing Verification System (BVS) involves a process where test runs are done against the tariffs published by the MNOs. These tests are done to verify that tariffs on all services are within specific targets and every billable mobile activity a consumer engages in is accurate. NCA staff additionally undertake these tests on various plans and packages from all MNOs.
The tests cover various attributes including duration of call, cost of call and credit balance after each call. The BVS is also used for quality of service testing of mobile money transactions.

4. Quality of Service (QoS) Regulations

The Authority has facilitated the drafting of new Quality of Service (QoS) regulations to reflect technological advancements that have sprung up over time. The NCA was limited, to a large extent by the current outdated QoS KPIs in the mobile licences. The draft regulations considers international standards, current industry average performance and obsoleteness of the existing QoS parameters. The regulations if approved would improve the operation and performance of interconnected networks and enable the Authority to implement a QoS framework which could be amended through Parliament when necessary.

The Network Monitoring Centre sits in the Communications Monitoring Centre

Public Consultative Workshops on the Draft Quality of Service Regulations were held in a number of towns. The team also met with other stakeholders who submitted inputs into the regulation.

Staff undergoing training on the use of the new monitoring equipment

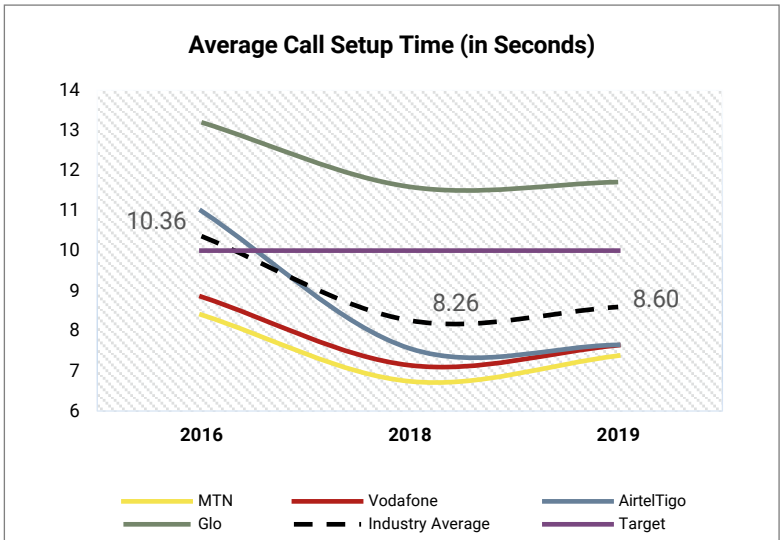
Benefits to Industry and Consumers

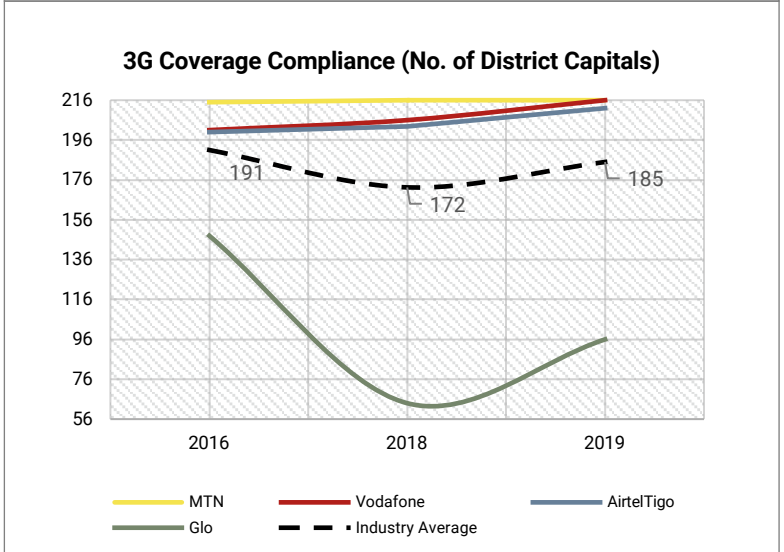
The implementation of these initiatives holds a number of benefits to the Industry as well as consumers.

The following are some of the benefits;

1. Complementary network performance monitoring and compliance.
2. Provides the Authority with a full or holistic view of performance of the networks at any given time and location.
3. Consumer protection is enhanced as violations are quickly detected and service providers prompted for resolution.
4. Ensures improved delivery of quality of service and experience to the user.
5. NCA is able to enforce QoS obligations at reduced operational cost.

Comparative Statistics of QoS Data (2016 – 2019)





"This is the most innovative enforcement drive we have taken in our history as far as Quality of Service is concerned, and with the most state of the art tools as well"

Henry Kanor
Deputy Director General
(Technical Operations)

Call drops, slow data connection, poor network coverage - these are some of the most noticeable indicators of poor Quality of Service that consumers notice and complain about. In an era of advanced technology and with the world moving towards 5G, it is imperative that Service Providers improve their service so User Experience will be enhanced.

This is the most innovative enforcement drive we have taken in our history as far as Quality of Service is concerned, and with the most state of the art tools as well. Service Providers are aware of the capabilities of the Authority to scientifically and practically measure the output of their services and to determine the Quality of Experience consumers receive from their providers.

The Authority works in tandem with Service providers so that whatever gaps that are identified are cured to the benefit of the consumer.
The NCA will continue to put in the work and to keep consumers interests at heart whiles supporting service providers to improve on their services.

CYBERSECURITY

"With the NCA-CERT, the Authority has its eyes on the players in the telecommunications sector. This means that the consumer is safer in the cyber world than before"

Background Information:

Ghana's Digital Agenda brings increased productivity and efficiency to the country's people, businesses, organisations, and economy. However, there are unavoidable risks as we connect, digitise, and computerise systems. Cybersecurity is important in protecting our valuable assets and services. As the fire service prevents and deals with fires, a Computer Emergency Response Team (CERT) also known as a Computer Security Incident Response Team (CSIRT) prevents and deals with cybersecurity incidents. Cybersecurity incidents may arise from malicious use of ICTs, vulnerabilities in ICTs, human mistakes, and even natural disasters. A CERT is responsible for receiving reports, analysing information on incidents, resolving those incidents, coordinating and supporting stakeholders to reduce the number and impact of incidents on computer systems, information, and services.

Mandate of the Authority on Cybersecurity:

The NCA's mandate to ensure cybersecurity in the telecommunications sector derives from Regulations 5 and 6 of the Electronic Communications Regulations, 2011 (L. I. 1991). Regulation 5 states that a provider of a public electronic communications service and an operator of a public electronic communications network shall take appropriate technical and organisational steps to ensure security of the service or network, and any message transmitted over the service or network. Regulation 6 (5) of L.I. 1991 enjoins operators to employ international best practices in the industry to promote the privacy, secrecy and security of communications carried or transmitted by the operator or through the communications system of the operator, and the personal and accounts data related to subscribers.

Previous Approach to Cybersecurity:

Effort began in 2017 to support cybersecurity activities to secure the telecommunications sector.

CERT-GH, operating from the Ministry of Communications coordinated some of the cybersecurity issues relating to the telecommunications sector.

Gaps which require the Authority's Action:

The situation where there was no CERT dedicated to the telecommunications sector had to be corrected. The approach of using CERT was deemed a more collaborative, effective and efficient approach to preventing and responding to cybersecurity incidents and issues. The key concept was to have some level of decentralisation and leverage of regulators' relationship with various organisations to improve coordinated development of cybersecurity. Further, the CERT eco-system provides a forum for information sharing, shared capacity building and technologies with respect to cybersecurity.

This gap necessitated the policy directive from the Ministry of Communications to have Sectoral CERTs set up. The National Communications Authority Computer Emergency Response Team (NCA-CERT) was thus in response to this need and to fill this gap. Ghana's nearly forty-one million mobile subscribers and twenty-six million data subscribers meant a CERT ecosystem would improve prevention and response to cybersecurity.

Participants of the 2019 Africa Endeavor programme at the NCA-CERT

The Current Approach to Cybersecurity:

The President, H.E. President Akufo-Addo, inaugurated the NCA-Computer Emergency Response Team (NCA-CERT) on the 22nd of October 2018. The NCA-CERT works with stakeholders to address incidents that affect the telecommunications sector to ensure a safer communications space. The NCA-CERT is one of the Sectoral CERTs under CERT-GH.

The NCA-CERT uses both proactive and reactive approaches towards ensuring a secure telecommunications space. The NCA-CERT constituents are the licence and authorisation holders regulated by the NCA. Some of these constituents are Mobile Network Operators (MNOs), Internet Service Providers (ISPs) and Broadband Wireless Access providers (BWAs). On being proactive, the NCA-CERT has continuous discussions and meetings with the various companies or providers to understand their cybersecurity operations, and provides feedback, guidance, or recommendations on cybersecurity.

The NCA-CERT also receives reports, from organisations such as CERT-GH, on malicious activity and vulnerabilities relating to the public networks such as those used by organisations, businesses, and customers. Cybersecurity Analysis is done on these reports to determine the category, impact, services affected, and advisories shared with the constituents concerned including information on identifying and resolving the cybersecurity incidents or issues. The NCA-CERT continues with follow-ups to progressively reduce the number of potentially malicious actors and vulnerable systems on public telecommunications networks. Cybersecurity is collaborative, and the NCA-CERT works with other divisions, such as Engineering and Regulatory Administration, in securing the Critical National Infrastructure. The NCA-CERT monitors and reports incidents on critical information infrastructure within Ghana including the aviation band, the digital terrestrial television (DTT) network, mobile network and service availability of selected locations.

As part of operations, the NCA-CERT builds relationships with other computer emergency response teams, with assistance from CERT-GH, to exchange information and build capability in areas such as communications, incident management and cybersecurity analysis. The NCA-CERT has systems to receive, visualise, analyse, and communicate with respect to cybersecurity incidents and issues.

Benefits to Industry and Consumers

The benefits of NCA's cyber security initiatives includes:

1. Helps in responding to cyber threats within Ghana's telecommunications space including attacks on our constituents.
2. Provides advisory service that assist in the prevention of potential cyber attacks.
3. Establishment of a collaborative and continuous effort involving all stakeholders.
4. Building cyber security capacity to ensure that we play our role in making a safer Ghana in advancement of Ghana's Digital Agenda.

Visitors at the NCA-CERT

Capacity Building

The NCA's capacity building programme for the CERT looks at all aspects of capacity building: people, processes and technologies. The NCA runs awareness training for staff and has completed cybersecurity awareness training for staff at the head office. The cybersecurity staff have undergone several training as well in areas of cybersecurity and this capacity building have been organised to ensure all staff have basic knowledge/understanding of cybersecurity in a consistent manner. This has involved looking at common terminologies, frameworks and approaches to improve efficient operations. The training programme for cybersecurity staff is a continuous process.

Cybersecurity Assurance and Situational Awareness programme

The NCA-CERT provides several services as this is one of the three main objectives. It should be noted these services (e.g. situational awareness, communications, capacity building, research and development, analysis, incident management) cut across other activities such as data protection and privacy. The key service units are NCA-CERT and the Data Protection & Privacy Unit.
The NCA-CERT has done a lot with regards to security assurance and situational awareness. Staff conduct vulnerability scans, compile malware incidents and reports are shared. These help deal with any cybersecurity incidents that came up. Reports from malware incidents also help with drafting topics for awareness trainings.

Incident Management & Analysis

The NCA-CERT Incident Management Services is related to the management of a cyber-event, which include alerting our constituents and coordinating activities associated with the response, and subsequently mitigation and recovering the incident. Cybersecurity analysis involves doing forensic investigations on data, documents, systems or artefacts of interest to cybersecurity.

When scanning of NCA internal network is done, there is need to go into and check systems. For this reason, the NCA-CERT has an analysis aspect that is done. Staff are currently following the training programme to build capacity and are utilising acquired skills as expected. Incident management is the objective or aspiration of CERTs. The functions in this service area cover the full life cycle of an incident's response.

Research & Development

The NCA is keen on keeping up with the ever changing threat landscape. This requires persistent research and development of new trends and technologies. The NCA is conducting a CERT benchmark study to develop performance gaps, adopt standardised processes and identify areas of improvement. The NCA-CERT has continued to work with CERT-GH to improve processes and operations, reporting, and understanding of some of the threats in the telecommunications sector.

SPECTRUM MANAGEMENT

"Did you know that without spectrum, your calls, texts or data won't go through? Spectrum is that pipe that makes all these possible!"

Background

Spectrum is essentially what makes it possible for the consumer to tune in to a radio station, be able to watch television, or make a phone call. This clearly is a very important resource. Its misuse or misapplication could mean that the consumer is unable to make phone calls, use data or watch TV and listen to radio, etc. Spectrum also makes it possible for aircrafts to be communicated with before take-off and landing. All of these activities happen because of the availability of spectrum. Spectrum management is simply the process of regulating the use of radio frequencies to promote efficient use and gain a net social benefit. It ensures interference-free access to the radio frequency spectrum for as many users and uses as possible. Spectrum as a finite resource has to be managed judiciously so that the state and businesses gain the most from its usage.

The Broadcast Monitoring Centre where Engineers have a real-time overview of the technical output of authorised TV and FM stations

Mandate of the NCA on Spectrum Management

As the Communications Regulator, Sections 2 and 58 of the Electronic Communications Act, 775 (2008) mandate the National Communications Authority (NCA) to regulate the radio frequency spectrum for broadcasting and telecommunications in accordance with the applicable standards and requirements of the International Telecommunications Union and its Radio Regulations, as agreed to or adopted by the Republic. In carrying out this function, Section 67 (2) of Act 775 enjoins the Authority to identify, adopt or establish preferred technical standards in regulations or where necessary, require conformity to a stated standard. These standards form a part of the conditions of all frequency authorisations and the Authority is mandated by Section 62 of Act 775 to establish frequency monitoring stations to monitor compliance with standards.

Previous Approach to Spectrum Management - Spectrum Monitoring System (SMS)

In 2009, the NCA acquired the Spectrum Monitoring System (SMS) to among others;

- ***Monitor Authorisation and Licence conditions of operators***
- ***Conduct Radio Frequency Interference investigation***
- ***Find Directions***
- ***Identify illegal operators***

The Authority currently has five (5) mobile spectrum monitoring stations and four (4) fixed stations in Accra, Kumasi, Takoradi and Tamale. The Authority also has portable spectrum analysers to complement the work of the monitoring stations.

Gaps which require the Authority's Action:

The SMS provided effective spectrum monitoring but did not provide a mechanism for service specific signal analysis, especially for broadcasting services. Following the country's decision to migrate from analogue to digital, there was a need for detailed analysis of Digital Terrestrial Television (DTT) services to support this transition. For example, although the SMS can measure the signal strength of a DTT signal, it could not provide the modulation characteristics, bit rate and Service Information (SI) and Programme Specific Information (PSI), among others.
It was also imperative to conduct continuous monitoring of FM radio broadcasting services and Radio Data Services (RDS) with the use of adjacent frequency channels in the same location.
However, the SMS was unable to provide continuous unattended measurement of broadcasting services and did not have a mechanism to record broadcast transport stream for evidence during enforcement.

The Current Approach - Broadcast Monitoring System (BMS)

To bridge the gaps identified on the SMS, the Authority has since 2018 acquired the Broadcasting Monitoring System (BMS) to facilitate the comprehensive monitoring of broadcasting services. The BMS has been set up to serve as a complementing tool to the SMS by monitoring the technical requirements of FM and TV Authorisation holders and SMS.

The system comprises:

- Receiving system: **4 DVB-T2/S2** and **10 FM Tuners**
- Monitoring Work Stations
- Broadcast server and storage **(96TB)**

For TV Broadcasting, the system has the ability to monitor EPG information, Logical Channel Numbering, Encryption, Signal Strength, Signal Quality and Error Loggings (Frozen screen, Black screen, Silent audio), Sound/Video format, Loudness and other Technical parameters such as SI/PSI table information (EIT, NIT, PID, Transmission data rates etc.).

Key monitoring parameters for FM Broadcasting entails MPX Deviation (bandwidth use), Signal strength, RDS information and Audio levels.

This newly acquired tool enables the NCA to see at first-hand the technical operations of broadcast authorisation holders and to respond promptly to infractions. It also enables the Authority to obtain real-time measurements of FM Radio and television signal and service quality.

The main objectives of the BMS are:

- To monitor the quality of service of FM Radio and Television broadcasting stations.
- To determine the technical parameters of FM Radio and Television broadcasting stations.
- To provide recording and/or logging of both broadcast content and technical metrics.

Installations in Ghana

Currently, the NCA has deployed fixed stations in Accra, Kumasi and Tamale and mobile systems in Koforidua, Bolgatanga, Sunyani and the Head Office (Accra). The fixed stations will be expanded to cover Takoradi, Koforidua and Ho by the end of November 2019.

While the BMS installed at the Head Office facilitates the comprehensive monitoring of broadcasting services in and around Accra, the installations in the other regions provide in-depth off-air digital terrestrial television (DTT) and FM Radio monitoring in other parts of the country.

This decentralisation is significant since the National DTT network is designed to transmit on two multiplexes – a national multiplex on the same frequency with the same content throughout the country and Regional multiplexes with some channels specific to particular regions.

Benefits to Industry and Consumers

As a Regulator, the BMS has been of immense benefit to the NCA's Regulatory work.

Some of the benefits are:

1. The NCA is able to meet ITU-R requirements for measurement of FM and TV transmission parameters. For example, the 15 minute observation time required by ITU-R for FM deviation can always be met.
2. The Authority can show proof of deviations for enforcement in this era of Tribunal & Court suits from sanctioned stations.
3. Ability to provide DTT quality analysis for the National Network on real time basis. This will also provide technical information to support consumer education during the transition.
4. Ensuring better broadcast service quality for consumers.
5. Detection of unauthorised broadcasting service quality for consumers.

Engineers received training after the Authority purchased the new monitoring equipment

One of the monitoring equipment

"Spectrum Management is very important to us here at the NCA. Spectrum, which practically is a finite resource, has to be monitored and managed well for the benefit of all our stakeholders"

Prince Ofosu Sefah
Deputy Director General (Operations)

Continuing a process which started about a decade ago but which has been given real focus under the leadership of the current Director General – Mr. Joe Anokye, we have successfully decentralised our technical field operations to a number of regional capitals and this has gone a long way to enhance the execution of the mission of the National Communications Authority (NCA).

Spectrum management is very important to us here at the NCA. Spectrum, which practically is a finite resource, has to be monitored and managed well for the benefit of all our stakeholders. Accordingly, we continue to refine our processes and systems to do this work well. A key part of the refinement of processes, is the decentralisation of our field (Zonal) operations with eight Offices throughout the country.

Having State-of-the-Art systems to monitor and ensure compliance to regulatory requirements for the benefit of all stakeholders, in alignment with the NCA's vision to be a World-Class regulator and maintain our hard-won reputation as a leading regulator in Africa, is a key commitment.

Under the current leadership, we are investing in these systems not just in our Corporate Head Office but across our decentralised operations in various regional capitals, giving us unprecedented monitoring presence throughout the country. Our main goal here is to improve the quality of telecommunication services for the people of Ghana.

TYPE APPROVAL (CONFORMANCE)

"We are constantly checking to ensure that the communication equipment such as phones, laptops, TV sets, etc that consumers use are safe. We also ensure that telecom masts are safe and do not harm communities"

Participants of an ITU/NCA training at the SAR Lab

Background

During a number of the Authority's public consultation and media sensitisation workshops and consumer outreach drives, it was revealing how members of the public did not realise that the phones they use had impacts on how clear their phone calls are, the potential of fake devices catching fire or harming them. The prevalence of fake devices is very common in sub-Saharan Africa. What the NCA has sought to do is to ensure that it fully exercises its mandate by ensuring that the electronic communications equipment that enter the Ghanaian market are safe to use and meet the international standards Ghana has aligned with.

In recognition of the importance of conformance and interoperability to the socio-economic development of Ghana, the NCA has implemented various initiatives to address issues including safety consideration and consumer experience. A key objective of the Authority is to protect the health and safety of consumers and telecommunications networks. This objective has resulted in the Authority conducting Type Approval of Equipment Authorisation to ensure that all electronic communications equipment used in the country comply with international standards that are applicable in Ghana. Type Approval of Electronic Communications Equipment is also conducted to ensure amongst other considerations that, no substandard equipment which may present health and safety hazards to consumers in general are operated in this country.

Mandate of the NCA on Type Approval (Conformance)

The mandate of the NCA as it pertains to Standards (Type Approval) is comprehensively outlined. Section 3(n) of the National Communications Authority Act, 2008, Act 769 allows that for the purpose of achieving its objective, the Authority shall certify and ensure the testing of communications equipment for compliance with international standards; and environmental health and safety standards including electromagnetic radiation and emissions. Further to this, Section 66 of the Electronic Communications Act, 2008, Act 775 states that any terminal equipment sold or otherwise provided in this country may be connected to a public electronic communications network if the Authority certifies that the terminal equipment is safe for the user; is in compliance with international standards; and environmental, health and safety standards including standards for electromagnetic radiation and emissions; meets the requirements of electromagnetic compatibility provisions of international treaties relating to electronic communications; does not pose a risk of physical harm to the network; effectively utilises the electromagnetic spectrum and prevents interference between satellite and terrestrial-based systems and between terrestrial systems; and is compatible with the network. The NCA is also mandated to recognise similar approvals from other jurisdictions that it may specify.

Previous Approach to Type Approval (Conformance)

Before the current regime, the Authority had two different approval procedures for Equipment Authorisation – Certification and Port Inspection as well as Type Approval Guidelines to help streamline type approval activities.

Manufacturers or Importers had to present test results from certified institutions or Laboratories about the intended device to be imported into the country.

The results amongst others indicated the radio frequency energy being radiated by the device.

When the device is found to be compliant, that is if it meets the relevant technical standards, the NCA certification was then issued.

Gaps which required the Authority's Action

Some gaps were identified that needed bridging by the NCA;

1. The NCA solely relied on the test reports submitted as part of the application requirements. There were no facilities to conduct testing or verifications where required and also to test during market surveillance.

2. The Type Approval Guidelines have been the main document outlining the requirements for the Type Approval process. A guideline is not a legislative instrument and therefore cannot be enforced in a court of law.

3. Additionally, Applications for Type Approval were done manually by the submission of applications at the offices of the NCA. The Type Approval application documents are bulky. As a result, the review process and approval certificate took a long time to complete.

4. The list of Type Approved electronic communications equipment (ECE) were not being published by the Authority.

5. There was also no link between the Type Approval process and ECE imported into the country.

The Current Approach to Type Approval (Conformance)

Taking cognisance of these gaps, the NCA has strengthened its Type Approval regime. The following have been implemented in this regard;

1. The NCA has a Type Approval Guideline that clearly outlines the requirements for the Type Approval application process including the lead time for reviewing the applications.

2. The Authority in collaboration with the Ghana Standards Authority has adopted and adapted identified international standards for the Type Approval regime. The work was achieved through the National Standardisation Committee on ICT, known as the TC24, which was set up by the Ghana Standards Authority. The committee is made up of representation from the National Communications Authority, Ministry of Communications, academia, industry, the Ghana Institution of Engineers and the Ghana Standards Authority.

3. Type Approval Regulations are being developed to help make provisions and requirements enforceable by law. The regulations have been drafted; public consultation and media sensitisation workshops have been held across the country. Further meetings and consultations will go on with industry players before it is submitted to Parliament.

4. A Type Approval Management System has been developed to enable applicants to submit their applications online. The Type Approval Management System also has a database of all electronic communications equipment Type Approved by the NCA. The database is accessible to the public including officials of Ghana Customs.

5. The Type Approval Management System also has a database of all the entities that have been issued dealership licences by the NCA.

6. Marking requirements have been outlined in the draft Type Approval Regulations. The NCA will ensure that all Type Approved electronic communications equipment have been marked as per the provisions in the regulations.

7. The NCA has established Type Approval Testing Laboratories to enable it to test and verify electronic communications equipment that are going through the Type Approval process, where necessary. The laboratories will also aid the market surveillance efforts of the NCA.

8. There are four Type Approval Testing Laboratories. These are Specific Absorption Rate (SAR) testing laboratory, Electromagnetic Field (EMF) measurements, Digital Terrestrial Television (DTT) receiver testing laboratory and Radio Frequency and Signalling (RF&Sig) testing laboratory.

9. There is now a link between the type approval process, port inspections and GCNet system making it difficult to clear equipment which is not Type Approved.

Benefits to Industry and Consumers

At the core of these regulatory interventions is the benefit it has for the industry, consumer, and indeed the state.

For consumers:

- Increased consumer access to safe and quality ICT devices.
- Enhanced consumer quality of experience on networks.
- Guaranteed environmental safety and health of users of ECE.
- Ability to check counterfeit ICT devices and facilitate secured digital transaction.

For Industry:

- Reduces the circulation of fake ICT devices.
- Decreasing time-to-market for companies manufacturing telecommunication equipment with shorter product life cycles, thus maximising export opportunities and allowing for rapid re-investment in research and development for next-generation technologies.
- Prevents damage/interruption to interconnected networks.
- Ensure effective use of the frequency spectrum.
- Avoid interference to other communications systems.
- Facilitates the availability of quality equipment to operators.
- Promotes interoperability between communications networks.
- Promotes the development of communications networks including the supply of Electronic Communications Equipment by qualified suppliers.
- Ensures conformance to national and international standards.
- Checks counterfeit equipment and facilitates secured digital transaction.

RF Signaling equipment at the NCA Type Approval Lab

Specific Absorption Rate (SAR) Testing Laboratory, Accra

"The Health and Safety of the Consumer was at the heart of the decision to establish the Type Approval Labs"

Ms. Olivia Quartey
Deputy Director General
(Managerial Operations)

The quest for standardisation is one that the Authority has always taken seriously and pursued vigorously over the years. This is largely because the issue of substandard devices and its impact on consumers is one that the Authority considers critical.

It is for that purpose that the Authority established the Type Approval Labs to protect the health and safety of the Consumer. We needed to ensure that electronic communications equipment used on the Ghanaian market are safe, and to also assure our people that the telecommunications space is safe.

It is particularly thrilling for us that on the continent, we are one of the few Regulators who have established this lab and the International Telecommunications Union (ITU) is partnering with us to train other regulators on the continent and across the world.

The NCA is in the process of drafting Type Approval Regulations to streamline type approval activities.

This is the first time that this is being done and we are happy to be executing our mandate to the benefit of the industry, government and consumers especially.

CAPACITY BUILDING INITIATIVES

WITH THE INTERNATIONAL TELECOMMUNICATIONS UNION (ITU)

In 2019, two key capacity building programmes took off under a collaboration with the International Telecommunications Union (ITU). The organisation of the two training programmes demonstrates the NCA's pedigree in possessing the requisite human resource as well as infrastructure to meet the requirements of the ITU.

The two programmes are Quality of Service Training Programme and the Conformance and Interoperability Testing Training Programme.

ITU-NCA Quality of Service Training Programme

The Quality of Service Training Programme (QoSTP) is a training programme developed under the auspices of the International Telecommunications Union (ITU) Human Capacity Unit and reviewed by ITU-T Study Group 12, the lead study group on Performance, Quality of Service (QoS) and Quality of Experience (QoE).

The QoSTP provides a set of modules for training in the theory and practice of Quality of Service (QoS) and Quality of Experience (QoE) planning, monitoring, analysis, and in their regulatory aspects in various areas of telecommunications. The NCA has been selected by the ITU as a training partner for the delivery of the QoSTP.

This provides an opportunity for ITU Member states and sector members to learn and share knowledge of practices in Quality of Service and Quality of Experience (QoE) in Ghana and across the world.

Conformance and Interoperability Testing Training Programme

The National Communications Authority (NCA) has commenced the first-ever training programme on Conformance and Interoperability Testing for members of the International Telecommunications Union (ITU) within the African Region. The training programme is designed to build capacity for Regulators on regulatory framework and practical Specific Absorption Rate (SAR), Radio Frequency (RF), and Electromagnetic Fields (EMF) tests, as well as facilitate the creation of basic lab facilities. Conformance testing is to determine whether an electronic communications equipment meets specific standards, while Interoperability testing measures if two or more equipment can work with each other.

The training programme, which is being co-sponsored by the ITU, drew participants from over ten (10) English-speaking countries – including Somalia, Tanzania, Uganda, Malawi and South Sudan.

Participants of the first ITU/NCA Conformance and Interoperability training in a group photograph with some management staff of the NCA, including Director General, Joe Anokye.

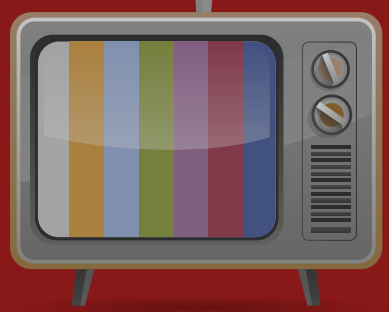
Training in progress at the NCA Tower in September 2019.

Participants of the 2nd Conformance and Interoperability training in a group photograph.

Summary of Television Broadcasting Stations in Ghana

as at September, 2019

- 2 Analogue Terrestrial Television
- 35 Digital Terrestrial Free-To-Air Television Programme Channel (Nationwide Coverage)
- 6 Digital Terrestrial Free-To-Air Television Programme Channel (Regional Coverage)
- 1 Digital Terrestrial Pay Television (Service only)
- 5 Digital Terrestrial Pay Television (Service and Frequency)
- 0 Digital Terrestrial Television (Network only)
- 8 Digital Terrestrial Radio Service on TV Multiplex
- 5 Satellite Television Broadcasting (Pay TV Direct-To-Home Bouquet)
- 9 Satellite Television Broadcasting (Free-To-Air Direct-To-Home Bouquet)
- 65 Satellite Television Broadcasting (Free-To-Air Direct-To-Home Single Channel)
- 0 Digital Terrestrial Television additional Services (eg. Teletext, etc)
- 0 Digital Terrestrial Mobile Television Service (Stand-alone Authorisation)
- 1 Digital Cable Television
- 1 Television over Internet Protocol (Pay TV)



- TOTAL NO. OF AUTHORISED TV STATIONS **138**
- TOTAL NO. OF STATIONS ON AIR **96**
- TOTAL NO. OF STATIONS NOT ON AIR **42**

Summary Statistics of FM Stations in the Country

Authorised VHF-FM Radio Stations as at September, 2019

Total number of Authorised FM Stations 477

Total number in operation 382

CONSUMER AND STAKEHOLDER EDUCATION DRIVES

The Authority continually conducts consumer education campaigns targeted at various stakeholders. These form part of the Authority's efforts at educating consumers on various issues including their rights and responsibilities and other topics of consumer interest.

They are sometimes also conducted on the back of celebrations such as the World Consumer Rights Day, World Telecommunications and Information Society Day (WTISD), Public Consultative Workshops, etc.

In 2019, these consumer engagements were carried out as usual. Below are some images from the engagements:

A section of the audience at the NCA Tower during the World Information Society Day celebrations in May 2019.

Public Consultative Workshops are one of the effective consumer interactions activities of the NCA.

Consumer outreach in Ho as part of NCA's public consultative processes.

NCA staff conduct one-on-one engagements with consumers.

Part of the tactics of our engagements sometimes involve the use of sketches or drama.

One-on-one interactions with some consumers in a market.

There are sometimes street possessions leading up to the public interactions. Local celebrities are also used in the process.

A snapshot of some consumer engagements

Participants of an ITU/NCA on a tour at the Type Approval laboratory.

Director General of the NCA, Joe Anokye presents a Certificate of Participation to a participant at one of the ITU-backed training programmes. With them is the Deputy Director General (Managerial Operations), Ms. Olivia Quartey.

Participants at a training session at the NCA Tower.

Participants at the ITU-backed training organised by the NCA in Accra visit the Communication Monitoring Centre.

Participants of the ITU-backed training session in a group photograph with trainers and some management staff of the NCA.

BENCHMARK VISITS BY REGULATORY AGENCIES FROM THE CONTINENT AND OTHERS

The NCA regularly gets request from educational institutions, various identifiable stakeholders in the communications industry and other regulators across the continent for benchmark visits.

For 2019, NCA had visits from the Tanzania Communications Regulatory Authority (TCRA), Angola Institute of Communications (INACOM), Zambia Information and Communications Technology (ZICTA) among others.

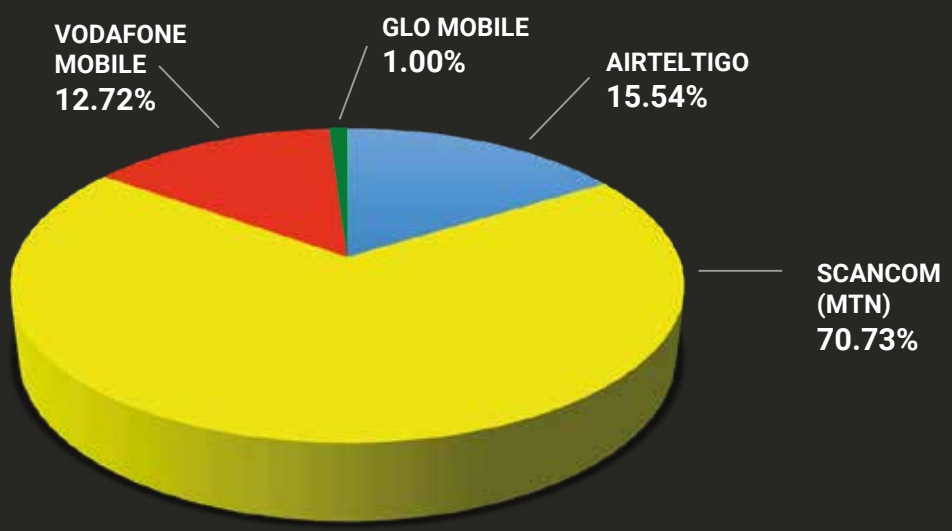
A group photograph of the Zambian delegation with their colleagues from the NCA.

The three-man Zambian team that visited the NCA.

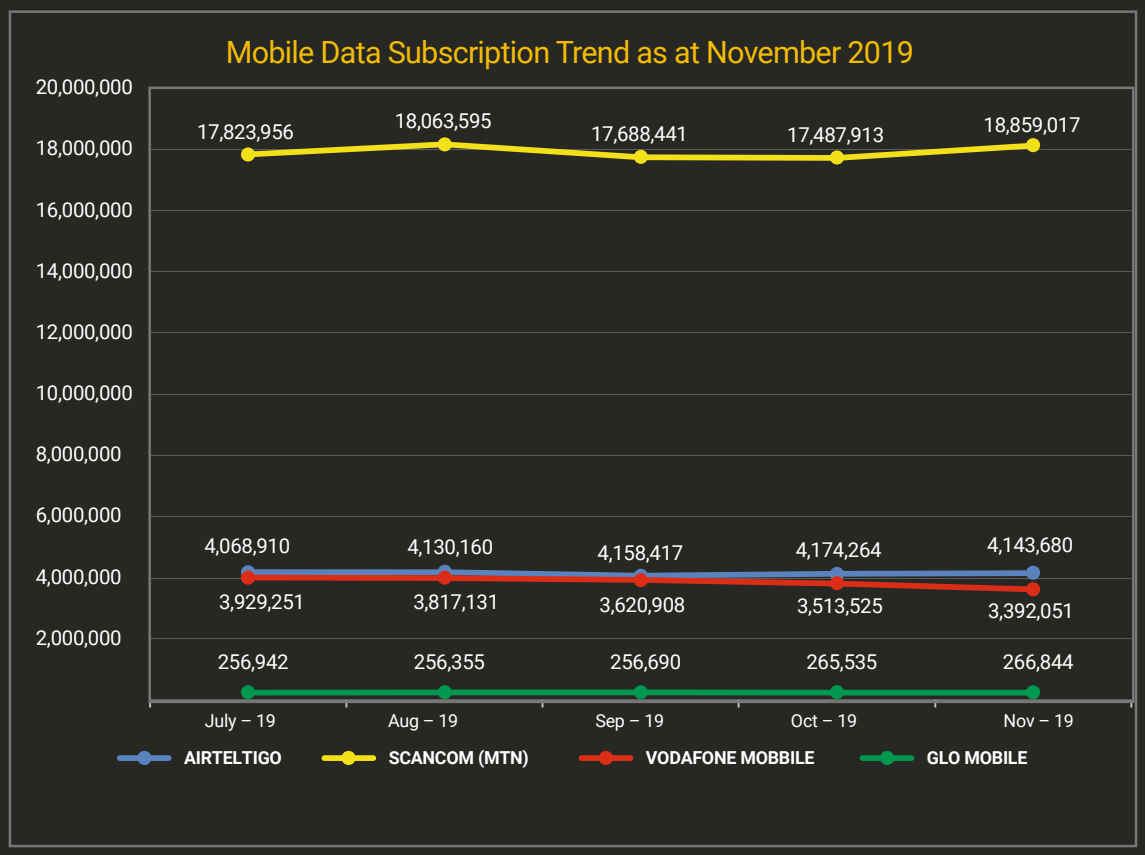
Students of the Radio Signaling School of the Ghana Armed Forces at the NCA Communication Monitoring Centre

Participants of the 2019 Africa Endeavor programme at the NCA-CERT

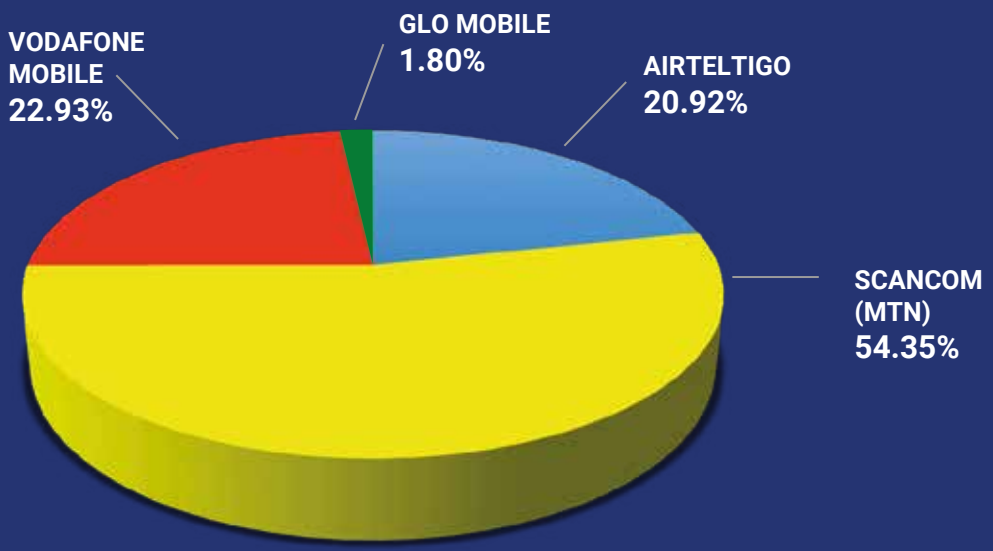
2G/3G Mobile Data Market Share for November 2019



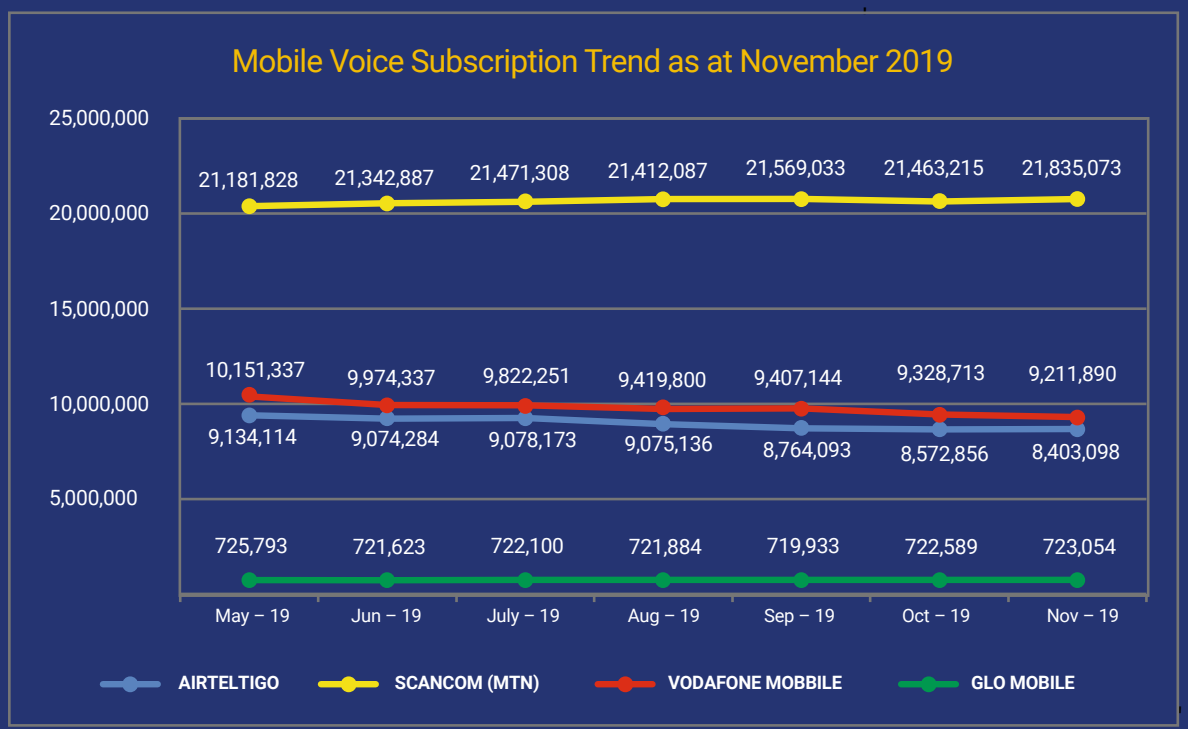
2G/3G Mobile Data Subscription for November 2019



Mobile Voice Market Share for November 2019

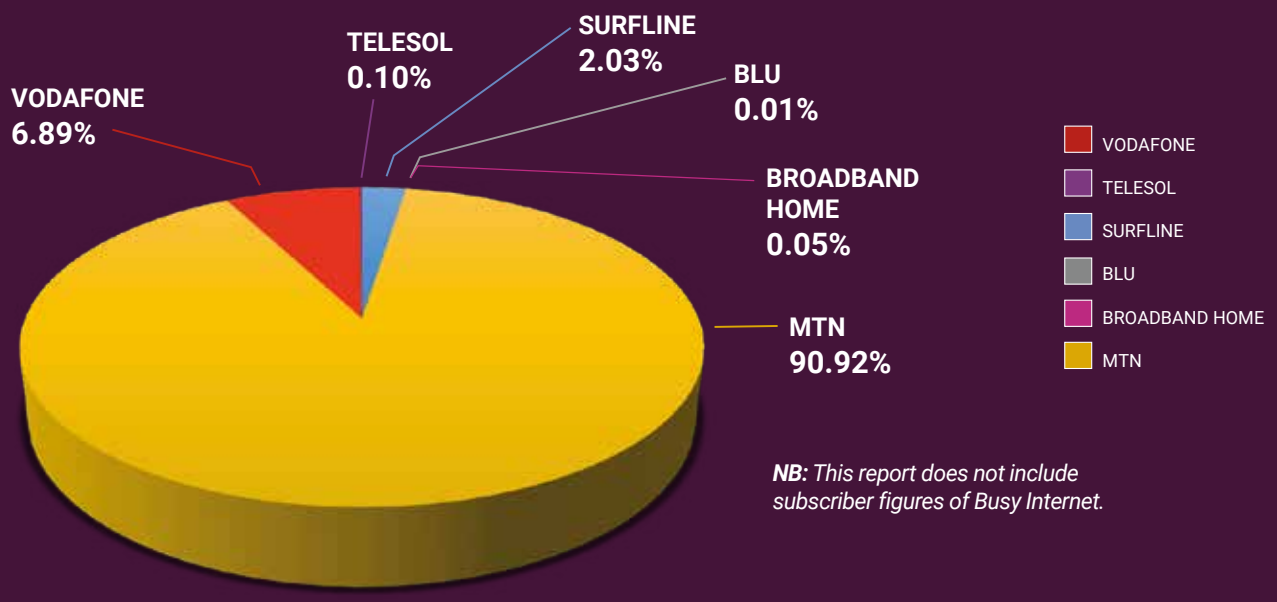


Mobile Voice Subscription Trend as at November 2019



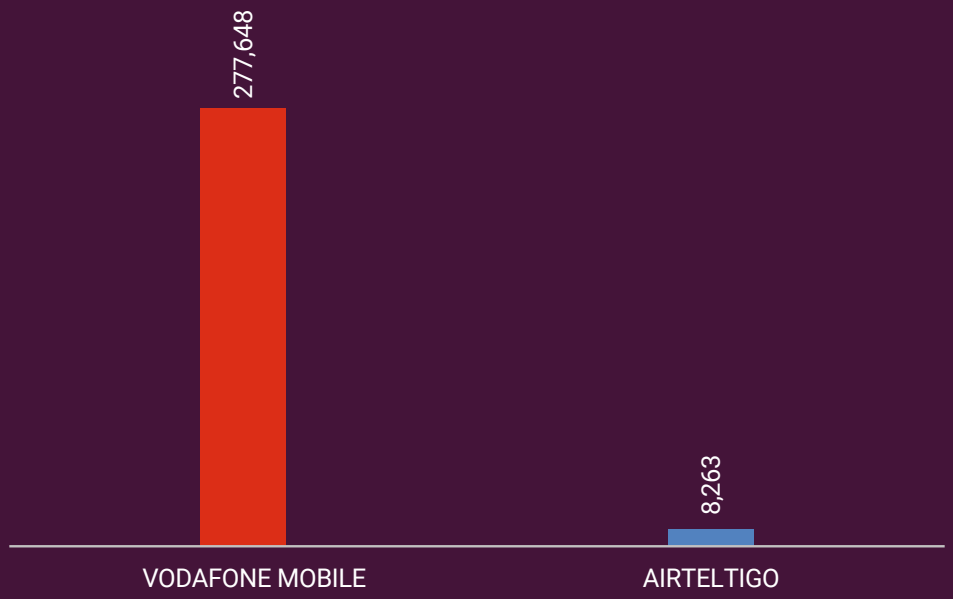
4G Data Market Share for November 2019

Market Shares (Mobile Voice) – November 2019



NB: *This report does not include subscriber figures of Busy Internet.*

Fixed Telephony Subscriptions for November 2019



Appreciation

It is very gratifying from the standpoint of the regulator that we have prioritised our needs for the industry, and in doing so, taken aboard the issues that matter most to consumers and our stakeholders.
We will like to thank the various stakeholders and consumers that we work with. Keep on giving us feedback based on your relationship with service providers and the many services that we regulate. The continuous feedback added to our outlined plans as the regulator will go a long way in ensuring that we derive the needed value from our investments in the communication space.
The Board, Management and Staff of the NCA are grateful to the Minister for Communications, Hon. Ursula Owusu-Ekuful (MP) and the entire staff of the Ministry for their support and policy direction. The continuous success of the Authority is largely hinged on the deep working relationship that exists between the Ministry and us.
We are also grateful to the following for their various contributions to the work of the Authority:

- His Excellency the President, Nana Addo Dankwa Akufo-Addo
- His Excellency the Vice President, Dr. Mahamadu Bawumia
- The Chief of Staff, Madam Frema Osei-Opare
- The Minister of Finance, Hon. Ken Ofori-Atta, and the Ministry of Finance
- The Minister of Information, Hon. Kojo Oppong-Nkrumah, and the Ministry of Information
- Minister for National Security, Hon. Albert Kan-Dapaah
- The Chairman of the Parliamentary Select Committee on Communications, Hon. Frederick Opare-Ansah and Members of the Committee
- Board Chair of the NCA Board of Directors, Kwaku Sakyi-Addo, and Members of the Board
- The Leadership of the Ghana Revenue Authority
- Chief of Defense Staff, Lt. Gen. Obed Akwa
- The National Cyber Security Advisor, Albert Antwi-Boasiako
- Mobile Network Operators and other Service Providers

I will also want to commend the Management and Staff of the National Communications Authority for their continuous dedication to work and to the state.

***Joe Anokye,** Director General*

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