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**Abridged report on the monitoring of quality of service of the
cellular mobile operators serving Gauteng Province – conducted
by ICASA in financial year 2019/2020 Quarter 1**

1. Introduction

This report is produced for the benefit of consumers that may not have the time to read the full report and would like to (a) have a better understanding of the monitoring of quality of service (QoS) of cellular land mobile network operators and, (b) to understand the results of the Authority's monitoring exercise in the Gauteng Province during the period 27 May 2019 to 13 June 2019. The report is based on the extended report on the monitoring titled "2019/20 Quarter 1: Voice Quality of Service Report – Gauteng Province".

Section 2 describes what the quality of a network is about and how measurements are conducted. Section 3 details why ICASA conducts QoS monitoring, while Section 4 focuses on the measurements that were conducted in the Gauteng Province. Section 5 gives the key results for the four operators (ECNS/ECS licensees) Cell C, MTN, Telkom and Vodacom. Section 6 gives the conclusion.

2. What is network quality of service and how are measurements done?

Quality of Service (QoS) measurement refers to the exercise of measuring the performance of services that are delivered over mobile networks. It provides an indication of what a customer experiences when using his/her cellphone on the cellular mobile network.

Only voice services are topical for this report. However, the Authority is in the process of establishing a capability to also monitor the quality of data services.

A drive-test method is used to measure the QoS. Drive-testing is a method of measuring the coverage, capacity and performance levels of a mobile network. Vehicles used are equipped with mobile radio equipment similar to a cellphone. The equipment can automatically make cellphone calls while driving. It makes calls in much the same way as a user would, but in a controlled and predetermined way. Measurements include a broad range of parameters of mobile cellular services.

Drive-tests are usually done on public roads. However, in villages, where public roads often do not exist, the vehicles may stop for a set of measurements and then advance to another point.

During a monitoring campaign for a particular province (which may take several weeks) the measurements are confined to a specific geographic region or regions. Specific regions are used for testing because it is not possible to survey an area as large as a province within the time and resources available. Fundamentally the measurements therefore represent a sampling of the network's performance.

When conducting measurements, calls would be initiated and maintained for a length of time. While doing so, it would be determined how easily a call is set up – whether the call is set up when first dialling, or whether there needs to be multiple attempts. Calls are of a standard length of time and during this period the system would also record whether a call is dropped. For voice calls, call set-up success ratio and call drop ratio are key elements in establishing quality of service (more on these aspects in section 3).

The whole process of making the calls is well controlled and parameters are automatically registered. Together with the measured values of the network parameters, the geographic position of every measurement is registered by means of a built-in GPS device. All information is recorded in files, called logfiles, for post-measurement processing.

Technical standards apply for the measurements and there is also a subscriber service charter that guides the Authority.

3. Why is ICASA conducting QoS measurements?

The Authority conducts these quality-of-service measurements to ensure that the operators (service providers) maintain a reasonable level of quality of service delivered to their customers.

The key performance indicators (KPIs) measured are: Accessibility, Retainability and Response Time. In definition: *accessibility* refers to the ability to set up a call; *retainability* refers to ability of the network to retain the call, i.e. not drop it and *response time* measured through Call Setup Time, refers to the time interval from the instant a user initiates a network connection request until a complete message indicating call disposition is received by the calling terminal.

To be more specific:

- Accessibility is measured through Call Setup Success Ratio (CSSR);
- Retainability is measured through Drop Call Ratio (DCR); and
- Response time is measured through Call Setup Time.

The targets of the above, are stipulated in the End-User and Subscriber Service Charter of 2016.

4. Monitoring that was done in Gauteng Province

The Authority conducted QoS measurements in the Gauteng Province on the networks of the cellular mobile operators; Cell C, MTN, Telkom and Vodacom. The measurements were carried out between 29 May to 13 June 2018 and covered a total distance of over 1800 km.

The measurements were conducted in areas and in circumstances where the mobile service is likely to be frequently and widely accessed. These areas include major towns, townships, farm areas, other rural areas, major road arteries, areas of major economic activity nodes and areas that generated previous complaints. The sampled areas include Pretoria West, Pretoria North, Bronkhorstspuit, Boksburg and Evaton.

Focus on the above regions was aimed at collecting sampled data that well represent the experience of the general public in an important and representative part of the province.

5. Key results

This section provides a summary and key finding of all measurements. The results give a snapshot of the mobile network performance and customer experience at these locations during the measurement period.

The results indicate that the quality of service and operators' network performance vary significantly on a per-location basis.

In terms of overall retainability (Drop Call Ratio) results, all operators met the overall Drop Call Ratio target of less than 3%, thus meeting the Retainability target.

In terms of overall accessibility (Call Setup Success Ratio), Cell C, MTN and Vodacom met the target of 98%. Telkom failed to meet the 98% target.

In terms of overall response time (Call Setup Time), all operators met the target of 20 seconds as prescribed in the End-User and Subscribers Service Charter Regulation of 2016.

The detailed report was shared with the mobile operators in order for them to share their plans and remedial action to address issue of poor performance. The improvement plans and remedial actions are provided below.

5.1. Vodacom

Vodacom provided feedback and network improvement plans that are in place for the areas that were identified to be negatively affecting customer experience by the Authority's QoS monitoring and shared the following remedial actions:

- Bronkhorstspruit route – The drop calls in the area were caused by congestion in transmission which was as the results of capacity upgrades that were done on the access network. These capacity upgrades added strain on the transmission network which resulted in poor performance. The microwave capacity (transmission network) was increased on 14 June 2019 and has since reduced failures.
- Boksburg and Sunward Park areas route – On the 6th of June 2019, the area had few sites that were out of service due to Dark Fibre Africa (DFA) fibre cut. One of the sites covering the area was also down due to power. Two

(2) new sites are planned to be built in the poor performing areas by March 2020.

- Evaton route – RF optimisation and capacity improvement to improve poor performance areas will be completed by 30 September 2019.
- Pretoria West route - Plans to build a new site in the area to resolve coverage issues.

Vodacom provided the above remedies to improve service in all areas irrespective of meeting all the targets.

5.2. MTN

MTN promised to remain committed to continuously improve the service across their network irrespective of the good performance demonstrated by the Authority's report.

5.3. Cell C

In order to provide Cell C subscriber with good quality of service, Cell C constantly engage with roaming partners to improve network coverage in affected areas.

Cell C's plans and remedies to improve the low performance areas include the following:

- Pretoria North – Network optimisation underway.
- Bronkhorstspuit route – Stability of Eskom and increased vandalism to be addressed.
- Boksburg route – Cell C is experiencing external interference and plans to formally lodge a complaint with the Authority.
- Evaton route – A service site experienced issues while the Authority was conducting measurements, the issue has since been resolved. Transmission is also required.

5.4. Telkom

Telkom gave the following response to the Authority's draft report:

Telkom has a new roaming agreement that went live nationally on 1 July 2019, the agreement will have a positive effect on Telkom's network coverage. This agreement includes 4G/LTE roaming and seamless call handover between network

and will also significantly improve Telkom's overall network voice and data quality, especially in areas where it has limited or no network coverage.

Telkom plans to further shut-down its GSM network. This is expected to improve the customer experience as all the GSM traffic will be carried through a roaming partner.

- Bronkhorstspuit route – a total of 11 sites planned are in the built and survey phase.
- Evaton route – a total of 12 sites planned are in the build and survey phase.

6. Conclusion

The monitoring method provides a snapshot of an operator's network performance, from the users' point of view, on the selected routes and the particular time of day. Although this is not necessarily a true representation of the mobile service providers overall network performance, enough understanding has been gained to assess that it could be difficult for a user to initiate a call in some of the tested areas. It also means that if the user succeeds in initiating a call and the call is established, then there is a likelihood that the call will be dropped before the user completes his/her conversation. Although users may be frustrated sometimes by not being able to make a call, or to have a call dropped, users will still be highly likely to get a reasonable service from any of the operators.

On the positive side, the operators have taken note of the results obtained by the Authority. The operators have undertaken to further investigate and have future network infrastructure investments to improve their respective networks in the areas of concern.

As we benchmarked the operators in Gauteng Province, the results showed that in terms of overall Call Setup Success Ratio, MTN, Cell C and Vodacom met the target of 98%, thus meeting the Accessibility target. At an area level, Cell C, MTN and Vodacom met the 98% CSSR target in all tested areas. Telkom failed to meet the CSSR target in Bronkhorstspuit and Evaton.

All operators met the overall Drop Call Ratio target of less than 3% and thus met the Authority's Retainability target. At an area level, MTN and Cell C met the 3%

DCR target in all tested areas. Telkom and Vodacom met the DCR target in Pretoria West, Pretoria North, Boksburg and Evaton but failed to meet the target in Bronkhorstspuit.

All operators met the Call Setup Time target of less than 20 seconds in all the tested areas as per the End-User and Subscribers Service Charter Regulations of 2016.