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**Abridged report on the monitoring of the quality of service of the
cellular mobile operators serving North West Province – conducted
by ICASA in 2017/2018 Quarter 2**

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 North West Province during the period between 31 July and 22 August 2017. The report is based on the extended report on the monitoring titled “Quality of Service Report: North West Province 2017/18 Quarter 2”.

Section 2 describes what the quality of a network is about and how the measurements are conducted. Section 3 details why ICASA conducts QoS monitoring, while Section 4 focuses on the measurements that were conducted in North West Province. Section 5 gives the key results for the four operators (licensees) Cell C, MTN, Telkom Mobile 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 – i.e. 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 does 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 two key performance indicators (KPIs) measured are fundamentally the accessibility of the network for calls and the ability of the network to retain the call, i.e. not drop it. The generic name for the ability to set up a call is *accessibility*. *Retainability* is a generic name used to refer to the ability to not drop calls. In technical terms one measures the accessibility by a parameter called Call Setup Success Ratio (CSSR) and the retainability by a parameter called Drop Call Ratio (DCR).

More specifically, the Call Setup Success Ratio (CSSR) is the fraction of the attempts to make a call that result in a connection to the dialled number, whilst the Dropped-Call Ratio (DCR) is the fraction of the calls which, due to the network, were cut off before the speaking parties had finished their conversation. Satisfactory performance applies when at least 98% of calls are set up on the first attempt in dialling and if not more than 3% of calls are dropped.

4. Monitoring that was done in North West Province

The Authority conducted QoS measurements in Limpopo Province on the networks of the cellular mobile operators Cell C, MTN, Telkom and Vodacom. The measurements were carried out between 31 July and 22 August 2017 and covered a total distance of over 2500 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 previously generated complaints. The sampled areas include Makapanstad, Moretele, Letlhabile, Ventersdorp and Potchefstroom. QoS measurements were conducted in North West Province before in 2016/17, and the recent QoS measurements were conducted in different areas.

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

5. Key results

This results section of the full report provides the summary and key findings 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 end-users' quality-of-service and operators' network performance vary significantly on a per-location basis.

In terms of overall retainability (Drop Call Ratio) results, only Telkom met the DCR target of less than 3%, thus meeting the retainability target. Cell C, MTN and Vodacom did not meet the retainability target as their DCR values were above the 3% target. There was no statistically significant difference in the results between Telkom, Cell C and MTN. However, there was statistically significant difference in results between Telkom and Vodacom.

In terms of overall accessibility (Call Setup Success Ratio), all four operators (Cell C, MTN, Telkom and Vodacom) were below the 98% target. There was no statistically significant difference between MTN and Vodacom results nor between Telkom and Cell C. There was a statistically significant difference in results between Vodacom and Cell C, and Vodacom and Telkom. The results also showed a statistically significant difference between MTN and Cell C, and between MTN and Telkom.

The results of this QoS monitoring report were shared with all the operators for comments and network improvement plan. The summarised remedial actions are listed below:

5.1. Vodacom

Vodacom shared the following remedial actions to address poor coverage and quality of service in the affected areas:

- Moretele and Makapanstad – Two new sites are planned and the projected on-air date is in September 2018.
- Letlhabile – Eight new sites are planned and the projected on-air dates are in January, June and September 2018.
- There is no 3G coverage in the Tladistad, Kgomo-Kgomo and Makapanstad but sites are planned to resolve the QoS issues.

5.2. MTN

MTN submitted the following remedial actions to address poor coverage and service quality in the areas:

- Makapanstad route – Down tilting has been done on one site in order to reduce pilot pollution on the 3G network.
- Lephallale route – Two new sites are planned to improve coverage.
- Letlhabile route – The operator is in the process of upgrading two sites, and an additional new site is awaiting integration into the network. These improvements will improve capacity and coverage in the area.
- Ventersdorp route – Addition of a new site is being prioritised to address lack of coverage on the outskirts of the area. In addition, two other sites have undergone optimisation.
- Potchefstroom route – Three sites have been optimised and an additional new site is planned south of Wilgeboom.

Since the time the Authority conducted the drive tests, MTN has initiated a process to add three new sites and has upgraded two existing sites and conducted optimisation of six cells to address coverage and quality aspects.

5.3. Cell C

Cell C highlighted the lack of its own networks' coverage in some of the areas tested. In these areas Cell C relies on national roaming arrangements with Vodacom's network. In summary, the poor performance was attributed to the following:

- Lack of seamless roaming/handover between the Cell C and Vodacom networks. Cell C relies on its national roaming arrangement with Vodacom in some of the areas specified in the Authority's report. Roaming provides coverage where Cell C's own network does not have coverage.

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

- Cell C has project plans for the future to have site roll-out, capacity and transmission routes improved and optimised in the low performing areas.
- Cell C is further testing seamless handover with its roaming partner Vodacom.
- New sites are planned to be built in poor performing areas.

6. Telkom

Telkom is generally pleased with the test results conducted in the North West Province. This was because Telkom was the only operator that met the Authority's KPI measurement target for the overall Drop Call Ratio (DCR) of less than 3% in the tested areas, thus meeting the retainability target. The operator also highlighted the following in its response:

- As a fourth entrant in the mobile market, the operator depends on national roaming agreement with MTN to cater for areas with limited or no Telkom coverage. Telkom acknowledges that the roaming agreement is particularly important as it doesn't have access to the 900 MHz frequency band, while Vodacom, MTN and Cell C has the 900 MHz spectrum.
- Telkom has already planned additional sites in both Makapanstad and Moretele areas, which are in the Initial Site Survey and Build phase. These additional sites will further improve coverage and quality of services.

- In Ventersdorp area, Telkom currently does not have any sites planned and will therefore continue to depend on the roaming partner to serve their customers.
- Telkom currently does not have any planned sites within the Letlhabile, Ventersdorp and Potchefstroom areas. However, Telkom will work on improving coverage in these areas through either planning more sites or engaging with their roaming partner to improve the quality of service provisioning to their customers.
- Telkom reiterated that their current Service Level Agreement with the roaming partner does not discriminate between Telkom and MTN customers in terms of the quality of service provisioning and applies on a national basis. Telkom therefore expects their customers to enjoy a similar QoS as experienced by MTN customers.

7. 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 when 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. However, the degree to which the operators' results are below the standard is not very large. Although users may be frustrated sometimes by not being able to make a call, or to have a call dropped, users will still be able 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 future network infrastructure investment to improve their respective networks in the areas of concern.