



350 Witch-Hazel Avenue, Eco Point Office Park
Eco Park, Centurion.
Private Bag X10, Highveld Park 0169
Telephone number: (012) 568 3000/1

**Abridged report on the monitoring of quality of service of the
cellular mobile operators serving Western Cape Province –
conducted by ICASA in financial year 2018/2019 Quarter 4**

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 Western Cape Province during the period 25 January 2019 and 12 February 2019. The report is based on the extended report on the monitoring titled "2018/19 Quarter 4: Voice Quality of Service Report – Western Cape 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 Western Cape 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, call drop ratio, call setup time and speech quality 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 Response time and Speech Quality. 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; *response time* refer to the time it takes for the user to connect to the nearest serving or base station and *speech quality* refers to the user's ability to hear the audio voice clearly.

To be more specific:

- Accessibility is measured through Call Setup Success Ratio (CSSR);
- Retainability is measured through Drop Call Ratio (DCR);
- Response time is measured through Call Setup Time; and
- Speech Quality is measured through the Mean Opinion Score.

The targets of the above, are stipulated in the End-user Service charter of 2016.

4. Monitoring that was done in Western Cape Province

The Authority conducted QoS measurements in the Western Cape Province on the networks of the cellular mobile operators; Cell C, MTN, Telkom and Vodacom. The measurements were carried out between 25 January 2019 to 12 February 2019 and covered a total distance of over 3000 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 George, Malmesbury, Paarl, Saldanha and Worcester.

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, MTN and Vodacom are the only operators that met the overall DCR target of less than 3% and thus met the Authority's Retainability target.

In terms of overall accessibility (Call Setup Success Ratio); Cell C, MTN and Vodacom achieved more than 98% CSSR values, thus met the Accessibility target

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

In terms of speech quality (Mean Opinion Score), Telkom is the only operator that failed to meet the target.

The detailed report was shared with the affected 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 report and shared the following plans and remedial actions:

- Paarl route - An additional sector on the serving site will be added to focus in the problem area. UMTS 900 will also be implemented to improve 3G coverage penetration in this area. Optimisation will be initiated on the serving cells and retrialing will be scheduled to ensure that the problem has been resolved.
- Malmesbury route - All soft changes such as Parameter optimisation and Neighbour additions have been completed for this area. Regional team will re-test this area to ensure that all issues are resolved.

Furthermore, there are challenges in securing new sites in the areas around Paarl Nature reserve since it is zoned as "Green" according to the Environmental Impact assessment policies.

5.2. MTN

MTN 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 plans and remedial actions:

- Paarl route – New site planned in the area
- Malmesbury route – Plan to deploy three new sites builds in the next twenty-four (24) months to address poor coverage issue.
- Worcester route – Plan to deploy a new site in the next twenty-four (24) months to improve coverage. Further network optimisation will be conducted.

Furthermore, MTN remains committed to continual investment in the improvement of the network quality thereby improving the end user mobile voice service experience.

5.3. Cell C

Cell C attributes poor performance to their major network optimising project which took place at the end of 2018 and the mountainous terrain. However, Cell C's plans and remedies to improve the low performance areas include the following:

- Constant engagement with its national roaming partner to improve coverage in the tested areas,

- Plan to conduct frequent optimisation and upgrade in initiatives to improve on its existing infrastructures. The optimisation challenges has been resolved by 22 February 2019 and further optimisation was completed in the first week of March 2019,
- Future plans which are to rollout more sites.

5.4. Telkom

Telkom views the test results as very significant and uses them as additional input to further improve the quality of the mobile network. Most call failures on the Telkom network were due to inadequate network coverage. This is being addressed by building additional sites in the tested areas to provide a more contiguous network coverage. Telkom's deployment plan within these areas are set out below:

- Malmesbury – Plan to deploy 4 sites
- Saldanah – Plans to build 7 sites.
- Paarl – Plans to build additional 22 sites.
- Worcester – Plans to build 3 additional sites.
- George – Plans to build additional 15 sites.

Network quality will be further improved through our roaming agreement with Vodacom and building of additional sites in these areas. In addition to building additional sites, other initiative to improve network and service quality is underway including LTE Carrier Aggregation, reframing of 2100 MHz spectrum for LTE, UMTS R99 parameter optimization, 256QAM modulation, etc.

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 able to get a reasonable service from any of the operators.

Cell C, MTN and Vodacom achieved more than 98% overall CSSR values, thus met the Accessibility target. At an area level, all operators met 98% CSSR target in George. MTN is the only operator that met the CSSR target in Malmesbury. Cell C, MTN and Vodacom also met the target in Saldanha and Worcester. Telkom only met the CSSR target in George and failed to meet the target in other tested areas. All operators failed to meet the CSSR target in Paarl.

MTN and Vodacom are the only operators that met the overall Drop Call Ratio target of less than 3% and thus met the Authority's Retainability target. At an area level, all operators met the DCR target of less than 3% in George and Saldanha. Vodacom and MTN are the only operators that met the DCR target in Malmesbury and Worcester. MTN, Vodacom and Telkom met the target Paarl.

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.

Telkom is the only operator that failed to meet the overall Speech Quality. At an area level, MTN, Vodacom and Cell C achieved an average Mean Opinion Score (MOS) of over 3 in all the tested areas. Telkom failed to meet the target for speech quality in Malmesbury and Worcester.