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Abridged report on the monitoring of quality of service of the cellular mobile operators serving Free State Province – conducted by ICASA in financial year 2018/2019 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 Free State Province during the period 7 to 18 May 2018. The report is based on the extended report on the monitoring titled "2018/19 Quarter 1: Voice Quality of Service Report – Free State 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 Free State Province. Section 5 gives the key results for the four operators (ECNS 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 – 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 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*. For the ability to not drop calls the generic name is *retainability*. 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 calls that result in a connection to the dialled number, whilst the Drop 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 Free State Province

The Authority conducted QoS measurements in the Free State Province on the networks of the cellular mobile operators Cell C, MTN, Telkom and Vodacom. The measurements were carried out between 7 to 18 May 2018 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 generated previous complaints. The sampled areas include Frankfort, Harrismith, Theunissen, Virginia and Bothaville.

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 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 quality of service and operators' network performance vary significantly on a per-location basis.

In terms of overall retainability (Drop Call Ratio) results, Vodacom, Cell C and Telkom did not meet the overall Drop Call Ratio target of less than 3%, only MTN met the DCR target, thus meeting the Retainability target.

In terms of overall accessibility (Call Setup Success Ratio), all operators failed to meet the 98% target, thus failed to meet the Accessibility target.

A draft of the QoS monitoring report was shared with all the operators for comments and a network improvement plan. The summarised remedial actions are listed as follows:

5.1. Vodacom

Vodacom provide 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:

- Frankfort route – Plans to build six (6) sites in this area to resolve coverage gaps and problems in the area. The estimated implementation of these sites is between one and two years (2020).

- Harrismith route – Plans to build eight (8) sites in this area to resolve coverage gaps and problems in the area; one of the sites came on air on the 30th May 2018. The remaining new sites are waiting for budget allocation. The estimated implementation of these sites is between two and three years (2021).
- Virginia route – Plans to build seven (7) sites in this area to resolve coverage gaps and problems in the area; some of the new sites are expected to be live between July and September 2018. Full area optimisation will be done once these sites come on air.
- Theunissen route – Plans to build seven (7) sites in this area to resolve coverage gaps and problems in the area; three (3) new sites to be on air by September 2018. Full area optimisation will be done once these sites come on air.

Vodacom further highlighted the following challenges which makes it difficult to invest in the areas and poses high operational expenditure costs:

a) Lack of infrastructure

- Access roads are too expensive to build at most of the planned sites.
- It is expensive to bring Eskom power close to area of interest where Vodacom wants to build sites.
- High vandalism in the area poses a security challenge on existing sites.

b) Municipality under administration

- The municipality owes Eskom billions of rands thus, Vodacom is facing challenges on existing infrastructure with lot of power cuts which increase operational costs.

5.2. MTN

MTN limited their response to two areas (Theunissen and Frankfort) where they did not meet the targets.

- Frankfort route – With the limited scope of the network, MTN has adjusted antenna tilts to improve the coverage and optimised neighbouring cell as an interim solution to improve customer experience. MTN have planned new sites to improve coverage in the area.

- Theunissen route – During phase 1 measurements, some of the sites were down and thus caused calls to block and drop. MTN is in the process of optimising sites in the area. There is also a plan to build new sites around poor coverage areas.

5.3. Cell C

Cell C highlighted the lack of its own network coverage in some of the areas tested. In order to provide Cell C subscriber with good quality of service, Cell C relies on its national commercial roaming agreement with Vodacom in addition to its own network coverage.

Cell C's plans and remedies to improve 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 has further entered into a national commercial roaming agreement with MTN. This agreement includes seamless handover which was absent in the Vodacom agreement.
- Frankfort route – Cell C experienced intermittent transmission fault on the network serving the area during the measurements, this fault was cleared.

5.4. Telkom

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

- Telkom views the test results as very significant and uses them as additional input to further improve the quality of the mobile network.
- Telkom depends mostly on its roaming partner (MTN) for coverage.
- To mitigate coverage problems in all tested areas, Telkom has additional 14 sites planned. The plan is to have these sites on air later this year.
- Virginia and Harrismith routes – Plans to build seven (7) sites before the end of 2018/19 financial year.
- Bothaville – Telkom has no sites in the area and planned to build sites to build 3 sites which are projected to be on air by October 2018.
- Frankfort route – Plans to build 3 sites, site planning is still on the initial site survey phase.

Telkom reiterates that the lack of access to lower frequency spectrum has negative influence on their ability to provide quality network coverage within targeted areas. Telkom will continue to engage with its roaming partner regarding service improvements in the affected area.

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 most 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.

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.