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Abridged report on the monitoring of quality of service of the cellular mobile operators serving KwaZulu-Natal Province – conducted by ICASA in financial year 2018/2019 Quarter 3

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 KwaZulu-Natal Province during the period 21 November 2018 to 9 January 2019. The report is based on the extended report on the monitoring titled "2018/19 Quarter 3: Voice Quality of Service Report – KwaZulu-Natal 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 KwaZulu-Natal 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 KwaZulu-Natal Province

The Authority conducted QoS measurements in the KwaZulu-Natal Province on the networks of the cellular mobile operators; Cell C, MTN, Telkom and Vodacom. The measurements were carried out between 21 November 2018 and 9 January 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 Newcastle, Msinga, Ulundi, Ohlelo and Hlabisa.

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 did not meet the overall Drop Call Ratio target of less than 3%, thus failed the Retainability target.

In terms of overall accessibility (Call Setup Success Ratio), all operators achieved less than 98% CSSR values, thus failed to meet 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), only Vodacom and MTN met 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:

- Hlabisa route – Performance was affected by poor sites availability as a result of theft and vandalism. Batteries will be replaced as well as site

security improvement will be investigated. New site is also planned and will be built by end of September 2020.

- Msinga and Ulundi route – Performance was affected by poor sites availability as a result of theft and vandalism. Batteries will be replaced as well as site security improvement will be investigated.
- Newcastle route – Poor performance was due to poor coverage and new site was activated in January 2019, to improve network performance.
- Ohlelo route – Poor coverage and quality gaps were identified. Two new sites are planned in the area to be completed by September 2020 and radio frequency (RF) optimisation projects have been implemented. 60% of the failures have already been resolved by the solutions that have been implemented.

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:

- Hlabisa route – Nine (9) new sites are planned in the area to address weak coverage. A further re-drive and network optimisation will be conducted.
- Msinga route – Ten (10) new sites are planned in the area to address poor coverage and performance. Furthermore, network optimisation will be conducted to improve performance.
- Newcastle route – Eight (8) new sites are planned in the area to address poor coverage and performance. Furthermore, network optimisation will be conducted to improve performance.
- Ohlelo route – Ten (10) new sites are planned in the area to address poor coverage and performance. Furthermore, redrive and network optimisation will be conducted to improve performance.
- Ulundi route –Five (5) new sites are planned in the area to address poor coverage and performance. Furthermore, redrive and network optimisation will be conducted to improve performance.

5.3. Cell C

Cell C attributes poor performance, to tests currently underway to update system parameters in order to accommodate MTN national roaming arrangement. Low performance is also due to low coverage. However, Cell C's plans and remedies to improve the low performance areas include the following:

- Hlabisa route – Poor performance was due to lack of network capacity and the issue will be addressed through network capacity upgrade.
- Ulundi and Newcastle route - Poor performance was due to poor coverage and the issue will be addressed through building new sites and upgrade of the existing sites.
- Msinga and Ohlelo route - Poor performance was due to poor coverage and the issue will be addressed through planned network expansions.
- Ulundi route - Poor performance was due to poor coverage and the issue will be addressed through building new sites and upgrade of the existing sites.

Furthermore, there was a major network optimisation project which took place during the month of November 2018 to December 2018. Power failures (load shedding) was also the contributor to poor performance. A total of 113 sites are being upgraded in the above areas.

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:

- Hlabisa route – a total of 11 sites are planned to be built.
- Msinga route – a total of 15 sites are planned to be built.
- Newcastle route – a total of 91 sites are planned to be built.
- Ohlelo route – a total of 26 sites are planned to be built.
- Ulundi route – a total of 16 sites are planned to be built.

In addition to building additional sites, other initiative to improve network and service quality is underway including LTE Carrier Aggregation, refarming of 2100 MHz spectrum for LTE, UMTS R99 parameter optimization, 256QAM modulation, etc.

Furthermore, Telkom has recently signed a new national roaming agreement with Vodacom, which is being implemented. Advantages of the new roaming agreement includes roaming on 4G/LTE and seamless call handover between networks. This will significantly improve Telkom's overall network voice and data quality, especially in areas where it has limited or no network coverage.

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.

All operators failed to meet both the overall Drop Call Ratio target of less than 3% and the overall Call Setup Success Ratio target of 98%. Thus, failure was due to poor performance by all operators in three of the five tested areas (Hlabisa, Msinga and Ohlelo).

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.