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QUALITY OF SERVICE MONITORING REPORT- FIRST QUARTER 2021

Department of Engineering & Infrastructure

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1. Background

In accordance with the mandate of the Commission to ensure fair competition and protect the consumer as provided for in Section 9 (2) (a) & (b) of the Telecommunications Act 2006 as amended, and the Quality of Service (QoS) obligations outlined in the relevant Sections of the cellular mobile licenses for Operators, the QoS monitoring, and reporting was outsourced to Blue Ribbon Solutions to measure on equal terms the compliance of licensees to pre-defined Key Performance Indicators (KPIs).

The measurement of KPIs was carried out on four (4) Mobile Network Operators (MNOs), namely Orange, Africell, Qcell and SIERRATEL, using raw files collected on a daily basis from the Base Station Controllers (BSCs) of the four (4) operators and dumped into the servers hosted by Blue Ribbon, with the view of analyzing technical parameters that translate into end-user's perception of the quality of service.

The first quarter 2021 report provides obligatory monitoring and enforcement of 2G voice and voice quality of six (6) consumer-oriented services, evaluated using KPIs of radio network parameters including Network Availability, Call Setup Success Rate, Handover Success Rate, Stand-alone Dedicated Control Channel (SDCCH) call drop rate, Traffic Channel (TCH) call drop rate and TCH congestion rate.

2. Definition of Key Performance Indicators (KPIs) Measured

Call Setup Success Rate (CSSR): A Call Setup Success Rate (CSSR) indicates the probability of successful calls initiated by the mobile station. The CSSR is an important KPI for evaluating the network performance. If this KPI is too low, the subscribers are unlikely to make calls successfully. This is measured using performance monitoring systems by analyzing CDRs of Operator's networks, test stations and drive test system. The threshold for call setup success rate is $\geq 95\%$.

Handover Success Rate: This is the ratio of the number of successful handovers to the total number of handover requests. Handover capability enables users to communicate continuously when they traverse different cells. It is measured using performance monitoring systems through accessing CDRs of Operator's networks, test stations and drive test system. The threshold for handover success rate is $\geq 95\%$.

Network Availability: Network availability is the ratio of probable attempts for mobile network services to total number of attempts. The calculation of network availability gives the percentage values of the site availability on the network. This is measured using performance monitoring systems by analyzing CDRs of Operator's networks, test stations and drive test system. The threshold for network availability is $\geq 95\%$.

Traffic Channel (TCH) Drop Call Rate: The traffic channels (TCHs) are a combination of voice and data signals (time slot assignments) that exist within a communication channel. The TCH call drop rate refers to the ratio of call drops to successful TCH seizures after the Base Station Controller (BSC) successfully assigns TCHs to mobile stations. It is measured using performance monitoring systems by analyzing CDRs of Operator's networks, test stations and drive test system. The threshold for TCH drop call rate is $\leq 2\%$.

TCH Congestion Rate: The TCH congestion rate is the proportion of the number of TCH assignment failures to the number of TCH seizure requests. If the TCH congestion rate is high, the

network service quality deteriorates. It is measured using performance monitoring systems by analyzing CDRs of Operator’s networks, test stations and drive test system. The threshold for TCH congestion rate is $\leq 1.5\%$

Stand-alone Dedicated Control Channel (SDCCH) Call Drop Rate: The Stand-alone Dedicated Control Channel (SDCCH) is a signaling channel that exists between GSM Mobile and GSM Base Stations. The SDCCH is used for most short transactions, including initial call setup, registration and SMS transfer. The SDCCH call drop rate indicates the probability of call drops when the mobile station occupies the SDCCH. It is measured using performance monitoring systems by analyzing CDRs of Operator’s networks, test stations and drive test system. The threshold for SDCCH drop call rate is $\leq 1.5\%$.

3. Snapshot of Quality of Service Monitoring Results

The table below provides an average summary of monthly performance measurements of the six (6) KPIs compared with the respective thresholds highlighted in GREEN. The figures highlighted in RED indicate that the Operator did not meet the pre-defined threshold of a particular KPI, while the figures indicated in YELLOW depict that the measurement counters of the BSCs were not recorded, and therefore provided a zero after a KPI performance analysis.

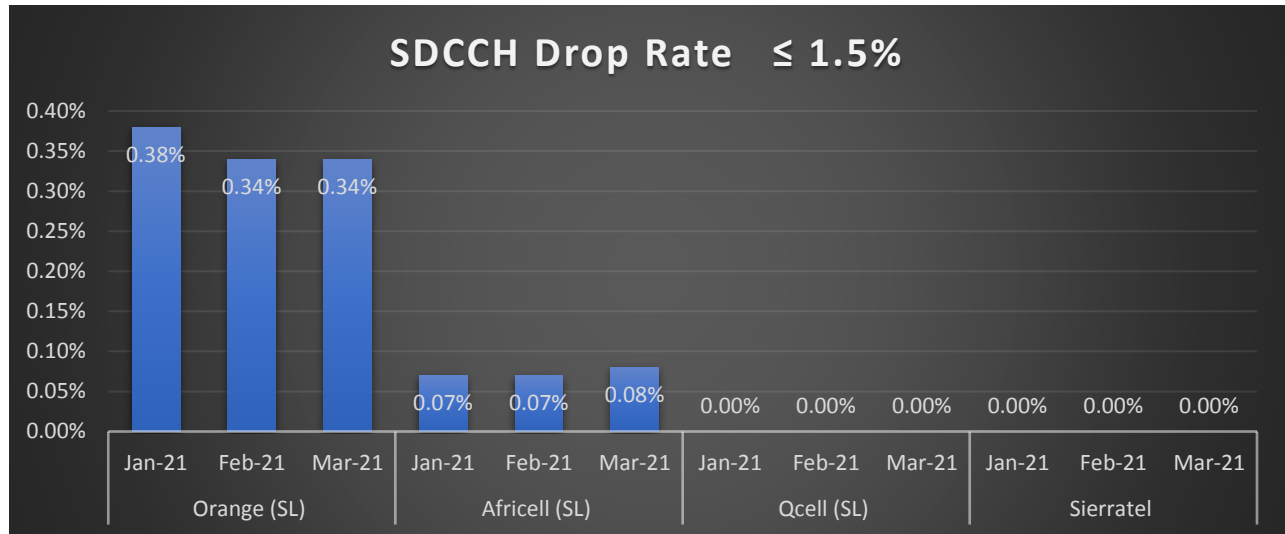
Operator	KPI	SDCCH Drop Rate	TCH Drop Call Rate	Call Setup Success Rate	Handover Success Rate	TCH Congestion Rate	Network Availability
	Threshold	$\leq 1.5\%$	$\leq 2.0\%$	$\geq 95\%$	$\geq 95\%$	$\leq 2.0\%$	$\geq 95\%$
Orange (SL)	Jan-21	0.38%	0.57%	98.83%	99.40%	0.04%	99.40%
	Feb-21	0.34%	0.54%	98.98%	98.07%	0.03%	99.72%
	Mar-21	0.34%	0.52%	98.99%	98.20%	0.03%	99.68%
Africell (SL)	Jan-21	0.07%	0.21%	99.17%	98.89%	0.07%	99.78%
	Feb-21	0.07%	0.21%	99.26%	98.82%	0.05%	99.31%
	Mar-21	0.08%	0.22%	99.20%	98.69%	0.06%	98.98%
Qcell (SL)	Jan-21	0.00%	0.25%	99.60%	94.21%	0.01%	99.31%
	Feb-21	0.00%	0.25%	99.52%	94.28%	0.00%	98.80%
	Mar-21	0.00%	0.24%	99.59%	94.83%	0.00%	99.59%
Sierratel	Jan-21	0.00%	3.81%	97.58%	99.41%	1.40%	0.00%
	Feb-21	0.00%	3.88%	98.10%	99.39%	1.00%	0.00%
	Mar-21	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
KEY							
		Failed to meet KPI Threshold					
		Measurement Counters not provided by Operators					

4. Detailed Quality of Service Analysis for First Quarter 2021

A detailed analysis of the six (6) KPIs for the four (4) mobile network operators is provided hereafter.

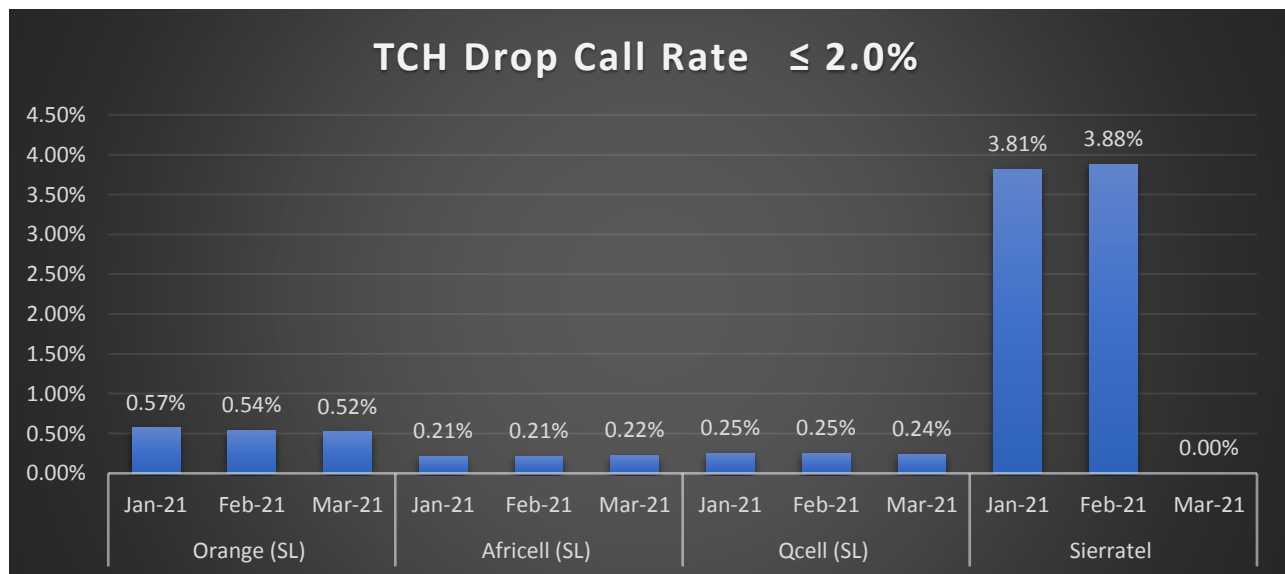
4.1 SDCCH Call Drop Rate

The bar chart below represents the analysis of SDCCH call drop rate for first quarter of 2021. During this period, all Operators met the pre-defined threshold of this KPI.



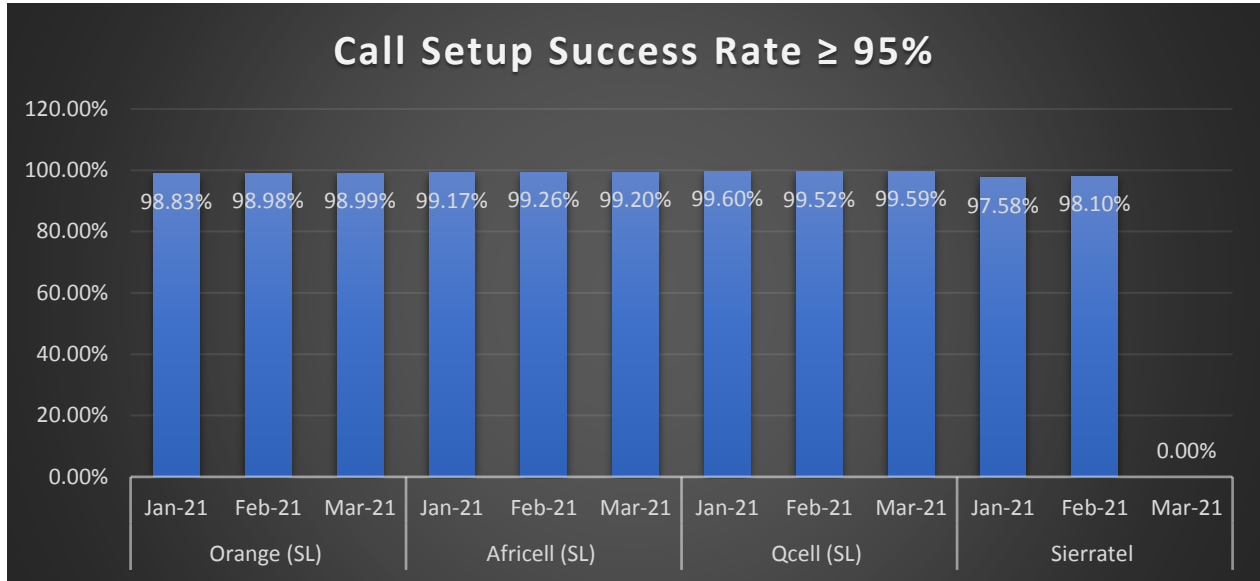
4.2 TCH Drop Call Rate

The bar chart below depicts the analysis of TCH drop call rate for first quarter of 2021. Orange, Africell and Qcell met the pre-defined threshold of this KPI, while Sierratel failed to meet the pre-defined threshold for the KPI throughout the period with performance measurements standing at **3.81%**, **3.88%** for January and February 2021. No data was provided for March.



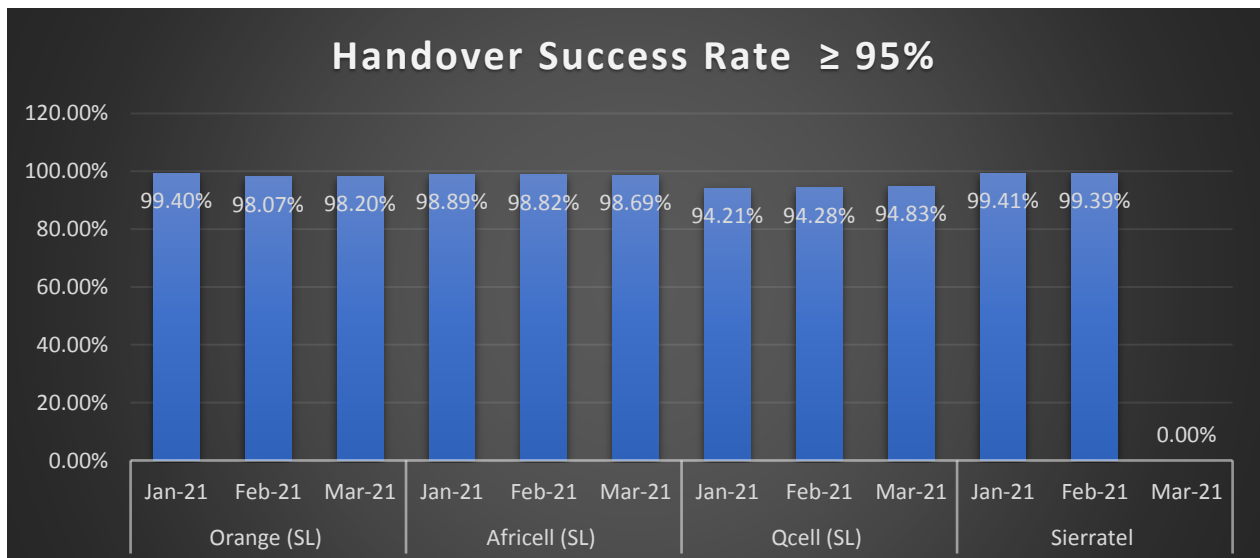
4.3 Call Setup Success Rate

The bar chart below represents the analysis of Call Setup Success Rate for the first quarter of 2021. Orange, Africell and Qcell met the pre-defined threshold of $\geq 95\%$ for this KPI, whereas Sierratel met the threshold of the KPI in January and February 2021 but did not provide data for March 2021.



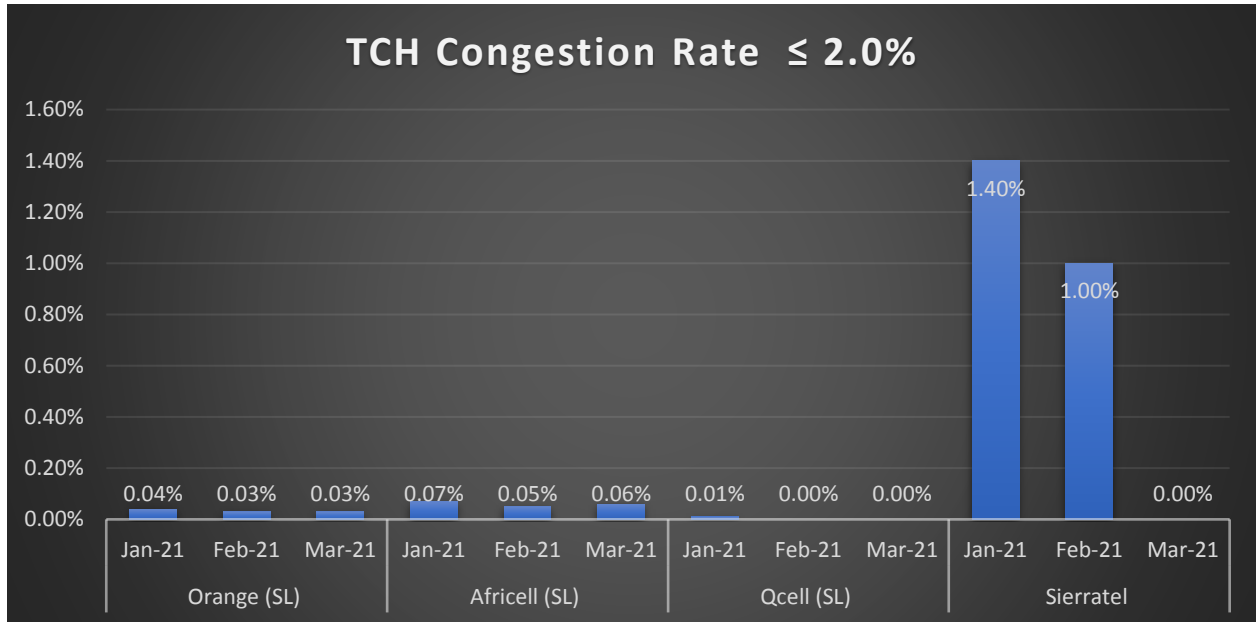
4.4 Handover Success Rate

The bar chart below illustrates the analysis of Handover Success rate for first quarter 2021. Orange and Africell met the pre-defined threshold for this KPI. Sierratel met the threshold in January and February but no data was provided for March. Qcell did not meet the pre-defined KPI threshold in the first quarter of 2021. Their performance measurement stood at **94.21%**, **94.28%** and **94.38%** respectively for January, February and March 2021.



4.5 TCH Congestion Rate

The bar chart below shows the analysis of TCH congestion rate for the first quarter of 2021. During this period, Africell, Orange, Sierratel & Qcell met the pre-defined threshold of this KPI.



4.6 Network Availability

The bar chart below shows the analysis of Network Availability for the first quarter of 2021. Apart from the inability of the BSC of Sierratel to record network availability counters throughout first quarter 2021, Orange, Africell and Qcell met the pre-defined threshold of this KPI.

