



NATIONAL COMMUNICATIONS AUTHORITY

## Quality of Service (QoS) Monitoring of Cellular Mobile Voice Services

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*[Communications for Development]*

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## **Background**

In pursuance of Annexures D1 and D2 of the Cellular Mobile Licence of Telecommunication Operators, the user perspective of the quality of voice services are tested to ensure the compliance of Operators to the obligations on service quality to the user.

The report is based on findings on quality of service in the three Northern, Eastern and Volta regions in February 2014. Espresso network was not available in all three Northern regions at the time of testing due to total outage of its systems serving the three regions.

## **What We Measure**

As per the Cellular Mobile licence obligations, the QoS indicators and their respective threshold for compliance under assessment considering the user's perspective are;

- **Stand-alone Dedicated Control Channel (SDCCH) Congestion Rate**
- **Call Setup Time (CST)**
- **Call Congestion Rate**
- **Call Drop Rate (CDR)**

## Findings

The results for the cities and towns tested for February 2014 are as below:

### a) Stand-alone Dedicated Control Channel (SDCCH) Congestion Rate

SDCCH Congestion Rate should be equal or less than one per cent (1%).

SDCCH Congestion is defined as the probability of failure of accessing a stand-alone dedicated control channel during call set up.

For analysis and calculations,

$$\text{SDCCH Congestion}[\%] = \frac{\text{Number of connect fails due to Immediate Assignment Failures}}{\text{MOC call attempts}} \times 100\%$$

**Table 1 Signalling Congestion Rate Cellular Mobile Voice Service, February 2014**

Month	City/Town	MTN	Vodafone	Tigo	Airtel	Glo
February	TAMALE	0	0	0	0	0
February	YENDI	0	0	0	0	0
February	BOLGA	0	0	0	0	0
February	NAVRONGO	0	0	0	0	0
February	BAWKU	0	0	0	0	0
February	WA	0	0	0	0	0
February	NANDOM	0	0	0	0	0
February	JIRAPA	0	0	0	0	0
February	AFLAO	0	0	0	0	0
February	KETA	0	0	0	0	0
February	ANLOGA	0	0	0	0	0
February	HO	0	0	0	0	0
February	KPANDO	0	0	0	0	0
February	HOHOE	0	0	0	0	0
February	JASIKAN	0	0	0	0	0
February	KOFORIDUA	0	0	0	0	0
February	ASAMANKESE	0	0	0	0	0
February	ODA	0	0	0	0	0
February	AKOSOMBO	0	0	0	0	0

### REMARKS:

- ❖ All Operators were in compliance in tested cities and towns in Eastern, Volta and the three northern regions in February with the signalling congestion threshold of less than 1 percent (1%).

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### b) Call Setup Time (CST)

CST should be less than ten seconds (<10secs) in 95% of cases.

Call Setup Time is the period of time elapsing from the sending of a complete destination address (target telephone number) to the setting up of a call to the receiving terminal;

$$\text{Call set - up time [s]} = t_{\text{alerting - signal}} - t_{\text{address - sending}}$$

$t_{\text{alerting signal}}$  – Moment when an alerting signal is sent to the called terminal

$t_{\text{address sending}}$  – Moment user presses the SEND button on the calling terminal

**Table 2. Call Setup Time of Cellular Mobile Voice Service, February 2014**

Month	City/Town	MTN	Vodafone	Tigo	Airtel	Expresso	Glo
February	TAMALE	8.2	<b>13.86</b>	<b>13.89</b>	7.66	N/A	5.41
February	YENDI	11.8	<b>11.75</b>	<b>17.65</b>	7.41	N/A	N/A
February	BOLGA	8.1	7.08	8.01	7.75	N/A	5.67
February	NAVRONGO	7.28	9.11	7.89	7.24	N/A	6.315
February	BAWKU	5.7	5.42	7.82	<b>13.27</b>	N/A	N/A
February	WA	8.76	<b>14.1</b>	8.74	<b>10.03</b>	N/A	8.58
February	NANDOM	8.05	<b>13.54</b>	7.6	<b>13.54</b>	N/A	N/A
February	JIRAPA	4.92	<b>11.45</b>	7.73	8.215	N/A	N/A
February	AFLAO	<b>10.07</b>	4.2	8.85	7.84	<b>12.93</b>	9.12
February	KETA	9.95	<b>12.09</b>	14.84	8.06	<b>15.26</b>	9.4
February	ANLOGA	11.65	<b>14.19</b>	7.77	<b>20.9</b>	<b>16.68</b>	8.9
February	HO	9.14	<b>14.69</b>	8.13	9.27	<b>13.83</b>	7.99
February	KPANDO	10.1	5.51	8.07	8.1	<b>10.56</b>	<b>14.29</b>
February	HOHOE	10.88	13.15	7.77	8.81	<b>10.82</b>	8.55
February	JASIKAN	8.67	8.51	7.73	7.94	<b>10.33</b>	N/A
February	KOFORIDUA	<b>11.89</b>	<b>17.17</b>	<b>11.96</b>	<b>13.6</b>	<b>10.77</b>	<b>10.15</b>
February	ASAMANKESE	7.49	6.95	7.47	8.95	<b>13.75</b>	6.4
February	ODA	8.73	<b>24.06</b>	7.85	7.86	<b>11.16</b>	6.16
February	AKOSOMBO	<b>10.22</b>	<b>23.34</b>	<b>10.22</b>	8.15	<b>10.28</b>	<b>10.64</b>

#### REMARKS:

- ❖ All Operators had call setup delays in certain locations.

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### c) Call Congestion Rate

Traffic Channel Congestion should be equal or less than one per cent (1%).

Call Congestion Rate is the probability of failure of accessing a traffic channel during call setup;

$$\text{Call Congestion [\%]} = \frac{\text{Number of Connect failed calls}}{\text{Total number of call attempts}} \times 100\%$$

**Table 3 Call Congestion Rate Cellular Mobile Voice Service, February 2014**

Month	City/Town	MTN	Vodafone	Tigo	Airtel	Expresso	Glo
February	TAMALE	0	0	0	0	N/A	0
February	YENDI	0	0	0	0	N/A	N/A
February	BOLGA	0	0	0.28	0	N/A	0
February	NAVRONGO	0	0	0	0	N/A	0
February	BAWKU	0	0	0	0	N/A	N/A
February	WA	0	0	2.5	0	N/A	0
February	NANDOM	0	0	0	0	N/A	N/A
February	JIRAPA	0	0	0	0	N/A	N/A
February	AFLAO	0	0	0	0	0	0
February	KETA	0	0	0	0	0	0
February	ANLOGA	0	0	0	0	0	0
February	HO	0	0	0	0	0	0
February	KPANDO	0	0	0	0	0	0
February	HOHOE	0	0	0	0	0	0
February	JASIKAN	0	0	0	0	0	0
February	KOFORIDUA	0	0	0	0	0	11.33
February	ASAMANKESE	0	0	0	0	0	0
February	ODA	0	0	0	0	0	0
February	AKOSOMBO	0	0	0	0	0	0

#### REMARKS:

- ❖ All operators except Expresso and Glo remained compliant to the licence threshold of less than one percent (1%) in all the tested locations.

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### d) Call Drop Rate (CDR)

Call drop rate should be equal or less than three per cent (3%).

Voice Call Drop Rate is the probability of a call terminating without any of the users' consent;

$$\text{Drop Rate [\%]} = \frac{\text{Number of calls terminated unwillingly}}{\text{Total number of call attempts}} \times 100\%$$

**Table 4 Call Drop Rate Cellular Mobile Voice Service, 2014**

Month	City/Town	MTN	Vodafone	Tigo	Airtel	Expresso	Glo
February	TAMALE	0.49	0	0	0	N/A	0
February	YENDI	0	0	0	0	N/A	N/A
February	BOLGA	0	0	0	0	N/A	0
February	NAVRONGO	<b>3.13</b>	0	0	0	N/A	0
February	BAWKU	0	0	0	0	N/A	N/A
February	WA	<b>1.61</b>	0	0	0	N/A	0
February	NANDOM	0	0	0	0	N/A	N/A
February	JIRAPA	0	0	0	0	N/A	N/A
February	AFLAO	0	0	0	0	0	0
February	KETA	0	0	0	0	0	0
February	ANLOGA	0	0	0	0	0	0
February	HO	0	0	0	0	0	0
February	KPANDO	0	0	0	0	1.79	0
February	HOHOE	0	0	0	0	0	0
February	JASIKAN	0	0	0	0	2.63	0
February	KOFORIDUA	0	0	0	0	0.64	0
February	ASAMANKESE	0	0	0	0	0	0
February	ODA	0	0	0	0	1.12	0
February	AKOSOMBO	0	0	0	0	1.82	0

#### REMARKS:

- ❖ All operators except MTN were in compliance with the Call Drop licence threshold of less than three percent (3%) in all localities tested.

## **REMEDIES**

- ❖ The NCA has notified Operators on publication of these findings and suspended sanctions to defaulters pending their performance in the next monitoring in the same regions.
- ❖ Espresso has operational challenges and has been directed to resolve them by the end of May 2014 to be in compliance with the obligations. Espresso is barred from any sales or marketing promotions within this period.