



QUALITY OF SERVICE MONITORING REPORT FOR MOBILE TELECOMMUNICATIONS NETWORK SERVICES FOR THE PERIOD 2014/2015

EXECUTIVE SUMMARY

The Communications Authority of Kenya (CA) presents the findings of the assessment of the performance of mobile networks in the country for the period 2014-2015. The assessment is conducted annually to ascertain compliance with the Kenya Information and Communication Act, 1998, the attendant Regulations and license conditions in relation to Quality of Service (QoS). The report provides the level of conformance of the licensee's services to the set quality of service standards expressed in terms of set of parameters, also referred to as Key Performance Indicators (KPIs).

The assessment was carried out while the market still had four mobile operators, Safaricom, Airtel, Orange and yuMobile, but the number reduced to three following exit of Essar Telekom from the Kenyan market in 2014. Essar Group was sold to Safaricom and Airtel Kenya with Safaricom taking over Essar's network infrastructure, while Airtel acquired the subscriber base. Results for the three networks in operation are subsequently presented in this report.

The assessment was carried out across the country and results are given on countrywide and regional basis. Measurements in some regions had overlaps due to the manner in which the existing road networks traverse what were formerly

local government boundaries. Prevailing insecurity made it difficult to cover North Eastern Counties of Mandera and Wajir, a phenomenon that also impacted on the data collection in parts of Marsabit, Samburu and Garissa Counties.

Out of the eight parameters, all operators complied with QoS targets on Handover Call Set Up Time and Signal Strength indicators. There was remarkable improvement on the quality of speech for all the operators. However, on overall performance of all the operators remained stagnant during the year.

QUALITY OF SERVICE REPORT

1. INTRODUCTION

Quality of Service is measured using eight Key Performance Indicators as shown in Table 1 below. For any mobile operator to be deemed compliant with the QoS standards, they are required to meet 80% of the targets as given.

Table 1: Performance Targets

No.	KEY PERFORMANCE INDICATOR – KPI	Targets
1.	Call Completion Rate	>95%
2.	Call Set Up Success Rate (CSSR)	>95%
3.	Call Drop Rate	<2%
4.	Call Block Rate	<5%
5.	Speech Quality (MOS)	95% of samples >3.1
6.	Call Set Up Time	<13.5 seconds
7.	Handover Success Rate (HO)	>90%
8.	Rx Lev (signal strength from base transmitting station)	Outdoor = - 102 dBm
		Indoor = -95 dBm
		In car = - 100 dBm

2. TEST CONFIGURATION

The assessment covered the three operating mobile networks and was undertaken simultaneously based on intra-network configuration. This means calls were made within the network and not across networks. Each network operator had a calling line (master) and a receiving line (slave) to generate mobile originating (MO) and mobile terminating (MT) calls. This configuration is reliable because it ensures that no network depends on the performance of another network. The regions covered are shown in Table 2 below.

Table 2: Regions Covered

No	Region	County Covered
1	Western Region	Vihiga, Busia, Kakamega, and Bungoma Counties
2	Nyanza Region	Kisumu, Kisii, Siaya, Migori, Homa Bay and Nyamira Counties.
3	North Rift Region	Turkana, Trans Nzoia, West Pokot, Uasin Gishu, Nandi, Baringo and Elgeyo Marakwet Counties
4	South Rift Region	Kericho, Nakuru, Narok and Bomet Counties
5	Coast Region	Mombasa, Lamu, Kwale, Tana River, and Taita Taveta Counties
6	Central Kenya Region	Samburu, Muranga, Nyeri, Kirinyaga, Embu, Meru, Nyandarua and Laikipia Counties
7	Lower Eastern	Machakos, Makueni, Kitui and Kajiado Counties
8	Upper Eastern	Isiolo and parts of Marsabit Counties
9	Nairobi Region	Nairobi and Kiambu Counties

N/B: The monitoring areas focused on Highways, Major roads, towns and small market centres

3. ANALYSIS OF ASSESSMENT / COVERAGE AREA CONSIDERED

The coverage of the regions assessed was aimed at collecting and sampling data that represents the experience of the general public. Measurements in some regions had overlaps due to the manner in which the existing road networks traverse what were formerly local government boundaries. The counties were covered as detailed in Table 2. Intertwined access infrastructure in Counties presently does not make it

feasible to present results by County. The results are therefore presented according to regions i.e. former Provinces. The report also provides the overall performance for each mobile network operator in the country. This is critical to guide the principal goal to bridge the digital divide across Kenyan communities and regions.

Security challenges made it difficult to cover the regions in Mandera, Garissa, Wajir and Turkana Counties. The situation also affected some parts of Marsabit, Samburu, Elgeyo Marakwet, and West Pokot Counties. These areas will be assessed once the security situation improves. The overall performance is provided in Table 3 below.

Table 3: Overall Performance per given Parameter

	HO	RX Lev	CSSR	Setup time	MOS	Completed Calls	Blocked calls	Dropped calls	Overall compliance
TARGET	90%	-102 dBm	95%	<13.5 Sec.	95% > 3.1	>95%	<5%	<2%	
SAFARICOM	97.27	-70.46	90.7	5.99	3.53	88.8	9.3	2.0	NC
Status	C	C	NC	C	C	NC	NC	C	
AIRTEL	98.16	-75.65	91.1	5.31	3.13	89.6	8.9	1.5	NC
Status	C	C	NC	C	C	NC	NC	C	
ORANGE	95.75	-71.11	85.6	7.78	3.41	83.6	14.5	1.9	NC
Status	C	C	NC	C	C	NC	NC	C	

Key:

C: Complaint

NC: Non-Compliant

From Table 3 above, an assessment of the overall performance indicates that all the four mobile network operators are non-compliant, despite having complied with QoS targets on Handover Success Rate, Voice Quality, Call Drop rate, Call setup time and Signal Strength. It is however noted that the performance on speech quality improved tremendously for three operators compared to the previous assessment period. A Summary of the overall performance since 2012 is shown in Table 4 below.

Table 4: Summary of overall performance for the last three years

Operator	Target QoS Parameters		Performance Achieved (%)		
	Number	Percentage (%)	2012/13	2013/14	2014/2015
Safaricom Limited	8	80	50	62.5	62.5
Airtel Network Kenya Limited	8	80	50	62.5	62.5
Telkom Kenya Limited	8	80	62.5	62.5	62.5

None of the three mobile network operators managed to comply with the 80% threshold for the last three assessments done since 2012.

4. REGIONAL PERFORMANCE

4.1 Western Kenya

KEY PERFORMANCE INDICATOR	TARGET	SCORE					
		Airtel		Orange		Safaricom	
Call Set-up time (in seconds)	<13.5 Sec	4.72 Sec	C	7.59 Sec	C	6.83 Sec	C
Call Set-up Success Rate (CSSR)	>95%	97.3 %	C	88.8 %	NC	82.3 %	NC
Call Drop Rate	<2%	0.7 %	C	1.6 %	C	1.7 %	C
Speech Quality (MOS)	>3.1	2.87	NC	3.41	C	3.47	C
Block Rate	<5%	2.7 %	C	11.2 %	NC	17.7 %	NC
Call completion Rate	>95%	96.6 %	C	87.2 %	NC	80.6 %	NC
RX Level (dBm)	>-102dBm	-74.05 dBm	C	-68.43 dBm	C	-70.71 dBm	C
Call Handover rate (HO)	>90%	99.01%	C	97.69 %	C	95.39 %	C

4.2 Nyanza Region

KEY PERFORMANCE INDICATOR	TARGET	SCORE					
		Airtel		Orange		Safaricom	
Call Set-up time (in seconds)	<13.5 Sec	5.44 Sec	C	8.33 Sec	C	6.31 Sec	C
Call Set-up Success Rate (CSSR)	>95%	94.0 %	NC	89.1 %	NC	86.1 %	NC
Call Drop Rate	<2%	2.0 %	C	1.6 %	C	2.0 %	C
Speech Quality (MOS)	>3.1	2.86	NC	3.33	C	3.55	C
Block Rate	<5%	6.0 %	NC	11.0%	NC	14.0 %	NC
Call completion Rate	>95%	91.9 %	NC	87.5 %	NC	84.0 %	NC
RX Level (dBm)	>-102dBm	-71.81 dBm	C	-66.31 dBm	C	-70.46 dBm	C
Call Handover rate (HO)	>90%	93.16 %	C	95.00%	C	96.05 %	C

4.3 North Rift Region

KEY PERFORMANCE INDICATOR	TARGET	SCORE					
		Airtel		Orange		Safaricom	
Call Set-up time (in seconds)	<13.5 Sec	7.93 Sec	C	8.27 Sec	C	6.35 Sec	C
Call Set-up Success Rate (CSSR)	>95%	90.2 %	NC	61.2 %	NC	95.3 %	C
Call Drop Rate	<2%	3.3 %	NC	5.3 %	NC	4.3 %	NC
Speech Quality (MOS)	>3.1	3.19	C	3.26	C	3.12	C
Block Rate	<5%	9.8 %	NC	38.8%	NC	4.7 %	C
Call completion Rate	>95%	86.8 %	NC	55.8 %	NC	91.1 %	NC
RX Level (dBm)	>-102dBm	-85.4 dBm	C	-81.52 dBm	C	-81.1 dBm	C
Call Handover rate (HO)	>90%	98.1 %	C	99.16%	C	96.25 %	C

4.4 South Rift Region

KEY PERFORMANCE INDICATOR	TARGET	SCORE					
		Airtel		Orange		Safaricom	
Call Set-up time (in seconds)	<13.5 Sec	4.73 Sec	C	7.94 Sec	C	5.93 Sec	C
Call Set-up Success Rate (CSSR)	>95%	83.2 %	NC	82.9%	NC	95.2%	C
Call Drop Rate	<2%	1.5 %	C	2.6%	NC	2.6%	NC
Speech Quality (MOS)	>3.1	3.02	NC	3.35	C	3.44	C
Block Rate	<5%	16.8 %	NC	17.1%	NC	4.8 %	C
Call completion Rate	>95%	81.8 %	NC	80.3%	NC	92.7%	NC
RX Level (dBm)	>-102dBm	-73.37 dBm	C	-68.8 dBm	C	-62.47 dBm	C
Call Handover rate (HO)	>90%	96.76%	C	90.91%	C	95.95%	C

4.5 Coast Region

KEY PERFORMANCE INDICATOR	TARGET	SCORE					
		Airtel		Orange		Safaricom	
Call Set-up time (in seconds)	<13.5 Sec	6.16 Sec	C	7.17 Sec	C	5.14 Sec	C
Call Set-up Success Rate (CSSR)	>95%	91.5%	NC	91.8 %	NC	92.3%	NC
Call Drop Rate	<2%	1.6%	C	1.1 %	C	1.1%	C
Speech Quality (MOS)	>3.1	3.54	C	3.32	C	3.67	C
Block Rate	<5%	8.5 %	NC	8.2%	NC	7.7%	NC
Call completion Rate	>95%	89.9 %	NC	90.7 %	NC	91.2%	NC
RX Level (dBm)	>-102dBm	-78.85 dBm	C	-65.35 dBm	C	-68.6 dBm	C
Call Handover rate (HO)	>90%	97.49%	C	98.86 %	C	99.21%	C

4.6 Upper Eastern Kenya

KEY PERFORMANCE INDICATOR	TARGET	SCORE					
		Airtel		Orange		Safaricom	
Call Set-up time (in seconds)	<13.5 Sec	9.90 Sec	C	9.89 Sec	C	5.93 Sec	C
Call Set-up Success Rate (CSSR)	>95%	70.9 %	NC	69.3 %	NC	95.7 %	C
Call Drop Rate	<2%	2.0 %	C	6.6 %	NC	5.3 %	NC
Speech Quality (MOS)	>3.1	2.62	NC	3.36	C	3.5	C
Block Rate	<5%	29.1 %	NC	30.7 %	NC	4.3 %	C
Call completion Rate	>95%	68.8 %	NC	62.7 %	NC	90.3 %	NC
RX Level (dBm)	>-102dBm	-73.02 dBm	C	-86.44 dBm	C	-82.69 dBm	C
Call Handover rate (HO)	>90%	100 %	C	89.89 %	NC	98.11%	C

4.7 Lower Eastern

KEY PERFORMANCE INDICATOR	TARGET	SCORE					
		Airtel		Orange		Safaricom	
Call Set-up time (in seconds)	<13.5 Sec	4.46 Sec	C	7.83 Sec	C	3.62 Sec	C
Call Set-up Success Rate (CSSR)	>95%	95 %	C	80.8%	NC	94.3%	NC
Call Drop Rate	<2%	1.1 %	C	1.5%	C	1.5%	C
Speech Quality (MOS)	>3.1	3.38	C	3.6	C	3.6	C
Block Rate	<5%	5.0 %	C	19.3%	NC	5.7 %	NC
Call completion Rate	>95%	93.9 %	NC	79.2%	NC	92.8%	NC
RX Level (dBm)	>-102dBm	-74.57 dBm	C	-64.57 dBm	C	-71.46 dBm	C
Call Handover rate (HO)	>90%	96.04%	C	95.96%	C	98.16%	C

4.8 Central Region

KEY PERFORMANCE INDICATOR	TARGET	SCORE					
		Airtel		Orange		Safaricom	
Call Set-up time (in seconds)	<13.5 Sec	4.71 Sec	C	7.69 Sec	C	5.80 Sec	C
Call Set-up Success Rate (CSSR)	>95%	96.8%	C	91.6 %	NC	97.5%	C
Call Drop Rate	<2%	1.1%	C	2.7 %	NC	3.9%	NC
Speech Quality (MOS)	>3.1	3.33	C	3.51	C	3.50	C
Block Rate	<5%	3.2 %	C	8.4%	NC	2.5%	C
Call completion Rate	>95%	95.7 %	C	88.8 %	NC	93.5%	NC
RX Level (dBm)	>-102dBm	-73.15 dBm	C	-66.87 dBm	C	-73.92 dBm	C
Call Handover rate (HO)	>90%	98.14%	C	95.00 %	C	94.51%	C

4.9 Nairobi Region

KEY PERFORMANCE INDICATOR	TARGET	SCORE					
		Airtel		Orange		Safaricom	
Call Set-up time (in seconds)	<13.5 Sec	4.72 Sec	C	7.11Sec	C	5.39 Sec	C
Call Set-up Success Rate (CSSR)	>95%	89.6 %	NC	97.6 %	C	96.5 %	C
Call Drop Rate	<2%	1.3 %	C	0.3 %	C	0.8 %	C
Speech Quality (MOS)	>3.1	3.31	C	3.59	C	3.66	C
Block Rate	<5%	10.4 %	NC	2.4 %	C	3.6 %	C
Call completion Rate	>95%	88.3%	NC	97.2 %	C	95.7 %	C
RX Level (dBm)	>-102dBm	-74.59dBm	C	-65.12 dBm	C	-62.99 dBm	C
Call Handover rate (HO)	>90%	98.21 %	C	97.43 %	C	98.92%	C

5. COUNTRYWIDE PERFORMANCE BY OPERATOR

5.1 Safaricom

	HO	RX	CSS R	Setup time	MOS	Completed	Blocked calls	Dropped calls	Overall compliance
TARGET	90%	-102 dBm	95%	<13.5 Sec.	95% > 3.1	95%	<5%	<2%	
Western	95.39	-70.71	82.3	6.83	3.47	80.6	17.7	1.7	N/C
Status	C	C	NC	C	C	NC	NC	C	
Nyanza	96.05	-70.46	86.1	6.31	3.55	84.0	14.0	2.1	N/C
Status	C	C	NC	C	C	NC	NC	NC	
North Rift	96.25	-81.1	95.3	6.35	3.12	91.1	4.7	4.3	NC
Status	C	C	C	C	C	NC	C	NC	
South Rift	95.95	-62.47	95.2	5.93	3.44	92.7	4.8	2.6	NC
Status	C	C	C	C	C	NC	C	NC	
Coast	99.21	-68.6	92.3	5.14	3.67	91.2	7.7	1.1	NC
Status	C	C	NC	C	C	NC	NC	C	
Lower Eastern	98.16	-71.46	94.3	3.62	3.6	92.8	5.7	1.5	NC
Status	C	C	NC	C	C	NC	NC	C	
Upper Eastern	98.11	-82.69	95.7	5.93	3.5	90.3	4.3	5.3	N/C
Status	C	C	C	C	C	NC	C	NC	
Central	94.51	-73.92	97.5	5.80	3.5	93.5	2.5	3.9	NC
Status	C	C	C	C	C	NC	C	NC	
Nairobi	98.92	-62.99	96.5	5.39	3.66	95.7	3.6	0.8	C
Status	C	C	C	C	C	C	C	C	

5.2 Airtel

	HO	RX	CSS R	Setup time	MOS	Completed	Blocked calls	Dropped calls	Overall compliance
TARGET	90%	-102 dBm	95%	<13.5 Sec.	95% > 3.1	95%	<5%	<2%	
Western	99.01	-74.05	97.3	4.72	2.87	96.6	2.7	0.7	C
Status	C	C	C	C	NC	C	C	C	
Nyanza	93.16	-71.81	94.0	5.44	2.86	91.9	6.0	2.0	N/C
Status	C	C	NC	C	NC	NC	NC	C	
North Rift	98.1	-85.4	90.2	7.93	3.19	86.8	9.8	3.3	NC
Status	C	C	NC	C	C	NC	NC	NC	
South Rift	96.76	-73.37	83.2	4.73	3.02	81.8	16.8	1.5	NC
Status	C	C	NC	C	NC	NC	NC	C	
Coast	97.49	-78.85	91.5	6.16	3.54	89.9	8.5	1.6	N/C
Status	C	C	NC	C	C	NC	NC	C	
Lower Eastern	96.0	-74.57	95.0	4.46	3.38	93.9	5.1	1.1	NC
Status	C	C	C	C	C	NC	NC	C	
Upper Eastern	100	-73.02	70.9	9.90	2.62	68.8	29.1	2.0	N/C
Status	C	C	NC	C	NC	NC	NC	C	
Central	98.14	-73.15	96.8	4.71	3.33	95.7	3.2	1.1	C
Status	C	C	C	C	C	C	C	C	
Nairobi	98.21	-74.59	89.6	4.72	3.31	88.3	10.4	1.3	NC
Status	C	C	NC	C	C	NC	NC	C	

5.3 Orange

	HO	RX	CSS R	Setup time	MOS	Completed	Blocked calls	Dropped calls	Overall compliance
TARGET	90%	-102 dBm	95%	<13.5 Sec.	95% > 3.1	95%	<5%	<2%	
Western	97.69	-68.43	88.8	7.59	3.41	87.2	11.2	1.6	N/C
Status	C	C	NC	C	C	NC	NC	C	
Nyanza	95.00	-66.31	89.1	8.33	3.33	87.5	11.0	1.6	N/C
Status	C	C	NC	C	C	NC	NC	C	
North Rift	99.16	-81.52	61.2	8.27	3.26	55.8	38.8	5.3	NC
Status	C	C	NC	C	C	NC	NC	NC	
South Rift	97.57	-75.27	82.6	3.34	3.08	80.7	17.4	1.9	NC
Status	C	C	NC	C	NC	NC	NC	C	
Coast	98.86	-65.35	91.8	7.17	3.32	90.7	8.2	1.1	N/C
Status	C	C	NC	C	C	NC	NC	C	
Lower Eastern	95.96	-64.57	80.8	7.83	3.6	79.2	19.3	1.5	NC
Status	C	C	NC	C	C	NC	NC	C	
Upper Eastern	89.89	-86.44	69.3	9.89	3.36	62.7	30.7	6.6.	N/C
Status	NC	C	NC	C	C	NC	NC	NC	
Central	95.00	-66.87	91.6	7.69	3.51	88.8	8.4	2.7	NC
Status	C	C	NC	C	C	NC	NC	C	
Nairobi	97.43	-65.12	97.6	7.11	3.59	97.2	2.4	0.3	C
Status	C	C	C	C	C	C	C	C	

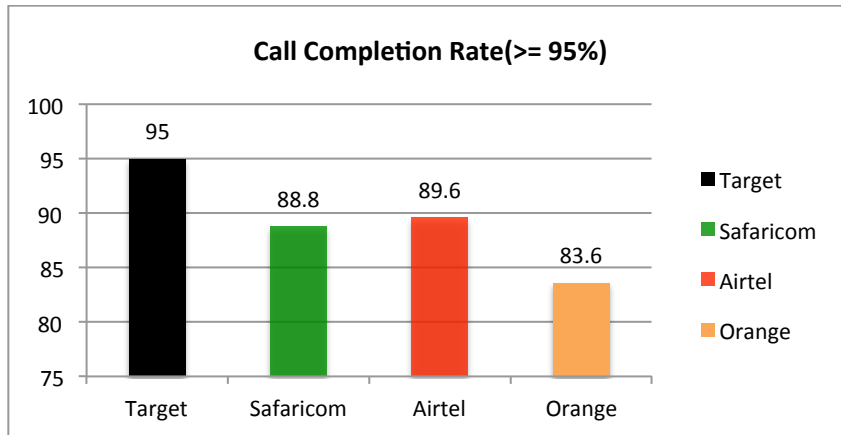
6. GENERAL OBSERVATIONS

The performance of the mobile network operators was rated best in Nairobi and worst in Upper Eastern and North Rift regions. The rest of the country recorded above average performance.

ANNEXES

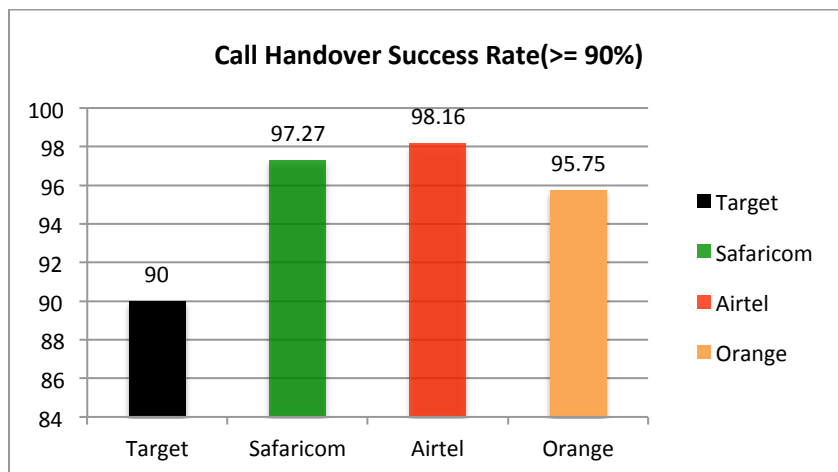
Annex 1: Comparison of operators on their Overall Performance per Parameter

1. Call Completion Rate



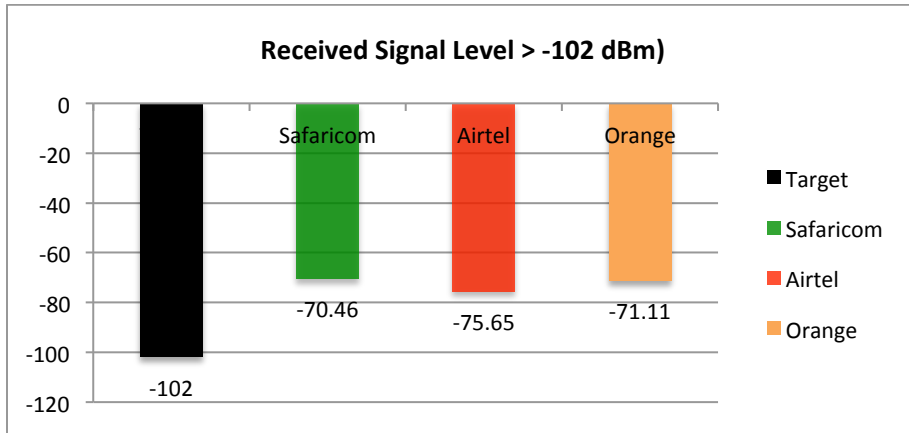
The Operators are rated on a target of greater than 95% . All the operators failed to meet the target.

2. Call handover Success Rate



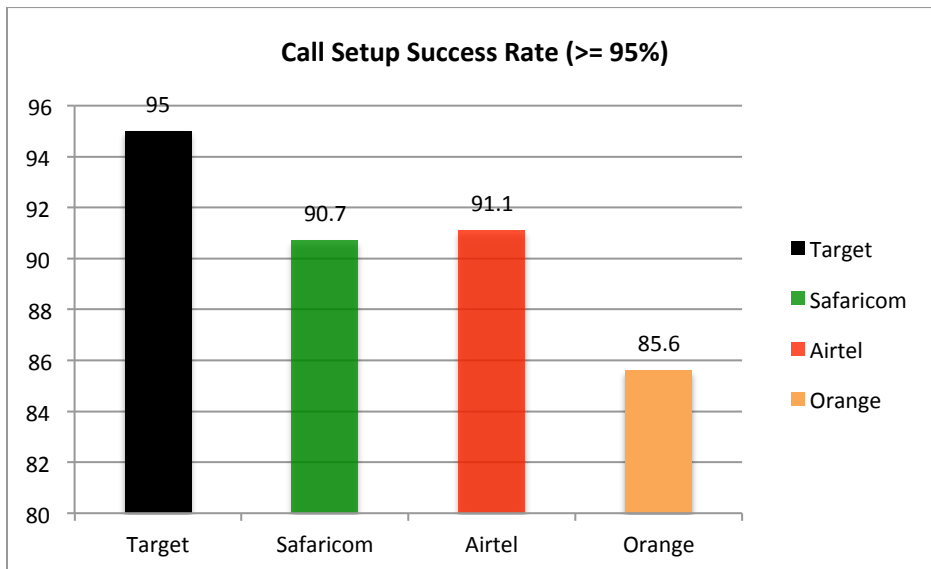
The Operators were rated on a scale of greater than 90%. All the operators met this target. Airtel Kenya Limited had the best performance on this parameter.

3. Received Signal Level



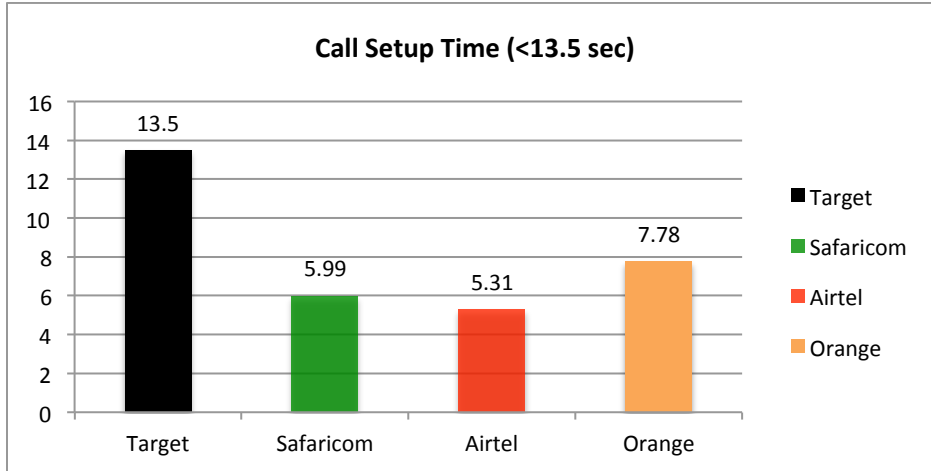
The operators were rated on a target of greater than -102dBM. All the operators met this target.

4. Call Setup Success Rate



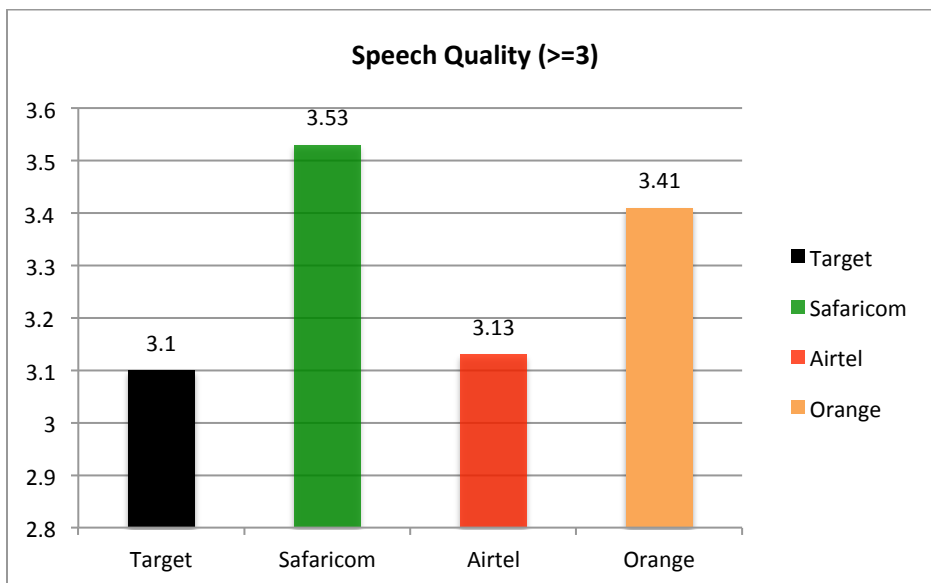
The operators were rated on a target of greater than 95%. None of the operators met this target.

5. Call Set-up Time



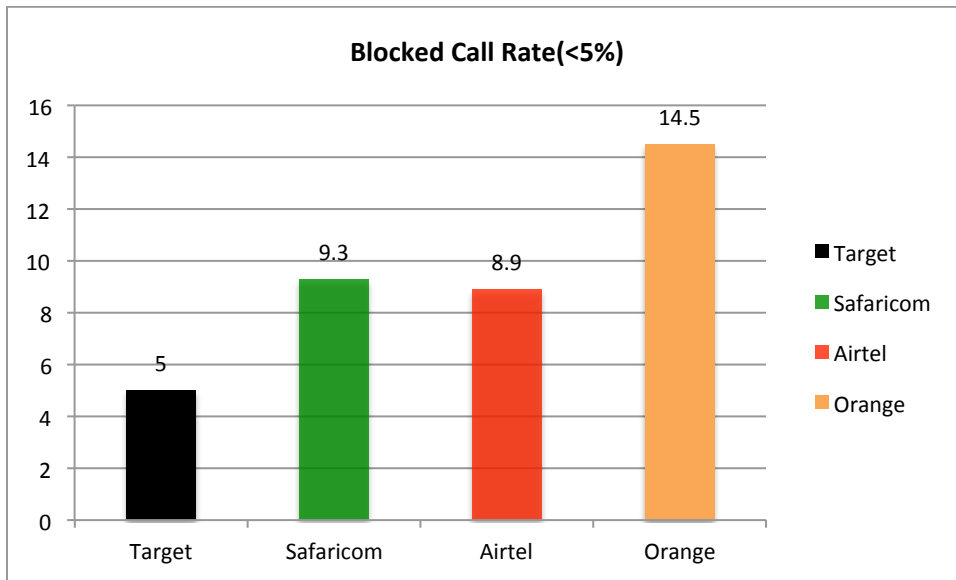
The operators were rated on a target of less than 13.5 Seconds. They all met the target. Airtel Kenya Limited Limited had the best performance on this parameter.

6. Speech Quality



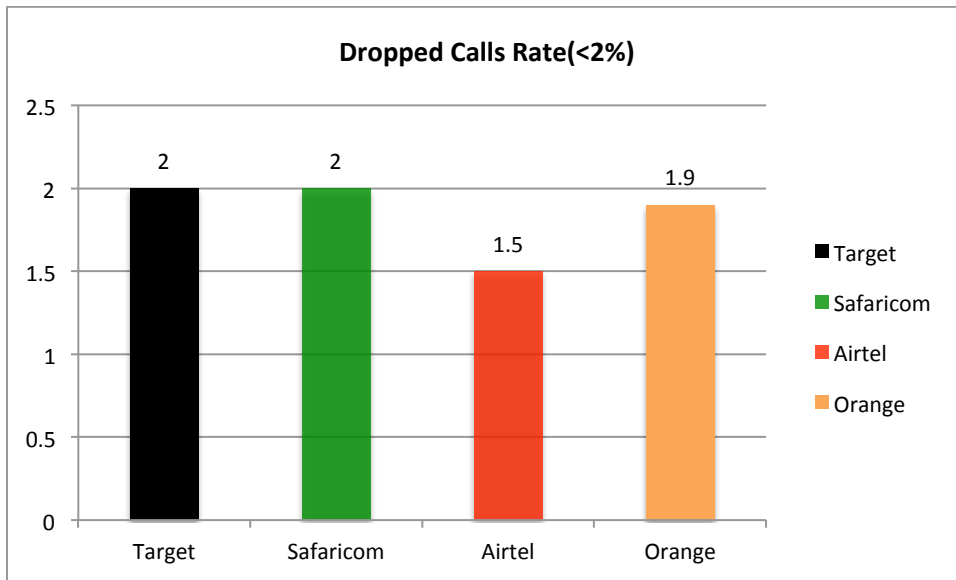
The operators were rated on a target of more than 3.1. They all met the target. Safaricom Limited Limited had the best performance on this parameter.

7. Blocked Call Rate



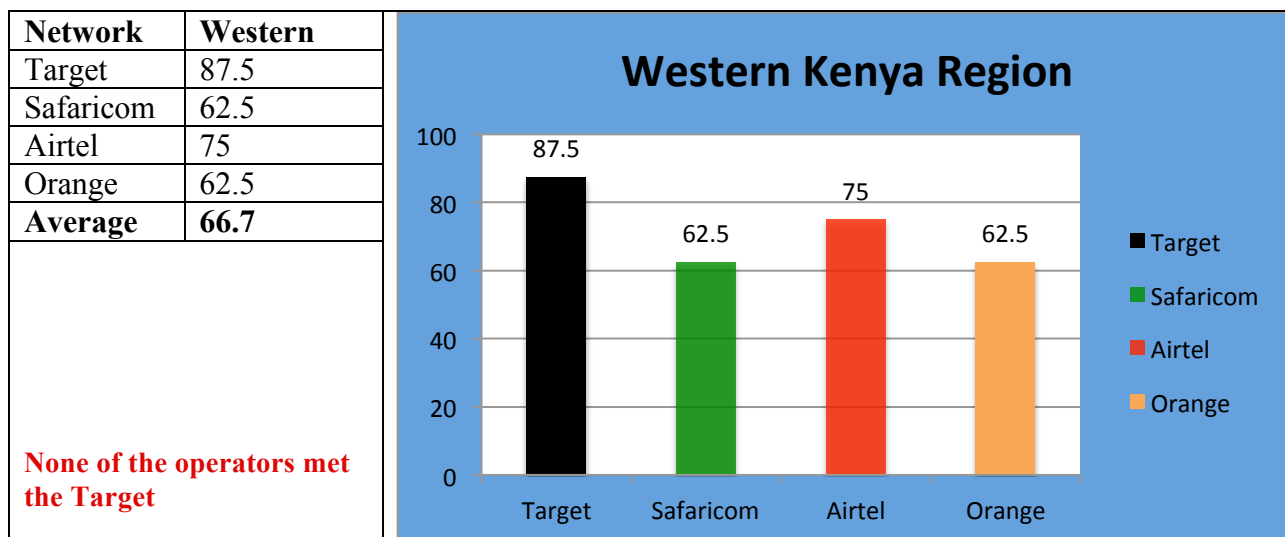
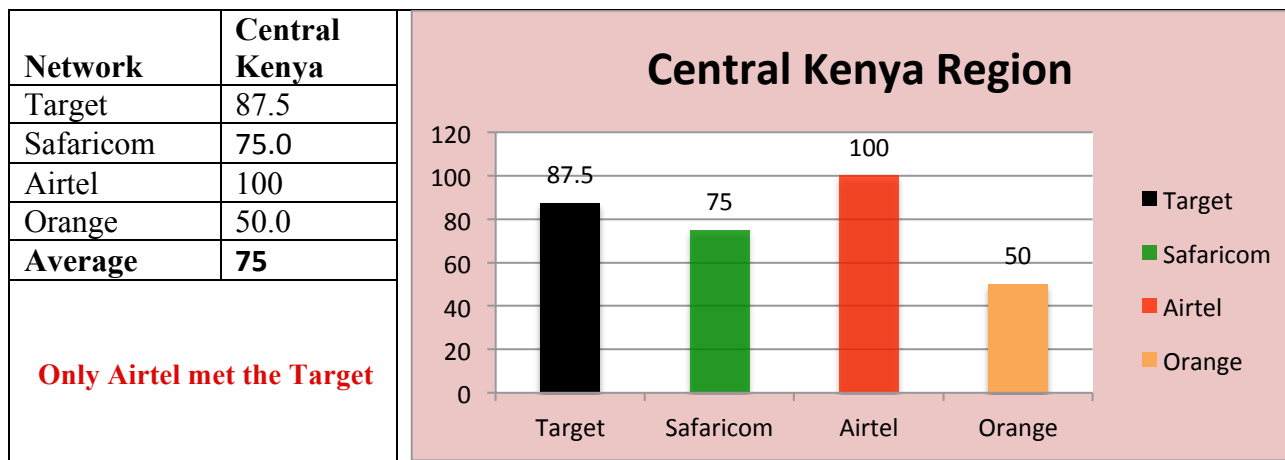
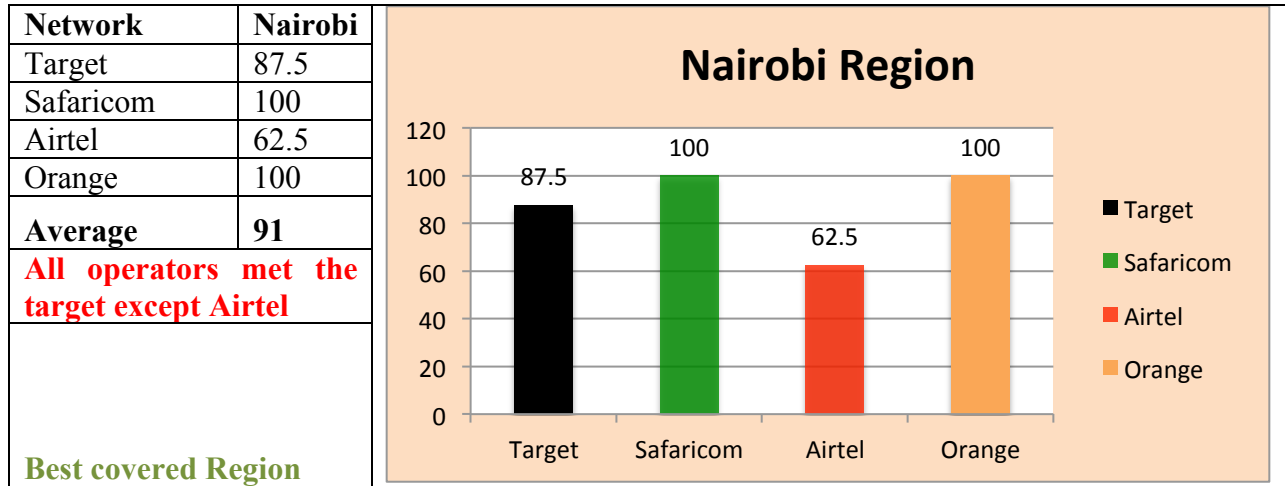
The Operators are rated on a target of less than 5%.. All the operators failed on this parameter. Airtel Kenya Limited Limited had the best performance on this parameter.

8. Dropped Call Rate



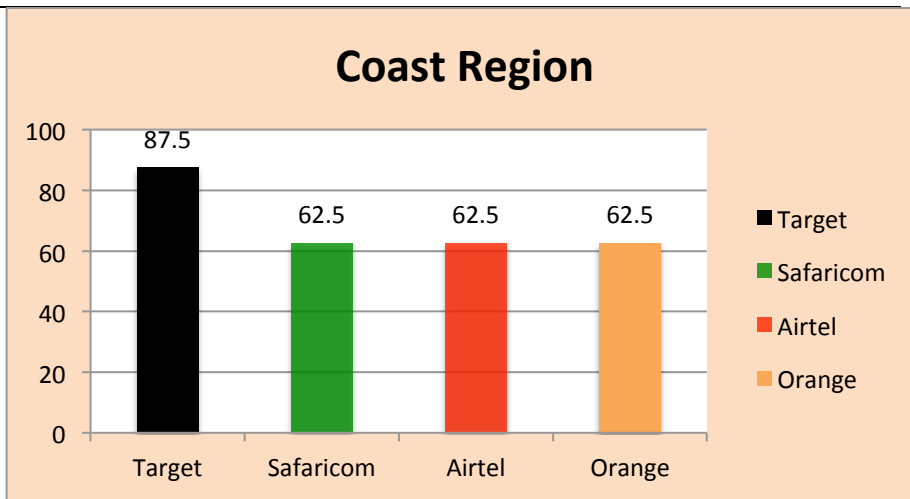
The operators are rated on a target of less than 2% of the calls that are dropped once successfully set up. All the operators met this target, although Airtel Kenya Limited recorded the best performance on this parameter.

Annex 2: Comparison of Operator Performance in Regions against the set Targets



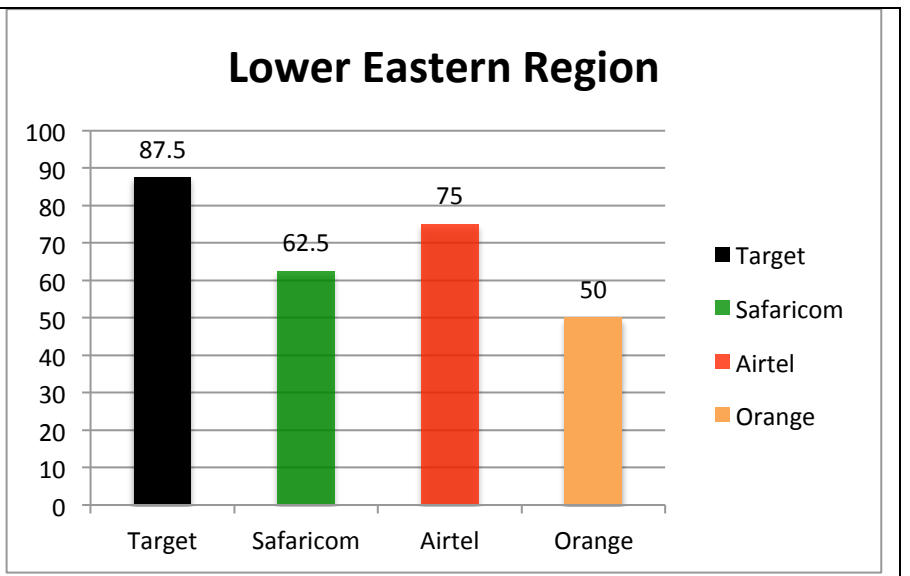
Network	Coast
Target	87.5
Safaricom	62.5
Airtel	62.5
Orange	62.5
Average	62.5

None of the operators met the Target

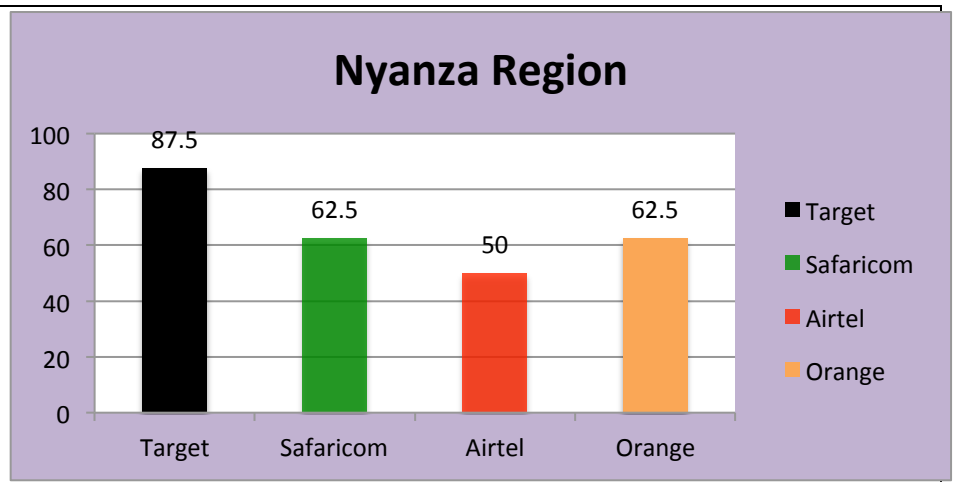


Network	Lower Eastern
Target	87.5
Safaricom	62.5
Airtel	75
Orange	50
Average	62.5

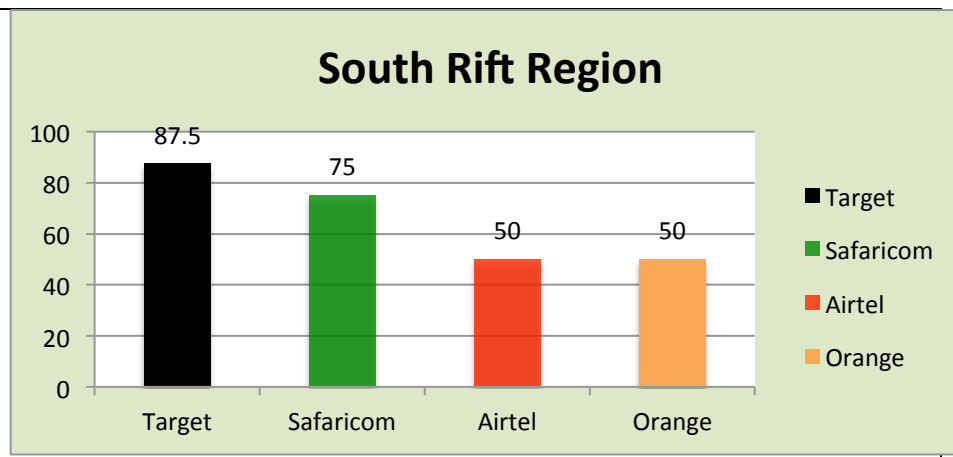
None of the operators met the Target



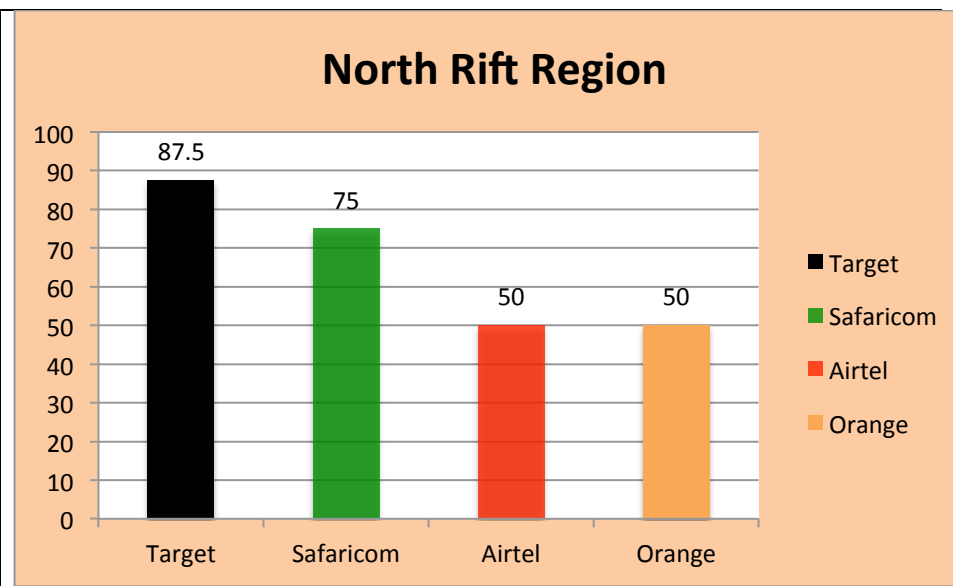
Network	Nyanza
Target	87.5
Safaricom	62.5
Airtel	50.0
Orange	62.5
Average	58.3
None of the operators met the Target	



Network	South Rift
Target	87.5
Safaricom	75
Airtel	50
Orange	50
Average	58.3
None of the operators met the Target	

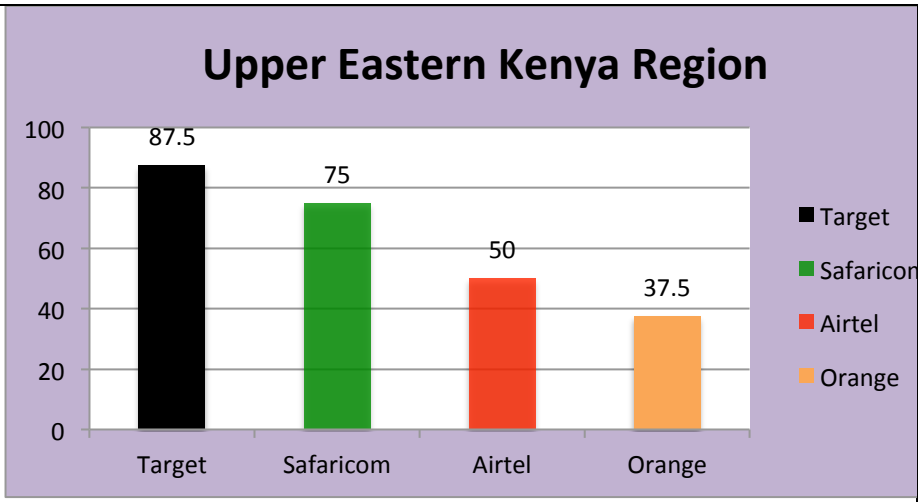


Network	North Rift
Target	87.5
Safaricom	75
Airtel	50
Orange	50
Average	58.3
None of the operators met the Target	



Network	Upper Eastern
Target	87.5
Safaricom	75
Airtel	50.0
Orange	37.5
Average	54.2

None of the operators met the Target



Annex 3: Trends of overall performance per operator from 2011/2012 to 2014/2015

