

# CERTIFICATE

## **P3 communications GmbH**

Am Kraftversorgungsturm 3, 52070 Aachen, Germany

hereby certifies that



### **Safaricom Kenya**

Safaricom Ltd., HQ3, Muguga Green  
Off Brookside Grove, off Waiyaki Way  
P.O BOX 66827-0800 Nairobi, Kenya

achieved „**Best in Test**“ with a  
Total Score of **527 of 1000**

in the **Mobile Benchmark Kenya 04/2016**.

(Score 232 of 400 in Telephony, Score 295 of 600 in Data Services)

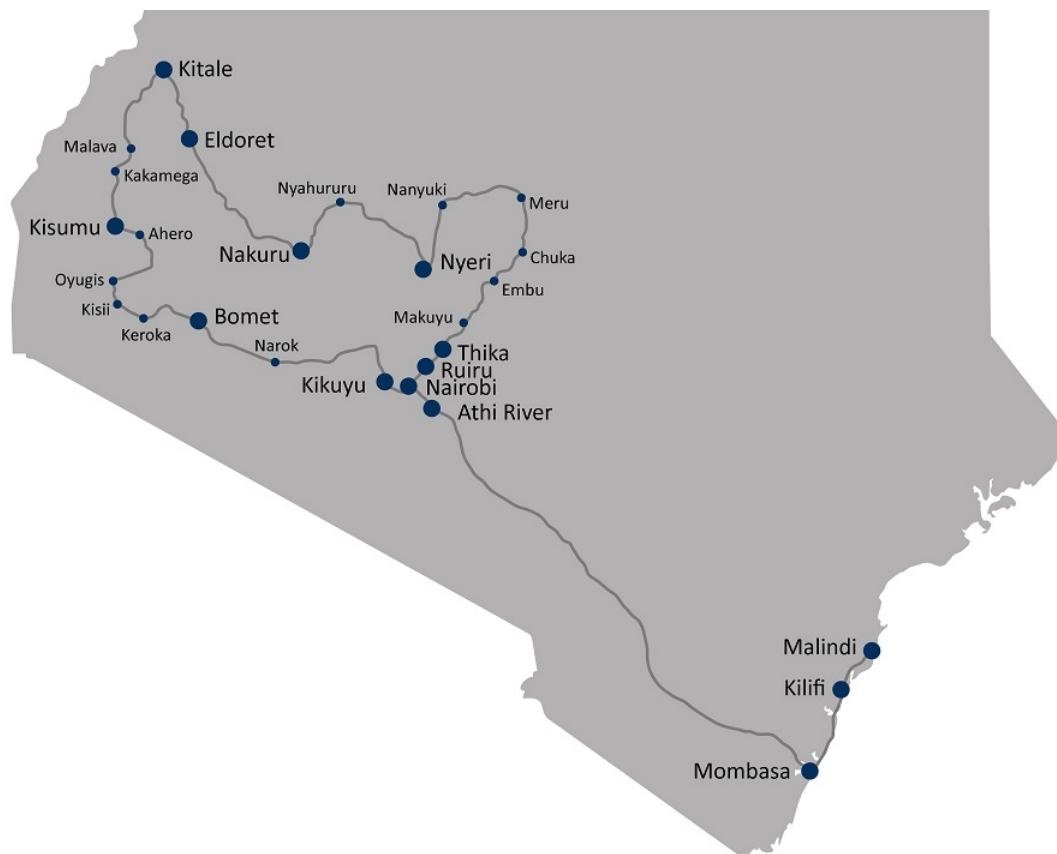


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*Head of Network Testing  
& Benchmarking*  
April 2016

## Measurement Setup

	<b>Voice</b>	<b>Data</b>
<b>Device</b>	Samsung Galaxy S5 LTE cat4 (SM-G900F) LTE/HSPA+ DC/HSUPA 5.76 P3 attenuator	Samsung Galaxy Note4 LTE cat6 (SM-N910F) LTE/HSPA+ DC/HSUPA 5.76 P3 attenuator
<b>Test Cases</b>	<p><b>Mobile-to-Mobile</b></p> <p>Side1 (4G preferred) to Side2 (3Gpref)</p> <p>115 sec call window</p> <p>70 sec call duration</p> <p>15 sec call setup timeout</p> <p>Email traffic injection on both sides (1 email per call window)</p>	<p><b>4G CA preferred</b></p> <p>HTTP DL datastream 10s</p> <p>HTTP UL datastream 10s</p> <p>HTTP 3MB DL fixed file transfer</p> <p>HTTP 1MB UL fixed file transfer</p> <p>Web Browsing - Kepler ETSI Ref. Page 7 live web pages</p> <p>YouTube SD video - 30s clip</p> <p>YouTube HD video - 30s clip</p>
<b>Mobility and Route Types</b>	100% drivetest cities, towns and roads	
<b>Samples</b>	~ 4600 per Operator	~ 1500 per Operator
<b>Dates</b>	<p><b>27 measurement days</b></p> <p><b>March 21st 2016 – April 20th 2016</b></p>	

## Testing Route



## Score Points and Breakdown

The following table indicates the score points achieved by the networks under test in the modules “Voice” and “Data Services” as well as the breakdown of achieved points in the geographical categories “Cities”, “Towns” and “Roads”.

Module	Infrastructure	Max.	Safaricom	Operator 2	Operator 3
<b>Voice</b>	<b>Total</b>	<b>400</b>	<b>232</b>	<b>222</b>	<b>162</b>
	Cities	260	61%	67%	48%
	Towns and roads	140	53%	33%	27%
<b>Data</b>	<b>Total</b>	<b>600</b>	<b>295</b>	<b>144</b>	<b>76</b>
	Cities	390	61%	29%	13%
	Towns	90	28%	12%	10%
	Roads	120	28%	16%	12%
<b>TOTAL</b>		<b>1.000</b>	<b>527</b>	<b>366</b>	<b>238</b>

Shown voice, data and total scores are rounded

The following table indicates the achieved percentage of the maximum score in each of the different infrastructural breakdowns.

Data	Service Group	Max.	Safaricom	Operator 2	Operator 3
Cities	Web Browsing	137	56%	25%	15%
	File Download	78	71%	45%	23%
	File Upload	78	58%	32%	7%
	YouTube	98	61%	20%	8%
Towns	Web Browsing	32	29%	21%	15%
	File Download	18	40%	8%	7%
	File Upload	18	16%	5%	1%
	YouTube	23	25%	10%	12%
Roads	Web Browsing	42	28%	22%	17%
	File Download	24	30%	11%	5%
	File Upload	24	26%	10%	10%
	YouTube	30	28%	16%	14%

## Voice KPI Overview

The following table indicates the achieved values of all networks under test in each of the relevant Voice Key Performance Indicators (KPIs) for the geographical categories “Cities” and “Towns and roads”.

Voice M2M	Kpi Name	Unit	Safaricom	Operator 2	Operator 3
Cities	Qualified	[%]	93,6	94,7	91,6
	Call Setup Time	[s]	6,7	6,0	8,3
	AVG Speech Quality	[MOS-LQO]	3,3	3,3	3,4
Towns and roads	Qualified	[%]	85,9	79,2	77,3
	Call Setup Time	[s]	7,0	6,9	7,5
	AVG Speech Quality	[MOS-LQO]	3,1	2,9	2,9

## Data KPI Overview

The following table indicates the achieved values of all networks under test in each of the relevant Data Key Performance Indicators (KPIs) for the geographical categories “Cities”, “Towns” and “Roads”.

Data Cities	Kpi Name	Unit	Safaricom	Operator 2	Operator 3
HTTP live page DL	Qualified	[%]	90,5	83,4	67,0
	AVG Session Time	[s]	3,3	5,1	6,1
HTTP static page DL	Qualified	[%]	91,7	88,9	75,7
	AVG Session Time	[s]	1,7	3,8	5,0
HTTP file DL 3MB	Qualified	[%]	94,9	92,6	86,9
	AVG Session Time	[s]	2,3	7,9	10,6
	90% faster than	[kbit/s]	7141	1497	1027
	10% faster than	[kbit/s]	51502	9996	8859
HTTP file UL 1MB	Qualified	[%]	92,6	88,7	41,1
	AVG Session Time	[s]	1,9	7,0	7,9
	90% faster than	[kbit/s]	1960	623	588
	10% faster than	[kbit/s]	17316	2675	1529
HTTP DL FDTT 10s	Qualified	[%]	97,4	95,1	91,5
	AVG throughput	[kbit/s]	29953	6050	4723
	90% faster than	[kbit/s]	5599	1455	684
	10% faster than	[kbit/s]	64763	11730	9834
HTTP UL FDTT 10s	Qualified	[%]	94,4	93,4	85,6
	AVG throughput	[kbit/s]	15204	1601	672
	90% faster than	[kbit/s]	1426	492	160
	10% faster than	[kbit/s]	27673	2962	1543
YouTube SD	Qualified	[%]	95,4	90,9	84,2
	Start Time	[s]	1,7	3,2	5,3
	Playouts w/o interruptions	[%]	99,3	97,7	97,3
YouTube HD	Qualified	[%]	91,4	78,8	66,8
	Start Time	[s]	1,8	3,7	8,1
	Playouts w/o interruptions	[%]	96,6	88,9	88,3

Data Towns	Kpi Name	Unit	Safaricom	Operator 2	Operator 3
HTTP live page DL	Qualified	[%]	82,4	56,7	42,1
	AVG Session Time	[s]	3,7	5,0	6,1
HTTP static page DL	Qualified	[%]	78,9	59,5	48,3
	AVG Session Time	[s]	2,8	4,2	5,2
HTTP file DL 3MB	Qualified	[%]	87,0	67,6	48,2
	AVG Session Time	[s]	5,8	8,4	8,8
	90% faster than	[kbit/s]	1819	1540	1363
	10% faster than	[kbit/s]	44280	9404	8165
HTTP file UL 1MB	Qualified	[%]	81,6	52,0	24,1
	AVG Session Time	[s]	3,8	8,8	10,3
	90% faster than	[kbit/s]	1120	510	503
	10% faster than	[kbit/s]	12480	2373	1412
HTTP DL FDTT 10s	Qualified	[%]	94,3	66,8	65,1
	AVG throughput	[kbit/s]	18397	5184	3814
	90% faster than	[kbit/s]	1755	966	150
	10% faster than	[kbit/s]	51072	10604	8229
HTTP UL FDTT 10s	Qualified	[%]	83,2	60,6	58,7
	AVG throughput	[kbit/s]	7566	1146	429
	90% faster than	[kbit/s]	483	109	83
	10% faster than	[kbit/s]	21680	2604	1115
YouTube SD	Qualified	[%]	87,6	65,8	55,3
	Start Time	[s]	2,1	3,7	5,2
	Playouts w/o interruptions	[%]	97,0	98,3	98,7
YouTube HD	Qualified	[%]	80,2	64,6	54,0
	Start Time	[s]	2,6	3,9	8,0
	Playouts w/o interruptions	[%]	94,3	84,2	91,2

Data Roads	Kpi Name	Unit	Safaricom	Operator 2	Operator 3
HTTP live page DL	Qualified	[%]	69,9	42,0	21,9
	AVG Session Time	[s]	4,0	5,2	6,0
HTTP static page DL	Qualified	[%]	65,0	44,8	24,7
	AVG Session Time	[s]	3,4	3,9	5,2
HTTP file DL 3MB	Qualified	[%]	72,7	47,5	32,5
	AVG Session Time	[s]	7,3	10,7	13,4
	90% faster than	[kbit/s]	1540	894	688
	10% faster than	[kbit/s]	28369	9917	7727
HTTP file UL 1MB	Qualified	[%]	65,6	41,6	9,7
	AVG Session Time	[s]	5,0	7,7	7,0
	90% faster than	[kbit/s]	873	541	958
	10% faster than	[kbit/s]	11019	2687	1524
HTTP DL FDTT 10s	Qualified	[%]	83,2	49,4	64,6
	AVG throughput	[kbit/s]	11176	5742	2483
	90% faster than	[kbit/s]	1021	1054	147
	10% faster than	[kbit/s]	26960	11013	8017
HTTP UL FDTT 10s	Qualified	[%]	81,3	48,8	45,1
	AVG throughput	[kbit/s]	4098	1380	442
	90% faster than	[kbit/s]	253	199	76
	10% faster than	[kbit/s]	11994	2944	1435
YouTube SD	Qualified	[%]	75,6	47,7	32,0
	Start Time	[s]	2,6	3,2	6,0
	Playouts w/o interruptions	[%]	97,8	97,1	97,4
YouTube HD	Qualified	[%]	64,0	47,9	26,7
	Start Time	[s]	2,9	3,8	8,0
	Playouts w/o interruptions	[%]	93,7	84,3	85,2