

# CERTIFICATE

## **P3 communications GmbH**

Am Kraftversorgungsturm 3, D-52070 Aachen, Germany

hereby certifies that



## **MTN South Africa**

MTN Group, Innovation Centre, 216 Fourteenth Avenue, Fairlands

achieved **“Best in Test”** with a

Total Score of **812 of 1000**

in the **Mobile Benchmark South Africa 02/2018.**

(Score 324 of 400 in Telephony, Score 488 of 600 in Data Services)

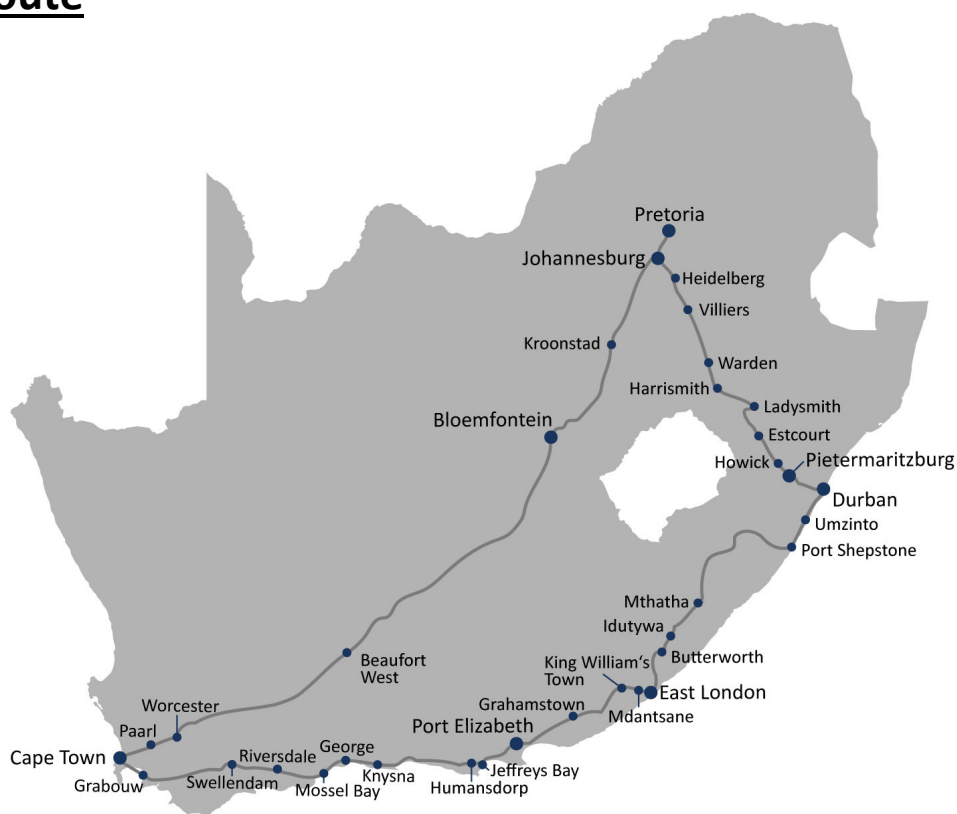


**Maziar Kianzad**  
*Managing Director*  
February 2018

## Measurement Setup

	<b>Voice</b>	<b>Data</b>
<b>Device</b>	Samsung Galaxy S8 cat16	Samsung Galaxy S8 cat16
<b>Test Cases</b>	<p><b>Mobile-to-Mobile</b></p> <p>Side1 (4G preferred) to Side2 (4G preferred)</p> <p>Side1 (VoLTE) to Side2 (VoLTE)</p> <p>115 sec call window</p> <p>70 sec call duration</p> <p>15 sec call setup timeout</p> <p>Multi-RAB traffic injection on both sides</p>	<p><b>Data 4G preferred CA</b></p> <p>HTTP DL datastream 7s</p> <p>HTTP UL datastream 7s</p> <p>HTTP 3MB DL fixed file transfer</p> <p>HTTP 1MB UL fixed file transfer</p> <p>Web Browsing - Kepler ETSI Ref. Page</p> <p>10 Live web pages (50% http / 50% https)</p> <p>4 YouTube HD video ~ 45s</p>
<b>Mobility and Route Types</b>	<p><b>100% Drivetest</b></p> <p>52% in Cities, 16 % in Towns and 32% on Roads</p> <p>Cities, towns and roads</p>	
<b>Samples</b>	~ 9000 per Operator	~ 2900 per Operator
<b>Dates</b>	<p><b>27 measurement days</b></p> <p><b>17.01.2018 – 17.02.2018</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.	MTN	Operator 2	Operator 3	Operator 4
<b>Voice</b>	<b>Total</b>	<b>400</b>	<b>324</b>	<b>314</b>	<b>125</b>	<b>144</b>
	Cities	240	86%	85%	29%	48%
	Towns	80	82%	83%	47%	20%
	Roads	80	64%	55%	23%	18%
<b>Data</b>	<b>Total</b>	<b>600</b>	<b>488</b>	<b>465</b>	<b>300</b>	<b>206</b>
	Cities	360	89%	83%	65%	48%
	Towns	120	80%	79%	27%	12%
	Roads	120	59%	58%	27%	17%
<b>TOTAL</b>		<b>1.000</b>	<b>812</b>	<b>779</b>	<b>425</b>	<b>351</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 data services.

Data	Service Group	Max.	MTN	Operator 2	Operator 3	Operator 4
Cities	Web Browsing	108	85%	77%	67%	37%
	File Download	90	83%	78%	68%	58%
	File Upload	90	93%	89%	59%	49%
	YouTube	72	97%	93%	67%	50%
Towns	Web Browsing	36	76%	72%	23%	8%
	File Download	30	76%	77%	20%	8%
	File Upload	30	80%	80%	26%	10%
	YouTube	24	90%	91%	44%	27%
Roads	Web Browsing	36	52%	54%	24%	7%
	File Download	30	66%	60%	25%	13%
	File Upload	30	53%	57%	25%	18%
	YouTube	24	72%	62%	39%	35%

## 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”, “Towns” and “Roads”.

Voice M2M	KPI Name	Unit	MTN	Operator 2	Operator 3	Operator 4
Cities	Qualifier	[%]	98,4	97,9	90,9	92,9
	Call Setup Time	[s]	4,1	3,6	7,2	6,1
	AVG Speech Quality	[MOS-LQO]	3,8	3,8	2,7	3,3
Towns	Qualifier	[%]	98,4	97,6	94,0	87,9
	Call Setup Time	[s]	5,3	3,7	7,3	6,5
	AVG Speech Quality	[MOS-LQO]	3,7	3,9	2,8	3,0
Roads	Qualifier	[%]	92,0	88,7	84,3	71,4
	Call Setup Time	[s]	4,9	4,1	7,5	6,6
	AVG Speech Quality	[MOS-LQO]	3,7	3,7	2,8	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	MTN	Operator 2	Operator 3	Operator 4
HTTP Live Page DL	Qualifier	[%]	98,9	98,3	96,5	91,6
	Time to first Byte	[ms]	529	627	735	903
	KBytes first second	[KB]	321	315	266	257
HTTP Static Page DL	Qualifier	[%]	100,0	98,3	98,0	91,9
	AVG Session Time	[s]	1,4	1,8	1,9	2,3
HTTP file DL 3MB	Qualifier	[%]	99,8	99,6	98,7	96,8
	AVG Session Time	[s]	1,6	2,0	3,1	4,3
	90% faster than	[kbit/s]	8095	7240	4537	2735
	10% faster than	[kbit/s]	49824	39344	28355	32877
HTTP file UL 1MB	Qualifier	[%]	99,9	99,9	96,8	94,2
	AVG Session Time	[s]	1,2	1,5	3,3	2,9
	90% faster than	[kbit/s]	7.253	5.321	1.184	1.313
	10% faster than	[kbit/s]	22.857	20.597	15.009	15.939
HTTP DL FDTT 7s	Qualifier	[%]	99,5	98,4	96,9	94,8
	AVG throughput	[kbit/s]	32066	27454	22429	23085
	90% faster than	[kbit/s]	9218	8574	5659	3351
	10% faster than	[kbit/s]	61824	47408	43387	50723
HTTP UL FDTT 7s	Qualifier	[%]	99,8	99,7	95,0	92,5
	AVG throughput	[kbit/s]	20.581	18.127	8.754	12.903
	90% faster than	[kbit/s]	9205	6690	1301	1462
	10% faster than	[kbit/s]	29204	28433	22103	20789
YouTube	Qualifier	[%]	99,7	99,1	94,0	90,6
	Start Time	[s]	2,2	2,5	3,4	3,4
	Playouts w/o interruptions	[%]	99,9	99,3	98,6	97,7
	AVG Resolution	[p]	1077,2	1074,0	1060,4	1048,6

Data Towns	KPI Name	Unit	MTN	Operator 2	Operator 3	Operator 4
HTTP Live Page DL	Qualifier	[%]	98,4	97,9	69,7	65,9
	Time to first Byte	[ms]	640	732	722	1.596
	KBytes first second	[KB]	281	287	236	177
HTTP Static Page DL	Qualifier	[%]	98,7	98,5	69,9	63,9
	AVG Session Time	[s]	1,9	2,1	2,2	4,2
HTTP file DL 3MB	Qualifier	[%]	99,3	99,0	71,2	82,8
	AVG Session Time	[s]	2,5	2,1	3,9	11,0
	90% faster than	[kbit/s]	5500	7526	3466	1075
	10% faster than	[kbit/s]	37694	35451	26786	16683
HTTP file UL 1MB	Qualifier	[%]	98,8	98,4	70,5	71,8
	AVG Session Time	[s]	1,7	1,9	2,2	7,6
	90% faster than	[kbit/s]	3.511	3.622	2.035	602
	10% faster than	[kbit/s]	19.021	18.307	13.894	7.917
HTTP DL FDTT 7s	Qualifier	[%]	98,7	99,4	69,9	77,9
	AVG throughput	[kbit/s]	25203	24211	21573	8270
	90% faster than	[kbit/s]	6831	8696	5052	955
	10% faster than	[kbit/s]	48629	43122	41176	18942
HTTP UL FDTT 7s	Qualifier	[%]	98,6	98,8	71,3	68,4
	AVG throughput	[kbit/s]	15.284	16.507	13.087	3.884
	90% faster than	[kbit/s]	3989	3962	2510	598
	10% faster than	[kbit/s]	27624	28994	23923	9011
YouTube	Qualifier	[%]	98,4	98,6	69,0	62,7
	Start Time	[s]	2,5	2,7	3,4	4,9
	Playouts w/o interruptions	[%]	99,5	99,6	99,4	92,5
	AVG Resolution	[p]	1070,7	1075,5	1060,5	971,6

Data Roads	KPI Name	Unit	MTN	Operator 2	Operator 3	Operator 4
HTTP Live Page DL	Qualifier	[%]	90,7	91,8	33,7	47,1
	Time to first Byte	[ms]	993	784	814	1.721
	KBytes first second	[KB]	267	265	246	185
HTTP Static Page DL	Qualifier	[%]	90,2	90,7	32,4	46,1
	AVG Session Time	[s]	2,2	2,8	2,2	4,2
HTTP file DL 3MB	Qualifier	[%]	92,9	92,8	31,3	55,3
	AVG Session Time	[s]	3,4	5,2	4,0	10,0
	90% faster than	[kbit/s]	4444	2099	2992	1147
	10% faster than	[kbit/s]	42599	35445	29918	20253
HTTP file UL 1MB	Qualifier	[%]	90,1	92,7	33,6	49,6
	AVG Session Time	[s]	3,3	3,5	3,1	7,5
	90% faster than	[kbit/s]	1.309	1.232	1.341	615
	10% faster than	[kbit/s]	19.061	17.422	14.920	12.607
HTTP DL FDTT 7s	Qualifier	[%]	92,8	93,4	31,6	54,6
	AVG throughput	[kbit/s]	25125	21133	19467	9406
	90% faster than	[kbit/s]	4832	2375	3874	1113
	10% faster than	[kbit/s]	54655	46027	39294	20667
HTTP UL FDTT 7s	Qualifier	[%]	89,2	89,6	31,4	47,1
	AVG throughput	[kbit/s]	10.992	9.794	11.448	4.852
	90% faster than	[kbit/s]	1519	1334	1299	630
	10% faster than	[kbit/s]	26596	25965	24204	18310
YouTube	Qualifier	[%]	91,2	88,4	33,0	45,2
	Start Time	[s]	3,1	3,1	3,5	5,0
	Playouts w/o interruptions	[%]	99,1	98,1	96,6	95,6
	AVG Resolution	[p]	1060,6	1039,5	1050,2	992,3