

CERTIFICATE

P3 communications GmbH

hereby certifies that



Vodafone Czech Republic a.s.

Náměstí Junkových 2/2808, Praha 5, 155 00, Czech Republic

achieved „**Best in Test**“ with a

Total Score of **885 of 1000**

in the **Mobile Benchmark Czech Republic 05/2017.**

(Score 342 of 400 in Telephony, Score 543 of 600 in Data Services)



Maziar Kianzad
*Head of Measurement
and Testing Solutions*
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Measurement Setup

	Voice	Data
Device	Samsung Galaxy S7 LTE cat9 P3 attenuator	Samsung Galaxy S7 LTE cat9 P3 attenuator
Test Cases	<p>Mobile-to-Mobile</p> <p>Mobile-to-Mobile (M2M)</p> <p>Side1 (4G preferred) to Side2 (3G preferred)</p> <p>Side1 (4G preferred) to Side2 (4G preferred)</p> <p>115 sec call window</p> <p>70 sec call duration</p> <p>15 sec call setup timeout</p> <p>Data traffic injection on both sides (100KB)</p> <p>(1 download per call window)</p>	<p>4G preferred CA</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</p> <p>10 Live web pages (50% http, 50% https)</p> <p>YouTube video streaming - 45s</p>
Mobility and Route Types	<p>100% Drivetest</p> <p>57% in Cities, 20% in Towns, 23% on Roads</p>	
Samples	M2M: ~4000 per Operator	Data 4G ~1600 per Operator
Dates	<p>11 measurement days</p> <p>April 25th - May 09th, 2017</p>	

Testing Route



Score Points and Breakdown

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

Module	Infrastructure	Max.	Vodafone	Operator 2	Operator 3
Voice	Total	400	342	326	285
	Cities	240	88%	81%	73%
	Towns	80	81%	91%	73%
	Roads	80	82%	73%	65%
Data	Total	600	543	525	533
	Cities	360	92%	87%	90%
	Towns	120	87%	87%	86%
	Roads	120	89%	88%	89%
TOTAL		1.000	885	851	818

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 breakdown.

Data	Service Group	Max.	Vodafone	Operator 2	Operator 3
Cities	Web Browsing	126,0	91%	89%	90%
	File Download	72,0	85%	80%	82%
	File Upload	72,0	93%	81%	88%
	YouTube	90,0	99%	95%	97%
Towns	Web Browsing	42,0	88%	87%	87%
	File Download	24,0	79%	83%	79%
	File Upload	24,0	82%	82%	82%
	YouTube	30,0	98%	96%	93%
Roads	Web Browsing	42,0	89%	87%	88%
	File Download	24,0	87%	86%	85%
	File Upload	24,0	86%	85%	86%
	YouTube	30,0	94%	95%	96%

Voice KPI Overview

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

Voice M2M	Kpi Name	Unit	Vodafone	Operator 2	Operator 3
Cities	Qualified	[%]	98,8	97,3	97,0
	Call Setup Time	[s]	4,6	4,1	6,5
	AVG Speech Quality	[MOS-LQO]	3,5	3,5	3,1
Towns	Qualified	[%]	97,4	98,8	96,9
	Call Setup Time	[s]	4,8	3,9	6,1
	AVG Speech Quality	[MOS-LQO]	3,6	3,6	3,1
Roads	Qualified	[%]	97,0	93,9	93,4
	Call Setup Time	[s]	5,6	4,8	6,7
	AVG Speech Quality	[MOS-LQO]	3,5	3,5	3,1

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”, “Townns” and “Roads”.

Data Cities	Kpi Name	Unit	Vodafone	Operator 2	Operator 3
HTTP live page DL	Qualified	[%]	99,3	98,9	99,3
	AVG Session Time	[s]	2,8	2,9	3,0
HTTP static page DL	Qualified	[%]	99,1	99,5	99,6
	AVG Session Time	[s]	1,2	1,2	1,3
HTTP file DL 3MB	Qualified	[%]	99,1	99,4	99,9
	AVG Session Time	[s]	1,4	2,2	2,0
	90% faster than	[kbit/s]	10005	5727	6200
	10% faster than	[kbit/s]	54054	37975	39158
HTTP file UL 1MB	Qualified	[%]	99,9	98,5	99,6
	AVG Session Time	[s]	0,9	1,3	1,1
	90% faster than	[kbit/s]	6074	3756	5493
	10% faster than	[kbit/s]	21248	16985	16006
HTTP DL FDTT 10s	Qualified	[%]	99,2	99,8	99,9
	AVG throughput	[kbit/s]	49523	28846	30140
	90% faster than	[kbit/s]	14894	7054	7807
	10% faster than	[kbit/s]	89761	59780	61952
HTTP UL FDTT 10s	Qualified	[%]	99,4	99,2	99,4
	AVG throughput	[kbit/s]	21240	14150	15619
	90% faster than	[kbit/s]	9319	4705	7482
	10% faster than	[kbit/s]	33858	20515	21798
YouTube	Qualified	[%]	100,0	99,4	99,8
	Start Time	[s]	1,5	1,5	1,5
	Playouts w/o interruptions	[%]	99,8	99,9	100,0
	AVG Resolution	[p]	691,7	668,5	671,5

Data Towns	Kpi Name	Unit	Vodafone	Operator 2	Operator 3
HTTP live page DL	Qualified	[%]	98,8	98,6	98,8
	AVG Session Time	[s]	2,8	2,9	3,0
HTTP static page DL	Qualified	[%]	98,7	99,0	98,8
	AVG Session Time	[s]	1,2	1,2	1,4
HTTP file DL 3MB	Qualified	[%]	98,4	100,0	99,7
	AVG Session Time	[s]	1,7	1,9	2,1
	90% faster than	[kbit/s]	6769	6951	5789
	10% faster than	[kbit/s]	44618	41251	33177
HTTP file UL 1MB	Qualified	[%]	98,4	99,0	99,7
	AVG Session Time	[s]	1,2	1,3	1,4
	90% faster than	[kbit/s]	4094	3515	4050
	10% faster than	[kbit/s]	17906	15974	15029
HTTP DL FDTT 10s	Qualified	[%]	99,3	99,7	100,0
	AVG throughput	[kbit/s]	34737	33334	20957
	90% faster than	[kbit/s]	10431	8104	5816
	10% faster than	[kbit/s]	61191	68775	39144
HTTP UL FDTT 10s	Qualified	[%]	99,0	99,0	98,1
	AVG throughput	[kbit/s]	15459	14111	14773
	90% faster than	[kbit/s]	4001	4369	5413
	10% faster than	[kbit/s]	25842	20586	20895
YouTube	Qualified	[%]	99,7	99,7	99,0
	Start Time	[s]	1,5	1,6	1,6
	Playouts w/o interruptions	[%]	100,0	100,0	100,0
	AVG Resolution	[p]	683,7	662,2	659,8

Data Roads	Kpi Name	Unit	Vodafone	Operator 2	Operator 3
HTTP live page DL	Qualified	[%]	97,8	97,0	98,3
	AVG Session Time	[s]	2,9	3,0	3,1
HTTP static page DL	Qualified	[%]	98,3	98,4	98,1
	AVG Session Time	[s]	1,1	1,2	1,4
HTTP file DL 3MB	Qualified	[%]	98,9	98,9	99,2
	AVG Session Time	[s]	2,4	2,8	2,7
	90% faster than	[kbit/s]	5182	5285	4486
	10% faster than	[kbit/s]	41623	38083	35191
HTTP file UL 1MB	Qualified	[%]	98,6	98,6	97,8
	AVG Session Time	[s]	1,6	1,5	1,5
	90% faster than	[kbit/s]	2658	2793	2901
	10% faster than	[kbit/s]	16667	16390	15123
HTTP DL FDTT 10s	Qualified	[%]	98,6	98,9	98,6
	AVG throughput	[kbit/s]	27854	25365	21369
	90% faster than	[kbit/s]	7740	6055	5771
	10% faster than	[kbit/s]	51718	52360	41569
HTTP UL FDTT 10s	Qualified	[%]	98,9	98,4	98,9
	AVG throughput	[kbit/s]	13618	12643	13438
	90% faster than	[kbit/s]	2767	3037	3845
	10% faster than	[kbit/s]	21258	20030	20291
YouTube	Qualified	[%]	98,0	99,2	99,4
	Start Time	[s]	1,6	1,6	1,6
	Playouts w/o interruptions	[%]	99,4	100,0	100,0
	AVG Resolution	[p]	671,0	644,2	657,1