

CERTIFICATE

P3 communications GmbH

Am Kraftversorgungsturm 3, D-52070 Aachen, Germany

hereby certifies that



Slovak Telekom

Bajkalská 28, 817 62 Bratislava, Slovak Republic

achieved „**Best in Test**“ with a

Total Score of **830 of 1000**

in the **Mobile Benchmark Slovakia 06/2016.**

(Score 321 of 400 in Telephony, Score 509 of 600 in Data Services)



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*Head of Network Testing
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July 2016

Measurement Setup

	Voice	Data
Device	Sony Xperia Z5 (E6653) P3 attenuator	Samsung Galaxy Note4 LTE cat6 (SM-N910F) LTE/HSPA+ DC/HSUPA 5.76 P3 attenuator
Test Cases	Mobile-to-Mobile (M2M) Side1 (4G preferred) to Side2 (3G preferred) Side1 (4G preferred) to Side2 (4G preferred) 115 sec call window 70 sec call duration 15 sec call setup timeout Email traffic injection on both sides (100KB) (1 email per call window)	Data 4G preferred CA HTTP DL datastream 10s HTTP UL datastream 10s HTTP 3MB DL fixed file transfer HTTP 1MB UL fixed file transfer Web Browsing - Kepler ETSI Ref. Page 10 Live web pages (50% http, 50% https) YouTube HD/ SD video - 45s
Mobility and Route Types	100% Drivetest 57% in Cities, 21% in Towns and 22% on Roads	
Samples	~ 2820 per Operator	~ 1180 per Service and Operator
Dates	18 measurement days June 10th – June 30th, 2016	

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.	Telekom	Operator 2	Operator 3	Operator 4
Voice	Total	400	321	304	210	152
	Cities	240	86%	80%	57%	43%
	Towns	80	81%	75%	65%	45%
	Roads	80	61%	65%	27%	17%
Data	Total	600	509	451	367	373
	Cities	360	88%	86%	81%	79%
	Towns	120	90%	71%	37%	38%
	Roads	120	70%	47%	24%	36%
TOTAL		1.000	830	755	578	526

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.	Telekom	Operator 2	Operator 3	Operator 4
Cities	Web Browsing	126	83%	80%	76%	77%
	File Download	72	89%	89%	81%	75%
	File Upload	72	92%	84%	79%	82%
	YouTube	90	93%	93%	92%	83%
Towns	Web Browsing	42	86%	63%	25%	36%
	File Download	24	87%	78%	53%	31%
	File Upload	24	91%	71%	32%	36%
	YouTube	30	95%	77%	47%	49%
Roads	Web Browsing	42	63%	40%	27%	34%
	File Download	24	73%	55%	20%	34%
	File Upload	24	69%	52%	21%	28%
	YouTube	30	77%	46%	27%	45%

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	Telekom	Operator 2	Operator 3	Operator 4
Cities	Qualifier	[%]	99,1	99,0	96,3	92,6
	Call Setup Time	[s]	6,5	8,1	10,6	8,8
	AVG Speech Quality	[MOS-LQO]	3,6	3,3	2,6	3,0
Towns	Qualifier	[%]	99,0	98,5	95,8	93,2
	Call Setup Time	[s]	7,6	8,5	6,1	9,3
	AVG Speech Quality	[MOS-LQO]	3,3	2,9	2,8	3,1
Roads	Qualifier	[%]	93,2	94,6	84,3	71,9
	Call Setup Time	[s]	8,1	8,1	8,1	9,7
	AVG Speech Quality	[MOS-LQO]	3,1	2,9	2,6	3,0

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	Telekom	Operator 2	Operator 3	Operator 4
HTTP Live Page DL	Qualifier	[%]	97,7	97,5	96,2	96,6
	AVG Session Time	[s]	3,7	4,0	4,0	3,7
HTTP Static Page DL	Qualifier	[%]	99,5	99,6	99,3	98,3
	AVG Session Time	[s]	1,2	1,5	1,5	1,3
HTTP file DL 3MB	Qualifier	[%]	99,7	99,6	99,6	98,4
	AVG Session Time	[s]	1,3	1,1	2,0	1,7
	90% faster than	[kbit/s]	13133	13170	7585	8970
	10% faster than	[kbit/s]	58537	53405	35487	38095
HTTP file UL 1MB	Qualifier	[%]	99,1	99,1	99,6	98,4
	AVG Session Time	[s]	1,0	1,3	1,8	1,1
	90% faster than	[kbit/s]	6446	3873	2720	6728
	10% faster than	[kbit/s]	13342	13038	9150	13040
HTTP DL FDTT 10s	Qualifier	[%]	99,4	99,9	99,7	97,7
	AVG throughput	[kbit/s]	51431	53525	25233	26033
	90% faster than	[kbit/s]	19488	18935	9495	11059
	10% faster than	[kbit/s]	97694	93711	47239	45425
HTTP UL FDTT 10s	Qualifier	[%]	99,3	99,4	99,6	98,1
	AVG throughput	[kbit/s]	25468	16263	12055	16642
	90% faster than	[kbit/s]	9913	4966	2466	7291
	10% faster than	[kbit/s]	46839	27147	19111	19867
YouTube	Qualifier	[%]	99,0	99,1	99,0	96,3
	Start Time	[s]	2,3	2,4	2,5	2,2
	Playouts w/o interruptions	[%]	99,7	99,7	99,6	98,9
	AVG Resolution	[p]	712,2	709,1	710,3	720,0
	HD Share	[%]	97,8	97,0	97,3	100,0

Data Towns	KPI Name	Unit	Telekom	Operator 2	Operator 3	Operator 4
HTTP Live Page DL	Qualifier	[%]	98,8	93,1	76,1	80,4
	AVG Session Time	[s]	3,9	4,2	5,3	3,8
HTTP Static Page DL	Qualifier	[%]	100,0	98,8	89,0	81,7
	AVG Session Time	[s]	1,2	1,8	3,7	1,3
HTTP file DL 3MB	Qualifier	[%]	100,0	100,0	96,9	81,4
	AVG Session Time	[s]	1,3	4,3	8,6	1,6
	90% faster than	[kbit/s]	12367	5031	1702	11110
	10% faster than	[kbit/s]	40067	32271	7792	39254
HTTP file UL 1MB	Qualifier	[%]	100,0	98,1	91,5	81,4
	AVG Session Time	[s]	1,1	2,0	6,8	1,1
	90% faster than	[kbit/s]	7306	2044	675	6424
	10% faster than	[kbit/s]	12077	10243	1987	12614
HTTP DL FDTT 10s	Qualifier	[%]	100,0	100,0	96,9	82,5
	AVG throughput	[kbit/s]	32521	21124	5679	28533
	90% faster than	[kbit/s]	16692	4841	1521	12990
	10% faster than	[kbit/s]	50465	35855	8200	44863
HTTP UL FDTT 10s	Qualifier	[%]	99,3	98,8	93,0	81,4
	AVG throughput	[kbit/s]	18656	9163	1712	16104
	90% faster than	[kbit/s]	10810	1988	360	7026
	10% faster than	[kbit/s]	22537	13922	2029	21495
YouTube	Qualifier	[%]	99,3	95,4	93,6	80,8
	Start Time	[s]	2,5	2,9	3,7	2,0
	Playouts w/o interruptions	[%]	100,0	98,4	99,1	100,0
	AVG Resolution	[p]	718,7	711,3	374,9	720,0
	HD Share	[%]	99,6	97,6	4,1	100,0

Data Roads	KPI Name	Unit	Telekom	Operator 2	Operator 3	Operator 4
HTTP Live Page DL	Qualifier	[%]	90,1	82,4	62,8	41,5
	AVG Session Time	[s]	4,0	4,4	5,0	3,9
HTTP Static Page DL	Qualifier	[%]	92,4	89,9	74,5	41,7
	AVG Session Time	[s]	1,4	2,5	3,3	1,4
HTTP file DL 3MB	Qualifier	[%]	93,7	90,3	80,4	43,8
	AVG Session Time	[s]	2,3	6,8	9,1	3,0
	90% faster than	[kbit/s]	6617	1273	1415	8014
	10% faster than	[kbit/s]	39474	31537	15918	34945
HTTP file UL 1MB	Qualifier	[%]	93,3	88,9	66,5	43,1
	AVG Session Time	[s]	1,9	4,3	5,1	1,9
	90% faster than	[kbit/s]	2519	854	1026	1850
	10% faster than	[kbit/s]	10980	9696	7634	12363
HTTP DL FDTT 10s	Qualifier	[%]	93,2	93,7	77,3	44,5
	AVG throughput	[kbit/s]	29666	15635	8669	21276
	90% faster than	[kbit/s]	9086	1703	1273	7495
	10% faster than	[kbit/s]	51056	36216	18627	39677
HTTP UL FDTT 10s	Qualifier	[%]	93,7	94,3	79,3	42,4
	AVG throughput	[kbit/s]	14493	6083	3397	12691
	90% faster than	[kbit/s]	2360	482	297	1255
	10% faster than	[kbit/s]	22568	14035	12506	20754
YouTube	Qualifier	[%]	92,1	83,4	73,6	42,1
	Start Time	[s]	2,6	3,0	3,4	2,8
	Playouts w/o interruptions	[%]	98,9	98,6	99,4	98,8
	AVG Resolution	[p]	689,2	562,0	455,1	720,0
	HD Share	[%]	91,5	56,1	26,4	100,0