

CERTIFICATE

P3 communications GmbH

Am Kraftversorgungsturm 3, D-52070 Aachen, Germany

hereby certifies that



T-Mobile Polska S. A.

Marynarska 12, 02-674 Warszawa, Poland

achieved „**Best in Test**“ with a

Total Score of **830 of 1000**

in the **Mobile Benchmark Poland 11/2016.**

(Score 344 of 400 in Telephony, Score 486 of 600 in Data Services)



Maziar Kianzad
Head of Network Testing
& Benchmarking
November 2016

Measurement Setup

	Voice	Data
Device	Samsung S5 P3 attenuator	HTC 10 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 56.8% in Cities, 17.5% in Towns and 25.8% on Roads	
Samples	~ 8520 per Operator	~ 3050 per Operator
Dates	27 measurement days October 15th – November 16th, 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.	T-Mobile	Operator 2	Operator 3	Operator 4
Voice	Total	400	344	338	322	333
	Cities	240	89%	85%	85%	84%
	Towns	80	85%	88%	85%	86%
	Roads	80	77%	79%	63%	79%
Data	Total	600	486	472	455	484
	Cities	360	87%	84%	84%	87%
	Towns	120	79%	76%	74%	74%
	Roads	120	66%	66%	53%	69%
TOTAL		1.000	830	810	777	817

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.	T-Mobile	Operator 2	Operator 3	Operator 4
Cities	Web Browsing	126	87%	84%	85%	85%
	File Download	72	81%	79%	79%	82%
	File Upload	72	86%	81%	80%	88%
	YouTube	90	92%	91%	90%	93%
Towns	Web Browsing	42	80%	75%	80%	71%
	File Download	24	74%	76%	76%	71%
	File Upload	24	68%	62%	44%	74%
	YouTube	30	91%	88%	88%	82%
Roads	Web Browsing	42	59%	60%	49%	62%
	File Download	24	74%	74%	62%	73%
	File Upload	24	55%	51%	36%	64%
	YouTube	30	78%	80%	66%	77%

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

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	T-Mobile	Operator 2	Operator 3	Operator 4
HTTP Live Page DL	Qualifier	[%]	98,6%	97,9%	98,2%	98,3%
	AVG Session Time	[s]	3,2	3,2	3,2	3,6
HTTP Static Page DL	Qualifier	[%]	99,1%	98,7%	99,7%	99,7%
	AVG Session Time	[s]	1,2	1,2	1,4	1,4
HTTP file DL 3MB	Qualifier	[%]	99,8%	99,5%	99,6%	100,0%
	AVG Session Time	[s]	2,0	2,1	3,0	2,1
	90% faster than	[kbit/s]	6527	5858	4107	6673
	10% faster than	[kbit/s]	43321	41379	39216	33492
HTTP file UL 1MB	Qualifier	[%]	99,5%	98,8%	99,3%	99,7%
	AVG Session Time	[s]	1,2	1,3	1,6	1,4
	90% faster than	[kbit/s]	4585	3367	2523	3620
	10% faster than	[kbit/s]	16913	15745	14260	15534
HTTP DL FDTT 10s	Qualifier	[%]	99,6%	99,2%	99,6%	99,8%
	AVG throughput	[kbit/s]	25363	24621	30140	30271
	90% faster than	[kbit/s]	6956	6606	4826	7911
	10% faster than	[kbit/s]	49212	49698	66546	60285
HTTP UL FDTT 10s	Qualifier	[%]	99,3%	98,5%	99,5%	99,9%
	AVG throughput	[kbit/s]	18525	18116	11834	20763
	90% faster than	[kbit/s]	4937	4091	2837	4432
	10% faster than	[kbit/s]	28362	28243	20013	35328
YouTube	Qualifier	[%]	99,5%	99,1%	99,4%	99,8%
	Start Time	[s]	1,4	1,4	1,5	1,6
	Playouts w/o interruptions	[%]	100,0%	99,8%	100,0%	99,9%
	AVG Resolution	[p]	619,6	619,0	595,3	622,5

Data Towns	KPI Name	Unit	T-Mobile	Operator 2	Operator 3	Operator 4
HTTP Live Page DL	Qualifier	[%]	97,2%	95,9%	97,3%	95,1%
	AVG Session Time	[s]	3,3	3,3	3,3	4,0
HTTP Static Page DL	Qualifier	[%]	98,0%	97,9%	97,9%	98,9%
	AVG Session Time	[s]	1,4	1,4	1,5	1,8
HTTP file DL 3MB	Qualifier	[%]	98,7%	99,4%	99,3%	99,0%
	AVG Session Time	[s]	2,2	2,3	3,2	4,6
	90% faster than	[kbit/s]	5096	5324	3874	2005
	10% faster than	[kbit/s]	44826	40900	36721	29024
HTTP file UL 1MB	Qualifier	[%]	96,9%	94,5%	91,7%	98,2%
	AVG Session Time	[s]	2,2	2,2	2,3	2,2
	90% faster than	[kbit/s]	1476	1342	1581	1590
	10% faster than	[kbit/s]	15262	14572	12442	12130
HTTP DL FDTT 10s	Qualifier	[%]	98,1%	98,7%	99,1%	99,3%
	AVG throughput	[kbit/s]	25746	24702	27557	19765
	90% faster than	[kbit/s]	6165	5242	3535	2546
	10% faster than	[kbit/s]	52613	50134	61496	43783
HTTP UL FDTT 10s	Qualifier	[%]	97,8%	98,1%	93,9%	99,0
	AVG throughput	[kbit/s]	12214	12098	8163	11681
	90% faster than	[kbit/s]	1289	1079	1186	1469
	10% faster than	[kbit/s]	25941	26011	17927	27979
YouTube	Qualifier	[%]	99,6%	98,9%	99,1%	98,8%
	Start Time	[s]	1,5	1,6	1,6	1,9
	Playouts w/o interruptions	[%]	99,8%	99,8%	100,0%	99,8%
	AVG Resolution	[p]	601,3	594,8	578,8	532,1

Data Roads	KPI Name	Unit	T-Mobile	Operator 2	Operator 3	Operator 4
HTTP Live Page DL	Qualifier	[%]	88,4%	89,5%	85,8%	89,8%
	AVG Session Time	[s]	3,7	3,6	3,5	4,1
HTTP Static Page DL	Qualifier	[%]	92,7%	91,0%	86,5%	95,5%
	AVG Session Time	[s]	1,9	1,9	1,9	2,1
HTTP file DL 3MB	Qualifier	[%]	96,7%	97,0%	93,9%	98,2%
	AVG Session Time	[s]	4,5	5,2	5,4	6,6
	90% faster than	[kbit/s]	2269	1920	1812	1438
	10% faster than	[kbit/s]	40040	39591	38598	28749
HTTP file UL 1MB	Qualifier	[%]	90,3%	87,8%	81,2%	93,0%
	AVG Session Time	[s]	3,5	3,3	3,0	3,4
	90% faster than	[kbit/s]	891	905	1046	917
	10% faster than	[kbit/s]	14383	14701	12634	11734
HTTP DL FDTT 10s	Qualifier	[%]	96,6%	97,3%	92,8%	97,7%
	AVG throughput	[kbit/s]	21874	22792	24014	17757
	90% faster than	[kbit/s]	2467	2379	1388	1458
	10% faster than	[kbit/s]	50491	49588	59668	43954
HTTP UL FDTT 10s	Qualifier	[%]	91,9%	91,5%	88,9%	96,2%
	AVG throughput	[kbit/s]	10190	10261	7465	9270
	90% faster than	[kbit/s]	686	716	433	501
	10% faster than	[kbit/s]	26421	25269	18839	31270
YouTube	Qualifier	[%]	95,5%	96,1%	90,5%	97,3%
	Start Time	[s]	1,8	1,9	1,9	2,3
	Playouts w/o interruptions	[%]	98,9%	99,6%	99,0%	98,2%
	AVG Resolution	[p]	549,5	554,5	535,9	495,3