

CERTIFICATE

P3 communications GmbH

Am Kraftversorgungsturm 3, D-52070 Aachen, Germany

hereby certifies that



vodafone

Vodafone Portugal

Av. D. João II, Lote 1.04.01, Parque das Nações,
1998 – 017 Lisboa, Portugal

achieved „**Best in Test**“ with a
Total Score of **893 of 1000**

in the **Mobile Benchmark Portugal 12/2015.**

(Score 362 of 400 in Telephony, Score 532 of 600 in Data Services)



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Head of Network Testing
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December 2015

Measurement Setup

	Voice	Data
Device	Samsung Galaxy S5 LTE cat4 (SM-G900F) LTE / HSPA+ DC / HSUPA 5.76 Attenuation book	Samsung Galaxy Note LTE cat6 (SM-N910F) LTE / HSPA+ DC / HSUPA 5.76 Attenuation book
Test Cases	Mobile-to-Mobile Set1 4Gpref (MRAB) to 3G pref (MRAB) 70 sec call duration 115 sec call window multiRAB 1:1 traffic injection	4G preferred CA HTTP File DL 3MB HTTP File UL 1MB HTTP DL stress test 10s HTTP UL stress test 10s Web Browsing-ETSI Ref. Page, 5 Live Websites YouTube SD Video-30s clip YouTube HD Video-30s clip
Mobility and Route Types	100% Drivetest 75% in Cities and 25% on Transfer Big cities, small cities and connecting roads	
Samples	~ 2000 per Operator	~ 1000 per Operator and Service
QoS DL/UL 4G/3G	Vodafone 300000/55000, MEO 464000/208000, NOS 27648/5440 Vodafone 41000/5625, MEO 44000/5687, NOS 5056/384	
Dates	17 measurement days November 7th –December 4th, 2015	

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 “Big Cities”, “Small Cities” and “Connecting Roads”.

Module	Infrastructure	Max.	Vodafone	Operator 2	Operator 3
Voice	Total	400	362	337	307
	big cities	260	90%	83%	74%
	small cities and connecting roads	140	90%	86%	81%
Data	Total	600	532	472	451
	big cities	390	91%	85%	83%
	small cities	90	88%	72%	73%
	connecting roads	120	80%	63%	50%
TOTAL		1.000	893	809	758

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.	Vodafone	Operator 2	Operator 3
big cities	Web Browsing	136.5	96%	93%	94%
	File Download	78.0	90%	86%	80%
	File Upload	78.0	88%	69%	72%
	YouTube	97.5	89%	86%	80%
small cities	Web Browsing	31.5	93%	80%	90%
	File Download	18.0	87%	79%	74%
	File Upload	18.0	84%	57%	55%
	YouTube	22.5	86%	67%	64%
connecting roads	Web Browsing	42.0	86%	67%	59%
	File Download	24.0	82%	71%	65%
	File Upload	24.0	75%	51%	37%
	YouTube	30.0	73%	61%	35%

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 “Big Cities” and “Connecting Roads”.

Voice M2M	Kpi Name	Unit	Vodafone	Operator 2	Operator 3
big cities	Qualified	[%]	98,8	97,4	96,6
	Call Setup Time	[s]	5,2	5,1	6,4
	AVG Speech Quality	[MOS-LQO]	3,8	3,5	3,1
small cities and connecting roads	Qualified	[%]	97,5	96,2	96,0
	Call Setup Time	[s]	5,2	4,8	6,0
	AVG Speech Quality	[MOS-LQO]	3,8	3,5	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 “Big Cities”, “Small Cities” and “Connecting Roads”.

Data big cities	Kpi Name	Unit	Vodafone	Operator 2	Operator 3
http Live Page DL	Qualified	[%]	99,5	98,9	99,1
	AVG Session Time	[s]	2,3	2,4	2,4
http Static Page DL	Qualified	[%]	99,7	99,0	99,5
	AVG Session Time	[s]	1,3	1,4	1,3
http file DL 3MB	Qualified	[%]	99,2	99,7	99,0
	AVG Session Time	[s]	1,5	2,1	2,2
	90% faster than	[kbit/s]	10667	6943	6785
	10% faster than	[kbit/s]	50420	43557	33058
http file UL 1MB	Qualified	[%]	99,8	95,4	96,9
	AVG Session Time	[s]	1,3	2,6	1,7
	90% faster than	[kbit/s]	4796	1244	3897
	10% faster than	[kbit/s]	12780	11173	7477
http DL FDTT 10s	Qualified	[%]	99,8	100,0	99,8
	AVG throughput	[kbit/s]	44806	30672	18602
	90% faster than	[kbit/s]	13384	8184	6966
	10% faster than	[kbit/s]	84708	58911	27221
http UL FDTT 10s	Qualified	[%]	99,2	99,0	99,0
	AVG throughput	[kbit/s]	20706	13291	4935
	90% faster than	[kbit/s]	4467	1070	3399
	10% faster than	[kbit/s]	35218	33202	5516
Youtube SD	Qualified	[%]	99,7	99,3	98,7
	Start Time	[s]	1,2	1,3	1,3
	Playouts w/o interruptions	[%]	99,2	98,7	98,9
Youtube HD	Qualified	[%]	98,4	98,2	96,3
	Start Time	[s]	1,5	1,6	1,7
	Playouts w/o interruptions	[%]	98,2	97,5	97,5

Data small cities	Kpi Name	Unit	Vodafone	Operator 2	Operator 3
http Live Page DL	Qualified	[%]	99,0	95,8	98,6
	AVG Session Time	[s]	2,5	2,8	2,8
http Static Page DL	Qualified	[%]	99,1	97,2	98,4
	AVG Session Time	[s]	1,5	1,9	1,6
http file DL 3MB	Qualified	[%]	100,0	99,5	99,5
	AVG Session Time	[s]	2,3	3,4	4,4
	90% faster than	[kbit/s]	8334	3666	2518
	10% faster than	[kbit/s]	44120	35036	23715
http file UL 1MB	Qualified	[%]	99,5	93,0	89,4
	AVG Session Time	[s]	1,7	4,2	2,1
	90% faster than	[kbit/s]	2780	731	2790
	10% faster than	[kbit/s]	12365	9081	7373
http DL FDTT 10s	Qualified	[%]	100,0	99,5	100,0
	AVG throughput	[kbit/s]	31783	22141	12393
	90% faster than	[kbit/s]	9362	3697	3155
	10% faster than	[kbit/s]	59884	46910	25563
http UL FDTT 10s	Qualified	[%]	99,6	98,6	100,0
	AVG throughput	[kbit/s]	17834	7895	4388
	90% faster than	[kbit/s]	3297	433	972
	10% faster than	[kbit/s]	34486	18626	5512
Youtube SD	Qualified	[%]	99,6	96,4	100,0
	Start Time	[s]	1,4	1,6	1,6
	Playouts w/o interruptions	[%]	97,8	98,1	98,6
Youtube HD	Qualified	[%]	98,2	93,2	94,5
	Start Time	[s]	1,7	1,9	2,1
	Playouts w/o interruptions	[%]	98,2	97,6	86,4

Data connecting routes	Kpi Name	Unit	Vodafone	Operator 2	Operator 3
http Live Page DL	Qualified	[%]	95,7	89,0	87,3
	AVG Session Time	[s]	2,8	3,4	3,9
http Static Page DL	Qualified	[%]	94,6	90,8	86,9
	AVG Session Time	[s]	1,9	2,6	3,0
http file DL 3MB	Qualified	[%]	97,5	94,9	94,3
	AVG Session Time	[s]	4,2	6,5	8,6
	90% faster than	[kbit/s]	2875	1699	1249
	10% faster than	[kbit/s]	33012	22923	16819
http file UL 1MB	Qualified	[%]	94,7	84,1	55,6
	AVG Session Time	[s]	2,8	5,7	3,5
	90% faster than	[kbit/s]	1161	643	910
	10% faster than	[kbit/s]	10582	8122	7266
http DL FDTT 10s	Qualified	[%]	98,6	97,1	97,3
	AVG throughput	[kbit/s]	18612	10601	6752
	90% faster than	[kbit/s]	2723	2445	977
	10% faster than	[kbit/s]	41253	27868	20385
http UL FDTT 10s	Qualified	[%]	96,4	94,5	92,6
	AVG throughput	[kbit/s]	9649	3592	2260
	90% faster than	[kbit/s]	1091	273	199
	10% faster than	[kbit/s]	22093	12501	5493
Youtube SD	Qualified	[%]	96,8	91,2	92,7
	Start Time	[s]	1,6	2,3	2,4
	Playouts w/o interruptions	[%]	97,1	98,4	95,5
Youtube HD	Qualified	[%]	89,7	87,2	71,0
	Start Time	[s]	2,1	2,7	3,4
	Playouts w/o interruptions	[%]	94,5	92,4	85,5