

CERTIFICATE

P3 communications GmbH

Am Kraftversorgungsturm 3, D-52070 Aachen, Germany

hereby certifies that

Vodafone Romania

Piața Charles de Gaulle nr.15, Sector 1, 011857 București, Romania

achieved „**Best in Test**“ with a

Total Score of **449 of 500**

in the **Mobile Benchmark Romania 12/2014.**

(Score 161 of 190 in Telephony, Score 288 of 310 in Data Services)



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Head of Network Testing
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Measurement Setup

Device	Samsung Galaxy S4 LTE (GT-I9506) LTE / HSPA+ DC / HSUPA 5.76 12 dB attenuation	Samsung Galaxy S4 LTE (GT-I9506) LTE / HSPA+ DC / HSUPA 5.76 12 dB attenuation
Test Cases	Mobile-to-Mobile 70 sec call duration. Multi-RAB active on both parties 1:10 traffic injection on both parties 2 car setup - Car1: 3G pref, Car2: 4G pref	HTTP DL stress test 10s HTTP UL stress test 5s Web Browsing-ETSI Ref. Page, Top 6 national live websites YouTube SD Video-60s clip YouTube HD Video-30s clip 2 car setup – Car1: 3G pref and Car2: 4G pref
Mobility and Route Types	Drive Test in the cities of Arad, Bacau, Braila, Brasov, Bucuresti, Cluj-Napoca, Constanta, Craiova, Galati, Iasi, Oradea, Pitesti, Ploiesti, Sibiu and Timisoara and connecting roads. Distance travelled: > 8200km	
Samples	~4650 per Operator Total: ~14000	4Gpref: ~400GB Data Traffic
Dates	Dates November 06th – December 2nd / 23 measurement days	

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” and “Connecting Roads”.

Category	Max.	Vodafone	Operator 2	Operator 3
Telephony	190	161	152	152
Big Cities	125	87%	78%	82%
Connecting Roads	65	82%	84%	75%
Data Services	310	288	276	213
Big Cities	240	98%	92%	74%
Connecting Roads	70	76%	78%	49%
TOTAL	500	449	428	365

The following table indicates the achieved percentage of the maximum score in each of the different data services.

Category	Max.	Vodafone	Operator 2	Operator 3
Data Services max.	310	288	276	213
Big Cities	240	98%	92%	74%
Web Browsing	84,0	98%	98%	97%
File Download	48,0	95%	91%	69%
File Upload	48,0	99%	93%	38%
YouTube	60,0	99%	84%	76%
Connecting Roads	70	76%	78%	49%
Web Browsing	24,5	95%	94%	68%
File Download	14,0	70%	69%	31%
File Upload	14,0	73%	83%	37%
YouTube	17,5	57%	57%	46%

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”.

TELEPHONY (Big Cities)	Vodafone	Operator 2	Operator 3
Call Success Ratio (%)	98,7	98,0	98,1
Call Setup Time (s)	6,2	8,9	7,4
Speech Quality (MOS-LQO)	3,4	3,3	3,5
Call Sustainability (%)	99,7	99,8	99,8

TELEPHONY (Connecting Roads)	Vodafone	Operator 2	Operator 3
Call Success Ratio (%)	95,6	96,4	94,2
Call Setup Time (s)	5,7	6,9	8,0
Speech Quality (MOS-LQO)	3,1	3,3	3,2
Call Sustainability (%)	99,5	99,4	99,3

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” and “Connecting Roads”.

DATA Services (Big Cities)	Vodafone	Operator 2	Operator 3
WEB-PAGE DOWNLOAD (Live/Static)			
Success Ratio (%/%)	99,7 / 99,6	99,4 / 100	99,5 / 99,5
Avg. Session Time (s/s)	1,4 / 0,7	1,4 / 0,6	2,5 / 1,4
FILE-DOWNLOAD (10 seconds)			
Avg. Throughput (kbit/s)	47198	40970	28203
90 % faster than (kbit/s)	26484	17850	6402
FILE-UPLOAD (10 seconds)			
Avg. Throughput (kbit/s)	34042	27078	7835
90 % faster than (kbit/s)	13828	6340	1369
YOUTUBE SD			
Success Ratio/Start Time (%/s)	99,8 / 0,8	99,1 / 0,8	98,7 / 1,6
Video playouts without interruptions (%)	99,9	99,9	99,5
YOUTUBE HD			
Success Ratio/Start Time (%/s)	99,8 / 1	96,4 / 1,2	96,9 / 2,1
Video playouts without interruptions (%)	99,9	96,5	96,1

DATA Services (Connecting Roads)	Vodafone	Operator 2	Operator 3
WEB-PAGE DOWNLOAD (Live/Static)			
Success Ratio (%/%)	97,8 / 98,1	97,7 / 97,8	87,3 / 92,4
Avg. Session Time (s/s)	2,2 / 1,8	2,2 / 1,7	3,4 / 3,4
FILE-DOWNLOAD (10 seconds)			
Avg. Throughput (kbit/s)	14242	16788	8999
90 % faster than (kbit/s)	2225	1729	204
FILE-UPLOAD (10 seconds)			
Avg. Throughput (kbit/s)	7115	8739	2048
90 % faster than (kbit/s)	251	535	79
YOUTUBE SD			
Success Ratio/Start Time (%/s)	96 / 1,6	96,7 / 1,8	85,4 / 2,2
Video playouts without interruptions (%)	96,3	96,3	95