

# CERTIFICATE

## **P3 communications GmbH**

Am Kraftversorgungsturm 3, D-52070 Aachen, Germany

hereby certifies that



## **Cosmote Mobile Telecommunications S.A.**

99 Kifissias Ave., 15124, Maroussi, Athens, Greece

achieved „**Best in Test**“ with a

Total Score of **719 of 1000**

in the **Mobile Benchmark Greece 07/2016.**

(Score 291 of 400 in Telephony, Score 428 of 600 in Data Services)



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## Measurement Setup

	Voice	Data
<b>Device</b>	Sony Xperia Z5 (E6653) P3 attenuator	Samsung Galaxy Note4 LTE cat6 (SM-N910F) LTE/HSPA+ DC/HSUPA 5.76 P3 attenuator
<b>Test Cases</b>	<b>Mobile-to-Mobile (M2M)</b> 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)	<b>Data 4G preferred CA</b> 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
<b>Mobility and Route Types</b>	100% Drivetest 57% in Cities, 27% in Towns and 16% on Roads	
<b>Samples</b>	~ 4500 per Operator	~ 1700 per Service and Operator
<b>Dates</b>	<b>17 measurement days</b> <b>June 22nd – July 8th, 2016</b>	

## 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.	Cosmote	Operator 2	Operator 3
<b>Voice</b>	<b>Total</b>	<b>400</b>	<b>291</b>	<b>246</b>	<b>97</b>
	Cities	240	70%	58%	24%
	Towns	80	82%	74%	25%
	Roads	80	70%	59%	24%
<b>Data</b>	<b>Total</b>	<b>600</b>	<b>428</b>	<b>270</b>	<b>162</b>
	Cities	360	78%	47%	31%
	Towns	120	58%	45%	16%
	Roads	120	64%	38%	25%
<b>TOTAL</b>		<b>1.000</b>	<b>719</b>	<b>515</b>	<b>259</b>

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.	Cosmote	Operator 2	Operator 3
Cities	Web Browsing	126	73%	47%	32%
	File Download	72	84%	55%	34%
	File Upload	72	68%	37%	26%
	YouTube	90	89%	51%	32%
Towns	Web Browsing	42	52%	34%	23%
	File Download	24	72%	61%	8%
	File Upload	24	45%	32%	12%
	YouTube	30	68%	58%	18%
Roads	Web Browsing	42	56%	31%	28%
	File Download	24	74%	41%	19%
	File Upload	24	60%	29%	21%
	YouTube	30	70%	51%	28%

## 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	Cosmote	Operator 2	Operator 3
Cities	Qualifier	[%]	95,7	94,1	88,2
	Call Setup Time	[s]	5,2	6,1	7,4
	AVG Speech Quality	[MOS-LQO]	3,5	3,2	3,2
Towns	Qualifier	[%]	97,8	96,8	83,0
	Call Setup Time	[s]	5,0	5,9	6,7
	AVG Speech Quality	[MOS-LQO]	3,5	3,3	3,2
Roads	Qualifier	[%]	93,1	91,3	79,5
	Call Setup Time	[s]	5,0	6,2	7,1
	AVG Speech Quality	[MOS-LQO]	3,6	3,2	3,2

## 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	Cosmote	Operator 2	Operator 3
HTTP Live Page DL	Qualifier	[%]	96,4	90,1	83,3
	AVG Session Time	[s]	4,3	4,3	4,6
HTTP Static Page DL	Qualifier	[%]	98,0	94,1	89,2
	AVG Session Time	[s]	1,5	1,9	2,3
HTTP file DL 3MB	Qualifier	[%]	99,0	96,0	91,9
	AVG Session Time	[s]	1,7	3,2	6,0
	90% faster than	[kbit/s]	9351	3712	1579
	10% faster than	[kbit/s]	51613	35150	26391
HTTP file UL 1MB	Qualifier	[%]	96,4	88,8	81,3
	AVG Session Time	[s]	2,6	3,5	4,0
	90% faster than	[kbit/s]	1325	857	835
	10% faster than	[kbit/s]	11158	15706	12563
HTTP DL FDTT 10s	Qualifier	[%]	98,9	93,8	91,8
	AVG throughput	[kbit/s]	52759	20448	13583
	90% faster than	[kbit/s]	13108	4207	2088
	10% faster than	[kbit/s]	105485	42229	28505
HTTP UL FDTT 10s	Qualifier	[%]	98,3	93,7	91,5
	AVG throughput	[kbit/s]	15162	10979	6196
	90% faster than	[kbit/s]	1150	402	277
	10% faster than	[kbit/s]	39842	29033	17798
YouTube	Qualifier	[%]	98,9	91,4	87,5
	Start Time	[s]	2,3	3,1	3,4
	Playouts w/o interruptions	[%]	99,6	97,2	95,4
	AVG Resolution	[p]	682,8	634,0	595,6
	HD Share	[%]	89,7	76,1	65,5

Data Towns	KPI Name	Unit	Cosmote	Operator 2	Operator 3
HTTP Live Page DL	Qualifier	[%]	91,2	84,2	52,0
	AVG Session Time	[s]	4,5	4,8	5,1
HTTP Static Page DL	Qualifier	[%]	95,9	92,7	68,5
	AVG Session Time	[s]	2,0	2,9	3,9
HTTP file DL 3MB	Qualifier	[%]	98,0	99,4	76,3
	AVG Session Time	[s]	2,3	6,6	13,4
	90% faster than	[kbit/s]	5149	1731	739
	10% faster than	[kbit/s]	47384	20698	16578
HTTP file UL 1MB	Qualifier	[%]	89,2	86,9	41,8
	AVG Session Time	[s]	3,5	5,6	4,2
	90% faster than	[kbit/s]	919	660	734
	10% faster than	[kbit/s]	9453	10069	10582
HTTP DL FDTT 10s	Qualifier	[%]	97,1	96,7	78,7
	AVG throughput	[kbit/s]	39150	11832	7529
	90% faster than	[kbit/s]	5629	1925	614
	10% faster than	[kbit/s]	83295	24808	19921
HTTP UL FDTT 10s	Qualifier	[%]	97,1	96,0	75,1
	AVG throughput	[kbit/s]	10843	4373	3909
	90% faster than	[kbit/s]	835	401	118
	10% faster than	[kbit/s]	32499	13502	13407
YouTube	Qualifier	[%]	95,4	95,4	69,2
	Start Time	[s]	2,6	3,7	4,9
	Playouts w/o interruptions	[%]	99,7	96,8	93,5
	AVG Resolution	[p]	593,5	513,5	514,6
	HD Share	[%]	64,9	42,6	42,9

Data Roads	KPI Name	Unit	Cosmote	Operator 2	Operator 3
HTTP Live Page DL	Qualifier	[%]	87,8	76,8	57,7
	AVG Session Time	[s]	4,6	4,9	4,8
HTTP Static Page DL	Qualifier	[%]	95,0	85,5	68,6
	AVG Session Time	[s]	2,0	3,2	2,8
HTTP file DL 3MB	Qualifier	[%]	95,6	87,9	66,9
	AVG Session Time	[s]	3,1	7,8	9,6
	90% faster than	[kbit/s]	3859	1300	918
	10% faster than	[kbit/s]	44527	20754	20413
HTTP file UL 1MB	Qualifier	[%]	92,4	82,3	52,3
	AVG Session Time	[s]	3,6	5,8	3,9
	90% faster than	[kbit/s]	866	668	811
	10% faster than	[kbit/s]	10146	10249	11856
HTTP DL FDTT 10s	Qualifier	[%]	93,4	88,3	72,1
	AVG throughput	[kbit/s]	36619	11222	11120
	90% faster than	[kbit/s]	6167	1685	819
	10% faster than	[kbit/s]	76602	24452	24594
HTTP UL FDTT 10s	Qualifier	[%]	93,6	87,5	72,8
	AVG throughput	[kbit/s]	9756	3831	5590
	90% faster than	[kbit/s]	732	286	110
	10% faster than	[kbit/s]	28860	12732	16907
YouTube	Qualifier	[%]	93,4	89,6	64,8
	Start Time	[s]	2,6	3,8	3,7
	Playouts w/o interruptions	[%]	98,8	95,2	93,2
	AVG Resolution	[p]	579,2	462,3	568,0
	HD Share	[%]	60,9	28,4	57,8