CERTIFICATE

LCC

LCC North Central Europe BV

Amerikastraat 7-11 5232BE Den Bosch Netherlands

hereby certifies

orange™

ORANGE ROMANIA S.A.

Bd.Lascar Catargiu 47-53,Bucharest, Romania

Ranked #1 for Mobile Voice and Data Service Performance in both metropolitan and rural areas of Romania.

The certification is based on independent performance benchmark measurement conducted by LCC International in 32 metropolitan areas of Romania - Bucharest, Cluj-Napoca, Iasi, Timisoara, Craiova, Constanta, Brasov, Arad, Galati, Pitesti, Ploiesti, Oradea, Bacau, Focsani, Braila, Sibiu, Ramnicu Valcea, Vaslui, Drobeta-Turnu Severin, Sfantu Gheorghe, Mangalia, Targu Secuiesc, Curtea de Arges, Fagaras, Pascani, Aiud, Roman, Tecuci, Barlad, Orsova, Lugoj, Calafat and on the roads and localities between during 27/11/2017 and 20/12/2017.

The results confirm that Orange Romania provides the best Mobile Voice and Mobile Data Services Performance. Measurements of Voice over LTE, Voice over 3G & 2G technologies, Data Web Browsing, YouTube Video, HTTP File Download and Upload services have been performed using **smartphone CAT 16 device** in 4G+/4G/3G/2G auto mode.

Marten Eriksson

Regional Head – North & Central Europe
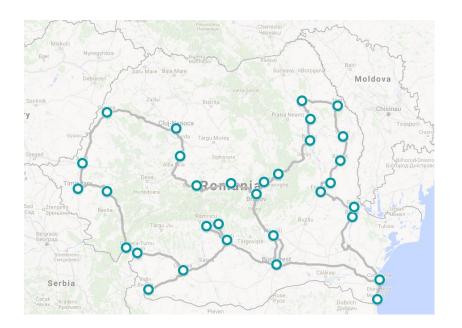
Source: LCC International Inc.

Measurement methodology

Test setup

	Voice	Data
Device	Samsung Galaxy S7 cat9 4G/3G/2G in-car test	Samsung Galaxy S8 cat16 4G/3G/2G in-car test
Test scenario	Mobile to Mobile VoLTE preferred - VoLTE preferred 70 sec voice call duration random pause after test 40 sec.	Data 4G preffered HTTP DL and UL 10sec file Web browsing ETSI Ref.Page Web browsing static and live pages (http & https) You Tube HD
Routes	32 metropolitan areas, localities and routes between	
Samples	8000 total samples per Operator	4000 total samples per Service
Dates	27 November 2017 - 20 December 2017	

Evaluation Route

Score overview

The following table presents Global Score indicator values obtained as a weighted average of KPI service values obtained in the evaluation.

	Max Score	Orange	Operator 2	Operator 3	Operator 4
Score Results	100%	92.8%	90.1%	89.3%	82.9%

Data score breakdown

The following table values shows detailed score values achieved for Data service category.

Category (Data)	Max Score	Orange	Operator 2	Operator 3	Operator 4
Web browsing	**20.00%**	**18.14%**	**17.98%**	**17.64%**	**17.05%**
Web browsing Success Static Pages	3.00%	2.99%	2.99%	2.95%	2.95%
Web browsing Delay Static Pages (< 4.0 sec)	2.00%	1.23%	1.25%	1.14%	0.71%
Web browsing Success Live Pages	9.00%	8.75%	8.65%	8.77%	8.74%
Web browsing Delay Live Pages(< 4.0 sec)	6.00%	5.17%	5.09%	4.77%	4.65%
HTTP DL transfer	**15.00%**	**12.24%**	**10.70%**	**10.33%**	**8.94%**
HTTP DL transfer Success	9.00%	8.93%	8.92%	8.91%	8.87%
HTTP DL transfer Throughput > 55Mbps	6.00%	3.31%	1.78%	1.43%	0.07%
HTTP UL transfer	**10.00%**	**8.75%**	**8.37%**	**8.08%**	**5.99%**
HTTP UL transfer Success	6.00%	5.99%	5.99%	5.84%	5.98%
HTTP UL transfer Throughput > 25Mbps	4.00%	2.77%	2.37%	2.24%	0.00%
You Tube	**15.00%**	**14.62%**	**14.57%**	**14.43%**	**13.39%**
You Tube Service Success Ratio	9.00%	8.78%	8.80%	8.71%	7.81%
YouTube HD Start delay <= 2.0 sec	1.50%	1.41%	1.41%	1.29%	1.22%
YouTube HD Play wo interruptions	3.00%	2.97%	2.91%	2.98%	2.94%
YouTube HD resolution (%)	1.50%	1.46%	1.45%	1.45%	1.42%

Voice score breakdown

The following table values shows detailed score values achieved for Voice service category.

Category (Voice)	Max Score	Orange	Operator 2	Operator 3	Operator 4
Mobile to mobile completion (%)	28.00%	27.79%	27.73%	27.53%	27.26%
Call setup time (<= 9sec)	6.00%	5.66%	5.51%	5.62%	5.21%
Speech Quality MOS (> 2.5)	6.00%	5.58%	5.23%	5.64%	5.04%

Data KPI results overview

The following table values shows the obtained performance during Data service measurements for each of the KPI categories.

Category (Data)	Orange	Operator 2	Operator 3	Operator 4
Web browsing				
Web browsing Success Static Pages	99.57%	99.70%	98.34%	98.30%
Web browsing Delay Static Pages (sec)	3.98	3.92	4.07	4.97
Web browsing Success Live Pages	97.27%	96.16%	97.47%	97.07%
Web browsing Delay Live Pages (sec)	2.25	2.21	2.25	2.49
HTTP DL transfer				
HTTP DL transfer Success	99.25%	99.10%	98.98%	98.52%
HTTP DL transfer Throughput (Mbps)	76.52	43.21	38.09	15.62
HTTP UL transfer				
HTTP UL transfer Success	99.80%	99.89%	97.34%	99.75%
HTTP UL transfer Throughput (Mbps)	37.35	31.39	26.07	4.82
You Tube				
You Tube Service Success	97.53%	97.83%	96.80%	86.82%
YouTube Start delay (sec)	1.26	1.21	1.47	1.49
YouTube Play wo interruptions (%)	99.06%	96.86%	99.35%	98.00%
YouTube HD resolution (%)	97.38%	96.77%	96.47%	94.40%

Voice KPI results overview

The following table values shows the obtained performance during Voice service measurements for each of the KPI categories.

Category (Voice)	Orange	Operator 2	Operator 3	Operator 4
Mobile to mobile completion (%)	99.24%	99.02%	98.33%	97.34%
Call setup time (sec)	4.41	6.64	5.26	6.84
Speech Quality MOS	3.18	2.9	3.12	2.81