

best in test.

For adding something on top in Greece and reaching an overall score of 940 dots in mobile network benchmarking survey we proudly award this certificate to

Cosmote Greece

Score 940 out of 1000 in Total
Score 258 out of 270 in Voice Services
Score 451 out of 480 in Data Services
Score 231 out of 250 in Crowdsourced Quality



Hakan Ekmen
Global Networks Lead, Comms Industry





Measurement Overview

umlaut tested and measured the performance of its voice and data services on smartphones in comparison to other 5G/LTE mobile radio networks in metropolitan and rural areas of Greece.

The audit was done as a performance benchmark performed by umlaut between 02.04.2024 and 25.04.2024 in cities and towns as well as on connection roads.

Dedicated measurements have been executed as drive tests outdoors using a Samsung Galaxy S23+.

All data measurements have been performed in 5G preferred mode. Voice measurements have been done in 5G/5G preferred mode on both sides, while call origin has been alternated.

In addition crowdsourced performance data has been collected and evaluated between CW46 2023 and CW17 2024.

The following pages provide a comparative overview about the performance results observed for the different tested service types.



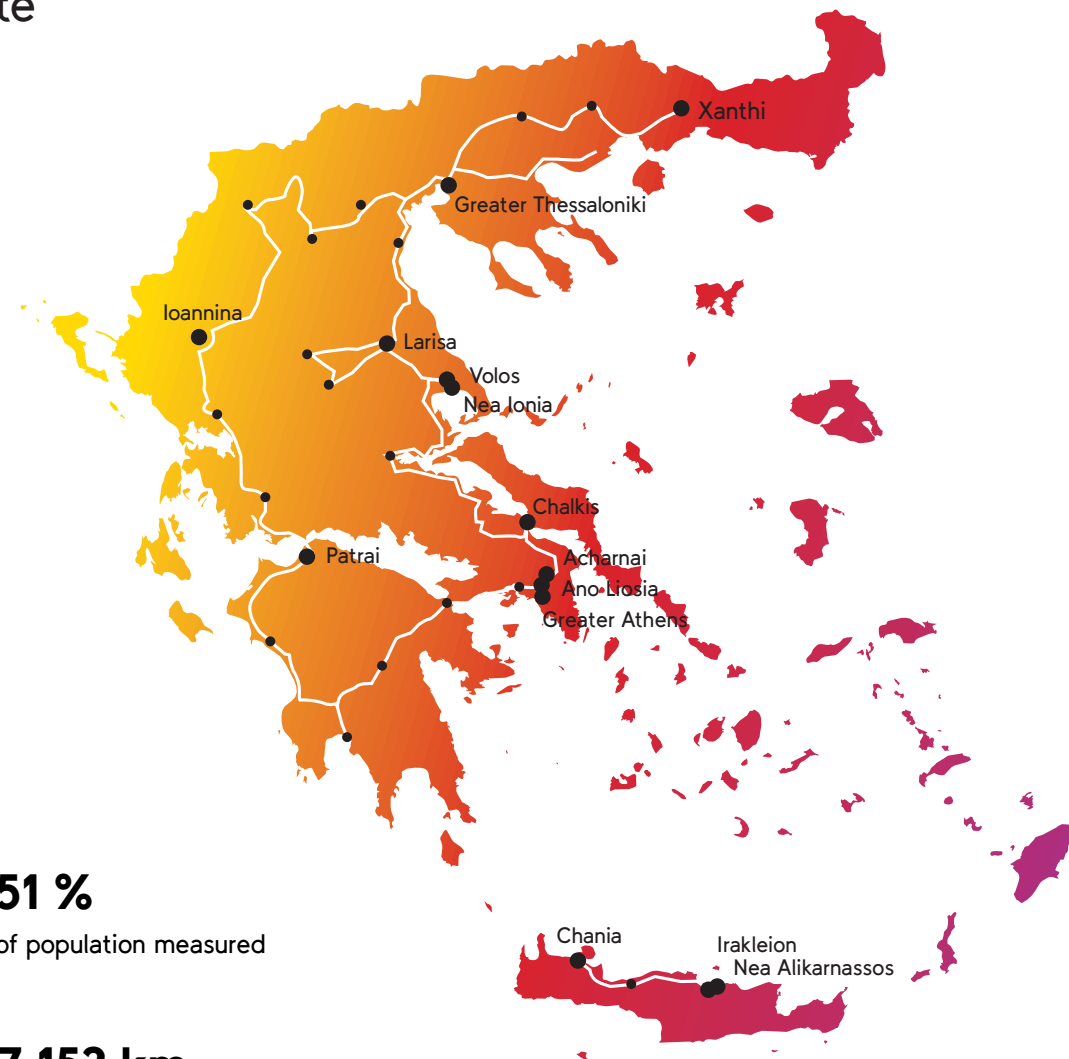
Measurement setup



Drivetest	Voice	Data
Device	Samsung Galaxy S23+	Samsung Galaxy S23+
Test Cases	Mobile-to-Mobile Side1 (VoLTE, 5G pref.) to Side2 (VoLTE, 5G pref.) 105 sec call window 70 sec call duration 15 sec call setup timeout Multi-RAB traffic injection on both sides	Data 5G preferred HTTP DL datastream 7s HTTP UL datastream 7s HTTP 10MB DL fixed file transfer HTTP 5MB UL fixed file transfer Web Browsing – Kepler ETSI Ref. Page 8 Live web pages 2 YouTube videos ~45s (Full HD and Live Full HD) Interactivity eGaming Conversational App
Mobility and Route Types	Drivetest and Walktest 53,55% in Cities, 20,70% in Towns and 25,75% on Roads	
Samples	11,354	87,702
Dates	21 measurement days 02.04.2024 – 25.04.2024	
Crowd Data Assessment	24 weeks CW46 2023 – CW17 2024	



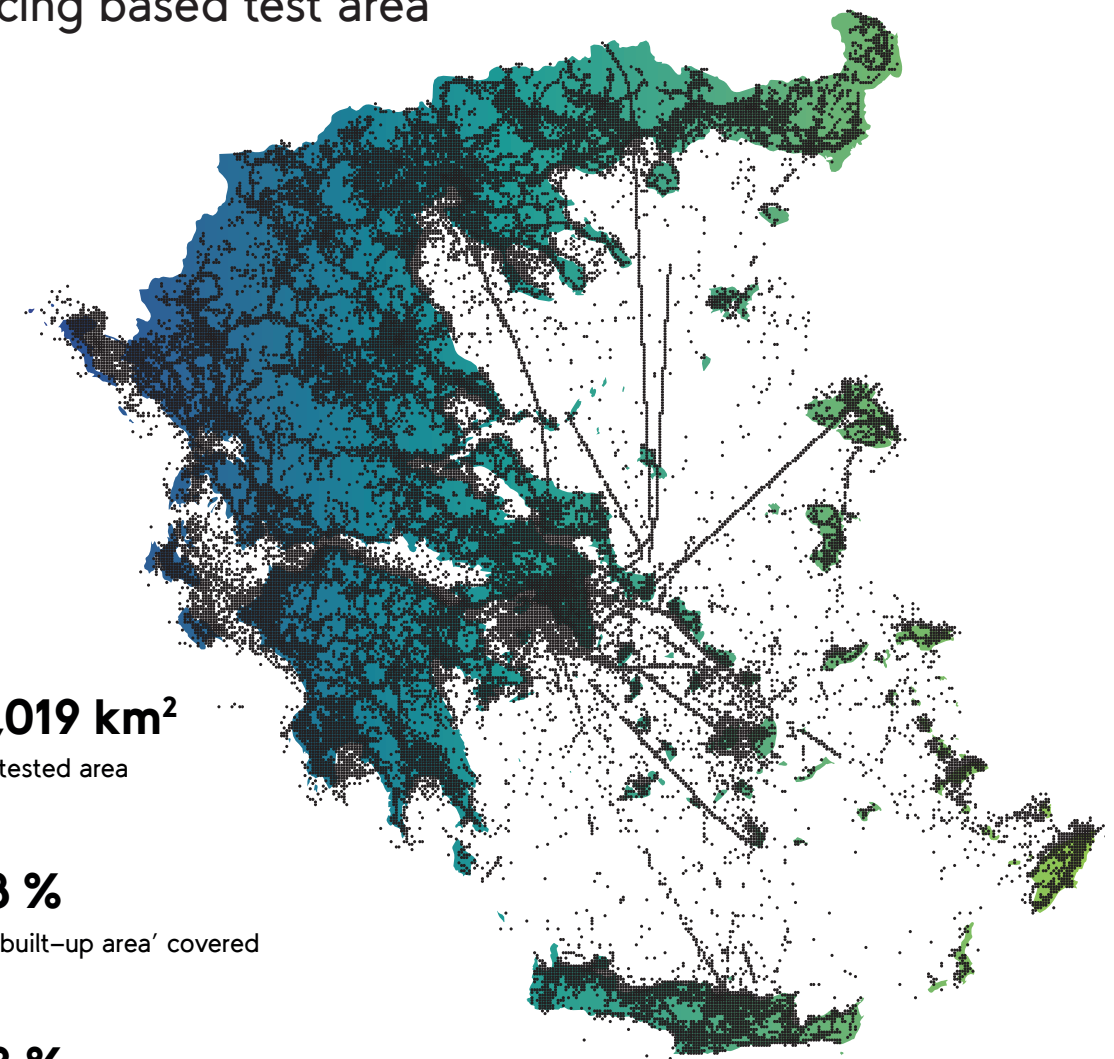
Testing areas




Drive route



-  **51 %**
of population measured
-  **7,152 km**
measuring distance


Crowdsourcing based test area




-  **105,019 km²**
size of tested area
-  **93.8 %**
of the 'built-up area' covered
-  **97.8 %**
of the 'Population area' covered




Claims

Best in test
Cosmote Greece



Best in data
Cosmote Greece



Best in voice
Cosmote Greece



Best in Reliability
Cosmote Greece



Best in crowd-sourced quality
Cosmote Greece



Methodology

The leader in mobile benchmarking, umlaut, has analyzed the mobile networks of Greece with regards to mobile network performance. We measure smartphone voice and data performance based on extensive drivetests – from major metropolitan areas to smaller cities and connection roads.

We objectively define the routes and test methodology and publish the results through certificates or public benchmark reports. In addition crowdsourced performance data has been collected and evaluated.

As the de-facto industry standard, our benchmarking methodology focuses on customer-experienced network quality and covers a wide range of mobile services.

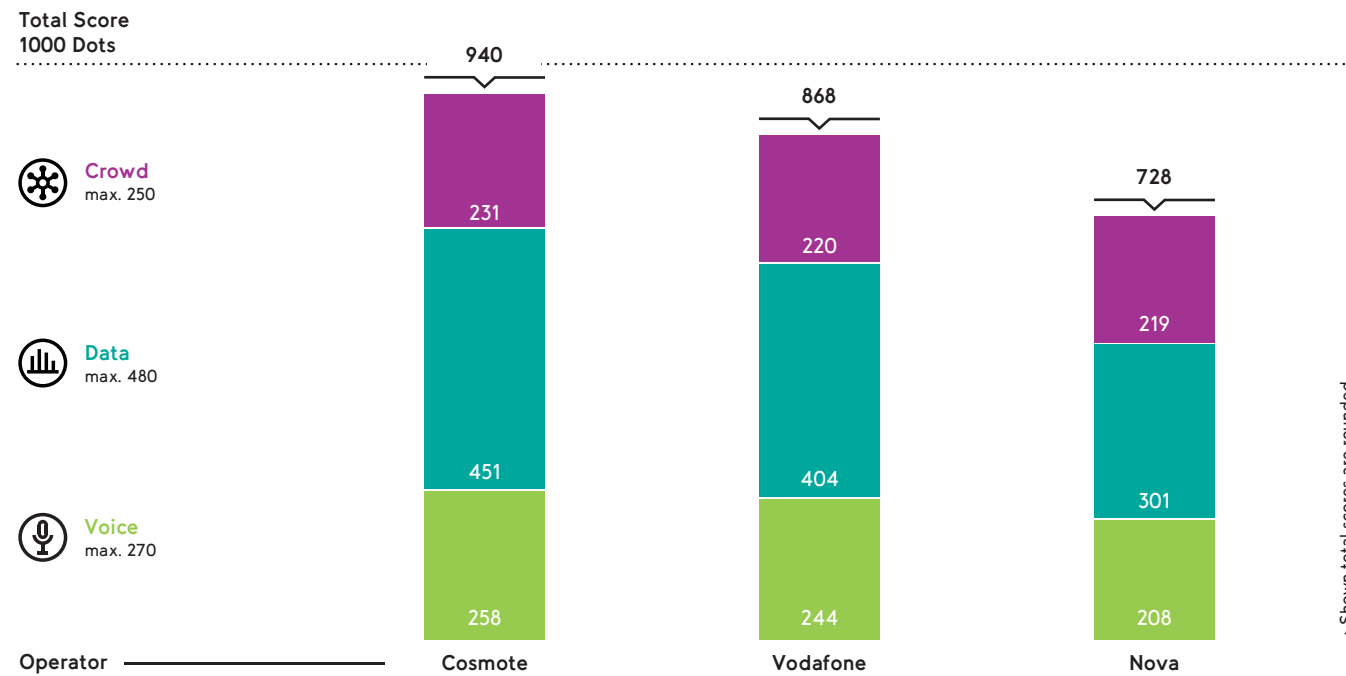
Today, more than 200 mobile networks in more than 120 countries are being evaluated by our unique scoring methodology.

It allows a technical analysis that is unprecedented in its level of detail and enables comparisons between the network performance and capability of each mobile network. Our public benchmarks as well as the certificate benchmarks help network operators to demonstrate how well they are delivering wireless connections to consumers, business users and enterprises and reveals the areas of improvement.



Score and breakdown

Cosmote Greece achieved the highest overall score among competitors with 940 dots out of 1000.



→ Shown total scores are rounded.

Overall score considering Voice, Data and Crowdsourcing.

Total score

		Cosmote	Vodafone	Nova
Voice	max. 270	258	244	208
Cities Drivetest	162	95%	91%	73%
Towns Drivetest	54	97%	96%	87%
Roads Drivetest	54	95%	83%	79%
Data	max. 480	451	404	301
Cities Drivetest	288	93%	83%	59%
Towns Drivetest	96	95%	84%	66%
Roads Drivetest	96	95%	87%	71%
Crowdsourced Quality	max. 250	231	220	219
Broadband Coverage	100	94%	90%	88%
Download Speed	56	91%	82%	85%
Upload Speed	19	90%	91%	84%
Latency	50	90%	87%	90%
Voice	11	93%	89%	87%
Stability	14	94%	92%	91%
Total	1000	940	868	728

Shown scores are rounded.



Achieved percentage of the maximum score in each of the different data services.

Data	Service Group	max	Cosmote	Vodafone	Nova
Cities	Web Browsing	64,8	98%	91%	60%
	File Download	64,8	96%	78%	60%
	File Upload	64,8	87%	80%	68%
	YouTube	64,8	92%	82%	39%
	OTT	28,8	90%	85%	75%
Towns	Web Browsing	21,6	99%	92%	68%
	File Download	21,6	98%	80%	66%
	File Upload	21,6	89%	81%	68%
	YouTube	21,6	96%	85%	53%
	OTT	9,6	93%	84%	82%
Roads	Web Browsing	21,6	99%	95%	70%
	File Download	21,6	98%	85%	73%
	File Upload	21,6	93%	87%	79%
	YouTube	21,6	94%	84%	60%
	OTT	9,6	89%	82%	79%

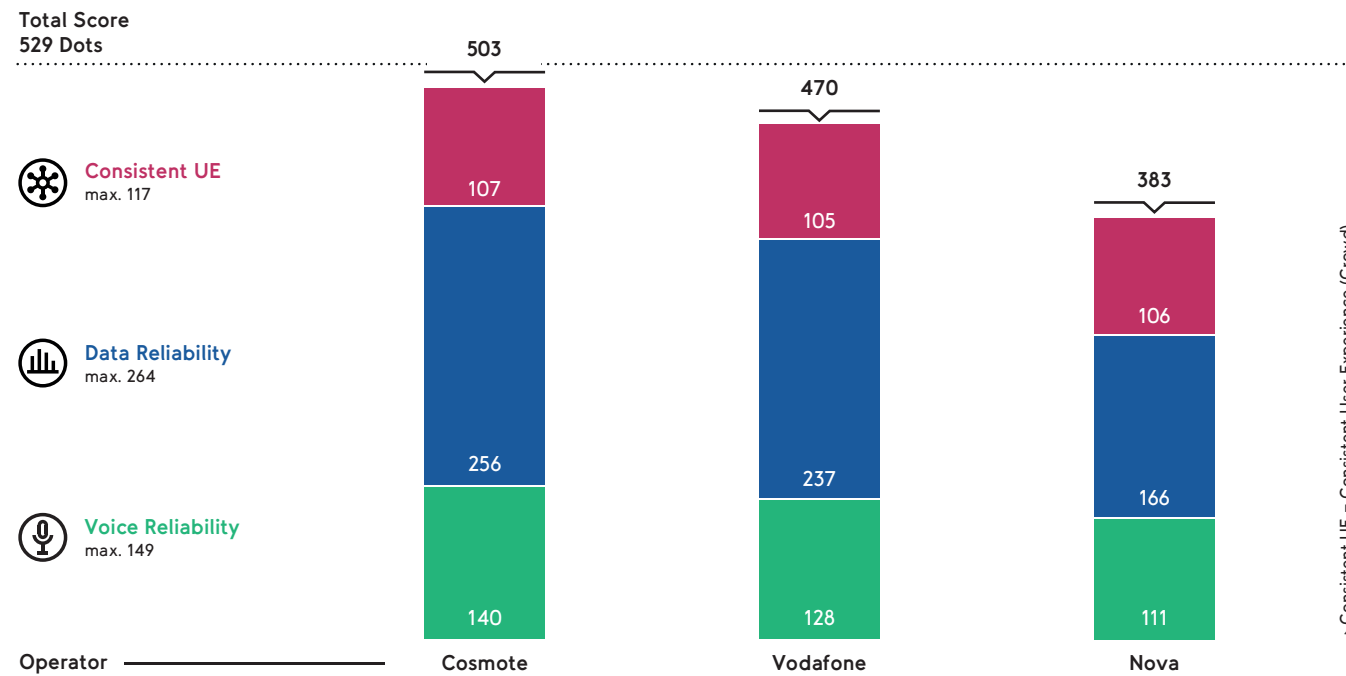


Achieved percentage of the maximum score in each of the different crowdsourcing services.

Crowd	Service Group	max	Cosmote	Vodafone	Nova
Crowdsourced Quality	Broadband Coverage	100	94%	90%	88%
	DL Speed	56	91%	82%	85%
	UL Speed	19	90%	91%	84%
	Latency	50	90%	87%	90%
	Voice	11	93%	89%	87%
	Stability	14	94%	92%	91%



Reliability



Reliability score considering Voice Reliability, Data Reliability and Consistent UE.

Total score

	Service Group	max	Cosmote	Vodafone	Nova
Reliability	Voice Reliability	149	95%	86%	74%
	Data Reliability	264	97%	90%	63%
	Consistent User Experience	117	92%	90%	91%

Score achievement in school grades:
outstanding (≥95%), very good (≥85% and <95%), good (≥75% and ≤85%), satisfactory (≤65% and <75%), sufficient (≤55% and <65%).



Voice KPI overview

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	Service Group	Unit	Cosmote	Vodafone	Nova
Cities	Qualifier	[%]	99,5	98,7	96,9
	Call Setup Time (P90)	[s]	0,8	1,5	2,0
	Speech Quality (P10)	[MOS-LQO]	4,6	4,4	3,7
	Multirab connectivity	[%]	98,2	99,4	94,7
Towns	Qualifier	[%]	99,6	99,6	98,8
	Call Setup Time (P90)	[s]	0,7	1,4	1,9
	Speech Quality (P10)	[MOS-LQO]	4,7	4,5	4,0
	Multirab connectivity	[%]	99,5	100,0	97,3
Roads	Qualifier	[%]	98,7	96,0	96,3
	Call Setup Time (P90)	[s]	0,7	1,5	2,2
	Speech Quality (P10)	[MOS-LQO]	4,6	4,3	3,7
	Multirab connectivity	[%]	99,2	99,1	95,6



Data Services KPI overview

Achieved values of all networks under test in each of the relevant Data Key Performance Indicators (KPIs) for the geographical category "Cities".

Data Cities	KPI Name	Unit	Cosmote	Vodafone	Nova
HTTP Web Page DL Smartphone	Qualifier	[%]	99,6	98,7	96,1
	Overall Session Time	[s]	1,0	1,3	2,5
HTTP 10MB DL Smartphone	Qualifier	[%]	99,8	99,6	97,6
	Overall Session Time	[s]	1,3	3,5	4,6
	90% faster than	[Mbit/s]	50,5	12,0	10,2
	10% faster than	[Mbit/s]	253,6	196,6	172,7
HTTP 5MB UL Smartphone	Qualifier	[%]	99,8	99,4	98,5
	Average Session Time	[s]	3,5	4,4	6,4
	90% faster than	[Mbit/s]	5,6	4,6	3,3
	10% faster than	[Mbit/s]	73,6	60,8	47,0
HTTP DL FDTT	Qualifier	[%]	99,8	99,4	96,0
	10% faster than	[Mbit/s]	746,3	312,9	345,6
	faster than 20 Mbit/s	[%]	97,1	85,1	84,0
	faster than 100 Mbit/s	[%]	86,4	40,5	35,2
HTTP UL FDTT	Qualifier	[%]	99,7	99,0	97,8
	10% faster than	[Mbit/s]	101,0	89,8	76,2
	faster than 2 Mbit/s	[%]	98,0	97,2	96,5
	faster than 5 Mbit/s	[%]	94,6	91,5	88,5
YouTube	Qualifier	[%]	99,6	98,0	90,4
	Start Time	[s]	2,0	2,4	3,7
	AVG Resolution	[p]	1079,2	1076,2	1076,0
YouTube Live Smartphone	Qualifier	[%]	99,1	97,7	88,0
	Start Time	[s]	2,5	2,9	4,0
	AVG Resolution	[p]	1079,4	1074,4	1077,0
Interactivity	Qualifier	[%]	93,7	90,2	88,6
	Interactivity egaming	[%]	82,1	75,4	77,9
Conversational App	Qualifier	[%]	99,4	99,4	95,3
	Speech Quality (P10)	[MOS-LQO]	3,2	2,9	3,2



Data Services KPI overview

Achieved values of all networks under test in each of the relevant Data Key Performance Indicators (KPIs) for the geographical category "Towns".

Data Towns	KPI Name	Unit	Cosmote	Vodafone	Nova
HTTP Web Page DL Smartphone	Qualifier	[%]	99,8	98,9	97,5
	Overall Session Time	[s]	1,0	1,3	2,5
HTTP 10MB DL Smartphone	Qualifier	[%]	100,0	99,8	98,0
	Overall Session Time	[s]	1,1	3,9	4,9
	90% faster than	[Mbit/s]	67,2	9,5	7,6
	10% faster than	[Mbit/s]	261,4	207,4	167,7
HTTP 5MB UL Smartphone	Qualifier	[%]	100,0	99,6	98,5
	Average Session Time	[s]	3,2	4,6	7,3
	90% faster than	[Mbit/s]	7,7	3,6	2,7
HTTP DL FDTT	10% faster than	[Mbit/s]	67,6	56,2	34,0
	Qualifier	[%]	100,0	99,6	98,5
	10% faster than	[Mbit/s]	804,1	379,0	214,2
HTTP UL FDTT	faster than 20 Mbit/s	[%]	99,0	85,8	81,4
	faster than 100 Mbit/s	[%]	88,7	46,3	31,5
	Qualifier	[%]	100,0	99,6	98,9
YouTube	10% faster than	[Mbit/s]	85,5	73,4	51,5
	faster than 2 Mbit/s	[%]	97,8	97,6	96,9
	faster than 5 Mbit/s	[%]	95,0	87,4	82,4
	Qualifier	[%]	99,8	98,8	94,3
YouTube Live Smartphone	Start Time	[s]	1,9	2,5	3,4
	AVG Resolution	[p]	1079,3	1077,0	1076,5
	Qualifier	[%]	100,0	97,9	92,6
Interactivity	Start Time	[s]	2,4	2,8	4,0
	AVG Resolution	[p]	1079,2	1075,2	1076,1
	Qualifier	[%]	95,8	92,4	89,9
Conversational App	Interactivity egaming	[%]	83,3	72,9	69,6
	Qualifier	[%]	99,7	99,2	97,7
Speech Quality (P10)	Speech Quality (P10)	[MOS-LQO]	3,4	2,7	3,2



Achieved values of all networks under test in each of the relevant Data Key Performance Indicators (KPIs) for the geographical category "Roads".

Data Cities	KPI Roads	Unit	Cosmote	Vodafone	Nova
HTTP Web Page DL Smartphone	Qualifier	[%]	99,8	99,1	97,7
	Overall Session Time	[s]	1,1	1,3	2,7
HTTP 10MB DL Smartphone	Qualifier	[%]	100,0	99,8	98,5
	Overall Session Time	[s]	1,3	3,7	4,9
	90% faster than	[Mbit/s]	50,4	11,4	9,4
	10% faster than	[Mbit/s]	199,4	155,4	122,9
HTTP 5MB UL Smartphone	Qualifier	[%]	99,8	99,3	98,8
	Average Session Time	[s]	2,6	4,2	6,2
	90% faster than	[Mbit/s]	7,2	4,9	3,4
HTTP DL FDTT	10% faster than	[Mbit/s]	71,1	55,5	38,0
	Qualifier	[%]	99,5	99,1	96,9
	10% faster than	[Mbit/s]	542,8	217,7	153,9
HTTP UL FDTT	faster than 20 Mbit/s	[%]	98,0	82,1	74,8
	faster than 100 Mbit/s	[%]	75,9	33,3	22,5
	Qualifier	[%]	99,6	99,4	97,6
YouTube	10% faster than	[Mbit/s]	93,7	79,7	57,2
	faster than 2 Mbit/s	[%]	98,9	97,0	97,4
	faster than 5 Mbit/s	[%]	95,0	89,1	89,4
	Qualifier	[%]	99,1	96,7	93,6
YouTube Live Smartphone	Start Time	[s]	2,1	2,7	3,9
	AVG Resolution	[p]	1079,2	1075,9	1074,9
	Qualifier	[%]	99,5	98,2	90,9
Interactivity	Start Time	[s]	2,6	3,0	4,1
	AVG Resolution	[p]	1079,3	1075,4	1077,4
	Qualifier	[%]	95,0	89,0	89,5
Conversational App	Interactivity egaming	[%]	78,4	73,7	74,0
	Qualifier	[%]	99,5	98,8	95,7
Speech Quality (P10)	Speech Quality (P10)	[MOS-LQO]	2,9	2,7	3,0



Crowd KPI overview

Achieved values of all networks under test in each of the relevant Crowd Key Performance Indicators (KPIs) for the categories "Broadband Coverage", "Download Speed", "Latency", "Voice Crowd" and "Stability".

Category	KPI name	Unit	Cosmote	Vodafone	Nova
Broadband Coverage	Coverage Quality	[%]	98.6	97.9	96.3
	Coverage Reach	[%]	92.3	85.8	81.2
	Time on broadband	[%]	96.9	95.9	96.0
Download Speed	Basic internet class	[%]	95.0	93.9	94.8
	HD video class	[%]	86.2	82.7	84.9
	UHD video class	[%]	32.3	26.9	26.5
Latency	OTT voice class	[%]	96.0	95.1	96.0
	Gaming class	[%]	89.5	87.3	89.8
Voice	HD voice	[%]	95.2	92.3	91.6
Download Speed Active	90% faster than	[Mbit/s]	7.6	3.9	5.2
	10% faster than	[Mbit/s]	188.3	100.8	101.6
	AVG data rate	[Mbit/s]	79.6	43.2	44.3
Upload Speed Active	90% faster than	[Mbit/s]	2.3	2.6	2.4
	10% faster than	[Mbit/s]	49.2	39.8	33.9
	AVG data rate	[Mbit/s]	22.6	18.8	15.3
Stability	Transaction success	[%]	94.4	92.4	91.0



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