

best in test.

For adding something on top in Sweden and reaching an overall score of 971 dots in mobile network benchmarking survey we proudly award this certificate to

Telia Sweden

Score 971 out of 1000 in Total
Score 267 out of 270 in Voice Services
Score 469 out of 480 in Data Services
Score 235 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 Sweden.

The audit was done as a performance benchmark performed by umlaut between 31.10.2024 and 27.11.2024 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 CW25 2024 and CW48 2024.

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



Measurement setup

	Drivetest	Voice	Conversational apps	Data
Device		Samsung Galaxy S23+	Samsung Galaxy S23+	Samsung Galaxy S23+
Test Cases		Mobile-to-Mobile (M2M) 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	Mobile-to-Mobile (M2M) Side1 (VoLTE, 5G pref.) to Side2 (VoLTE, 5G pref.) 105 sec call window 70 sec call duration 15 sec call setup timeout	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 8 Live web pages 2 YouTube videos ~ 45s (Full HD and Live Full HD) Interactivity eGaming, Video Chat HD
Mobility and Route Types	100% Drivetest	~54% in Cities, ~24% in Towns and ~22% on Roads		
Samples	20,494	181,059		
Dates	23 measurement days 31.10.2024 – 27.11.2024			
Crowd Data Assessment	24 weeks CW25 2024 – CW48 2024			



Testing areas

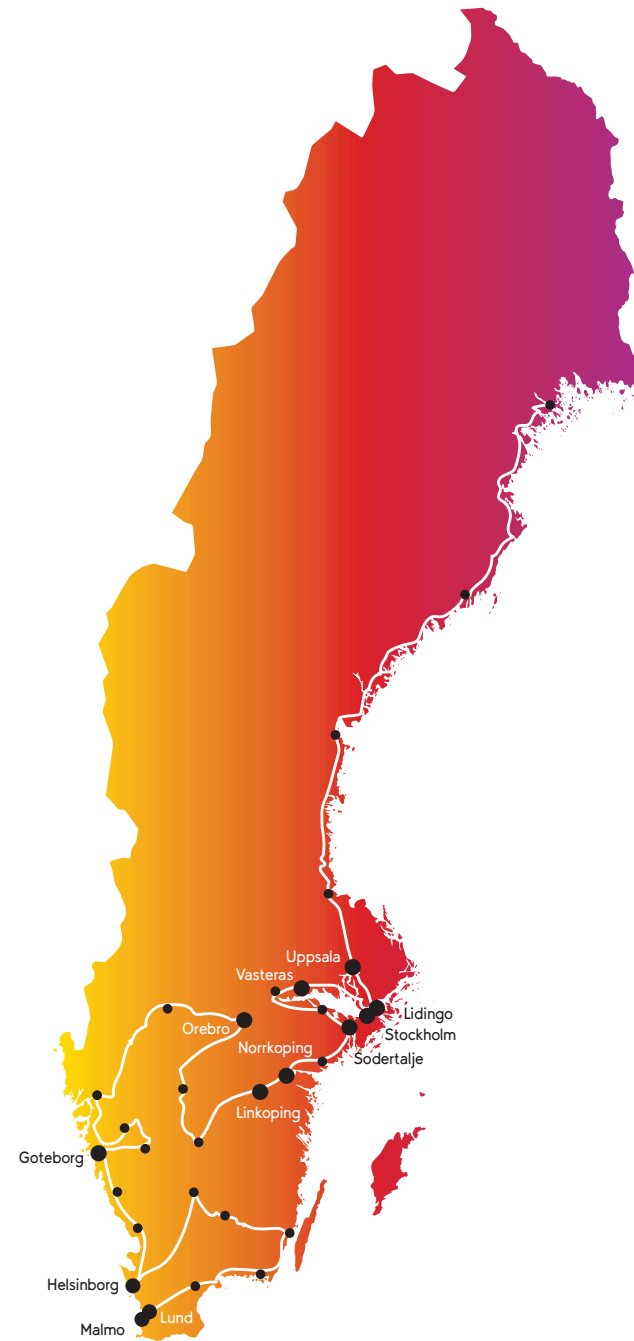
Drive route



~ 46 %
of population measured



10,453 km
measuring distance



Crowdsourcing based test area



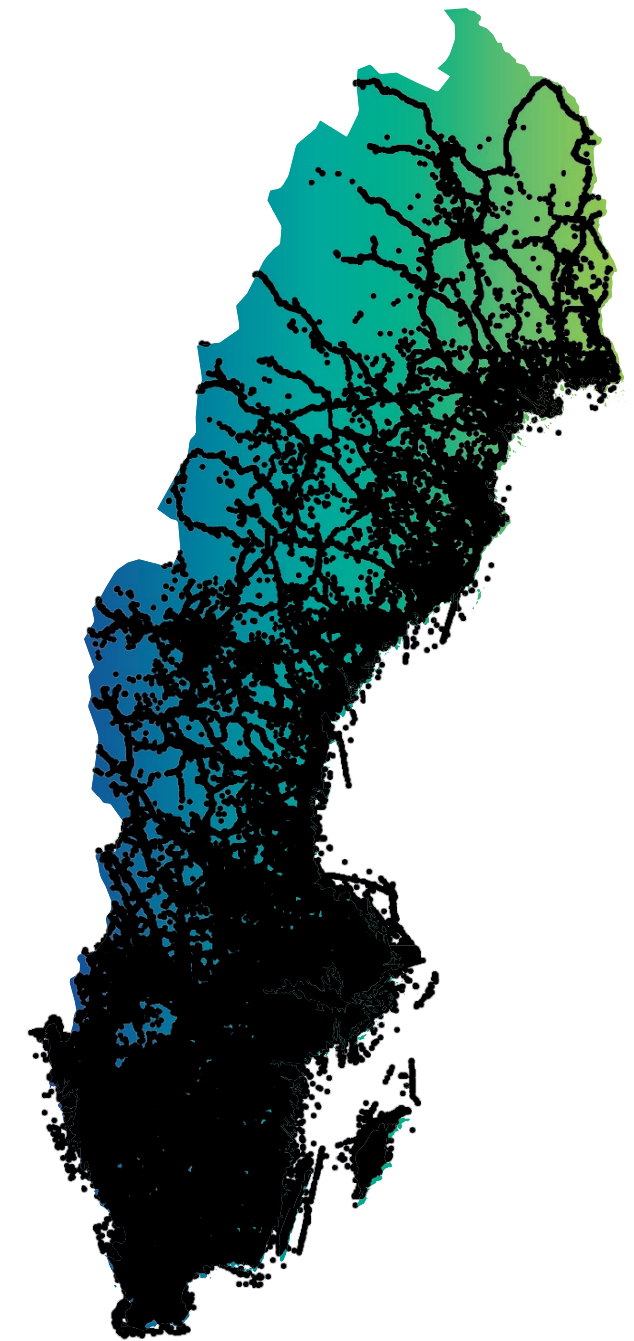
98.3 %
of the 'built-up area' covered



97.0 %
of the 'Population area' covered




136,772 km²
size of tested area







Claims

Best in test
Telia Sweden



Best in data
Telia Sweden



Best in voice
Telia Sweden



Best in Reliability
Telia Sweden



Best in crowd-sourced quality
Telia Sweden



Methodology

The leader in mobile benchmarking, umlaut, has analyzed the mobile networks of Sweden 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.

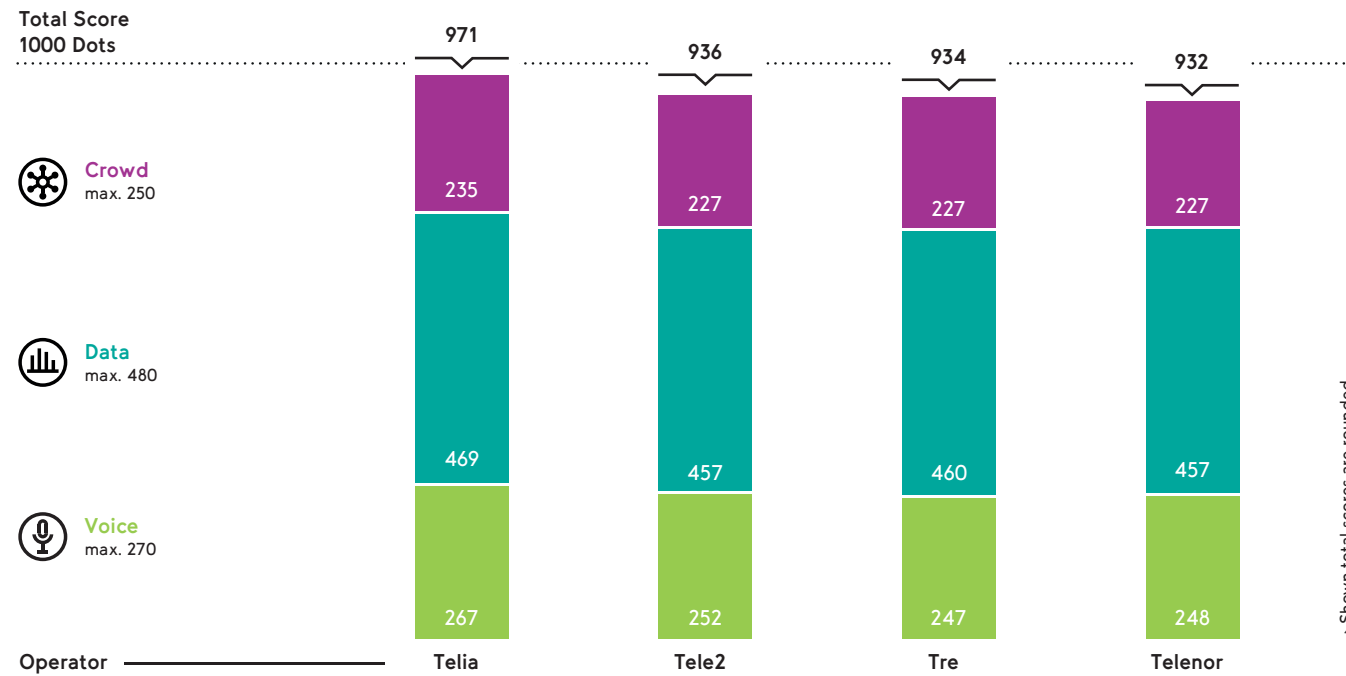
Today, more than 200 mobile networks in more than 120 countries are being evaluated by our unique scoring methodology.

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

Telia Sweden achieved the highest overall score among competitors with 971 dots out of 1000.



↑ Shown total scores are rounded.

Overall score considering Voice, Data and Crowdsourcing.

Total score

		Telia	Tele2	Tre	Telenor
Voice	max. 270	267	252	247	248
Cities Drivetest	162	99%	94%	91%	92%
Towns Drivetest	54	98%	94%	91%	91%
Roads Drivetest	54	99%	91%	94%	93%
Data	max. 480	469	457	460	457
Cities Drivetest	288	99%	97%	97%	97%
Towns Drivetest	96	98%	97%	95%	97%
Roads Drivetest	96	95%	89%	93%	87%
Crowdsourced Quality	max. 250	236	228	228	227
Broadband Coverage	113	94%	90%	89%	89%
Download Speed	75	95%	93%	93%	93%
Latency	50	92%	88%	90%	90%
Voice	13	98%	97%	98%	95%
Total	1000	971	936	934	932

Shown scores are rounded.



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

Data	Service Group	max	Telia	Tele2	Tre	Telenor
Cities	Web Browsing	50,4	100%	99%	99%	99%
	File Download	64,8	100%	98%	98%	98%
	File Upload	64,8	100%	97%	98%	97%
	YouTube	64,8	97%	95%	96%	96%
	OTT	43,2	96%	94%	94%	95%
Towns	Web Browsing	16,8	100%	99%	98%	100%
	File Download	21,6	99%	99%	91%	99%
	File Upload	21,6	99%	97%	96%	97%
	YouTube	21,6	96%	98%	96%	97%
	OTT	14,4	95%	92%	93%	94%
Roads	Web Browsing	16,8	98%	95%	97%	93%
	File Download	21,6	94%	86%	89%	86%
	File Upload	21,6	93%	88%	93%	85%
	YouTube	21,6	97%	88%	93%	84%
	OTT	14,4	92%	87%	93%	92%

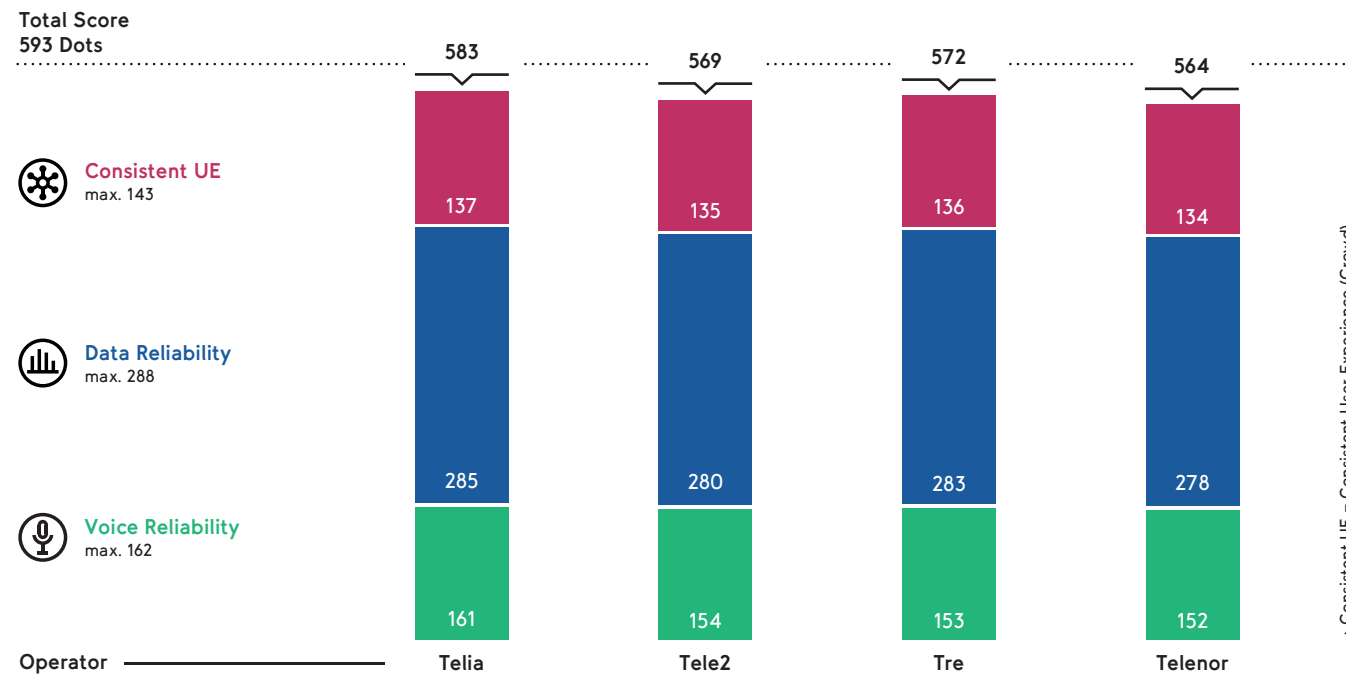


Achieved percentage of the maximum score in each of the different crowdsourcing services.

Crowd	Service Group	max	Telia	Tele2	Tre	Telenor
Crowdsourced Quality	Broadband Coverage	113	94%	90%	89%	89%
	Download Speed	75	95%	93%	93%	93%
	Latency	50	92%	88%	90%	90%
	Voice	13	98%	97%	98%	95%



Reliability



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

Total score

	Service Group	max	Telia	Tele2	Tre	Telenor
Reliability	Voice Reliability	162	99%	95%	95%	94%
	Data Reliability	288	99%	97%	98%	97%
	Consistent User Experience	143	96%	95%	95%	94%

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	Telia	Tele2	Tre	Telenor
Cities	Qualifier	[%]	100,0	99,6	99,5	99,4
	Call Setup Time (P90)	[s]	0,9	2,5	3,6	2,8
	Speech Quality (P10)	[MOS-LQO]	4,4	4,2	4,3	4,2
Towns	Qualifier	[%]	99,9	99,7	99,4	99,3
	Call Setup Time (P90)	[s]	1,0	2,6	3,5	2,8
	Speech Quality (P10)	[MOS-LQO]	4,4	4,2	4,3	4,2
Roads	Qualifier	[%]	99,9	98,8	99,6	99,2
	Call Setup Time (P90)	[s]	1,0	2,6	3,5	3,0
	Speech Quality (P10)	[MOS-LQO]	4,4	4,2	4,3	4,2



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 "Cities".

Data Cities	KPI Name	Unit	Telia	Tele2	Tre	Telenor
HTTP Web Page DL Smartphone	Qualifier	[%]	99,9	99,8	99,9	99,9
	Overall Session Time	[s]	0,8	0,9	1,0	1,0
HTTP 10MB DL Smartphone	Qualifier	[%]	99,9	100,0	100,0	100,0
	Overall Session Time	[s]	0,6	0,9	1,0	0,8
	90% faster than	[Mbit/s]	120,8	73,5	50,6	86,2
	10% faster than	[Mbit/s]	415,6	336,1	322,6	357,1
HTTP 5MB UL Smartphone	Qualifier	[%]	100,0	99,9	100,0	99,9
	Average Session Time	[s]	1,0	1,4	1,3	1,4
	90% faster than	[Mbit/s]	27,6	17,0	19,0	18,2
	10% faster than	[Mbit/s]	107,0	95,5	87,8	94,2
HTTP DL FDTT	Qualifier	[%]	100,0	99,9	99,9	99,8
	10% faster than	[Mbit/s]	1098,9	777,1	742,1	930,9
	faster than 20 Mbit/s	[%]	99,8	97,1	97,8	97,9
	faster than 100 Mbit/s	[%]	95,5	91,0	85,9	92,7
HTTP UL FDTT	Qualifier	[%]	100,0	99,9	100,0	99,9
	10% faster than	[Mbit/s]	160,3	131,8	121,1	132,4
	faster than 2 Mbit/s	[%]	99,9	99,6	99,9	99,8
	faster than 5 Mbit/s	[%]	99,7	98,7	99,4	98,4
YouTube	Qualifier	[%]	99,9	99,6	99,8	99,9
	Start Time	[s]	1,4	1,5	1,6	1,5
	AVG Resolution	[p]	1079,8	1080,0	1079,7	1080,0
YouTube Live Smartphone	Qualifier	[%]	99,8	99,5	99,8	99,6
	Start Time	[s]	2,1	2,2	2,3	2,2
	AVG Resolution	[p]	1079,7	1079,1	1079,9	1079,5
Interactivity EGaming	Qualifier	[%]	98,8	99,2	98,0	99,1
	Interactivity EGaming	[%]	86,0	79,8	83,9	83,3
Interactivity Videochat	Qualifier	[%]	98,6	95,7	95,5	97,0
	Interactivity Videochat	[%]	92,1	88,2	90,2	91,2
Conversational App	Qualifier	[%]	99,9	100,0	100,0	99,9
	Speech Quality (P10)	[MOS-LQO]	4,1	3,9	4,0	3,9



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	Telia	Tele2	Tre	Telenor
HTTP Web Page DL Smartphone	Qualifier	[%]	100,0	99,9	99,8	99,9
	Overall Session Time	[s]	0,9	1,0	1,2	1,0
HTTP 10MB DL Smartphone	Qualifier	[%]	100,0	100,0	100,0	100,0
	Overall Session Time	[s]	0,7	0,8	2,0	0,8
	90% faster than	[Mbit/s]	100,3	86,9	21,4	95,0
	10% faster than	[Mbit/s]	362,3	307,7	217,4	326,1
HTTP 5MB UL Smartphone	Qualifier	[%]	100,0	100,0	100,0	100,0
	Average Session Time	[s]	1,2	1,7	1,8	1,7
	90% faster than	[Mbit/s]	23,3	12,9	13,0	12,9
HTTP DL FDTT	Qualifier	[%]	100,0	100,0	100,0	99,9
	10% faster than	[Mbit/s]	1025,0	735,5	533,7	852,3
	faster than 20 Mbit/s	[%]	98,5	98,0	94,6	98,9
HTTP UL FDTT	Qualifier	[%]	100,0	100,0	100,0	100,0
	10% faster than	[Mbit/s]	153,9	111,8	88,2	117,5
	faster than 2 Mbit/s	[%]	100,0	99,7	99,7	99,7
	faster than 5 Mbit/s	[%]	99,7	98,8	98,0	98,9
YouTube	Qualifier	[%]	99,6	100,0	99,9	99,9
	Start Time	[s]	1,5	1,6	1,9	1,6
	AVG Resolution	[p]	1079,7	1079,4	1080,0	1080,0
YouTube Live Smartphone	Qualifier	[%]	99,9	100,0	99,7	99,7
	Start Time	[s]	2,2	2,3	2,5	2,2
	AVG Resolution	[p]	1078,9	1079,2	1079,8	1079,1
Interactivity EGaming	Qualifier	[%]	98,6	98,8	98,2	99,5
	Interactivity EGaming	[%]	81,0	73,6	78,0	79,2
Interactivity Videochat	Qualifier	[%]	99,1	95,0	95,5	97,5
	Interactivity Videochat	[%]	91,0	87,4	89,4	89,5
Conversational App	Qualifier	[%]	99,8	100,0	100,0	100,0
	Speech Quality (P10)	[MOS-LQO]	4,1	3,9	4,0	3,9



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

Data Roads	KPI Name	Unit	Telia	Tele2	Tre	Telenor
HTTP Web Page DL Smartphone	Qualifier	[%]	99,9	99,2	99,7	98,9
	Overall Session Time	[s]	1,3	1,4	1,3	1,4
HTTP 10MB DL Smartphone	Qualifier	[%]	100,0	99,3	100,0	99,1
	Overall Session Time	[s]	2,1	3,6	2,8	3,2
	90% faster than	[Mbit/s]	16,7	11,7	15,5	12,1
	10% faster than	[Mbit/s]	198,0	203,0	94,8	206,2
HTTP 5MB UL Smartphone	Qualifier	[%]	100,0	99,8	100,0	98,9
	Average Session Time	[s]	2,9	4,0	3,2	4,0
	90% faster than	[Mbit/s]	6,9	4,5	6,1	5,0
HTTP DL FDTT	Qualifier	[%]	99,9	99,2	100,0	99,3
	10% faster than	[Mbit/s]	475,2	369,6	126,1	383,2
	faster than 20 Mbit/s	[%]	88,7	77,7	89,7	79,9
HTTP UL FDTT	Qualifier	[%]	99,8	99,2	100,0	98,7
	10% faster than	[Mbit/s]	83,0	59,9	66,1	62,0
	faster than 2 Mbit/s	[%]	98,3	98,2	98,9	97,3
	faster than 5 Mbit/s	[%]	94,9	89,4	94,0	88,9
YouTube	Qualifier	[%]	99,9	98,2	98,8	96,9
	Start Time	[s]	1,9	2,0	2,0	2,1
	AVG Resolution	[p]	1079,9	1078,8	1080,0	1078,4
YouTube Live Smartphone	Qualifier	[%]	99,7	98,0	99,3	97,5
	Start Time	[s]	2,6	2,8	2,6	2,7
	AVG Resolution	[p]	1078,7	1075,9	1078,0	1072,5
Interactivity EGaming	Qualifier	[%]	97,2	96,7	95,8	97,0
	Interactivity EGaming	[%]	71,5	64,8	77,2	73,1
Interactivity Videochat	Qualifier	[%]	95,9	87,8	93,6	91,3
	Interactivity Videochat	[%]	86,1	86,6	89,9	88,7
Conversational App	Qualifier	[%]	99,9	99,6	99,8	99,8
	Speech Quality (P10)	[MOS-LQO]	3,6	3,6	3,8	3,7



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	Telia	Tele2	Tre	Telenor
Broadband Coverage	Coverage Quality	[%]	99.5	99.1	99.4	98.3
	Coverage Reach	[%]	84.7	75.0	71.2	75.1
	Time on broadband	[%]	99.4	99.0	99.0	98.2
Download Speed	Basic internet class	[%]	97.7	96.3	96.8	96.6
	HD video class	[%]	92.2	89.1	90.3	90.0
	UHD video class	[%]	33.2	29.5	30.8	31.9
Latency	OTT voice class	[%]	98.5	98.3	98.4	98.1
	Gaming class	[%]	92.2	87.0	91.9	90.8
	Egoshooter class	[%]	6.4	2.7	4.2	5.5
Voice	HD voice	[%]	98.3	97.7	98.4	96.5



umlaut – Part of Accenture

umlaut communications GmbH

Am Kraftversorgungsturm 3 · 52070 Aachen · Germany

Hakan Ekmen · Global Networks Lead, Comms Industry

cell +49 151 571 33 235 · hakan.ekmen@accenture.com

www.umlaut.com