

Audit Report.

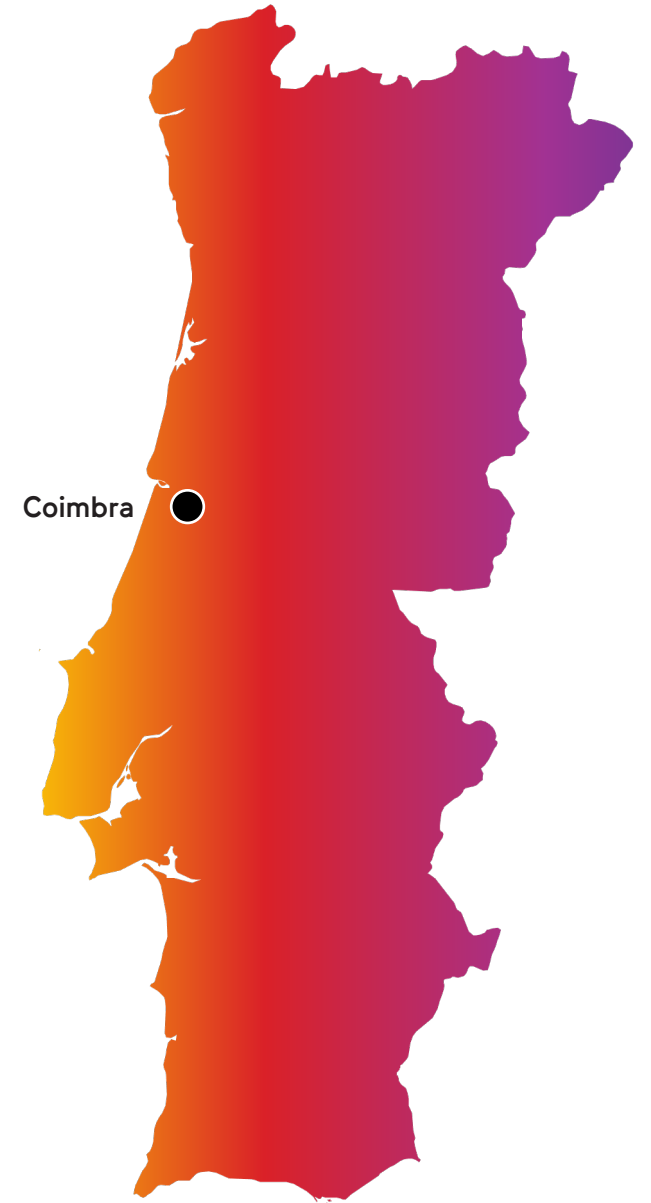
Portugal, Coimbra — 2025





Foreword

We have analyzed the mobile network performance of the mobile networks of MEO, Vodafone and NOS in Coimbra, a riverfront city in central Portugal.





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 Coimbra, Portugal. The audit was done as a performance benchmark performed by umlaut between 03.02.2025 and 04.02.2025. 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 CW35 2024 and CW06 2025 for Coimbra, Portugal. The following pages provide a comparative overview about the performance results observed for the different tested service types.



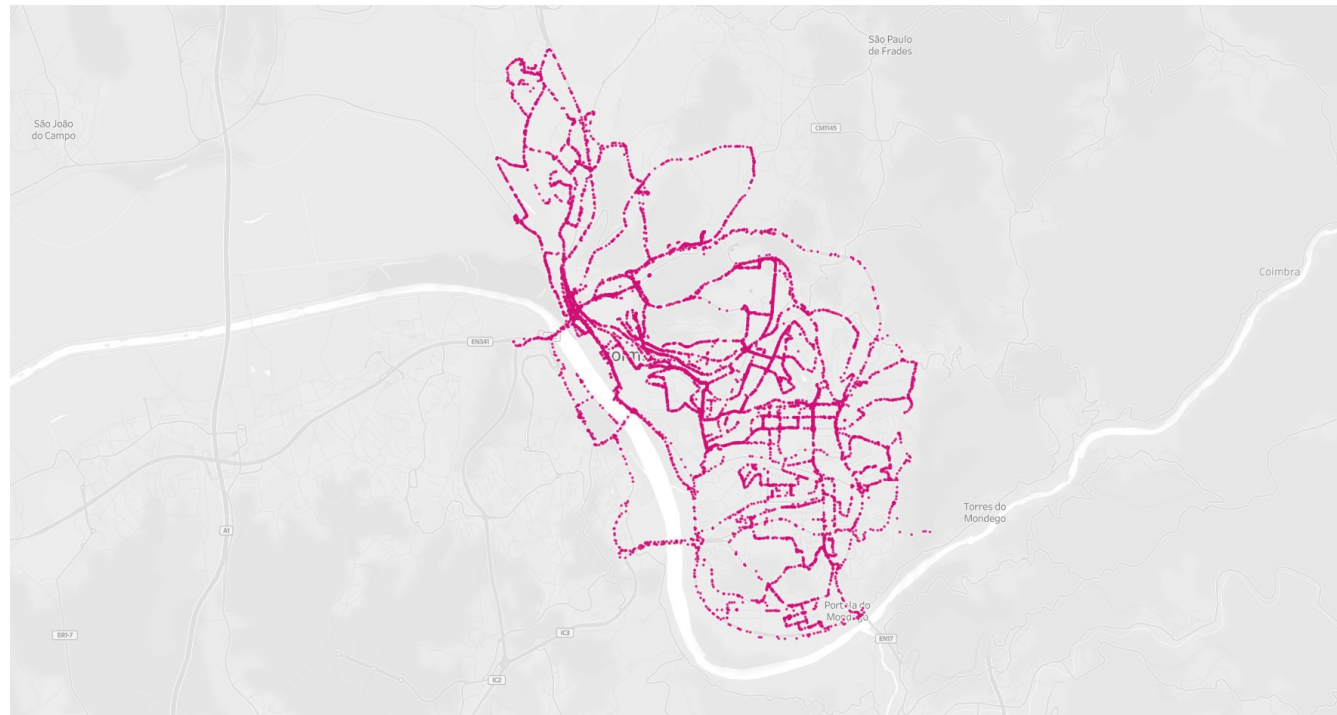
Measurement setup

Drivetest	Voice	Data
Device	Samsung Galaxy S23+	
Test Cases	Mobile-to-Mobile (M2M) Side1 (VoLTE) to Side2 (VoLTE) 105 sec call window 70 sec call duration Device capabilities and features depending on firmware British English speech sample (super wideband) 100KB HTTP traffic injection 15s Opt D Call Setup Timeout	Data 5G preferred CA HTTP DL datastream 7s HTTP UL datastream 7s HTTP 10MB DL fixed file transfer HTTP 5MB UL fixed file transfer 8 Live web pages YouTube v16 Interactivity testing (eGaming) Generic OTT voice channel
Mobility and Route Types	Drivetest	
Samples	1377 in total	13074 in total
Dates	03.02.2025 and 04.02.2025	
Crowd Data Assessment	24 weeks CW35 2024 – CW06 2025	



Testing areas

Driven routes in Coimbra by Drivetest cars



Drivetest



~ 520 km
measuring distance

Crowd



317.11 km²
size of tested area



Score and breakdown

MEO achieved the highest overall score among competitors with 976 dots out of 1000.



Overall score considering Voice, Data and Crowdsourcing.



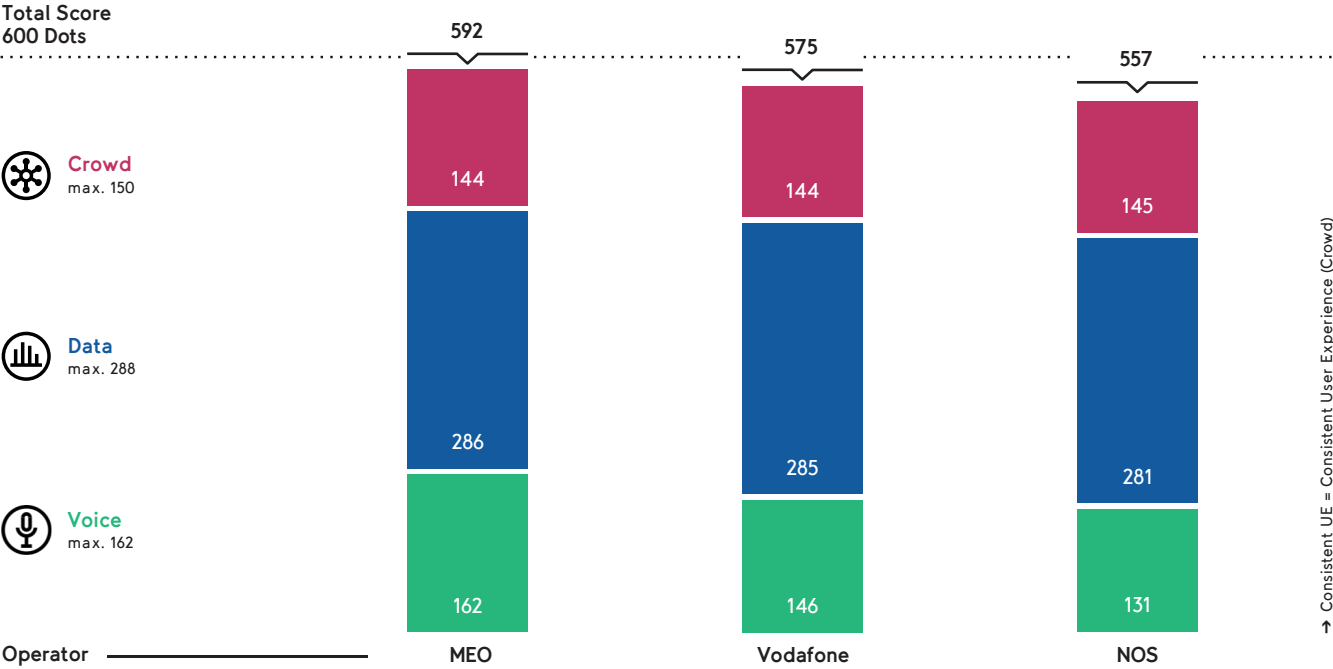
Total score

		MEO	Vodafone	NOS
Voice	max. 270	267	248	223
Overall	270	99%	92%	83%
Data	max. 480	469	467	461
Overall	480	98%	97%	96%
Crowdsourced Quality	max. 250	240	240	239
Broadband Coverage	100	98%	98%	96%
Download Speed	55	97%	96%	97%
Upload Speed	20	97%	98%	94%
Latency	50	93%	93%	93%
Voice	10	89%	97%	98%
Stability	15	95%	97%	98%
Total	1000	976	955	923

Shown scores are rounded.



Reliability



Reliability score considering Voice, Data and Crowd.



Total score

	Service Group	max	MEO	Vodafone	NOS
Reliability	Voice	162	100%	90%	81%
	Data	288	99%	99%	98%
	Crowd	150	96%	96%	96%

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



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

Data	Service Group	max	MEO	Vodafone	NOS
Overall	Web Browsing	84.0	100%	100%	99%
	File Download	108.0	99%	99%	98%
	File Upload	108.0	98%	99%	98%
	YouTube	108.0	99%	97%	98%
	OTT	72.0	91%	90%	84%



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

Crowd	Service Group	max	MEO	Vodafone	NOS
Crowdsourced Quality	Broadband Coverage	100	98%	98%	96%
	DL Speed	55	97%	96%	97%
	UL Speed	20	97%	98%	94%
	Latency	50	93%	93%	93%
	Voice	10	89%	97%	98%
	Stability	15	95%	97%	98%



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".

Voice	Service Group	Unit	MEO	Vodafone	NOS
Voice M2M	Qualifier	[%]	100	99.1	98.3
	Call Setup Time (P90)	[s]	1.9	2.4	3.7
	Speech Quality (P10)	[MOS–LQO]	4.7	4.5	4.4



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	MEO	Vodafone	NOS
HTTP Web Page DL Smartphone	Qualifier	[%]	100.0%	100.0%	100.0%
	Overall Session Time	[s]	0.9	1.1	1.2
HTTP 10MB DL Smartphone	Qualifier	[%]	100.0%	100.0%	99.7%
	Average Session Time	[s]	0.6	0.7	1.1
	90% faster than	[Mbit/s]	114.5	97.1	75.6
	10% faster than	[Mbit/s]	347.8	315.3	220.5
HTTP 5MB UL Smartphone	Qualifier	[%]	100.0%	100.0%	100.0%
	Average Session Time	[s]	1.4	1.2	1.7
	90% faster than	[Mbit/s]	19.8	22.0	19.3
	10% faster than	[Mbit/s]	79.5	91.1	64.1
HTTP DL FDTT	Qualifier	[%]	100.0%	100.0%	100.0%
	10% faster than	[Mbit/s]	935.6	878.8	764.9
	faster than 20 Mbit/s	[%]	99.4%	99.7%	100.0%
	faster than 100 Mbit/s	[%]	97.1%	96.2%	98.4%
HTTP UL FDTT	Qualifier	[%]	100.0%	100.0%	100.0%
	10% faster than	[Mbit/s]	122.3	136.7	112.0
	faster than 2 Mbit/s	[%]	99.4%	100.0%	99.7%
	faster than 5 Mbit/s	[%]	98.7%	100.0%	99.0%
YouTube	Qualifier	[%]	100.0%	99.7%	100.0%
	Start Time	[s]	1.4	1.6	1.6
	AVG Resolution	[p]	1080.0	1080.0	1080.0
YouTube Live Smartphone	Qualifier	[%]	100.0%	100.0%	100.0%
	Start Time	[s]	2.0	2.3	2.2
	AVG Resolution	[p]	1078.8	1080.0	1080.0
Interactivity eGaming	Qualifier	[%]	97.2%	97.5%	97.1%
	Interactivity score	[%]	0.7	0.7	0.6
Interactivity Videochat	Qualifier	[%]	96.8%	97.4%	95.8%
	Interactivity score	[%]	0.9	0.9	0.9
Conversational App	Qualifier	[%]	99.8%	100.0%	97.9%
	Speech Quality (P10)	[MOS–LQO]	3.9	3.9	4.0



Crowd KPI overview

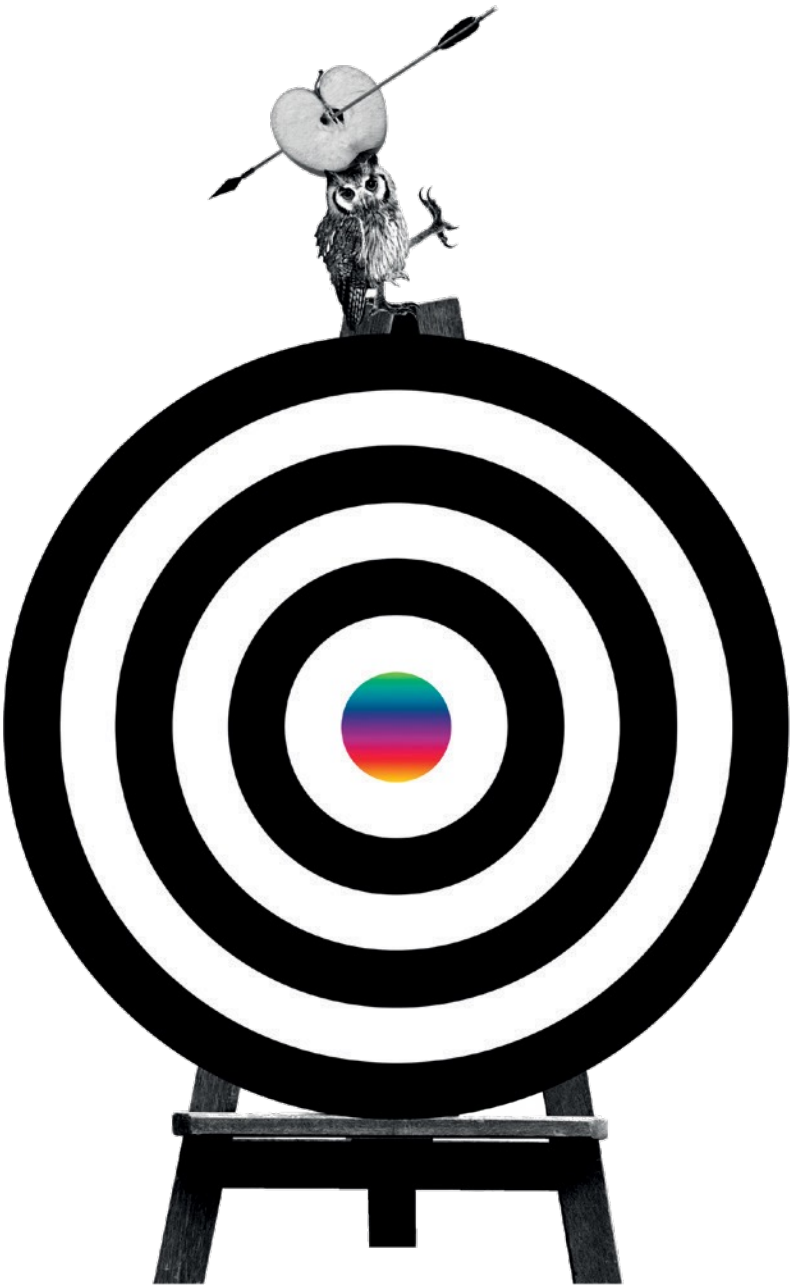
Achieved values of all networks under test in each of the relevant Crowd Key Performance Indicators (KPIs) for the categories "Broadband Coverage", "Download Speed", "Latency". "Voice Crowd" and "Stability".

Category	KPI name	Unit	MEO	Vodafone	NOS
Broadband Coverage	Coverage Quality	[%]	98.6 %	98.5 %	98.6 %
	Coverage Reach	[%]	100.0 %	98.9 %	90.5 %
	Time on broadband	[%]	98.6 %	98.8 %	98.8 %
Download Speed	Basic internet class	[%]	97.5 %	96.8 %	97.5 %
	HD video class	[%]	90.0 %	91.3 %	92.2 %
	UHD video class	[%]	29.8 %	29.8 %	28.3 %
Latency	OTT voice class	[%]	98.1 %	98.1 %	98.4 %
	Gaming class	[%]	94.6 %	94.6 %	92.7 %
	Egoshooter class	[%]	23.6 %	18.7 %	15.7 %
Voice	HD voice	[%]	92.4 %	97.7 %	98.3 %
Download Speed Active	90% faster than	[Mbit/s]	38.1	15.2	44.9
	10% faster than	[Mbit/s]	235.3	288.3	211.6
	AVG data rate	[Mbit/s]	102.8	97.2	101.0
Upload Speed Active	90% faster than	[Mbit/s]	11.8	8.9	11.6
	10% faster than	[Mbit/s]	37.0	44.9	30.7
	AVG data rate	[Mbit/s]	22.8	21.9	20.0
Stability	Transaction success	[%]	95.5 %	97.0 %	97.6 %



Key takeaways

- || MEO achieves the highest score in Coimbra with 976 points out of 1000, followed by Vodafone with 955 points and NOS with 923 points.
- || MEO shows the highest performance in voice services with 267 points out of 270, followed by Vodafone with 248 points and NOS with 223 points
- || MEO leads in the data category with 469 points out of 480 points, followed by Vodafone with 467 points and NOS with 461 points
- || In crowdsourced quality, MEO and Vodafone achieves the highest score with 240 points out of 250, followed by NOS with 239 points





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