Audit Report

Portugal, Funchal — 2024

umlaut
Part of **Accenture**

Foreword
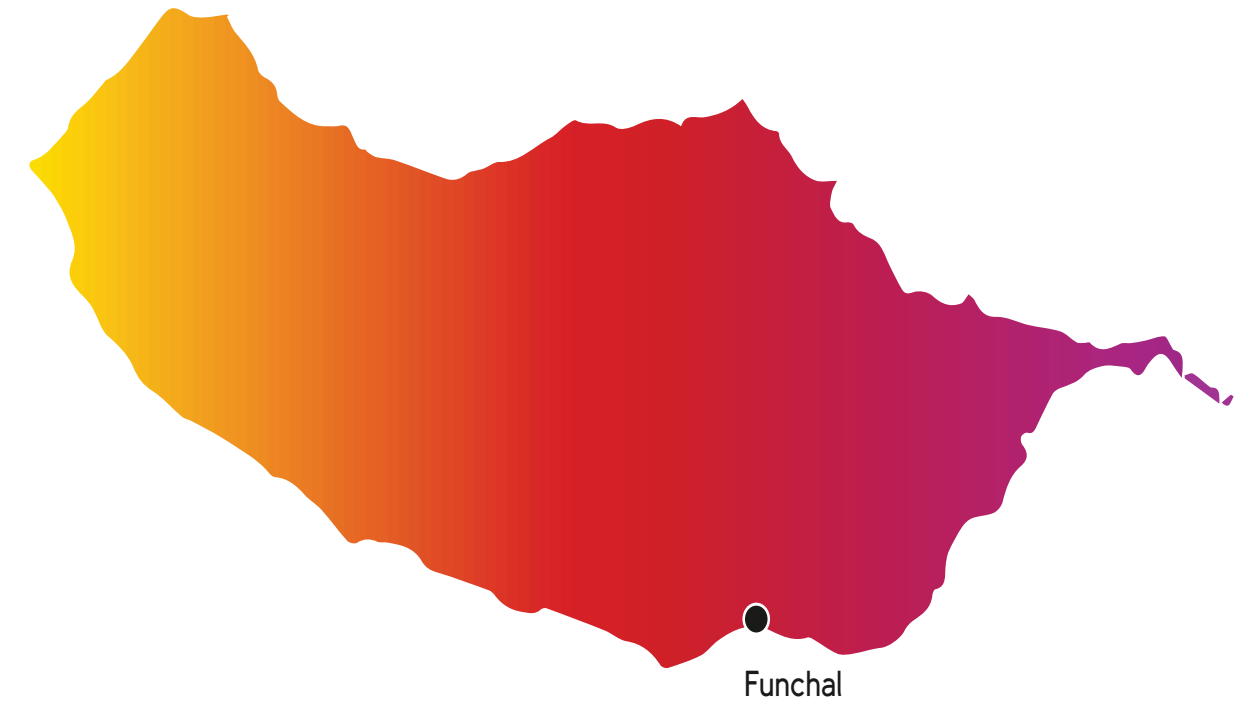
Funchal

We have analyzed the mobile network performance of the mobile networks of MEO, Vodafone and NOS in Funchal, the largest city on the Portuguese island of Madeira.

Measurement Overview

Measurement setup

umlaut tested and measured the performance of its voice and data services on smartphones in comparison to other 5G/LTE mobile radio networks in Portugal, Funchal.
The audit was done as a performance benchmark performed by umlaut between 25.09. and 27.09.2024.
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 CW15 2024 and CW38 2024 for Funchal, Portugal.
The following pages provide a comparative overview about the performance results observed for the different tested service types.

Drivetest	Voice	Data
Device	Samsung Galaxy S23+	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	1655 in total	14630 in total
Dates	25.09.2024 – 27.09.2024	
Crowd Data Assessment	24 weeks CW15 2024 – CW38 2024	

Testing areas

Driven routes in Funchal by Drivetest cars

Drivetest

Crowd

~ 450 km

measuring distance

71.86 km²

size of tested area

Score and breakdown

MEO achieved the highest overall score among competitors with 956 dots out of 1000.

**Total Score
1000 Dots**

Crowd
max. 250

Data
max. 480

Voice
max. 270

Operator

↑ Shown total scores are rounded.

Overall score considering Voice, Data and Crowdsourcing.

Total score

		MEO	Vodafone	NOS
Voice	max. 270	263	258	219
Overall	270	97%	96%	81%
Data	max. 480	459	426	427
Overall	480	96%	89%	89%
Crowdsourced Quality	max. 250	234	224	229
Broadband Coverage	100	96%	94%	95%
Download Speed	55	95%	90%	96%
Upload Speed	20	98%	93%	96%
Latency	50	86%	76%	77%
Voice	10	84%	90%	93%
Stability	15	96%	92%	95%
Total	1000	956	908	875

Shown scores are rounded.

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

Data	Service Group	max	MEO	Vodafone	NOS
	Web Browsing	84,0	99%	95%	95%
	File Download	108,0	99%	92%	89%
Overall	File Upload	108,0	95%	89%	92%
	YouTube	108,0	97%	94%	91%
	OTT	72,0	87%	70%	75%

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

Crowd	Service Group	max	MEO	Vodafone	NOS
	Broadband Coverage	100	96%	94%	95%
	DL Speed	55	95%	90%	96%
Crowdsourced Quality	UL Speed	20	98%	93%	96%
	Latency	50	86%	76%	77%
	Voice	10	84%	90%	93%
	Stability	15	96%	92%	95%

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
	Qualifier	[%]	99,8	99,8	98,0
Voice M2M	Call Setup Time (P90)	[s]	2,2	2,7	3,4
	Speech Quality (P10)	[MOS–LQO]	4,7	4,5	4,3

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	[%]	99,9	99,5	99,6
	Overall Session Time	[s]	1,2	1,4	1,4
HTTP 10MB DL Smartphone	Qualifier	[%]	100,0	99,4	99,4
	Average Session Time	[s]	0,9	1,5	2,2
	90% faster than	[Mbit/s]	73,2	30,2	19,7
	10% faster than	[Mbit/s]	229,2	186,9	232,6
HTTP 5MB UL Smartphone	Qualifier	[%]	100,0	99,7	100,0
	Average Session Time	[s]	2,1	3,1	2,1
	90% faster than	[Mbit/s]	11,1	7,5	10,6
	10% faster than	[Mbit/s]	58,5	58,6	61,8
HTTP DL FDTT	Qualifier	[%]	100,0	99,7	100,0
	10% faster than	[Mbit/s]	703,7	320,5	630,0
	faster than 20 Mbit/s	[%]	99,1	98,2	90,6
	faster than 100 Mbit/s	[%]	92,0	67,2	61,5
HTTP UL FDTT	Qualifier	[%]	100,0	99,4	99,4
	10% faster than	[Mbit/s]	91,6	101,7	91,0
	faster than 2 Mbit/s	[%]	99,7	99,1	99,4
	faster than 5 Mbit/s	[%]	98,2	97,6	97,0
YouTube	Qualifier	[%]	100,0	99,7	99,4
	Start Time	[s]	1,7	2,0	2,0
	AVG Resolution	[p]	1078,8	1078,0	1078,4
YouTube Live Smartphone	Qualifier	[%]	99,7	99,4	99,1
	Start Time	[s]	2,2	2,5	2,6
	AVG Resolution	[p]	1079,7	1079,6	1078,4
Interactivity eGaming	Qualifier	[%]	99,1	80,1	92,7
	Interactivity score	[%]	0,5	0,5	0,4
Interactivity Videochat	Qualifier	[%]	95,2	90,9	89,0
	Interactivity score	[%]	0,9	0,8	0,8
Conversational App	Qualifier	[%]	99,8	99,8	99,8
	Speech Quality (P10)	[MOS–LQO]	3,8	3,6	3,4

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	[%]	97.5	97.9	97.8
	Coverage Reach	[%]	100.0	100.0	100.0
	Time on broadband	[%]	98.0	96.2	96.3
Download Speed	Basic internet class	[%]	96.3	95.4	96.6
	HD video class	[%]	91.2	89.0	87.0
	UHD video class	[%]	30.9	27.1	25.9
Latency	Gaming class	[%]	97.7	96.7	96.9
	OTT voice class	[%]	91.9	75.4	76.0
	Egoshooter class	[%]	0.1	0.0	0.0
Voice	HD voice	[%]	89.8	93.0	95.1
Download Speed Active	90% faster than	[Mbit/s]	41.6	32.8	26.2
	10% faster than	[Mbit/s]	178.1	70.3	245.5
	AVG data rate	[Mbit/s]	85.6	47.8	105.5
Upload Speed Active	90% faster than	[Mbit/s]	15.3	18.0	12.9
	10% faster than	[Mbit/s]	39.4	28.5	34.6
	AVG data rate	[Mbit/s]	26.0	23.1	22.4
Stability	Transaction success	[%]	95.6	92.4	95.0

Key takeaways

MEO achieves the highest score in Funchal with 956 points out of 1000, followed by Vodafone with 908 points and NOS with 875 points.

MEO leads in the data category with 459 points out of 480 points, followed by NOS with 427 points and Vodafone with 426 points.

MEO shows the highest perfor–mance in voice services with 263 points out of 270, followed by Vodafone with 258 points and NOS with 219 points.

In crowdsourced quality, MEO achieves the highest score with 234 points out of 250, followed by NOS with 229 points and Vodafone with 224 points.
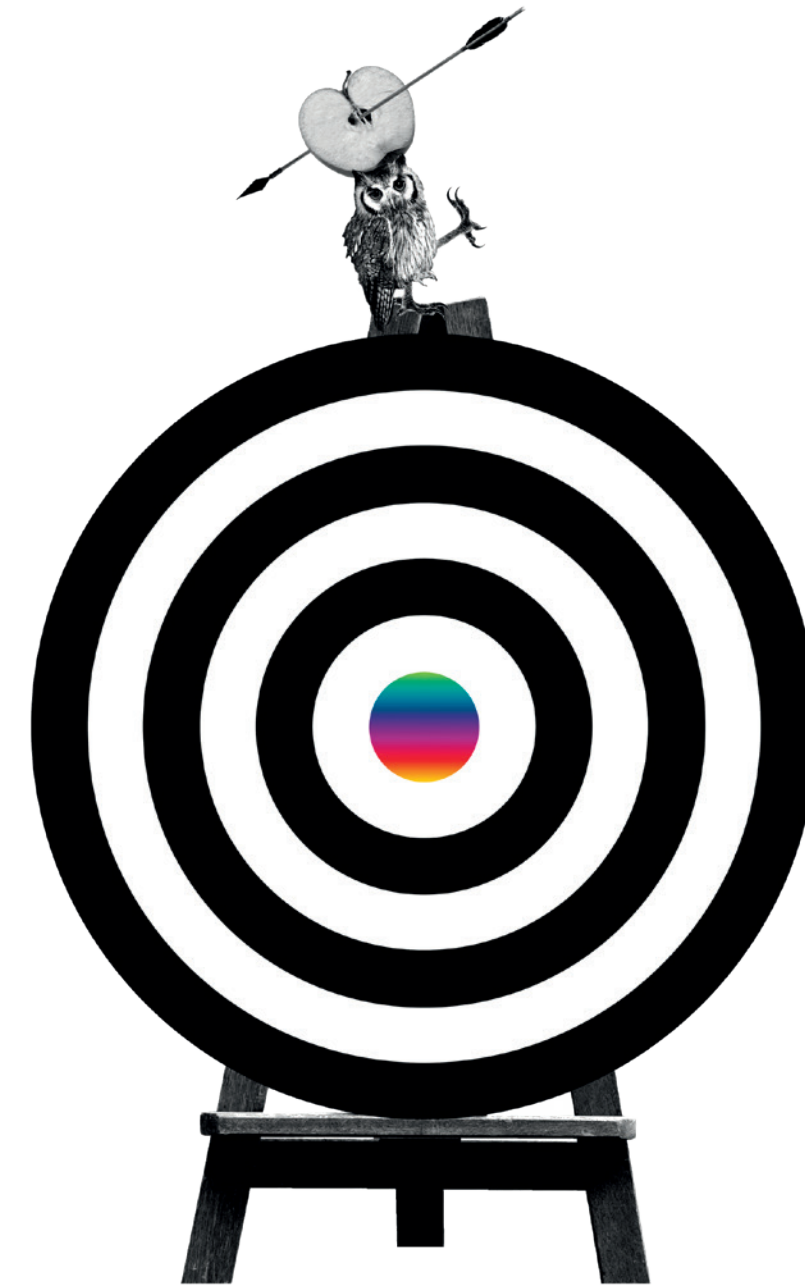
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