

# CERTIFICATE

**Systemics-PAB Sp. z o.o.**  
Wolodyjowskiego 46B, 02-724 Warsaw, Poland

hereby certifies that

**Orange Moldova S.A.**  
Alba Iulia 75 St., MD 2071, Chişinău, Republic of Moldova

received the title for


## THE BEST MOLDAVIAN MOBILE NETWORK IN THE TEST

This certificate is based on the results of the measurement campaign, which was carried out by Systemics-PAB in April and May 2022. The measurement campaign assessed the quality of experience of mobile voice and data services in Moldova. All mobile Network Operators in Moldova: Orange Moldova S.A. (Orange), Moldcell S.A. (Moldcell), Moldtelecom S.A. (Unite) were tested. Systemics-PAB performed the benchmarking measurements throughout Moldova covering 12 largest cities as measured by population, and national roads across the country. The measurements were carried out using Swissqual Smart Benchmarker system equipped with Samsung Galaxy S10 terminals for voice/VoLTE tests and Samsung Galaxy S21+ terminals for data tests. For the coverage assessment Rohde and Schwarz radio scanners were used. Voice tests were done in mobile to mobile mode. The assessment of quality of services was done using international standards and Systemics-PAB expert knowledge.

The results of the measurements showed Orange as operator achieving the highest overall results for the quality of experience of mobile services in Moldova.

Orange Moldova S.A. can therefore be certified as the operator with the highest overall quality of mobile services in the test.

Certificate Date: 20.05.2022



---

Jan Kondej  
Chief Technical Officer

## Test Route

The periodical drive tests of mobile networks play the vital role in maintaining the highest standards of the telecommunication services quality and customer experience when using the network. It allows to assess the situation on the market and is one of the tools for stimulating the competitiveness.

As a part of DSBO project Systemics-PAB delivered extensive benchmarking campaign to measure the quality of mobile telecommunication services offered by mobile networks operators in Moldova across the country.

The benchmarking measurements took place between April 24<sup>th</sup> and May 5<sup>th</sup> of 2022 and covered representative areas of cities and roads in Moldova. The total distance covered by each of 2 drive test cars used was over 5500 km. Measurements took close to 90 hours delivering over 2700 voice service tests and more than 1500 for each of data services tests. All the tests were conducted using SwissQual (Rohde&Schwarz Group) benchmarking solution installed in the roof boxes on measurement cars.



## Measurement Setup

	Voice/VOLTE testing	Data testing
Device	Samsung Galaxy S10 (SM-G973FDS) LTE / HSPA+ DC / HSUPA 5.76 attenuation - 7dB	Samsung Galaxy S21+ (SM-G996B) LTE / HSPA+ DC / HSUPA 5.76 (5G capable) attenuation - 7dB
Test Cases	<b>Mobile-to-Mobile</b> <b>Best available Voice technology:</b> 115 sec call window 85 sec call duration 15 sec call setup time out HTTP Transfer 100kB Data traffic injection (1 test per call window)	<b>Data 4G preferred:</b> <b>APN with default IPv4/IPv6 settings</b> HTTP UL and DL stress test 7s HTTP 5MB UL and 10MB DL fixed file transfer Live Web Browsing 8 pages (http & https) YouTube Streaming
Tests and Route Types	100% Drive test Big Cities, Small Cities and Connecting Roads	

\* attenuation inserted to simulate usage conditions

## Scoring Methodology

The quality assessment and the comparison between operators was prepared using the ETSI Technical Report 103559 Annex B approach. The Report was developed and published in August 2019. It fulfils market needs for open and "standardized" countrywide mobile network benchmarking and scoring. TR103599 allows to get results which are transparent about how the actual scoring has been achieved including methods and underlying assumptions.

The document discusses the construction and methods of such a countrywide measurement campaign, with respect to the area and population to be covered, the collection and aggregation of the test results and the weighting of the various aspects tested. The experienced quality of service varies over time so that the individual score of a particular throughput cannot be fixed once and for all. In order to reflect 5G implementation values for data KPIs thresholds were adopted and bigger files were used for emulation of receiving/sending attachments (fixed size file DL/UL test).

The basic philosophy of the scoring is driven by customer's experience with the network and service quality. In assessing the overall performance and overall score of each mobile network, 2 main categories of services (with subcategories) have been evaluated:

- Voice services, affecting 40% of the overall score
- Data services, affecting 60% of the overall score and consisting of following tests:
- Fixed Size File DL
- Fixed Size File UL
- Fixed Duration File DL
- Fixed Duration File UL
- Web Browsing
- YouTube streaming

## Additional assumptions

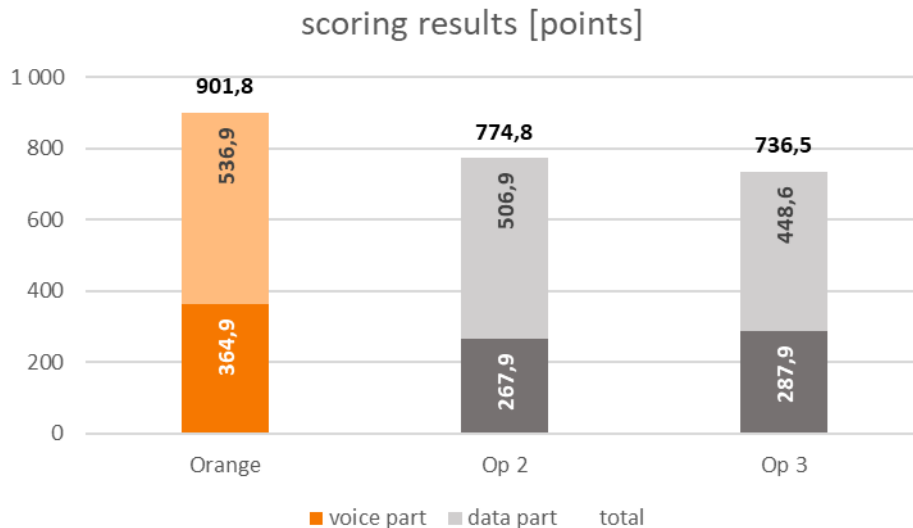
The test area was designed to cover cities and connecting roads (with villages along roads) that constitute around 50% of the Moldavian population.

In order to keep the fairness of testing methodology all the operators in the benchmark were tested using the same measurement terminal type supporting functionalities offered by networks to achieve the best performance. The selection of measurement terminals models for data and voice tests took also into account the stability of the terminal itself as well as availability of the appropriate firmware version to support VoLTE and high data throughputs. The quality of services was not limited by SIM cards used in the project. Commercial tariffs were used.

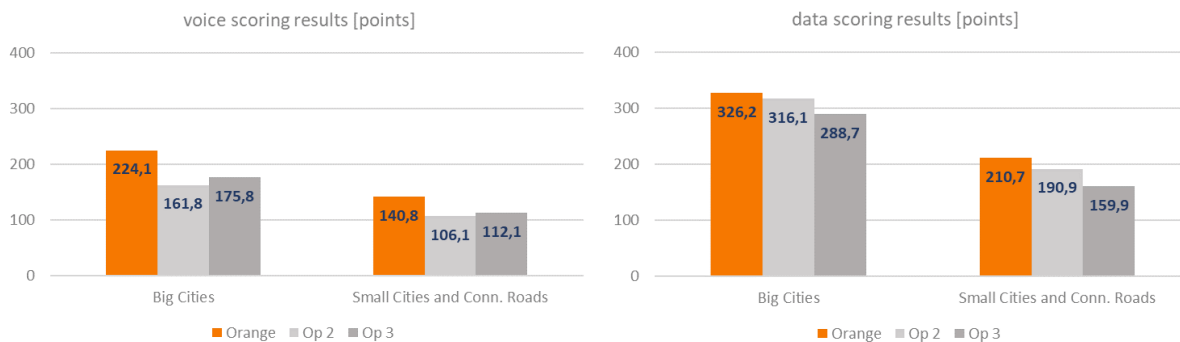
The selection of web pages to be tested was done based on Alexa rank of most popular web destinations in Moldova which are accessible for drive testing (automated test by robots).

## Scoring Results

With applied scoring methodology the highest number of points in overall scoring was achieved by Orange and was equal to 901.8 out of 1000 of maximum achievable. The other operators scored 774.8 and 736.5 points. Orange got the best score in both voice and data tests. For the first time in measurements in Moldova the 900 scoring points level was exceeded.



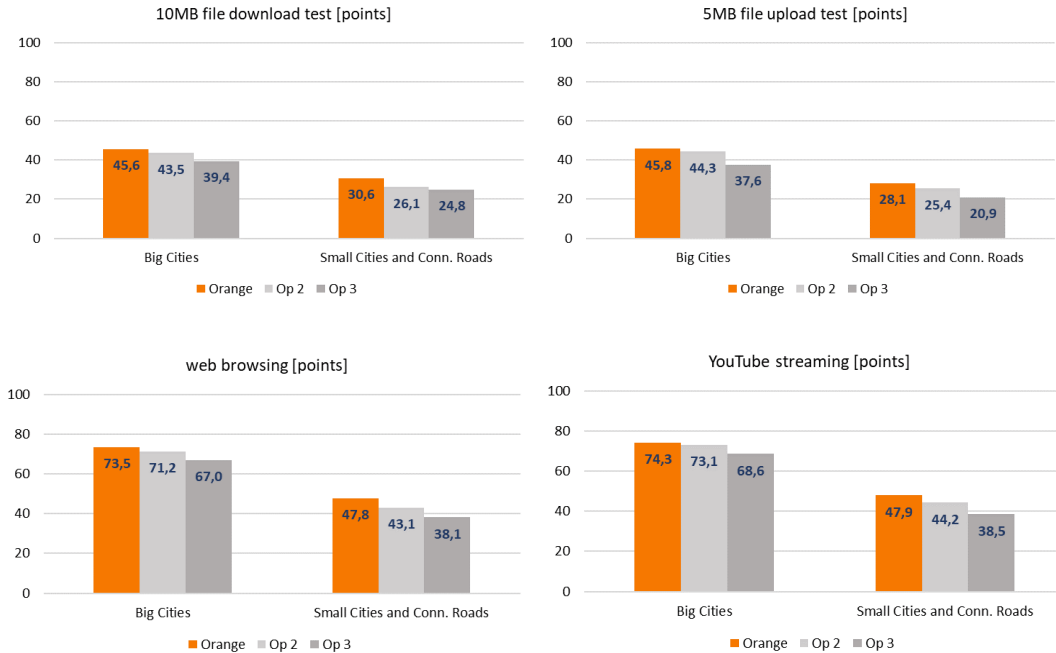
Orange achieved the highest overall score due to the best quality of services in all measured aggregations, in Large Cities, Small Cities and on Roads.



In case of voice services Orange is being ahead especially due to implementation of VoLTE. In the test 94% of conducted voice connections were offered with VoLTE. There is a noticeable scoring difference between Orange and other two operators for data services testing.

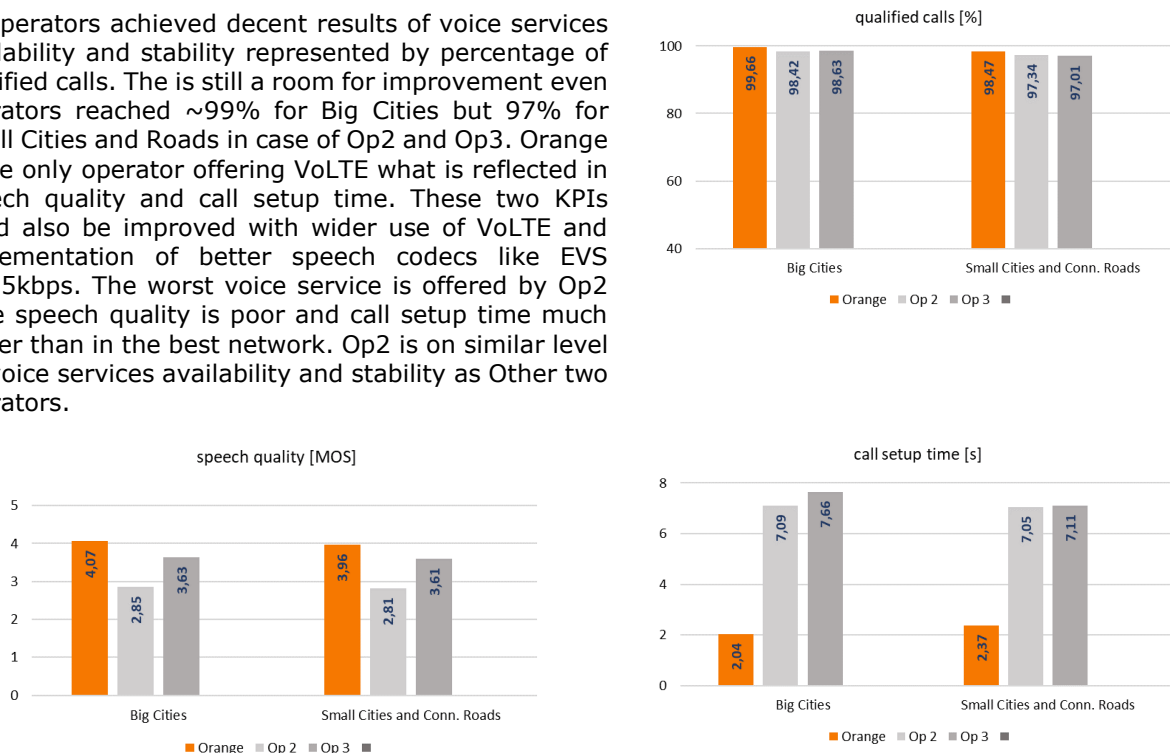
Orange has improved its performance in almost all services, minor degradations have been seen on YouTube VMOS performance due to no network causes, furthermore UL 7s qualifier degradation was found vs 2021 due to higher number of not qualified samples on connection roads.

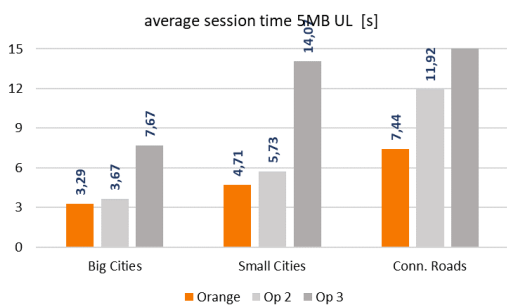
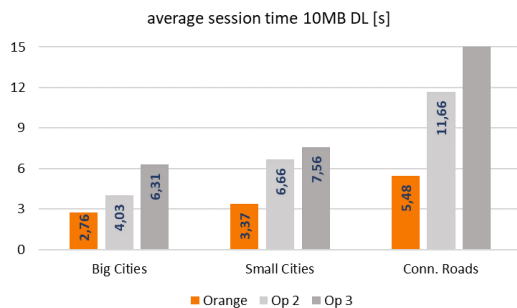
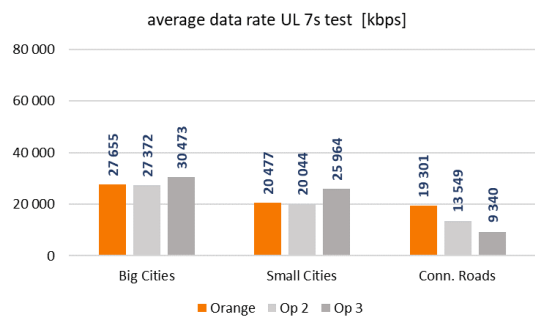
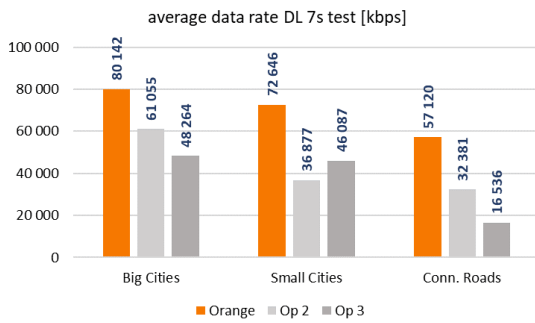
The comparison of the scoring results for selected tests for big cities and other areas is presented on charts below.



## Tests Results in Details

All operators achieved decent results of voice services availability and stability represented by percentage of qualified calls. There is still a room for improvement even though operators reached ~99% for Big Cities but 97% for Small Cities and Roads in case of Op2 and Op3. Orange is the only operator offering VoLTE what is reflected in speech quality and call setup time. These two KPIs could also be improved with wider use of VoLTE and implementation of better speech codecs like EVS 23.85kbps. The worst voice service is offered by Op2 where speech quality is poor and call setup time much longer than in the best network. Op2 is on similar level for voice services availability and stability as the other two operators.





There is still no 5G coverage in Moldova. Orange DL throughput performance is significantly ahead of competition. Compared with 2021 benchmark, increase in Orange throughput is observed in Big cities, due higher bandwidth used and wider implementation of 3CA. Op2 started to use 4CA in Kishniev and Soroca.

Orange presents the highest LTE DL Bandwidth (average ~32MHz) thanks to highest CA usage and 20MHz in L800. Op2 follows with average BW ~26MHz using 10MHz in L800, 20MHz in L1800/L2600 & 5MHz in L2100. Op3 behind competitors with average BW ~21MHz using L1800/2100 carriers. All networks support 2x2MIMO only.

In case of Uplink throughput Op3 is the fastest in Big and Small Cities. Orange is best on Connecting Roads. Orange and Op3 have higher uplink bandwidth than Op2 what is visible in cities. There is no UL carrier aggregation in use in Moldova.

Orange achieved shortest average session time among all operators for 10MB file download in all area types. For connecting roads, Op3 shows very long sessions times. In cities the session times of Op2 and Op3 are well behind Orange.

The data throughput for 10% of best tests in Orange network was best and reaching 150Mbps for DL and 48Mbps for UL tests.

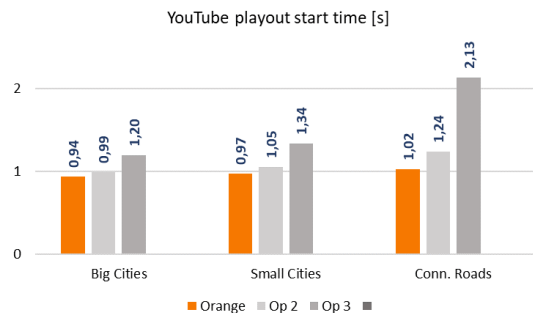
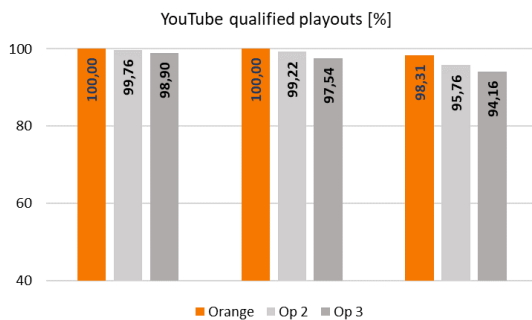
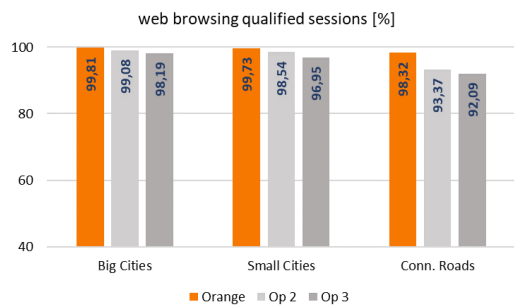
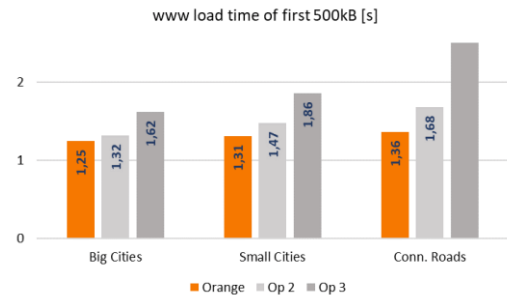
Orange achieves also the shortest session times among all operators for the 5MB file upload. The average session time of Op3 on connecting roads is few times longer than competition.

Almost all operators demonstrate very similar DL/UL reliability except Op2 Op3 with low UL reliability on connection roads.

Op3 has shown still the high the usage of 3G especially on connecting roads.

Orange was measured with the shortest access to live web content (time to load of the first 500kB) and the best service reliability in all aggregations, Op2 was second stays very close (~150ms behind) with good service reliability. Op3 well behind competition in term of service reliability and time to first picture.

Orange shows the fastest Youtube playout start time and the best YouTube reliability. Orange presented highest percentage of good playouts: 100% in Big and Small cities and above 98% on connecting roads. Almost all operators achieve similar VMOS scoring slightly above 4 in all aggregations. Op3 was worst in Connecting roads with the result below 4 points. Orange take a lead in term of picture resolution. Tests in Orange network shows 63% of playouts with 1080p resolution while Op2 and Op3 have 64 and 63% of highest resolution playouts.



5G network was not available in Moldova during test period.

Systemics-PAB is well known European company providing comprehensive surveys and measurements of the quality of network services and the end-user experience. Systemics-PAB conducts complex projects in multiple countries worldwide for telecom operators, regulators, network equipment providers, lab testing organizations and enterprises. Systemics-PAB offers the expert know-how developed over more than 15 years in this business.