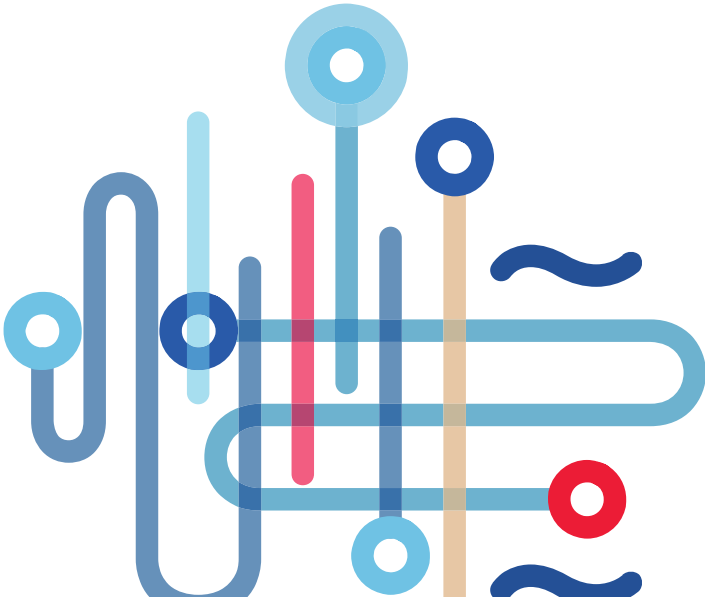
RATEL
Benchmarking mobile network operators 2017

VESNA KRZMAN

REPUBLIC OF SERBIA
RATEL
REGULATORY AGENCY FOR
ELECTRONIC COMMUNICATIONS
AND POSTAL SERVICES



Background

Subscribers need objectively measured quality, not marketing

- Strong marketing campaigns by mobile network operators (MNO), every network is the best one
- The lack of trust among subscribers

- No objective and overall measurements of mobile network performance done so far in Serbia

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EU Electronic Communications Regulatory Framework

Framework Directive 2002/21/EC

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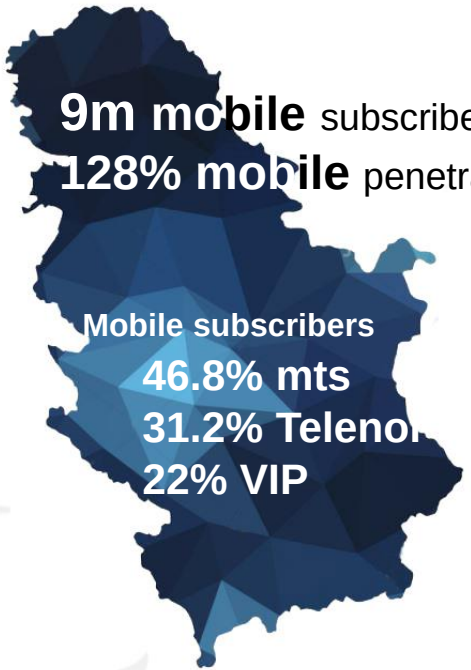
Snapshot Serbia



3 MNOs with own network infrastructure

mts (Telekom Srbija)
Telenor
VIP mobile

Available technologies

VOICE services: 2G/3G (no VoLTE in 2017)
DATA services: 2G/3G/4G

Source: RATEL Overview for the Telecom market 2016

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Mobile drivetest benchmark

Preparation

March – August 2017

Measurement plan
SIM cards
Logistics

Measurements & Control

September – October 2017

270 measurements hours
35 cities measured
10 000km of drivetest route

Publishing results

Deecember 2017

http://benchmark.ratel.rs/

Data processing

Daily processing
Automatic and manual verification

Verification & Analysis

November 2017

Final cross-check
Reporting

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Benchmark scope

More than 270 measurement hours

18 measurement phones

6000 voice calls

100000 data sessions

35 cities

All national roads of category one (IA and IB)

More than 10000 km of drivetest route

Population and roads data based on:
✓ The 2011 census of the Republic Institute of Statistics
✓ Regulation on categorization of national roads in the Republic of Serbia

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Aggregation and Measurement routes

Aggregation levels:

- Large cities (> 70 000 citizens)
- Small cities (> 15 000 citizens)
- Roads

35 Large and Small cities

More than 10000 km of measurement route

- More than 5000 km in the cities
- More than 5000 km on the roads

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Customer centricity

Benchmarking the best
user experience,
not the avarage user experience,
nor the theoretical capacity of
the mobile networks

The best quality a user can get

Mobile user experience

Commercial SIM Tariff plans

Bad voice quality, MOS < 2.3

HTTP Browsing Live pages

https://www.google.rs
https://www.facebook.com
https://m.kupujemprodajem.com
https://www.kupindo.com

Quality of the YouTube
live stream (VMOS)
HD video, 1080p

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Measurement scenario

SCENARIO

Measurement of:
- radio parameters for 2G/3G/4G technologies
- KPIs for voice and data services

Measurement server located in SOX, Serbia with 1 Gbps connectivity to the internet

VOICE

Mobile-to-mobile, auto mode (4G/3/2G)
MOC: MTC = 1:1
multiRAB

DATA

Auto mode (4G/3G/2G)
File DL, File UL, Capacity tests (DL/UL)
Web Browsing, YouTube, Ping

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SIM cards

Measurement SIM cards provided by MNOs

- All SIMs are LTE capable
- All SIMs with the best tariff plans and provisioning commercially available
- RATEL provided verification SIMs

MNOs provided measurement SIMs

- 30 SIMs for voice tests
- 44 SIMs for data tests

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Measurement equipment

Rohde & Schwarz Diversity Benchmarker II
NQview
PCTEL SeeGull scanner
External antennas

Measurement phones
VOICE:
Samsung Galaxy S4 (LTE cat4)
DATA:
Samsung Galaxy Note4 (LTE cat6)

Mobile drivetest benchmark was done by using equipment in the ownership of “Systemics-PAB sp. z o.o.” from Poland

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Measurement tests setup

VOICE

Call window duration = 115s
Call duration = 85s
Max call setup time = 15s
Speech sample = ENG WB
No of samples in the call = 6
MultiRAB size = 100KB

DATA

HTTP Download = 3MB
HTTP Upload = 1MB
Capacity Download = 3 streams, 10s
Capacity Upload = 3 streams, 10s
HTTP Browsing = Kepler + 4 Live pages
YouTube = Livestream HD, 1080p, 31s
Ping = 40B and 800B

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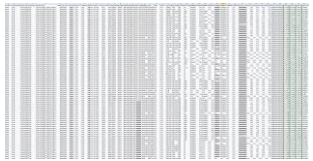
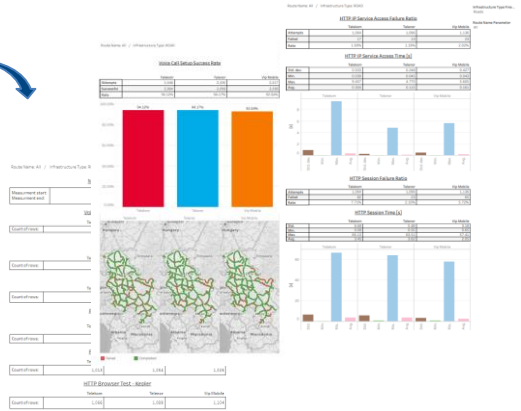
Data processing
Verification and Analysis

Measurement data
(upload on daily basis)

Data verification
Manual validation



CDRs



Weekly reporting
Data analysis

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KPIs

According to ETSI TS 102-250-2 standard

VOICE

- Call Success Ratio
- Call Setup Time
- CSFB Duration
- Handover Statistics
- Speech Quality (P.863)
- Codec Usage
- Technology Usage

DATA

- IP Service Access Success Ratio
- IP Service Access Time
- Session Failure Ratio
- Transfer Time
- Mean User Data Rate
- Browsing Session Time
- YouTube VMOS (J.343.1)
- Technology Usage

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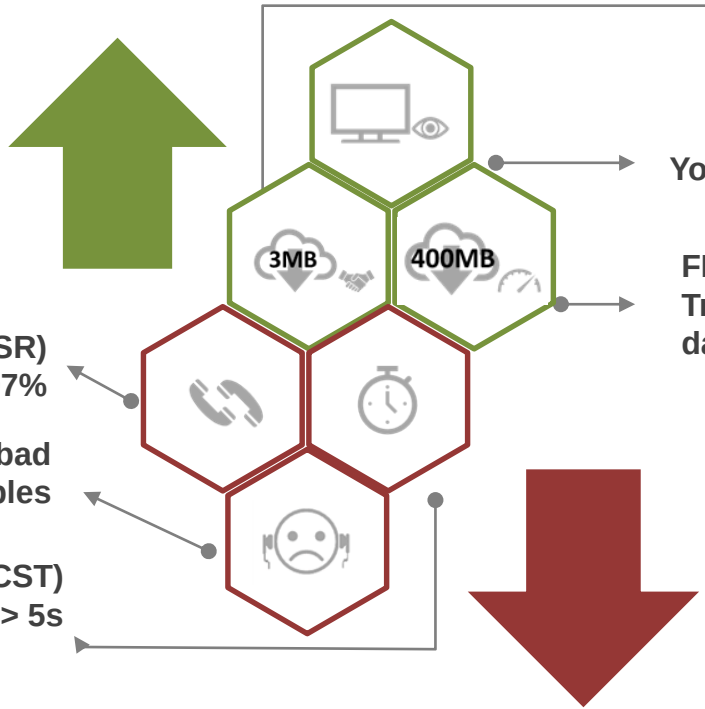
Results Overview

Data results

All KPIs for data tests were on the good level



HTTP File Transfer (Download) (HTTP DL 3MB) > 99% in the cities

YouTube VMOS > 3.9

FDTT HTTP DL Capacity Transfer Download average data rates > 27 Mbps

Call Success Rate (CSR) mostly < 97%

High percentage of bad MOS samples

Call Setup Time (CST) mostly > 5s

Voice results

All KPIs for voice tests were on the level which requires improvements

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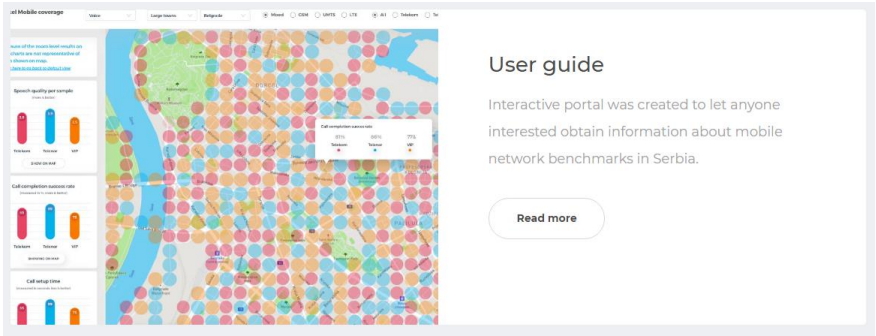
Interactive portal

- Publicly available website
- Available for desktop, laptop and mobile devices
- Available in Serbian and English
- Results presented on the map
- Selectable filter criteria
- Zooming down to the street level 10 zoom levels
- Comparative operators results



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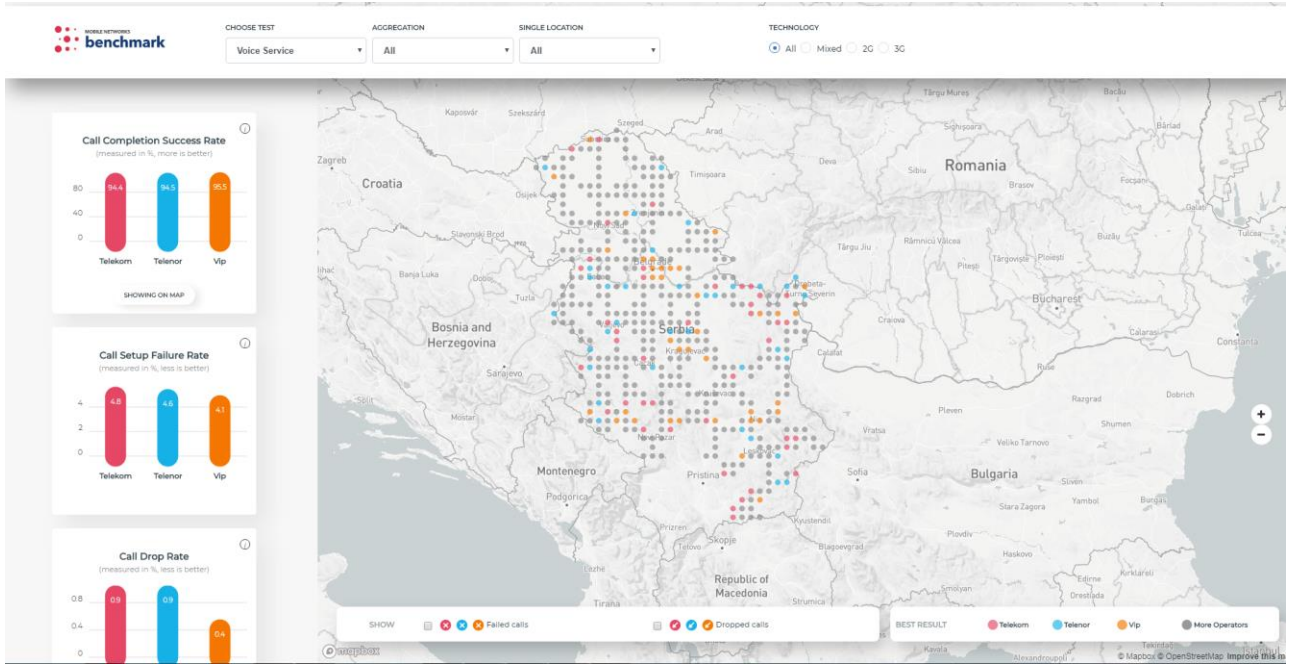
http://benchmark.ratel.rs



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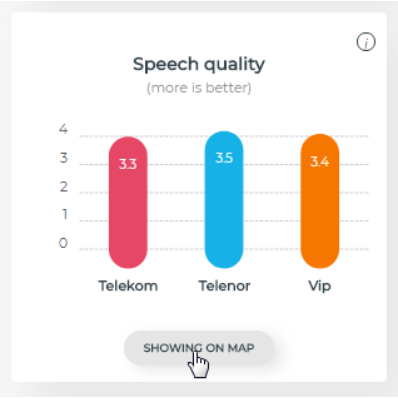
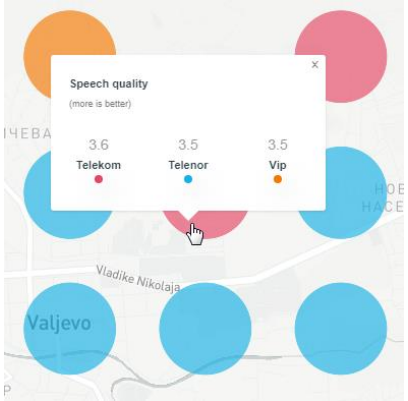
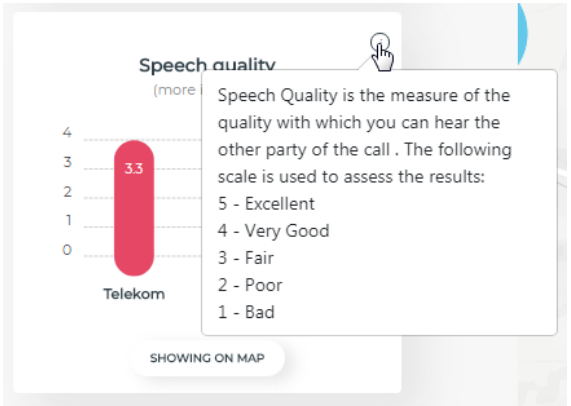
Intuitive user friendly GUI



Choosing results by clicking the „Show on map" button



By clicking on any circle, a popup window will display results for this particular area



Each chart described precisely the data it contains, how the data is being measured (units) and how to interpret the data

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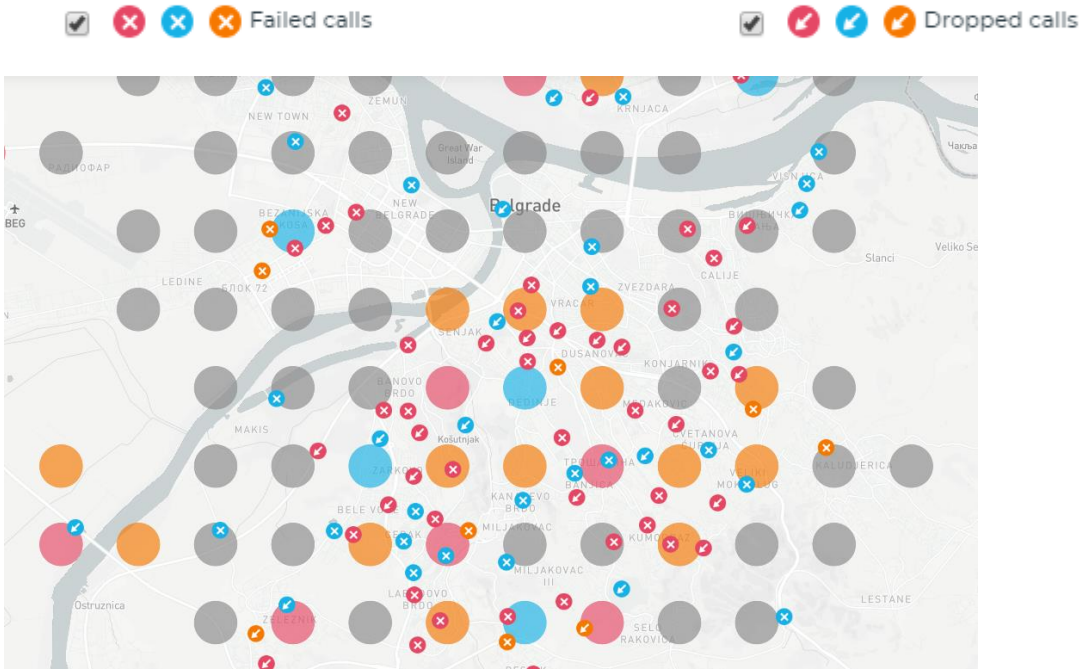
Detailed analysis

Possibility for further analysis by using the Information about:

- Failed calls
- Dropped calls



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Benchmarking mobile network operators 2018

Outlook

Measurement scope extension:

- Railway tests
- Hot-spot tests

- Testing The first VoLTE trial in Serbia

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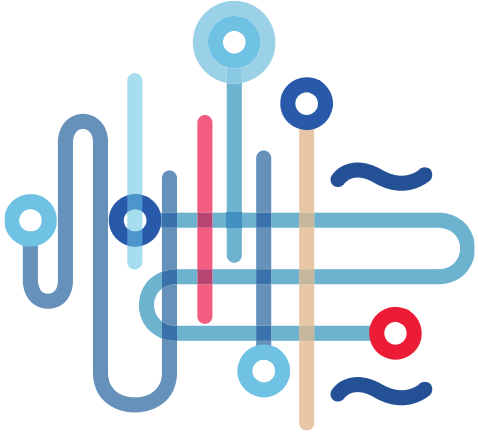
RATEL NetTest



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RATEL NetTest QoS crowdsorcing platform

- RATEL enabled the NetTest platform for measuring the quality of internet connection for fixed and mobile
- NetTest follows the BEREC recommendation on internet coverage and quality
- RATEL NetTest is available since June 2016

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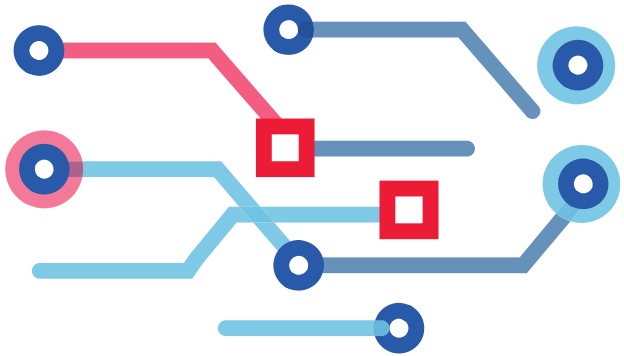

- Supported browsers: Google Chrome, Firefox, Internet Exploer, Safari
- The server system allows 100 (hundred) simultaneous measurements with total capacity of 1Gbit / s;
- The testing procedure must not interrupt or unjustifiably reduce the quality of Internet access

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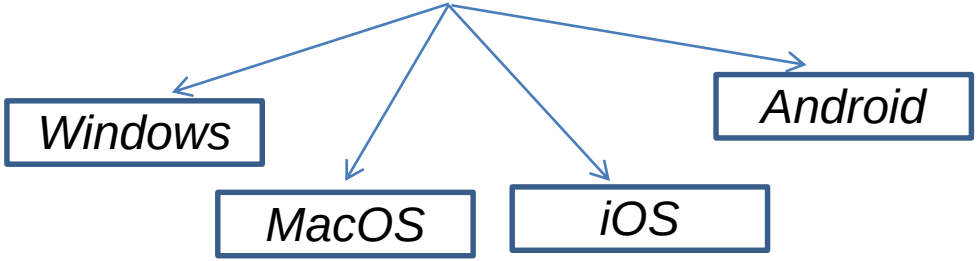
- RATEL NetTest supports a wide range of devices and operetang systems



- Users of mobile platform can get the application RATEL NetTest free from Google Play Store or Apple App Store, depending on the operating system they are using

GET IT ON Google Play

Download on the App Store

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Republic of Serbia
RATEL
Regulatory Agency for Electronic Communications and Postal Services

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Information
Regulations
Instructions and forms
Market
Users
Postal services

PORTAL

Complaints about telecommunications operators
RF spectrum availability
Other services...

REGISTER

Database of RF spectrum use
Register of decisions adopted by the Director
Ported Number Registry
Other registers

News | 24.04.2018.
BEREC Mini Board's Study Trip to North America

News | 19.04.2018.
RATEL made Decision on the requirements regarding the provision of public electronic communications services at a fixed location via public mobile communications networks using CLL technology (Cellular Local Loop)

News | 18.04.2018.
New Managing Board of the Institute for Standardization of Serbia

News | 18.04.2018.
EMF RATEL system extended by another six sensors

News | 04.04.2018.
Protocol on Cooperation between Ministry of Trade, Tourism and Telecommunications and RATEL

Rules
List of all rules.

Tenders
No tenders available currently

Electronic Communications market - Quarterly Reports

MOBILE NETWORKS benchmark

emf ratel

RATEL NetTest

RATEL
Regulatory Agency for Electronic Communications and Postal Services

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Location on the city map

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011/3242-673

FAX
011/3232-537

CONTACT
ratel@ratel.rs
Contact page

LEGAL DISCLAIMER
Legal disclaimer
footer_text7!

Start Your NetTest now!

Additional Information

☐ I want to provide additional information regarding my internet connection

RATEL NetTest

Platform enables quality measurement of all kinds of internet connections:

- Mobile internet connection (EDGE, UMTS, LTE)
- Fixed lines connection (DSL, LAN, fibre-optic)
- WiFi connection

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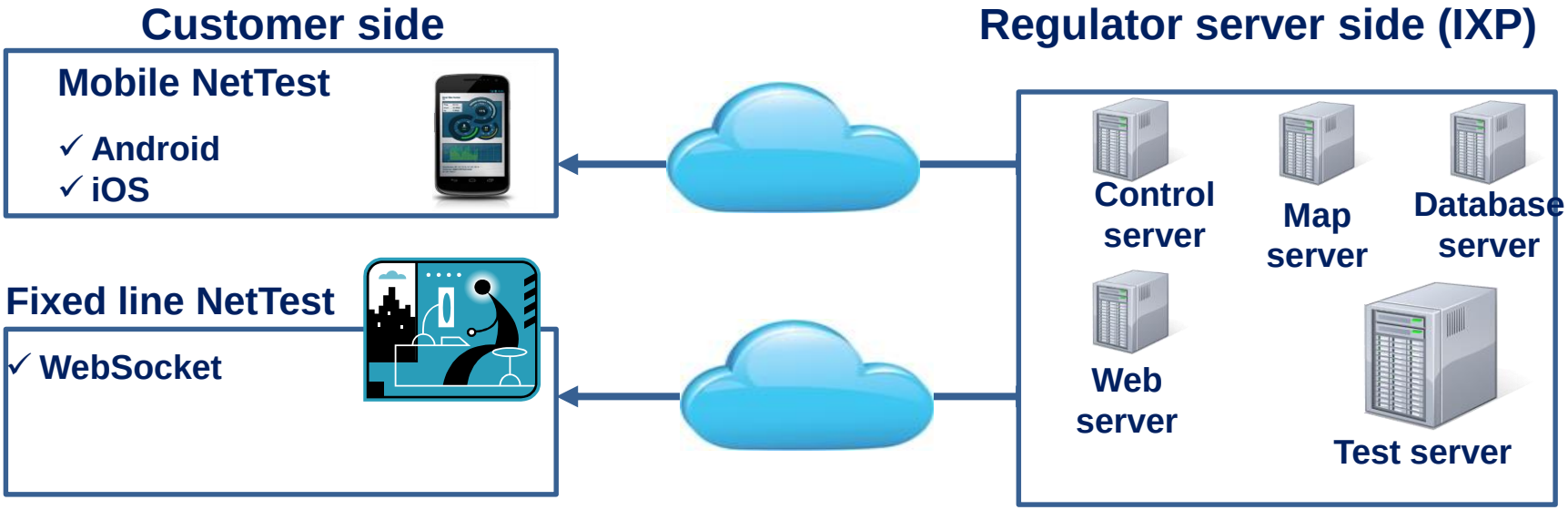
Structure of RATEL NetTest



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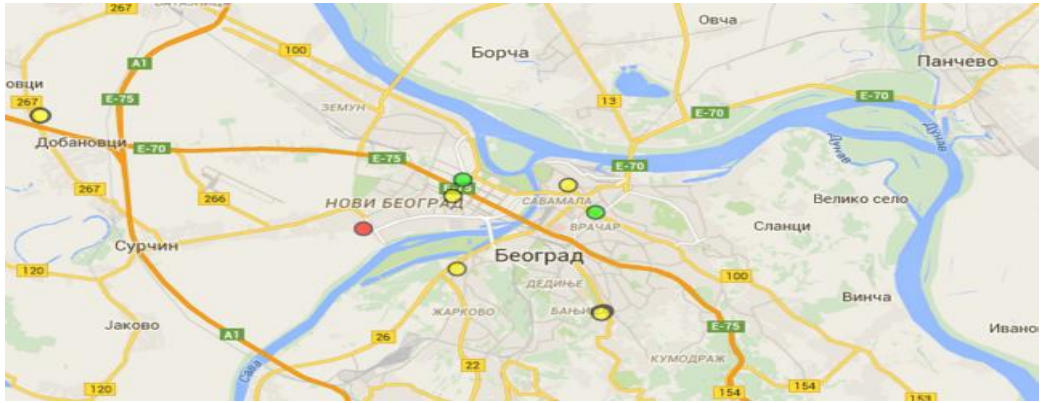
RATEL NetTest QoS parameters

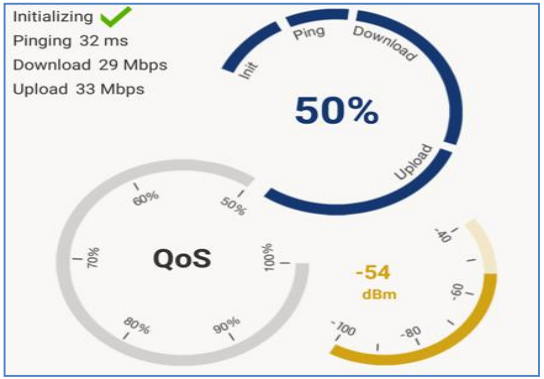
Mobile, WLAN:

- Signal strenght
- Up/Down Throughput
- Jitter
- Ping
- Packet loss
- Traceroute
- VoIP test
- Unmodified content
- Web page test
- Connection transparency
- DNS availability
- TCP/UDP ports avilability



Fixed Lines:

- Up/Down Throughput
- Ping



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Future plans

- Upgrading Ratel Net Test according to the BEREC Measurement tool (Public procurement of measuring tools is in progress)

- Open data according to GDPR (General Data Protection Regulation)

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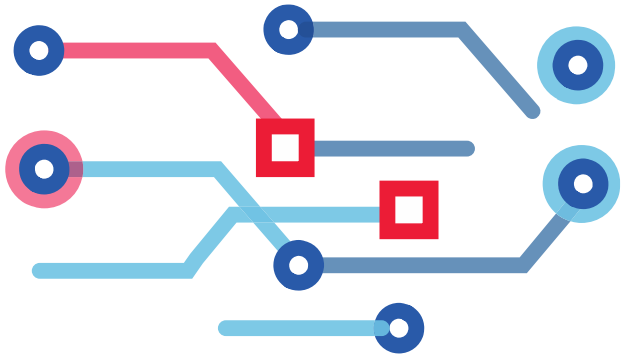

Thank you

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