

Measuring QoS and Mapping of Shared Infrastructure

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QoS Parameters Submitted by Operators

- Telecommunications operators are required to submit the quality of service measurement results at least once a year
- RATEL keeps and publishes records on the quality of public communication networks and services on its website

Measuring QoS Submitted by RATEL

- We carry out QoS parameters measurements of:
 - ❖ Mobile and Fix services
 - ❖ BB services
 - ❖ Analog and Digital Media Content Distribution
 - ❖ Internet
 - ❖ IPTV
 - ❖ VoIP

RATEL NetTest QoS crowdsourcing platform

- RATEL's NetTest: platform for measuring the quality of internet connection for fixed and mobile users
- NetTest follows the BEREC recommendation on internet coverage and quality
- RATEL NetTest is in the final implementation phase
- The 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



RATEL NetTest QoS Crowdsourcing Platform

Customer side

Mobile NetTest

- ✓ Android
- ✓ iOS



Fixed line NetTest

- ✓ WebSocket



Fixed line measurements:

- ✓ ITU-T Y.1564
- ✓ RFC2544



Regulator server side (IXP)



Control server



Map server



Database server



Web server



Test server



FTP server

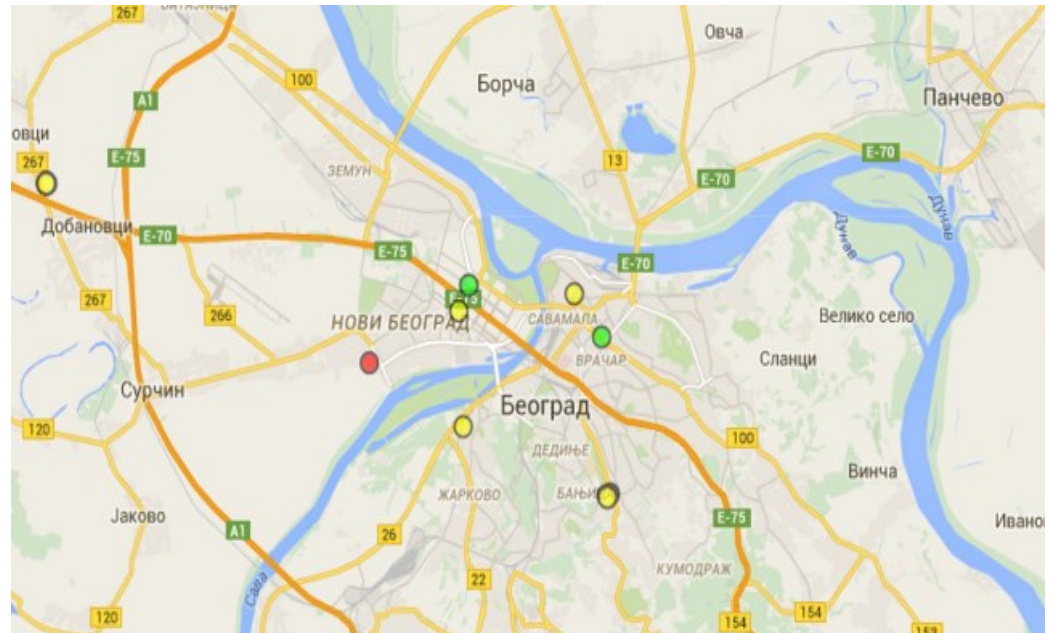


HTTP server

RATEL NetTest QoS parameters

Mobile, WLAN:

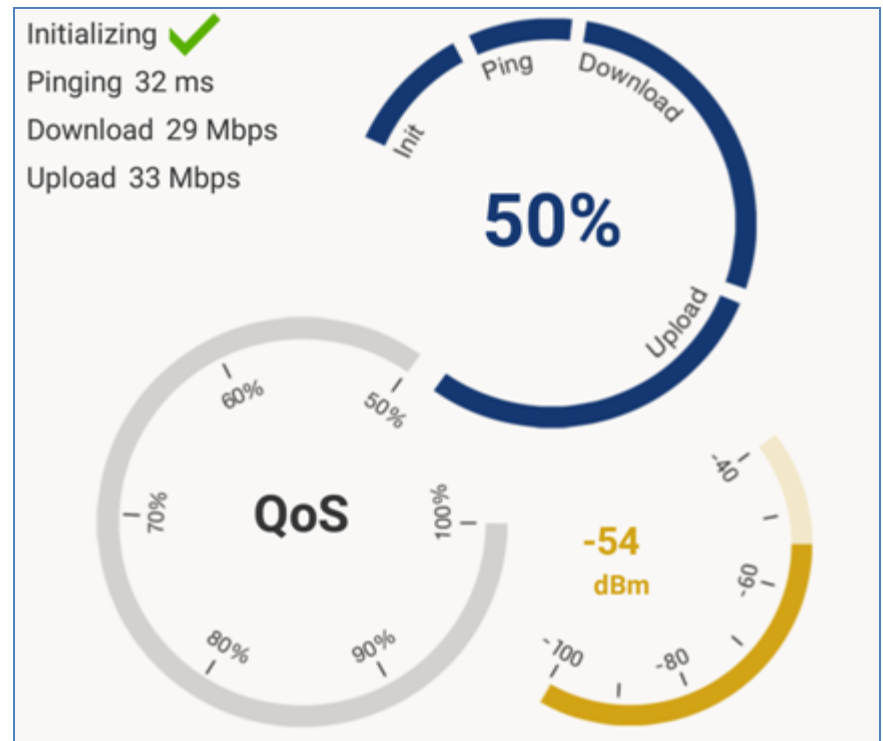
- Signal strength
- Up/Down throughput
- Jitter
- Ping
- Packet loss
- Traceroute
- VoIP test
- Unmodified content
- Web page test
- Connection transparency
- DNS availability
- TCP/UDP ports availability



RATEL NetTest QoS parameters

Fixed lines:

- Up/Down Throughput
- Ping



Future Plans

- Mobile Benchmarking tests (GSM, UMTS, LTE, LTE-A)
- Mobile Voice Quality, ITU-T P.863 (POLQA)
- RFC6349 TCP Throughput Testing
- FTP testing (verification with measurement equipment)
- HTTP testing (verification with measurement equipment)
- Feasibility study on QoS DVB-T2 Monitoring Network
- Operators quarterly reports on QoS network parameters

Infrastructure Mapping System

- Detailed geo-referenced and structured information about the telecommunication infrastructure in Serbia that may be shared
- Reasons for infrastructure mapping :
 - ❖ Optimization of infrastructure deployment
 - ❖ Avoiding costs of setting-up new networks
 - ❖ Better planning/cost sharing
 - ❖ Accelerating construction of Next Generation Networks

Mapping System Implementation Strategy

Rulebook on the method of collecting and publishing data on type, availability and geographical location of the capacity of electronic communication networks

- Based on the Electronic Communications Law
- Adopted in July 2015
- Database implementation – deadline is July 2016
- Web – GIS application for end users (Network operators)

Database (1)

- RATEL is responsible for the database establishment, maintenance and financing
- RATEL defines:
 - ❖ Data delivery method(s)
 - ❖ Database access procedures
 - ❖ Interfaces and protocols
- Database will be operated by RATEL
- Republic Geodetic Authority provides base for cable infrastructure data

Database (2)

What type of data is in the Database?

1) Cable infrastructure data:

- ❖ Network operator (owner)/location/cable route
- ❖ WGS84 coordinates of important nodes (beginning/end, junction)
- ❖ Cable route length/geo-footage
- ❖ Cable type
- ❖ Conduits information (tube type / number of ducts in the tube / cabinet type / number of cabinets on the cable route)
- ❖ Shared capacity / Unused capacity
- ❖ Cable ending installation

Database (3)

2) Antenna towers and equipment:

- ❖ Network operator (owner)
- ❖ Antenna tower location
- ❖ Tower construction type
- ❖ Tower base shape/dimensions (m)
- ❖ Tower height
- ❖ Building height in meters (if the tower is mounted on a building)
- ❖ Free tower space data (height of the free segment / available azimuth for mounting)
- ❖ Equipment (type/free capacity) - if it is the subject of sharing

Database (4)

- Who can access the Database?
 - ❖ Administrative units (RATEL)
 - ❖ Network operators
 - ❖ Other entities possessing telecommunication infrastructure, with RATEL's permission
- Network operators concern: gathered data might be used by environmental organizations against them, security issues!

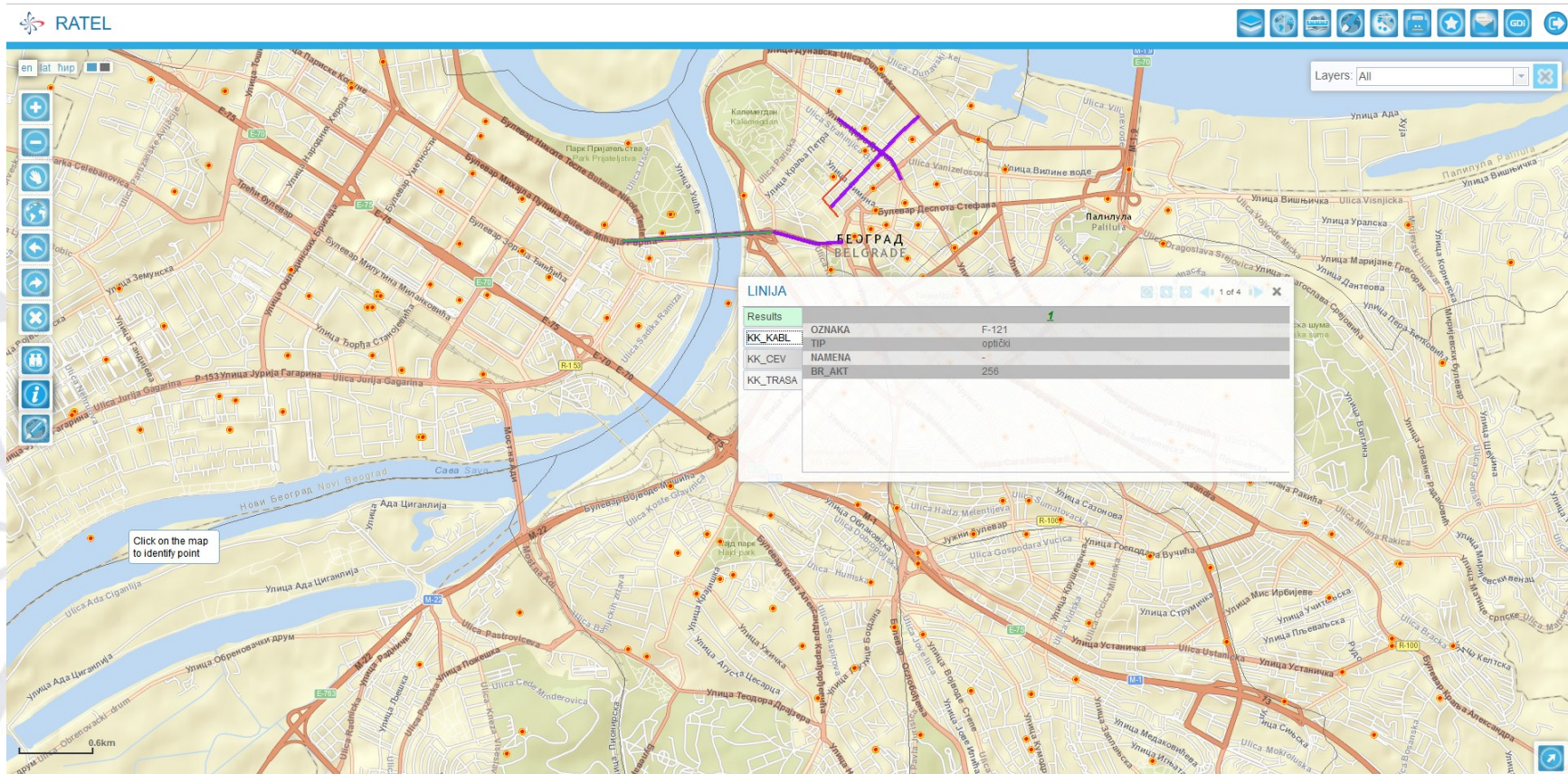
Web Application (1)

- Developed on Esri GIS mapping software solutions
- Esri SDE (Spatial Database Engine)
- Data can be imported:
 - ❖ Through a Web application
 - ❖ Via services for automated data exchange with Network operators
- Defined access right control

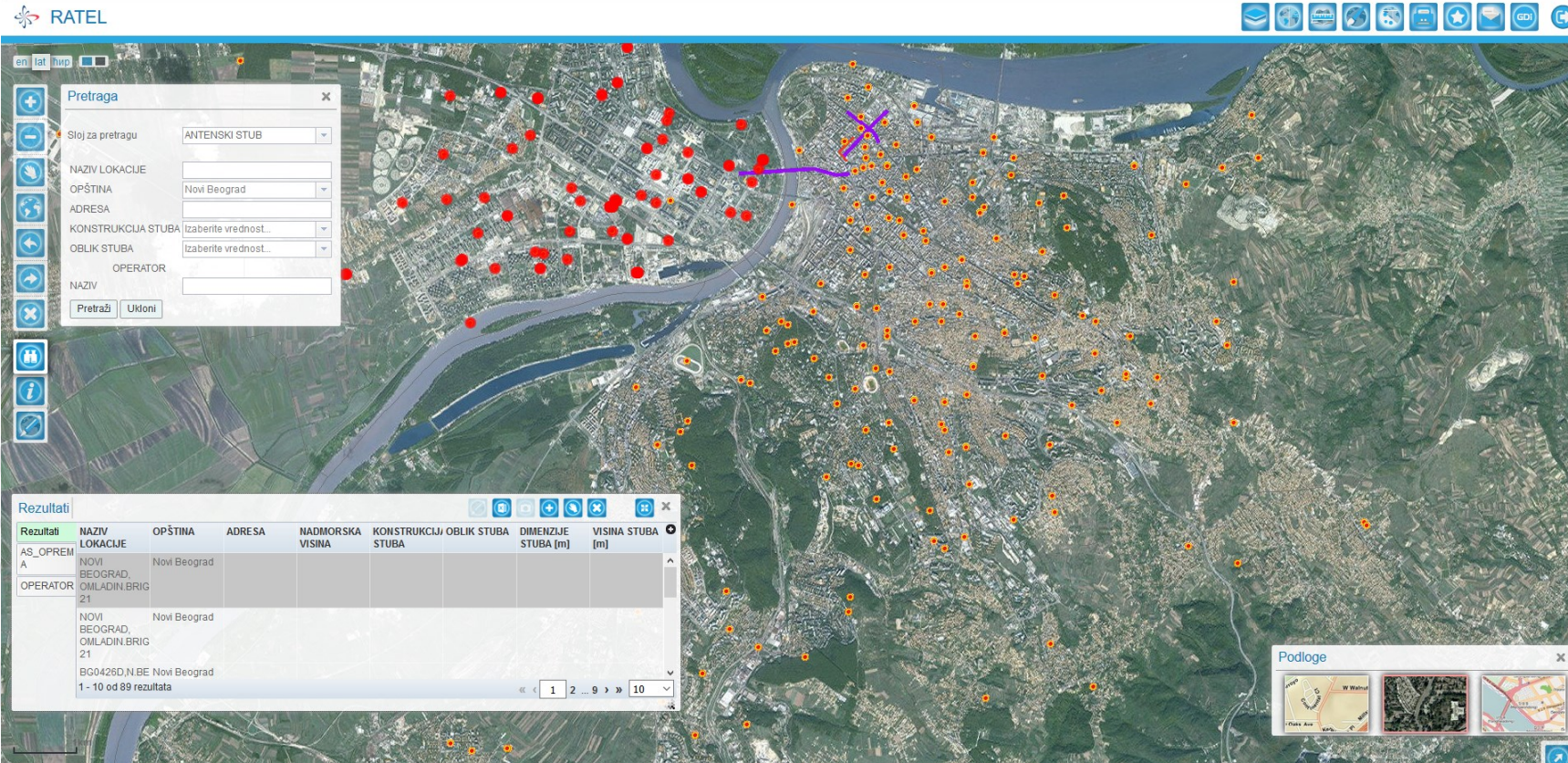
Web Application (2)

- Standard tools for working with maps:
 - ❖ Layer turning on/off
 - ❖ Zooming
 - ❖ Length/space measurements
 - ❖ Coordinate defining in multiple coordinate systems
 - ❖ Data selection using spatial queries / free hand
 - ❖ Variety of bases through free ArcGIS online service (satellite shots, topographic maps, street networks, etc.)

Infrastructure Presentation



Different Map Views



The screenshot displays the RATEL web application interface. At the top left, the RATEL logo and name are visible. The main area shows a satellite map of Novi Beograd, Serbia, with numerous red and orange markers indicating antenna locations. A search filter window is open on the left, and a results table is displayed at the bottom left. The search filter includes fields for 'Sloj za pretragu' (ANTENSKI STUB), 'NAZIV LOKACIJE', 'OPŠTINA' (Novi Beograd), 'ADRESA', 'KONSTRUKCIJA STUBA', 'OBLIK STUBA', and 'OPERATOR'. The results table lists search results with columns for 'NAZIV LOKACIJE', 'OPŠTINA', 'ADRESA', 'NADMORSKA VISINA', 'KONSTRUKCIJA STUBA', 'OBLIK STUBA', 'DIMENZIJE STUBA [m]', and 'VISINA STUBA [m]'. A 'Podloge' (Layers) window is also visible at the bottom right.

Pretraga

Sloj za pretragu: ANTENSKI STUB

NAZIV LOKACIJE:

OPŠTINA: Novi Beograd

ADRESA:

KONSTRUKCIJA STUBA: Izaberite vrednost...

OBLIK STUBA: Izaberite vrednost...

OPERATOR:

NAZIV:

Pretraži Ukloni

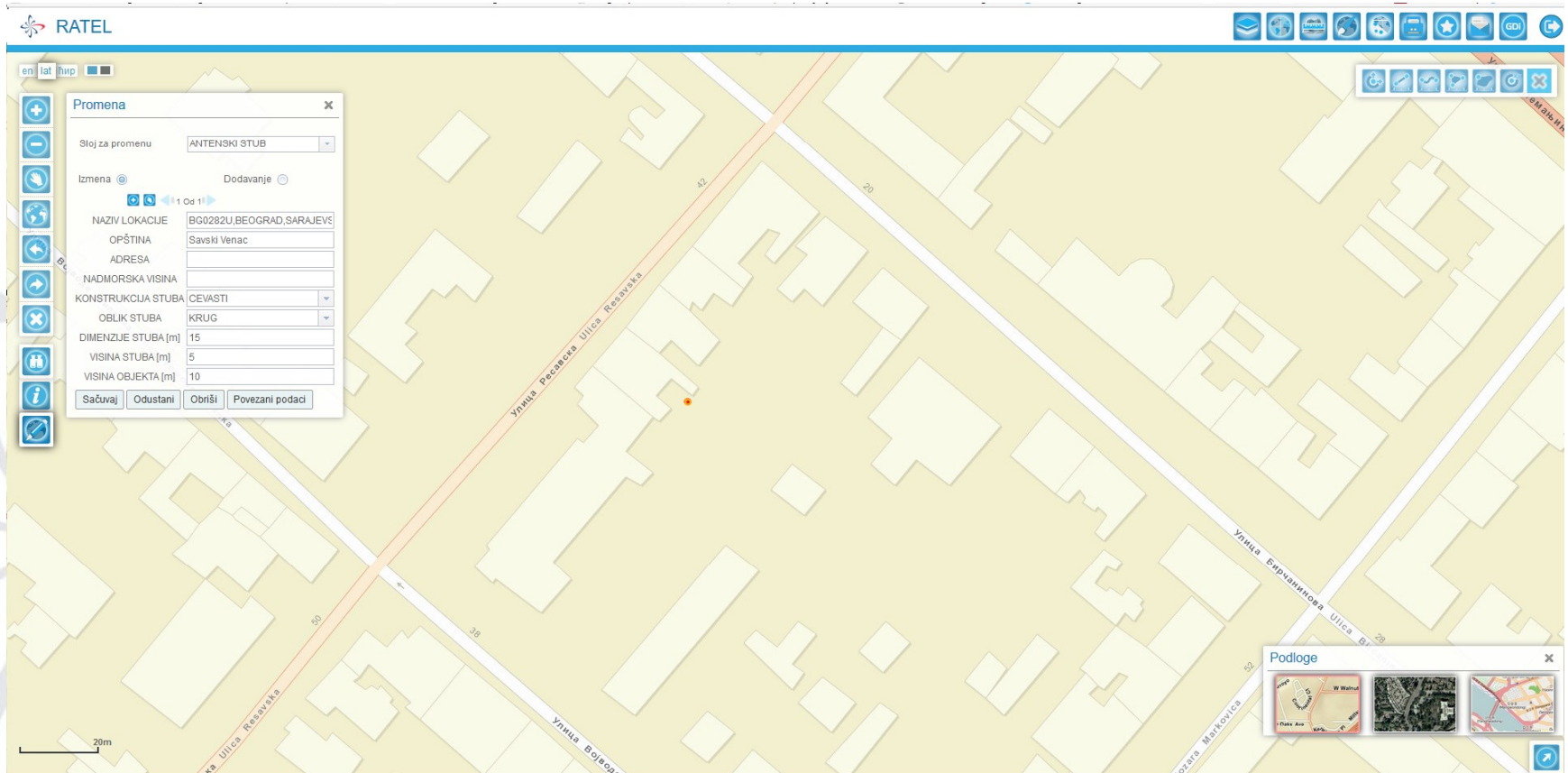
Rezultati

Rezultati	NAZIV LOKACIJE	OPŠTINA	ADRESA	NADMORSKA VISINA	KONSTRUKCIJA STUBA	OBLIK STUBA	DIMENZIJE STUBA [m]	VISINA STUBA [m]
AS_OPREMA	NOVI BEOGRAD, OMLADIN BRIG 21	Novi Beograd						
	NOVI BEOGRAD, OMLADIN BRIG 21	Novi Beograd						
	BG0426D_N_BE Novi Beograd							

1 - 10 od 89 rezultata

Podloge

Data Import into the Database



The screenshot displays the RATEL web application interface. The main area is a map showing a street grid with buildings. A red dot on the map indicates the location of a data entry. A 'Promena' (Change) dialog box is open, allowing for data entry. The form includes fields for location name, municipality, address, and various technical specifications for the antenna pole. A 'Podloge' (Bases) panel is visible in the bottom right corner, showing a small map and satellite view options.

Promena

Stoj za promenu: ANTENSKI STUB

Izmena @ Dodavanje ○

NAZIV LOKACIJE: BG0282JU.BEOGRAD.SARAJEVS

OPŠTINA: Savski Venac

ADRESA:

NADMORSKA VISINA:

KONSTRUKCIJA STUBA: OEVASTI

OBLIK STUBA: KRUG

DIMENZIJE STUBA [m]: 15

VISINA STUBA [m]: 5

VISINA OBJEKTA [m]: 10

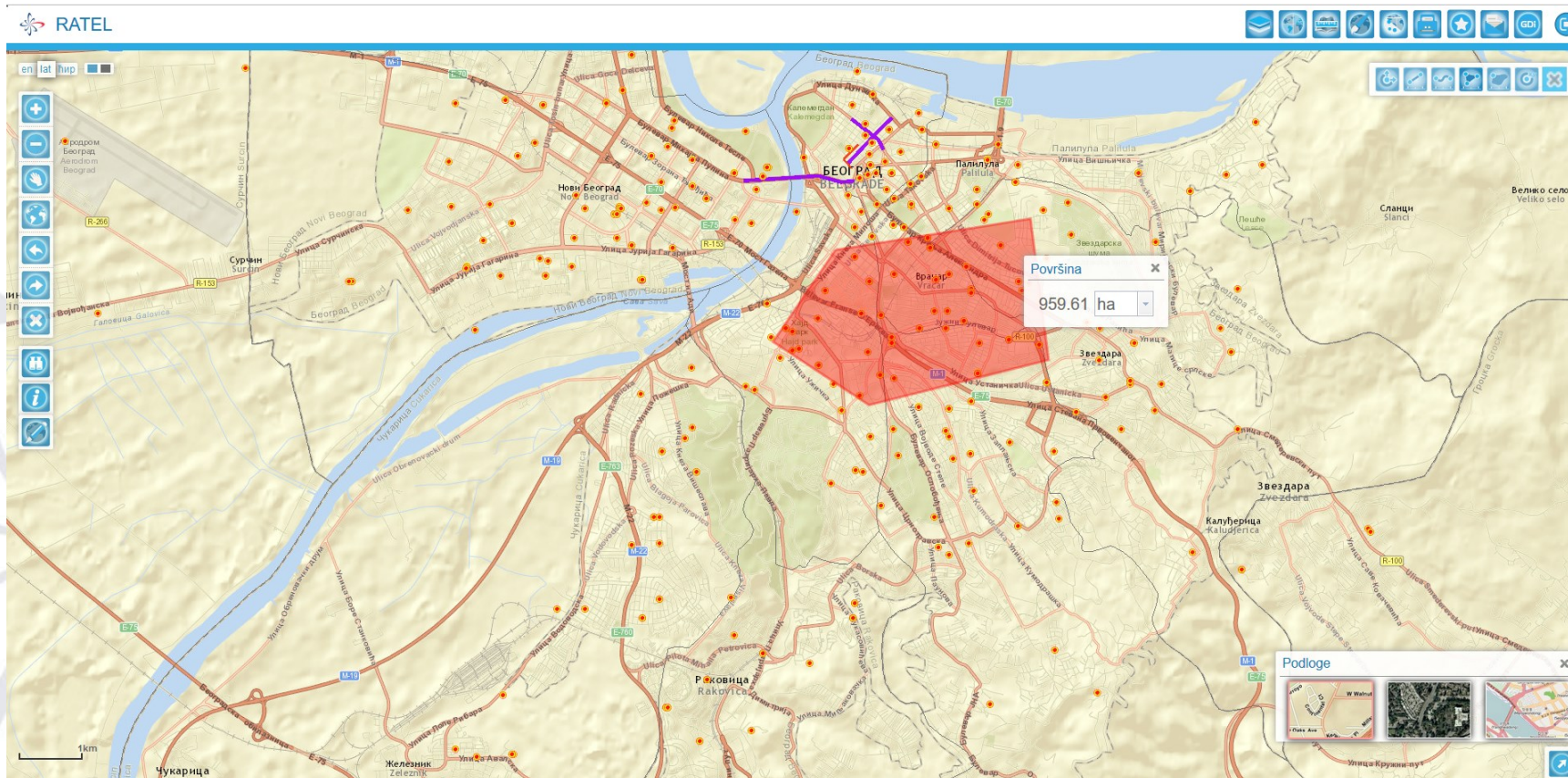
Sačuvaj Odustani Obriši Povezani podaci

Podloge

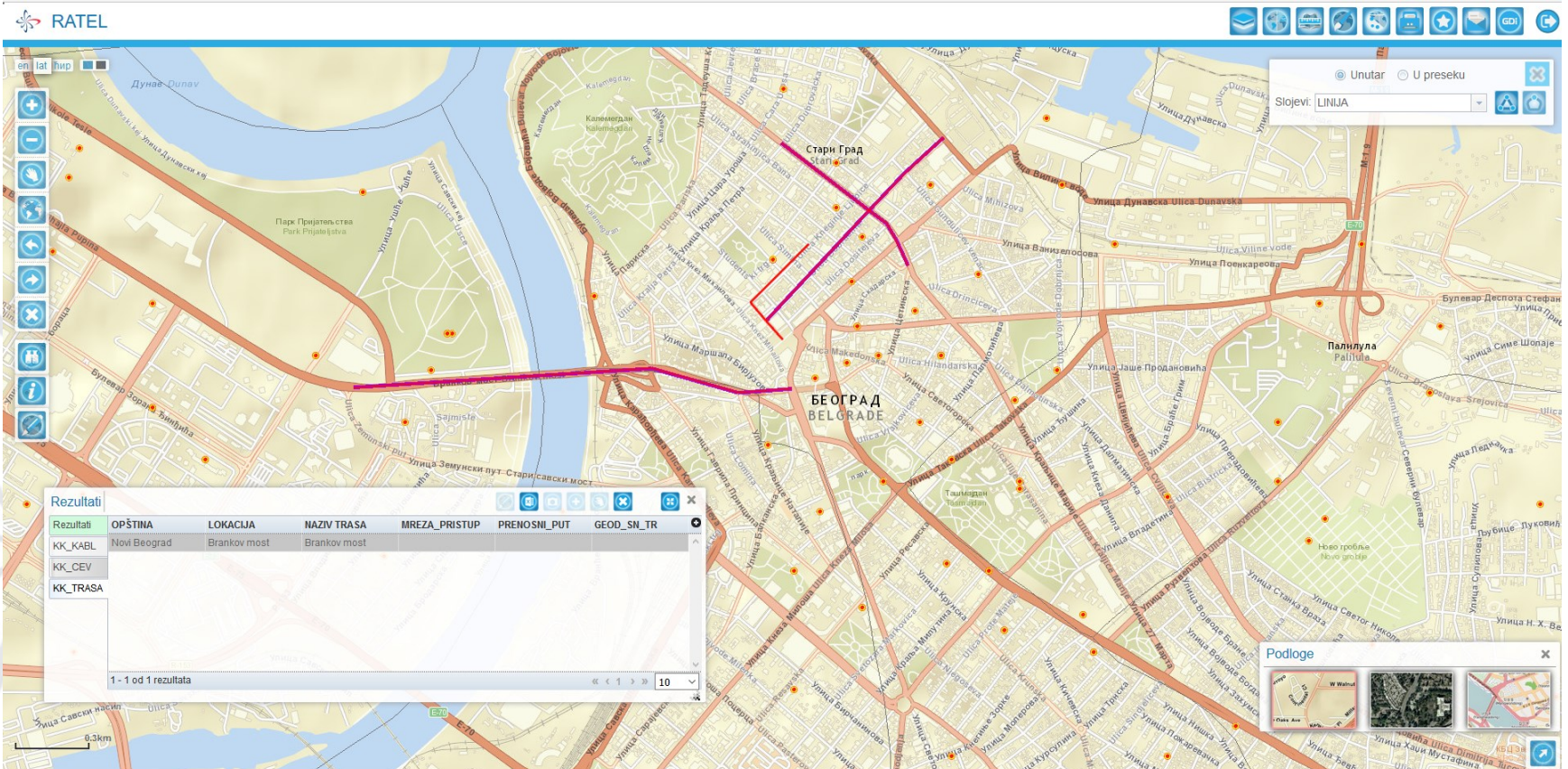
W Walnut

W Walnut

Using Standard Tools



Data Selection



The screenshot displays the RATEL web application interface. The main map shows a city grid with a highlighted orange route. A search results table is overlaid on the bottom left, showing one result for a cable route. The table has columns for OPŠTINA, LOKALCIJA, NAZIV TRASA, MREZA_PRISTUP, PRENOSNI_PUT, and GEOD_SN_TR. The result row shows 'Novi Beograd', 'Brankov most', 'Brankov most', and 'KK_KABL'. A 'Podloge' panel at the bottom right shows three thumbnail maps: 'Plan', 'Sat', and '3D'.

Rezultati	OPŠTINA	LOKALCIJA	NAZIV TRASA	MREZA_PRISTUP	PRENOSNI_PUT	GEOD_SN_TR
KK_KABL	Novi Beograd	Brankov most	Brankov most			
KK_CEV						
KK_TRASA						

1 - 1 od 1 rezultata

Conditions for Infrastructure

Sharing

- Network operators interested in sharing the infrastructure must provide their data within 6 months from the date the Database was established
- In case of the new infrastructure construction, data must be provided within 15 days after its launch
- Network operators need to update changes in the infrastructure, at least once every 3 months



Thank you for your attention