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Measuring QoS and Mapping of Shared Infrastructure

Miodrag Ivković
Electronic Communications
Department Director

Warsaw, 11÷12 April 2016.

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QoS Parameters Submited by Operators

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

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Measuring QoS Submited by RATEL

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

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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, UMTE, LTE)
  - Fixed lines connection (DSL, LAN, fibre-optic)
  - WiFi connection

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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

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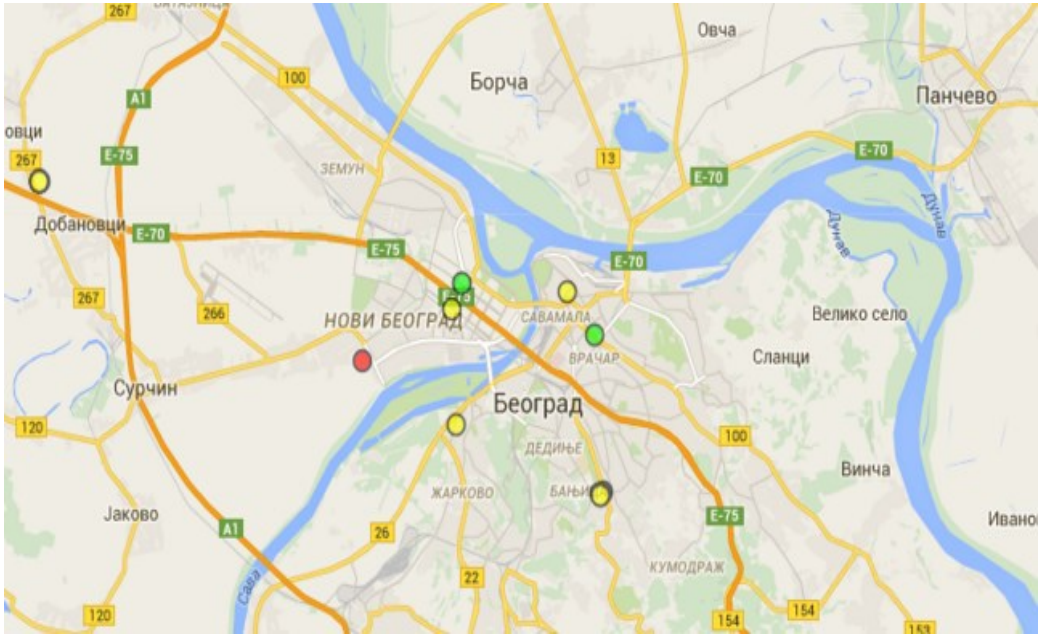
RATEL NetTest QoS parameters

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



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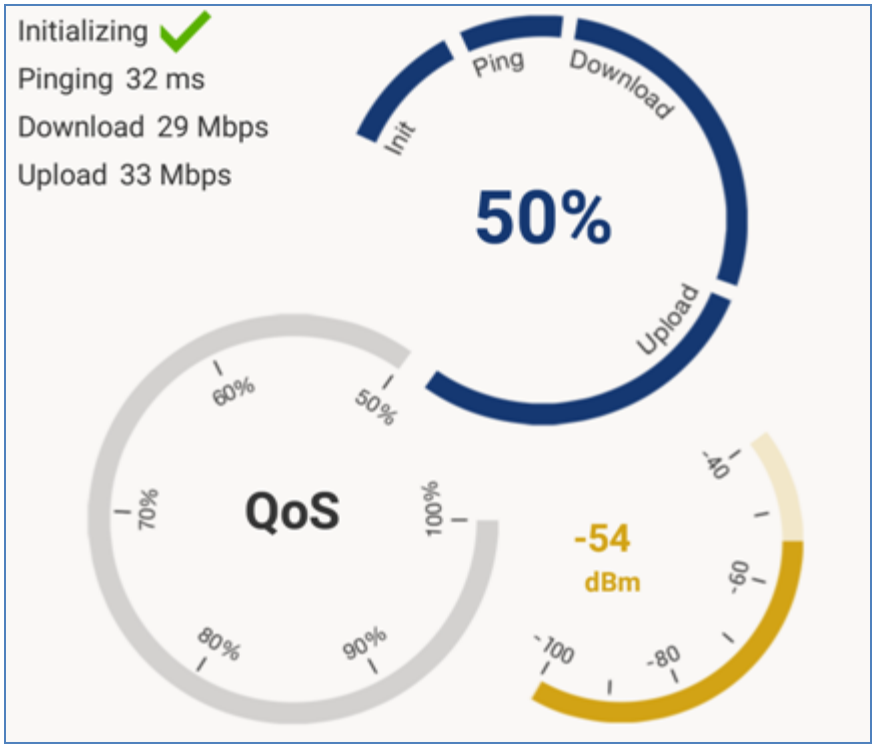
RATEL NetTest QoS parameters

Fixed lines:

- Up/Down Throughput
- Ping



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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 equipement)
- HTTP testing (verification with measurement equipement)
- Feasibility study on QoS DVB-T2 Monitoring Network
- Operators quarterly reports on QoS network parameters

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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

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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)

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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

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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

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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

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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!

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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

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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.)

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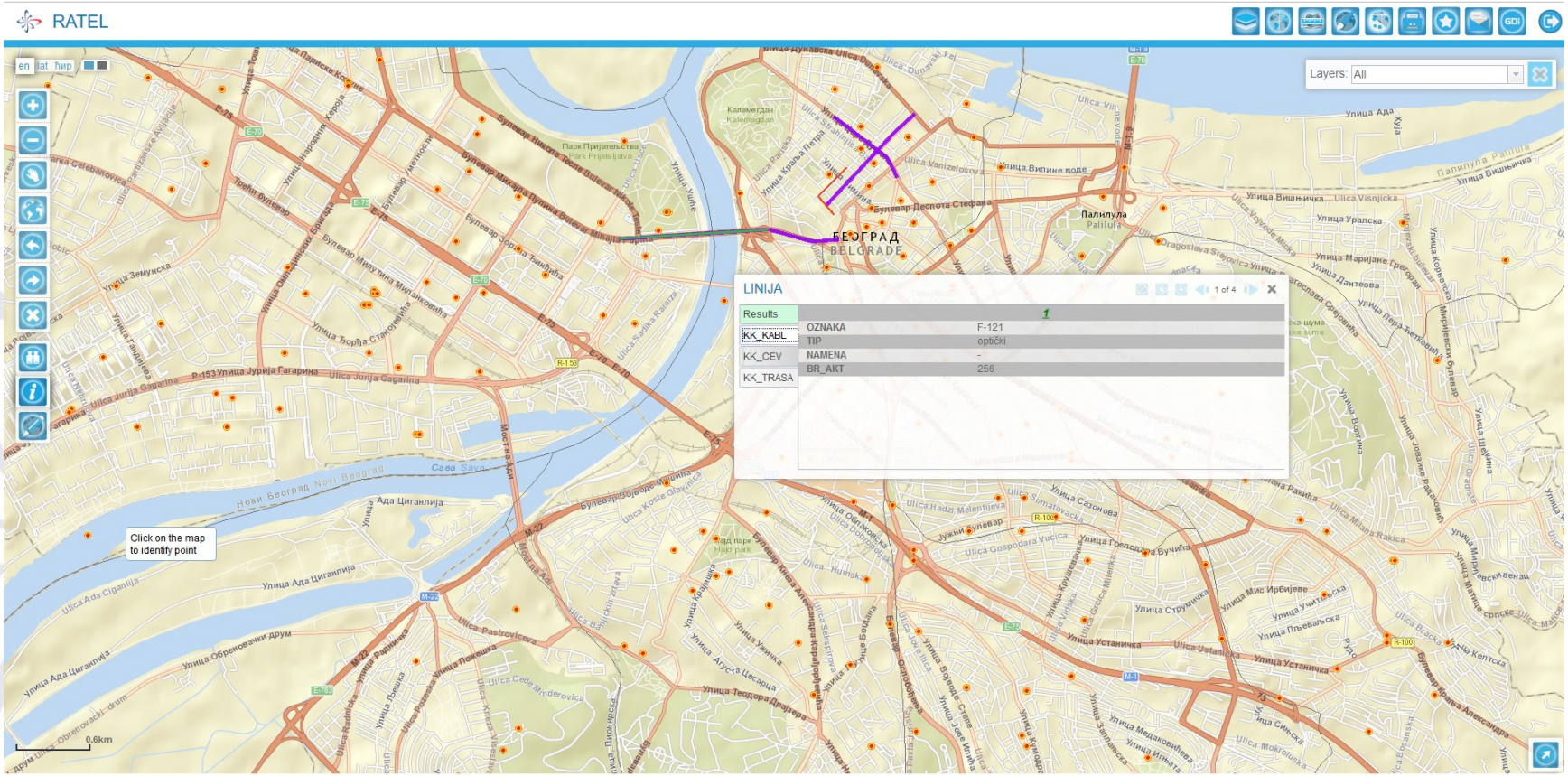
Infrastructure Presentation



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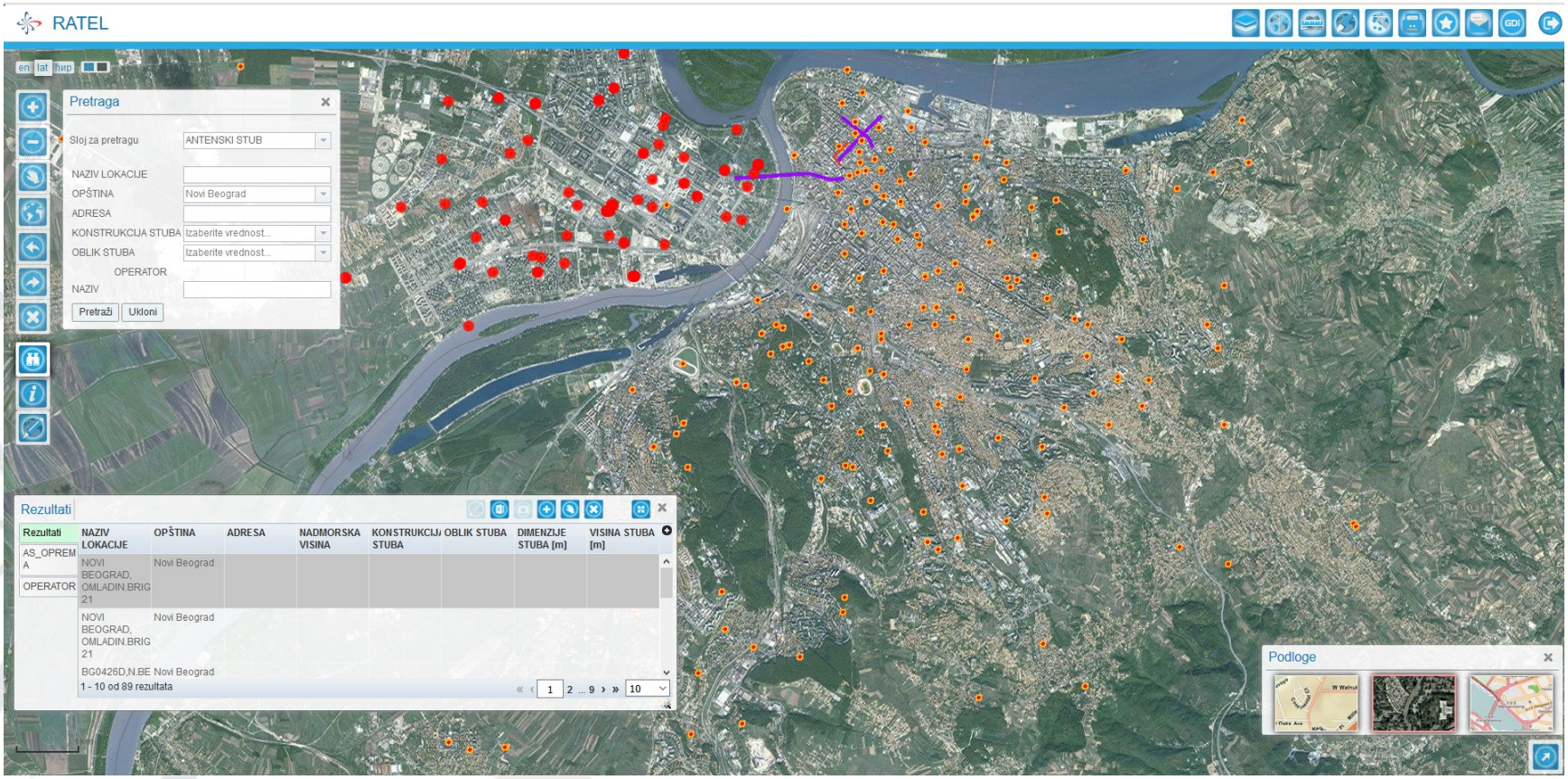
Different Map Views



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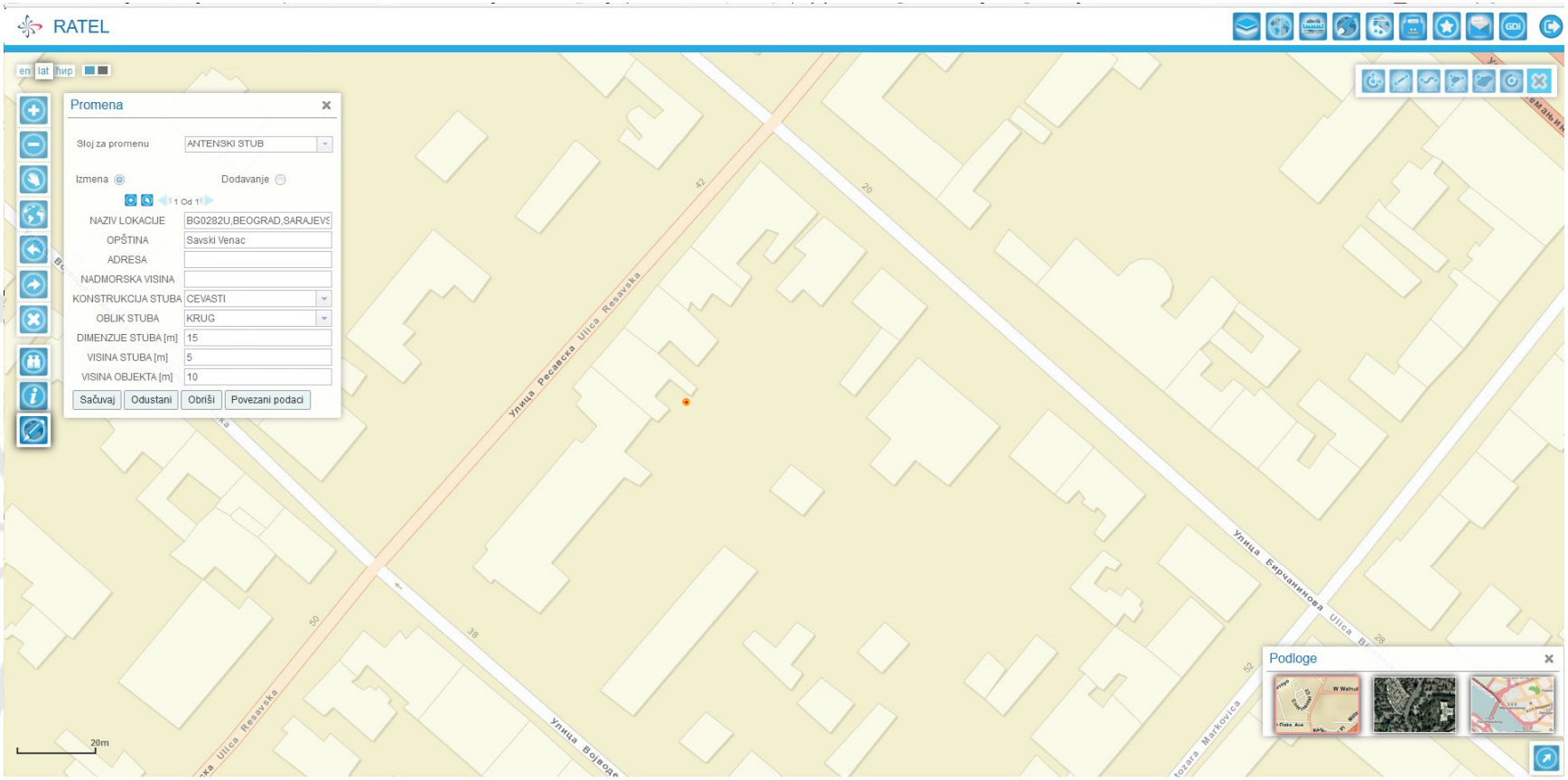
Data Import into the Database



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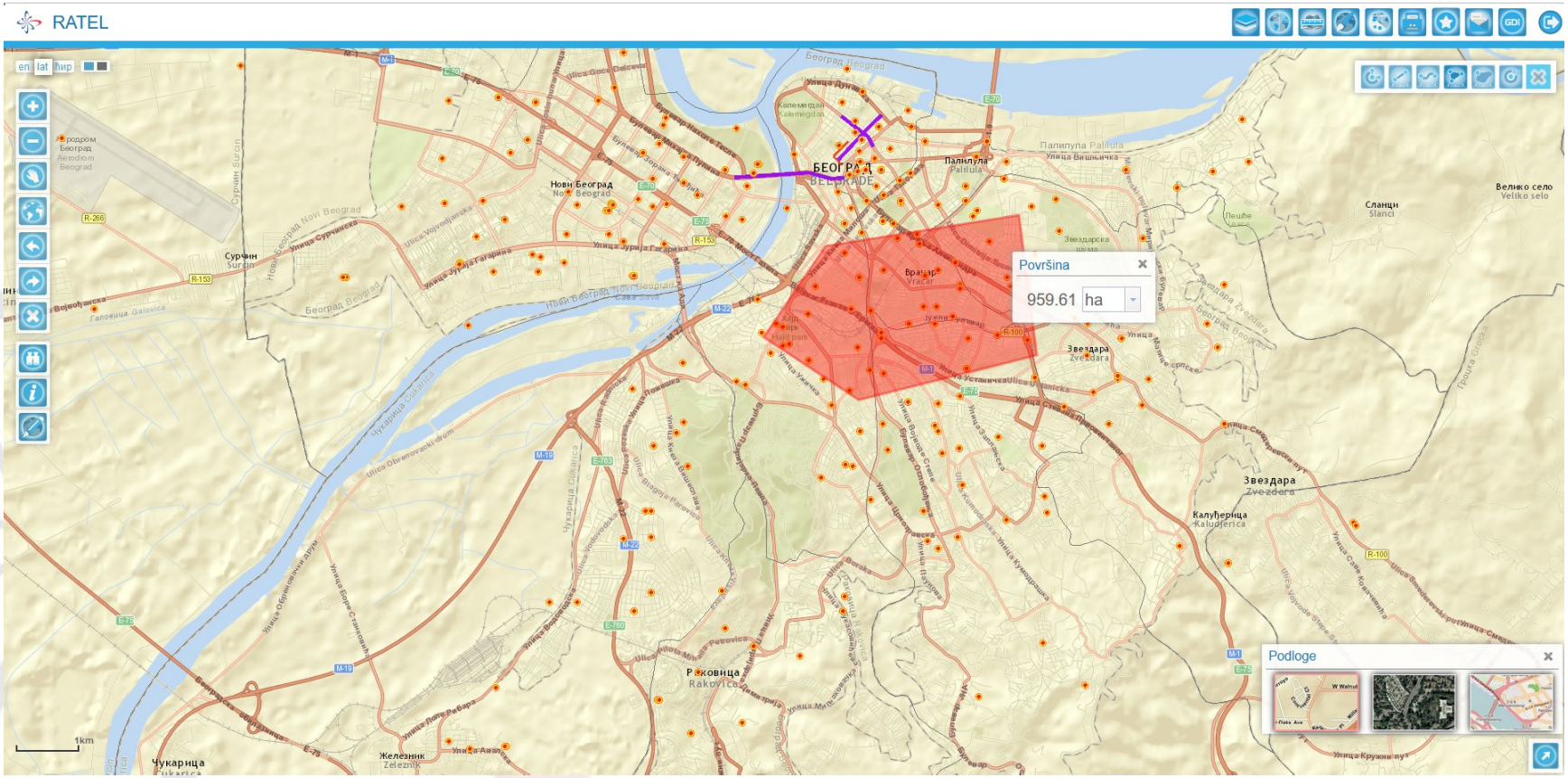
Using Standard Tools



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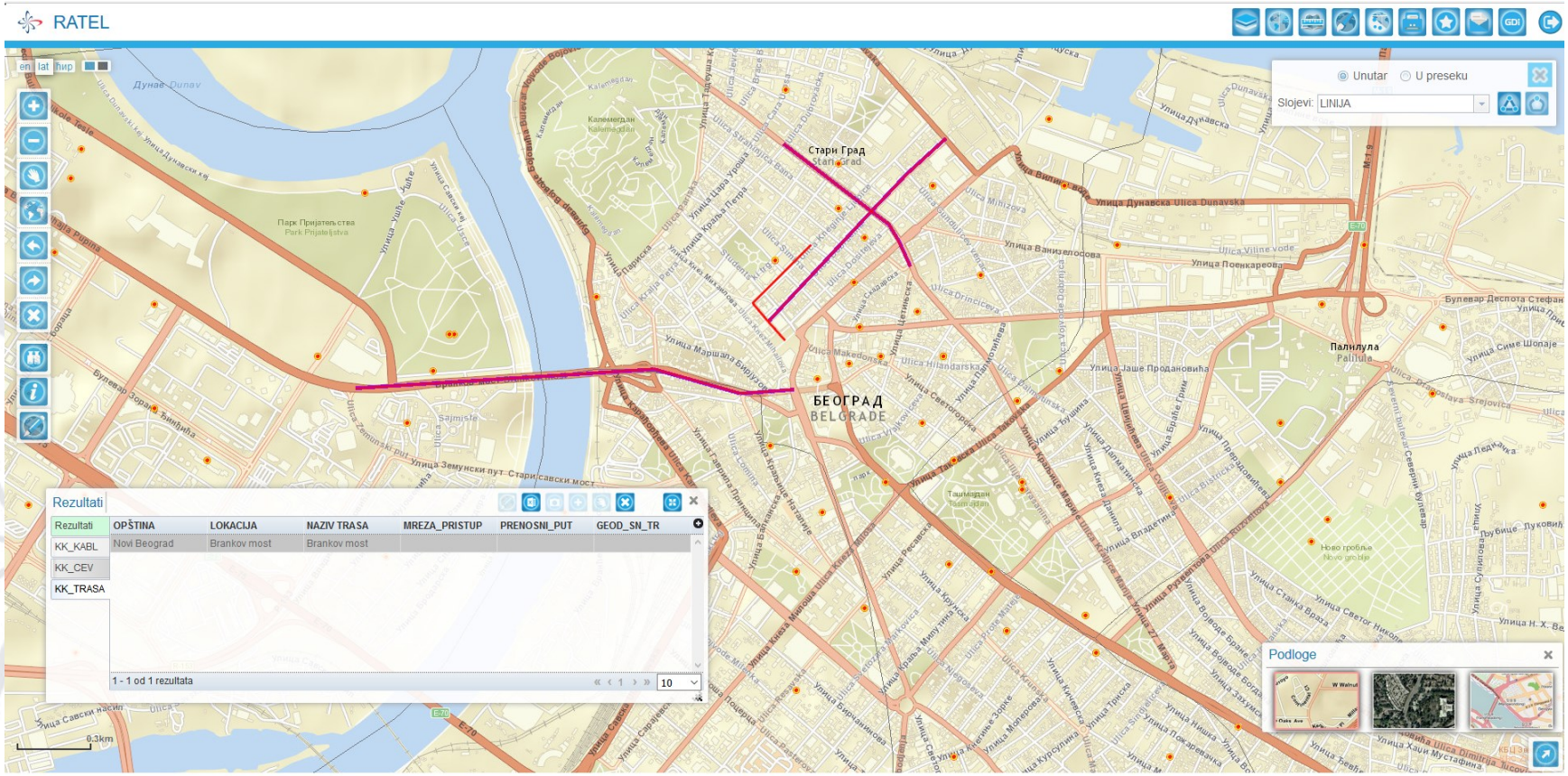
Data Selection



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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

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Thank you for your attention