

Broadband Mapping System in Montenegro

Montenegro

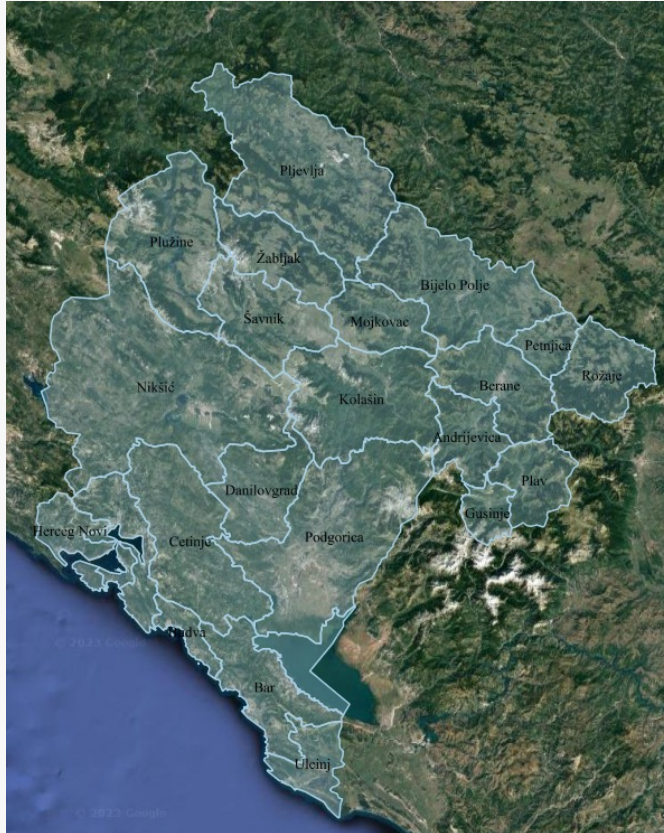
Agency for Electronic Communications and Postal Services (EKIP)

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Montenegro

- Population: 620.029
- Territory: 13.883 km²
- Capital City: Podgorica
- The Capital: Cetinje
- Municipalities: 25
- Settlements: 1.307

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NATIONAL LEGISLATION RELATED TO THE MAPPING

- 1. THE LAW ON ELECTRONIC COMMUNICATIONS**
- 2. THE RULE BOOK ON THE TYPE, MANNER OF DELIVERY AND DISCLOSURE OF DATA ON ELECTRONIC COMMUNICATIONS INFRASTRUCTURE AND ASSOCIATED FACILITIES WHICH MAY BE OF INTEREST FOR THE SHARED USE *(IN ACCORDANCE WITH THE LAW ON ELECTRONIC COMMUNICATIONS)***
- 3. LAW ON THE USE OF INFRASTRUCTURE FOR THE INSTALLATION OF HIGH-SPEED ELECTRONIC COMMUNICATION NETWORKS**
- 4. DIGITAL TRANSFORMATION STRATEGY OF MONTENEGRO 2022-2026.**

MAPPING SYSTEM IN EKIP- DATA AND USERS

Data

- Electronic communication infrastructure and associated equipment
- Planned electronic communication infrastructure
- Broadband coverage

Users

- Operators
- Planners and designers
- National and local Institutions
- Public access

MAPPING SYSTEM IN EKIP- RELATED TO THE RELEVANT DATA

From operators:

- Antenna poles
- Other poles
- Buildings for EC equipment placement
- Ducts and cables
- Air cables
- Planned EC infrastructure

File used within the system:

- .shp
- .xls
- .pdf
- .kml

From National institutions:

- Cadastre and State Property Administration:
 - o Municipalities
 - o Settlements
 - o Residential buildings
 - o Cadastral parcels
- National Statistic Authority-MONSTAT:
 - o Population
 - o Households

ELECTRONIC COMMUNICATION INFRASTRUCTURE – DATA IMPORT/INDIVIDUAL ENTRY

Entry of individual data:

An individual entry is possible directly on the map, by adding the specific individual infrastructure.

Import of grouped data:

Group import is possible via shapefiles sent for the group of objects who we want to add, update or delete.

MAPPING SYSTEM IN EKIP- STATISTICAL DATA**EC infrastructure:**

- 606 antenna poles
- 729 buildings for EC equipment placement
- 8.009,60km ducts
- 3.699,75km air cables

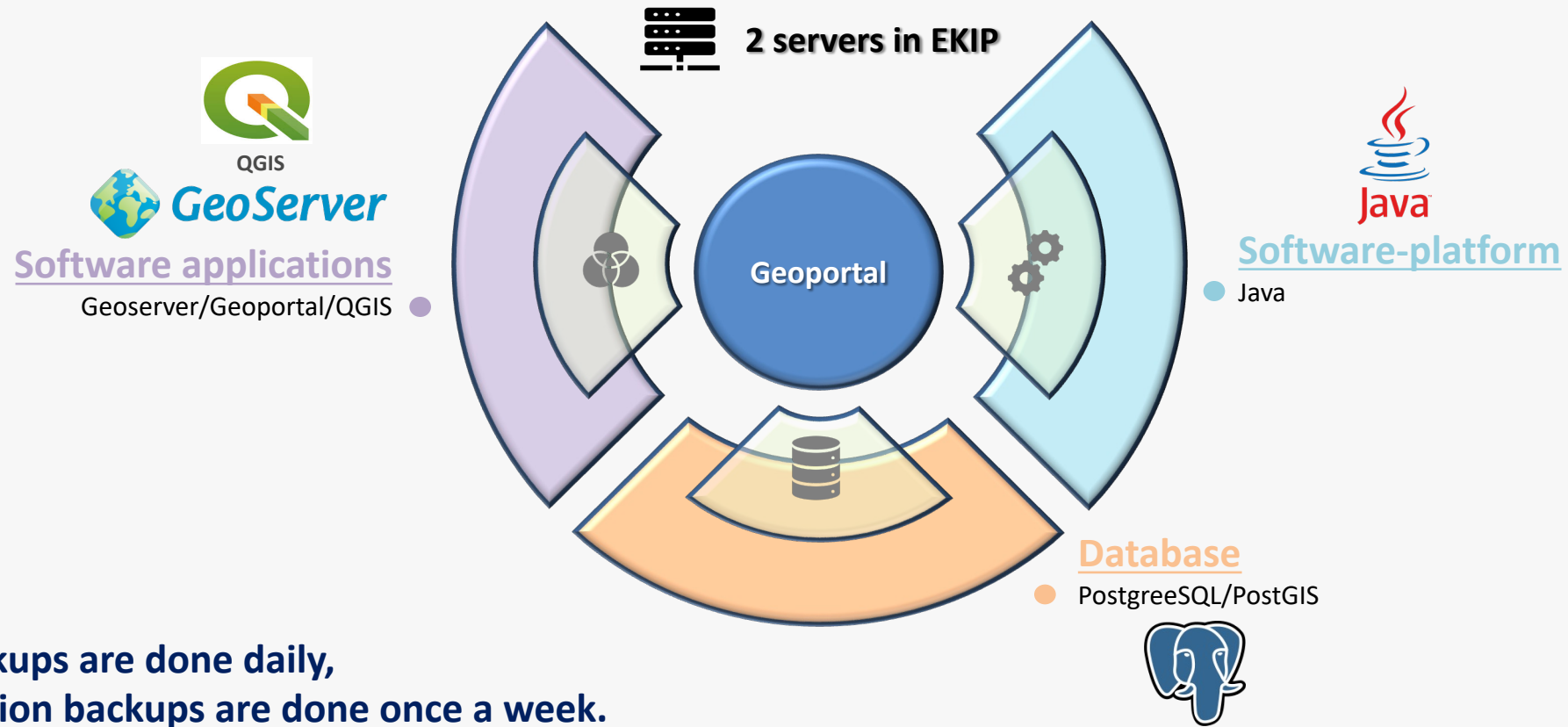
Shared EC infrastructure:

- 329 antenna poles
- 229 buildings for EC equipment placement
- 735 km ducts

Users:

- 17 Operators
- 13 Planners/designers
- 5 Local Institutions (Bar, Cetinje, Niksic, Podgorica i Mojkovac)
- 4 National Institutions

MAPPING SYSTEM IN EKIP- COMPONENTS



**Database backups are done daily,
while application backups are done once a week.**

MAPPING SYSTEM IN EKIP- HARDWARE AND SOFTWARE

Two Servers:

HPE ProLiant DL380 Gen10 server product+upgrades:

- 1 x Intel® Xeon® Gold 6126 processor with 2.6 GHz, 12 cores, and 120W for HPE DL380 Gen10 server
- 2 x HPE 16 GB Dual Rank x 8 DDR4-2666 CAS-19-19-19 Registered Smart Memory
- 8 small form factor drive bays Hot plug
- 3 x 1.2 TB SAS, enterprise, 10Krpm, SFF HDD with smart carrier
- HPE 1 Gb 331 i Ethernet adapter 4-parts per controller
- HPE Smart Array P408i-a Controller
- 2 x HPE 500W Flex Slot Power Supplies

Software platform:

Java SDK v.1.8.0_261(JDK8)

Database:

PostgreSQL v.12.4.1

PostGIS v.3

Software application:

Geoserver v. 2.17.2

Geoportal v.1.0

Desktop software application:

QGIS v.3.15

MAPPING SYSTEM IN EKIP- ACCESS LEVELS TO THE WEB PORTAL

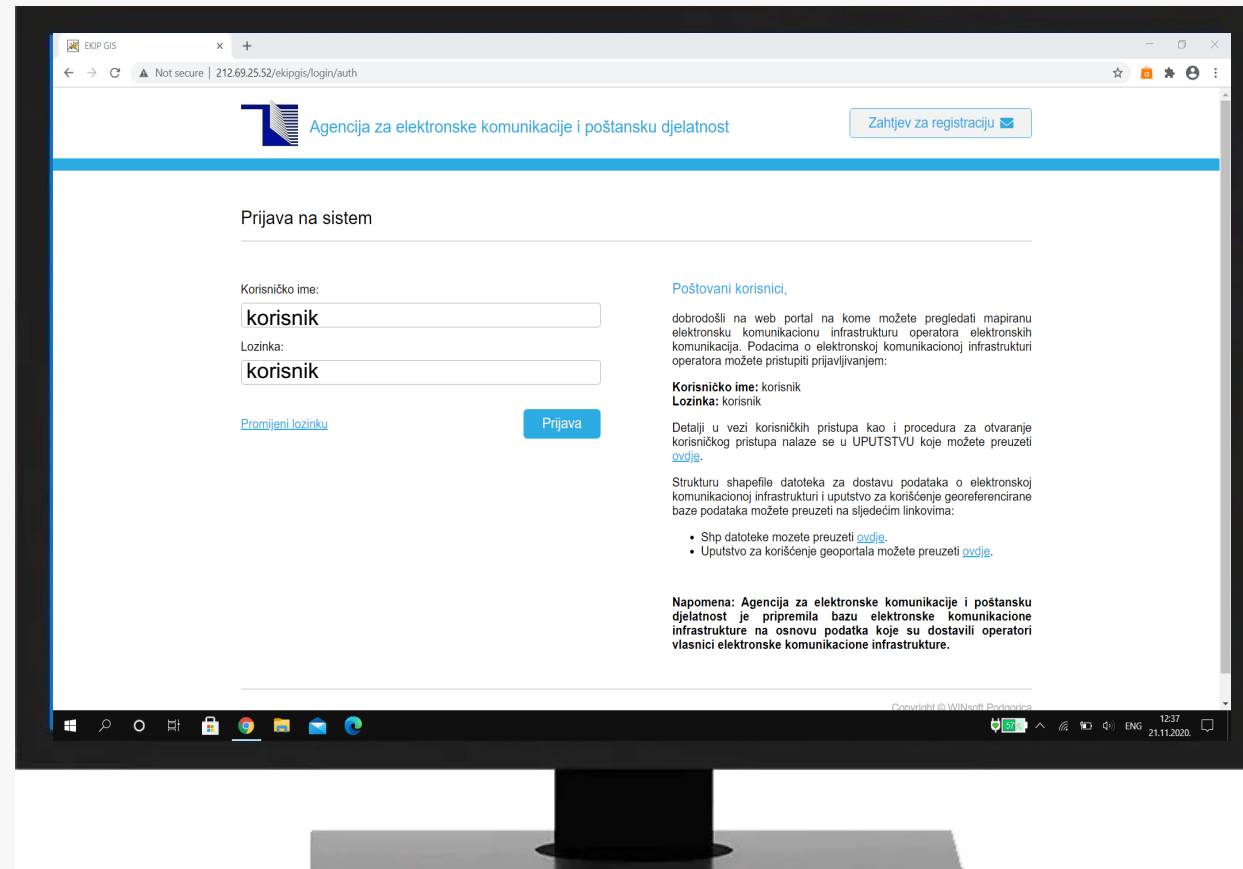
Link: <http://geoportal.ekip.me>

Public access :

- Geographical location and ownership of the EC infrastructure
- Review of actual broadband coverage

Username: **korisnik**

Password: **korisnik**



BROADBAND COVERAGE – VISUALIZATION

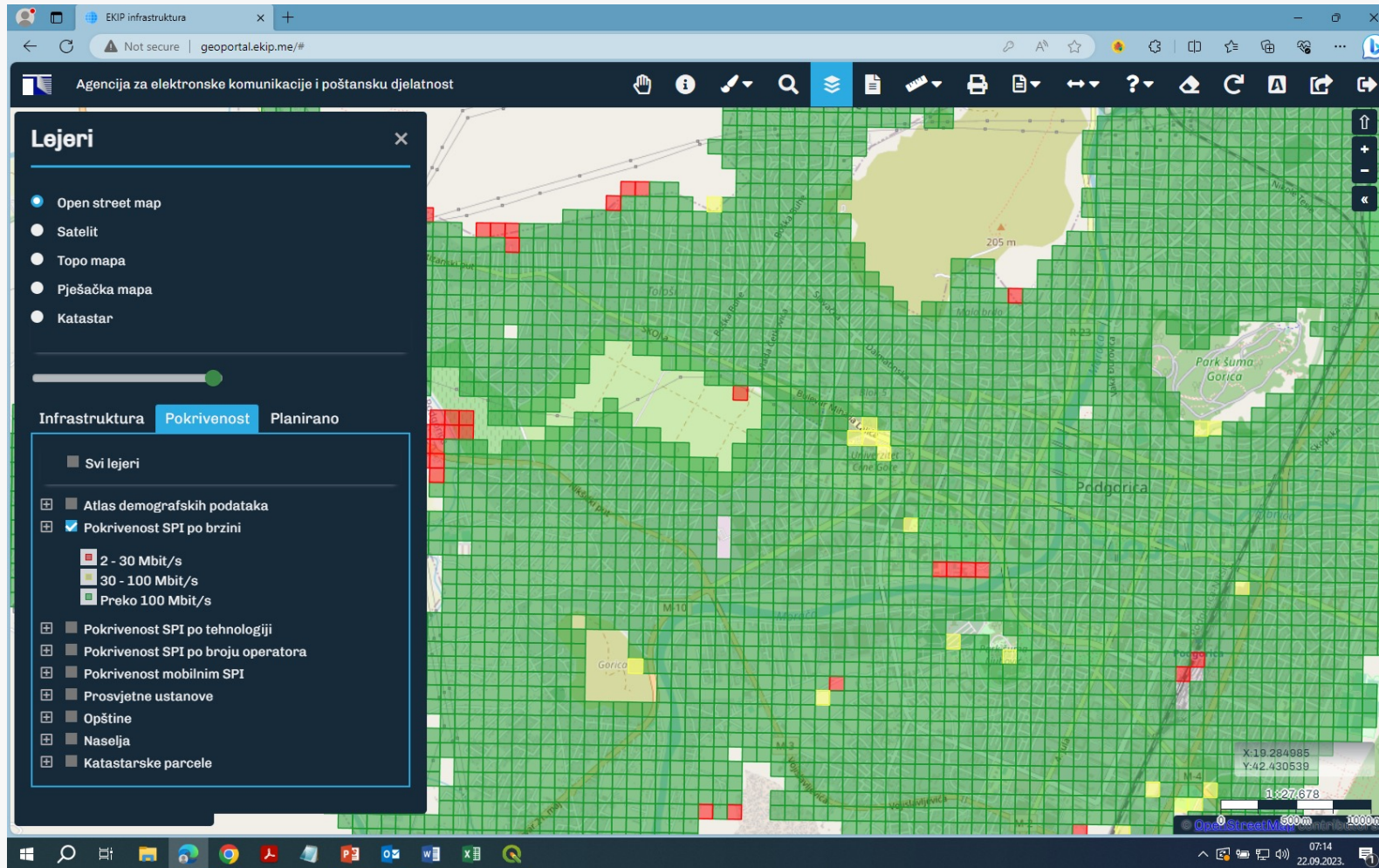
The visual representation of broadband internet coverage is based on data provided by operators on endpoint locations. Next to spatial data, endpoints characterize attribute data related to:

- Ownership of the endpoint,
- Type of endpoint,
- Broadband technology and
- Broadband speed.

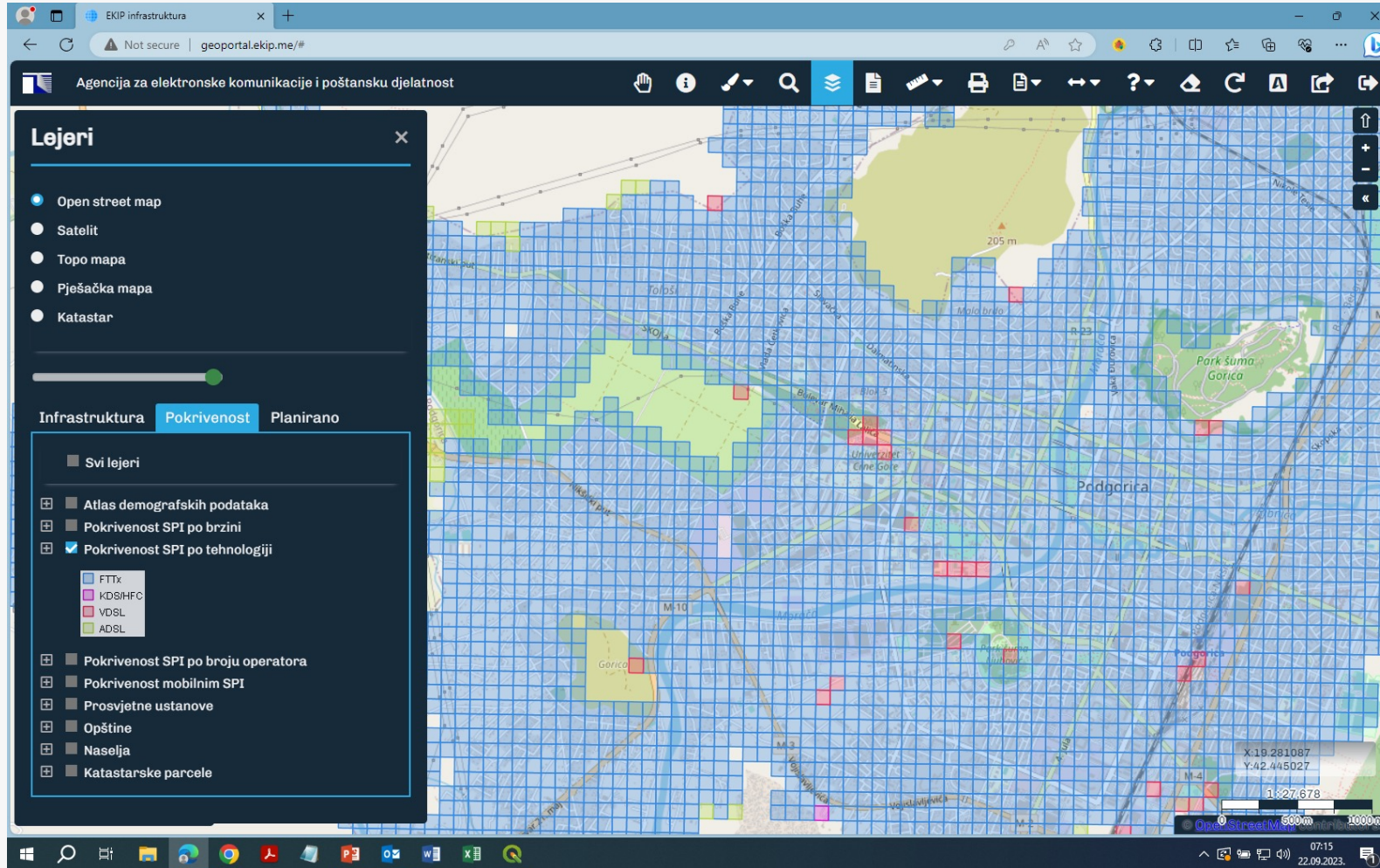
Broadband coverage is shown in grids of 100x100m, which are formed on the bases of locations of endpoints:

- By speeds (coloured by dominant speed in grid)
- By technologies (coloured by dominant technology in grid as well as show of all available technologies in grid)
- By number of operators which provide services (coloured by number of available operators in grid as well as show of all available operators in grid)

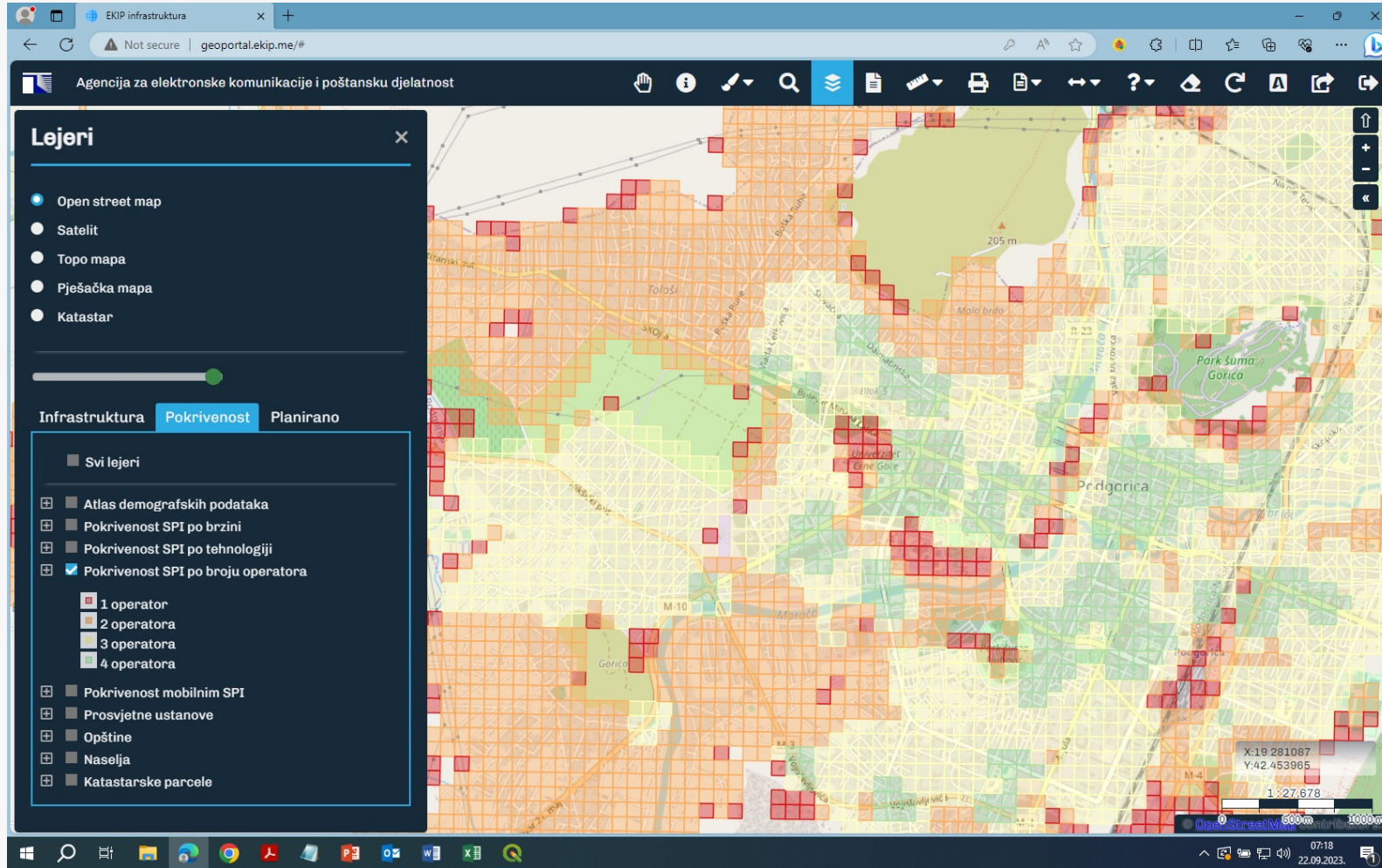
BROADBAND COVERAGE – VIEW BY SPEEDS



BROADBAND COVERAGE – VIEW BY TECHNOLOGIES



BROADBAND COVERAGE – VIEW BY NUMBER OF OPERATORS

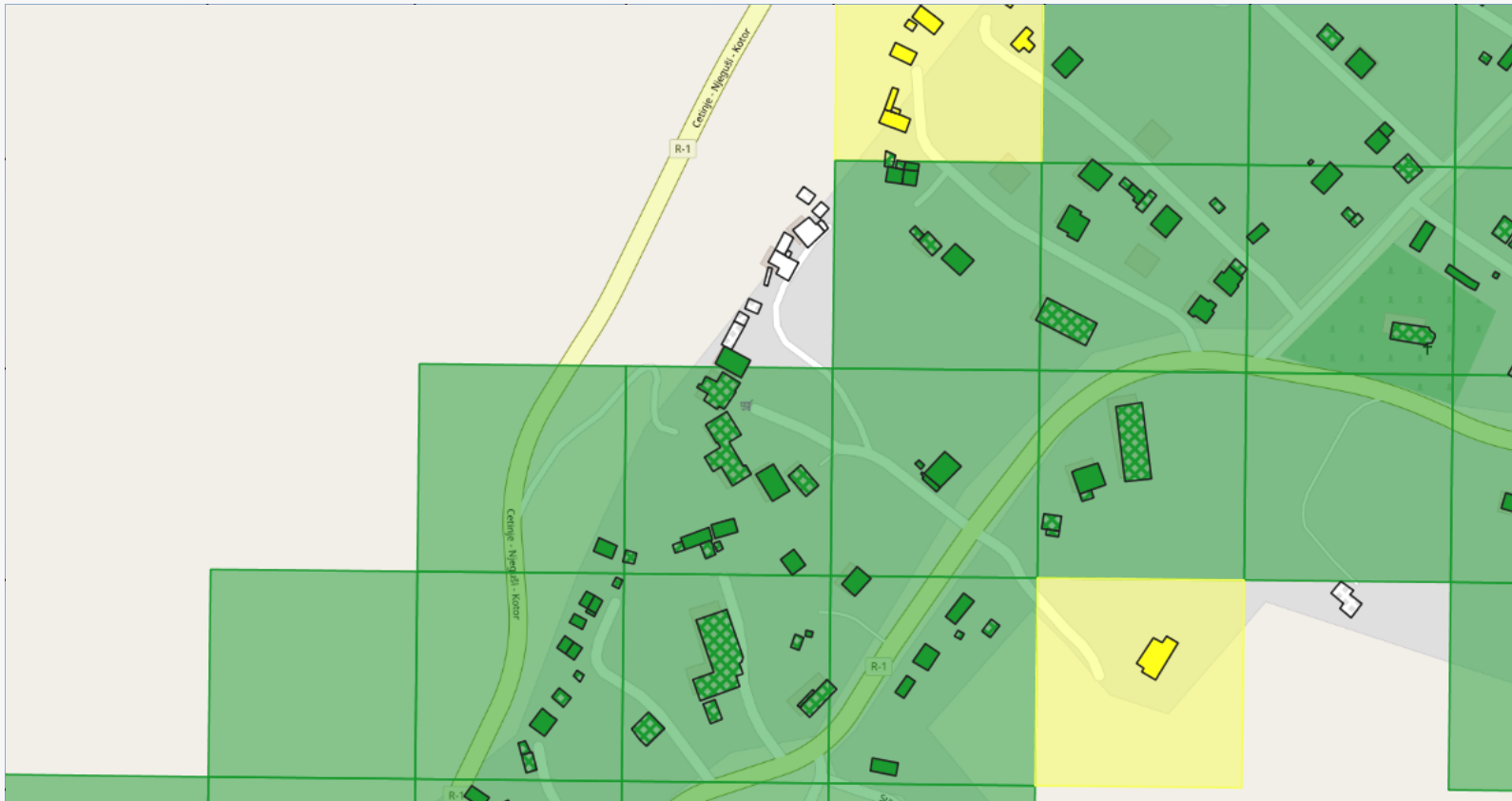


BROADBAND COVERAGE – CALCULATION METHODOLOGY

- Broadband coverage calculation methodology are based on:
 - Endpoints by operators,
 - Number of households in settlements by MONSTAT,
 - Position buildings on the maps with number of residential units by Cadastre and State Property Administration
 - Borders of municipalities and settlements by Cadastre and State Property Administration

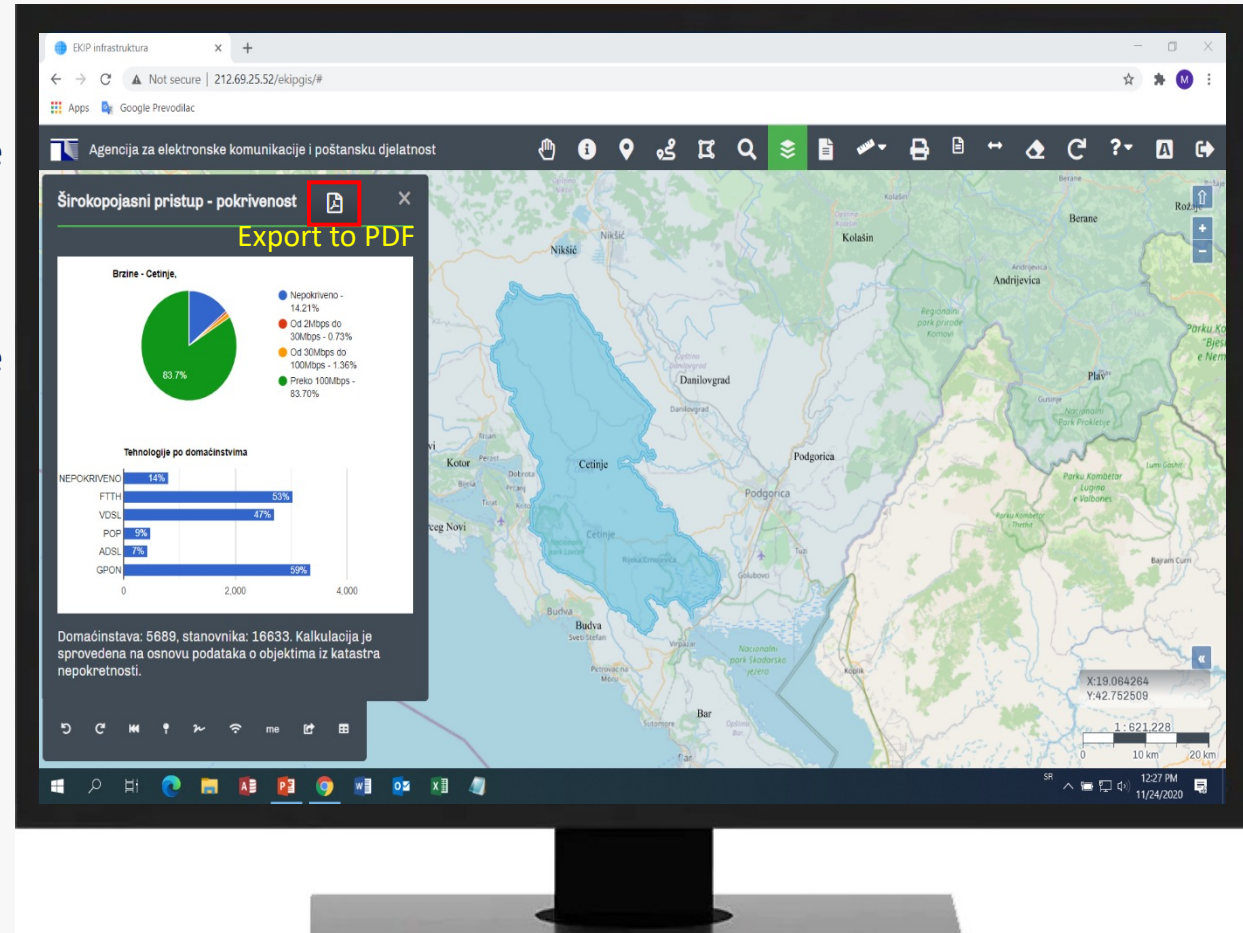
- Calculation of percentage coverage of households:
 - We didn't have data on households within buildings, we obtained this data by dividing the number of households by the total number of residential units in each individual settlement. The result of this division yielded a coefficient representing the average number of households in residential units in each individual settlement.

 - There is a grid of 100x100m. Then, at the position where the endpoints are located, we created buffers with a radius of 100 meters. Each square of the grid touch by buffers is colored depends on dominant technology or speed. Also, each building overlap these squares are considered to be covered by fixed broadband internet access. Other buildings within the selected or drawn area are considered to be uncovered.

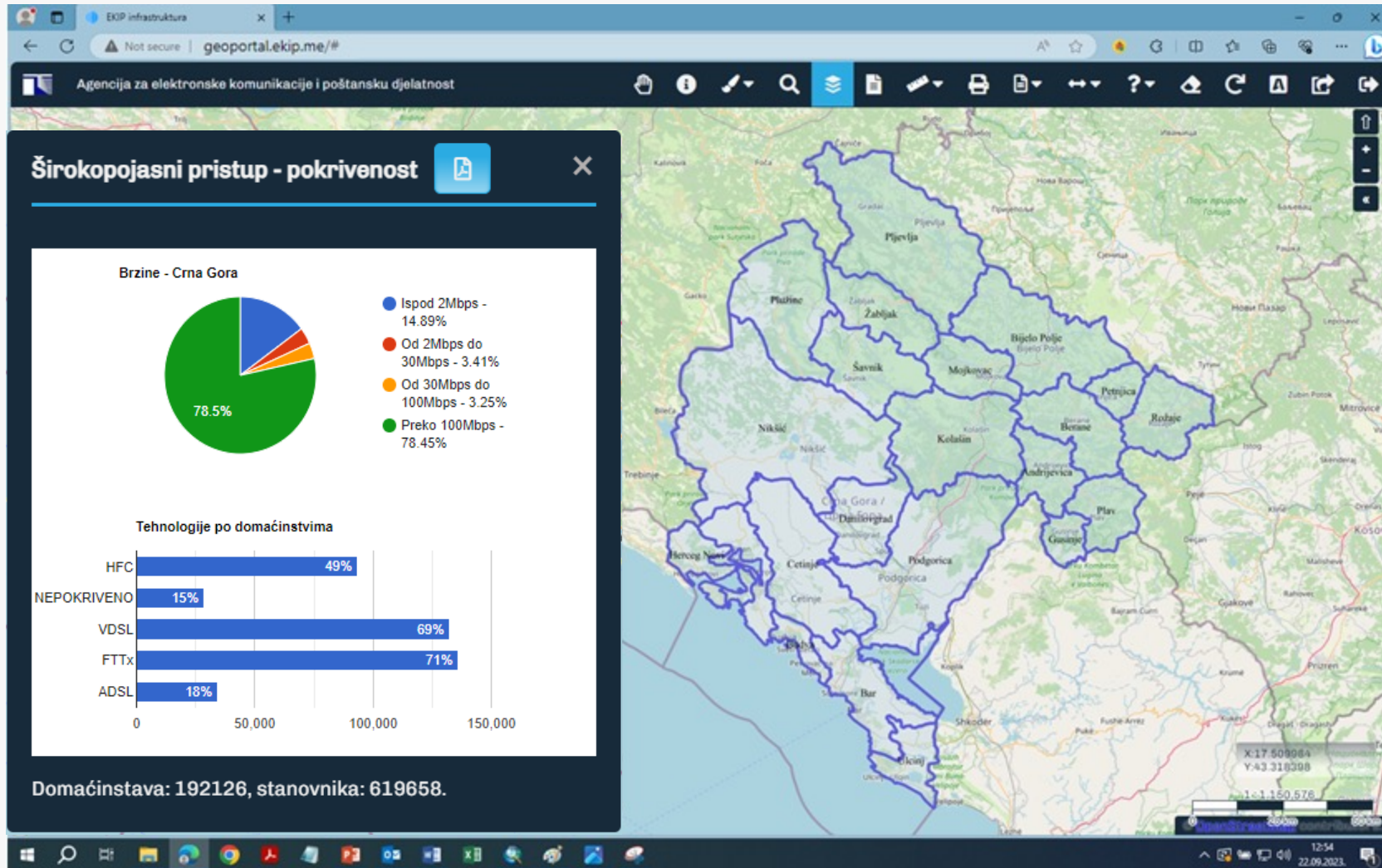
BROADBAND COVERAGE – CALCULATION METHODOLOGY

BROADBAND COVERAGE – THE SEMPLE

- Broadband coverage within the selected **settlement** of Bajice.
- Broadband coverage within the selected Cetinje **municipality**.
- Broadband coverage within whole **Montenegro**.



BROADBAND COVERAGE OF MONTENEGRO



CHALLENGES IN WORK

Certain inconsistencies between the database and the real situation on the ground, the data control in the Geoportal is performed as follows:

- on the basis of the notification about the start of commissioning of the equipment, which we receive from the operator
- by comparing it with data from other systems in the Agency

FUTURE STEPS TOWARD THE IMPROVED MAPPING SYSTEM IN EKIP

- Improvement of the Geoportal related to provision of additional functionalities related to the monitoring within defined period of time:
 - Broadband coverage development
 - Electronic communication infrastructure development
 - Planned electronic communication infrastructure and its implementation
 - Implementation of the new accessible WMS services (State address registry)
- Improvement of data control tools to enable data snapping and evaluation of the quality of provided data.

Thank you for your attention!

Q/A

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