REGIONAL INITIATIVES – EUROPE

Twinning project

ALBANIA - SLOVENIA: BROADBAND INFRASTRUCTURE MAPPING

Report

Telecommunication Development Sector

Twinning project Albania - Slovenia: Broadband infrastructure mapping

This report was prepared by International Telecommunication Union (ITU) expert Mr Marko Simončič from the Agency for Communication Networks and Services of the Republic of Slovenia (AKOS) under the supervision of the Europe Coordination Office of the ITU Telecommunication Development Bureau (BDT). ITU would like to thank the Chairman of AKEP, Mr Piro Xhixho, the Director of Cabinet, Mr Rudolf Papa, Mr Shefqet Meda, Director of Authorization and Frequency Management Department, Mr Oleons Peti, Foreign and Public Relation Office, and and Tanja Muha, Acting Director, of AKOS

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1. Introduction

The recent European Commission (EC) policy framework[1] underlines the significance of next generation network (NGN) technology by including NGN deployment as part of a growth strategy for economic and social development in order to reap the full benefits offered by ICTs, and to remain competitive in international markets, widespread and stable access to high-speed Internet infrastructure and services have been targeted.

The following goals have been set for 2020:

- 30 Mbit/s coverage or more for all in Member States of the European Union (EU);
- 50 per cent of households to have 100 Mbit/s subscriptions or higher.

There is still need for action before every user has access to NGNs. As of 2014, only 68 per cent of all EU households had access to bandwidths of 30 Mbit/s. Meeting the challenge of financing a good quality and cost-efficient broadband infrastructure is a crucial factor. In the context of investing in high-speed digital networks, mapping of broadband infrastructure is a key success factor that enables policy-makers to plan ahead.

Mapping of broadband infrastructure benefits a variety of stakeholders. For example, for policy makers and regulators to assess policy interventions, they need large-scale independent measurements to assess network performance when deciding about state aid schemes, and owners of electronic networks infrastructure and operators of electronic communications services could be helped with investment planning or market research. With the importance and benefits of mapping of broadband infrastructure in mind, the Electronic and Postal Communications Authority in Albania (AKEP[2]) has developed a system for mapping broadband infrastructure.

2. Twinning concept

While initial development was carried out by external contractors, AKEP created additional system requirements when using the tool, upgrading the system to fulfil their requirements, especially for regular and ad hoc analysis and reports. AKEP also carried out benchmark research across Europe with other mapping tools and found that a good broadband mapping tool was being used in Slovenia.

In February 2016, a twinning concept was brought forward with the help of ITU whereby the Agency for Electronic Communications Networks and Services in the Republic of Slovenia (AKOS) worked with AKEP on the project of mapping of telecommunication infrastructure in Slovenia[3].

Experts from AKEP, AKOS, and ITU further discussed this project during the ITU-EC Regional Conference for Europe on Broadband Services and Infrastructure Mapping, held from 11 to 12 April, 2016 in Warsaw, Poland. Discussions were continued in May 2016 to evaluate the AKEP system and prepare the technical specifications for a system upgrade presented in this report including the tender process, associated costs, and documentation.

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1 https://ec.europa.eu/digital-single-market/en/broadband-strategy-policy

2 The legal basis for electronic communications regulation in Albania is the Law on Electronic Communications of 2008, which defines the Electronic and Postal Communications Authority (AKEP) of Albania.

3 Details of the first meeting is presented in Annex 1.

3. Slovenia broadband mapping

The main objective of the two-day visit (10 to 11 March 2016) of the AKEP delegation to Slovenia was to share knowledge, experiences, and compare solutions regarding the mapping of broadband infrastructure in Slovenia. The AKEP delegation consisted of:

- Mr Shefqet Meda, Director of Authorization and Frequency Management Department
- Mr Ermin Pina, Head, Sector of Frequency Monitoring and Quality Inspection Department
- Mrs Aferdita Elbasani, Authorization and Frequency Management Department
- Ms Ardiola Allushi, Information technology and Broadband Department

The stakeholders involved in mapping project were:

- The Surveying and Mapping Authority of the Republic of Slovenia, Ministry of the environment and spatial planning.
- The Agency for Communication Networks and Services of the Republic of Slovenia (AKOS).
- The Directorate for the Information Society, Ministry of Education, Science and Sport.

The Spatial Planning Act was adopted in Slovenia in 2002 (Official Gazette of the RS, No. 110/2002). The Spatial Planning Act defined the responsibilities and procedures in spatial planning and the types and contents of spatial documents at the national and local levels. The Act also provided legal basis for the adoption of the basic strategic spatial planning document, namely the Spatial Development Strategy of the Republic of Slovenia (Official Gazette of the RS, No. 76/2004). The Cadastre of Public Infrastructure system was established in 2005 and development continued in 2006. The legal basis for spatial planning is the Spatial Planning Act (Official Gazette of the RS, No. 33/2007), which replaced the Spatial Planning Act from the year 2002. The Act clearly regulates the system of national spatial planning documents and their interrelation and precisely defines their contents, adoption procedures and, within this framework, the procedure of integrated assessment of their environmental impacts.

The Slovenia Electronic Communications Act contains several articles relative to building infrastructure. Article 14 requests operators to provide data of their network termination points and it provides the legal basis for adopting a general act concerning entry, collection and access to data in the register of infrastructure, networks, and facilities, and that will define:

- who reports data to the Cadastre of Public Infrastructure;
- to whom they report data;
- the period for the first report and for further changes;
- data status (not public);
- requests of data on availability of network elements.

Article 15 of the Electronic Communications Act gives supervisory power to AKOS and the possibility to fine owners of infrastructure if they do not provide data or if they provide incomplete or incorrect data. AKOS was included in the mapping project in 2012, together with the Ministry of Education, Science and Sport, the Directorate for the Information Society, and the Surveying and Mapping Authority of the Republic of Slovenia. Following the Electronic Communications Act, the secondary legislation ensured the protection of infrastructure owner related data.

Network termination points, which are collected through this new mapping procedure, means the physical point at which a subscriber is provided with access to a public communications network. In the case of networks involving switching or routing, the network termination point shall be identified by means of a specific network address, which may be linked to a subscriber number or name.

Data needs to be provided directly to the Surveying and Mapping Authority of the Republic of Slovenia.

AKOS has established a database for all available inputs, including additional data collected from owners of electronic communications infrastructure, in order to get a complete picture of the networks available in Slovenia. The advantages of having this database include:

- reusing already collected data;
- adding different information and various other databases, such as fixed wireless broadband access (FWBA), base stations, MDF data (main distribution frame);
- faster responsiveness in accessing information;
- more flexibility on queries to be formulated;
- use of open source software.

Slovenia uses open source and other available free tools, including PostgreSQL and PostGIS as spatial database extenders, which support geographic objects allowing location queries to be run in SQL. For analysis and complex research, AKOS is using Geographic Information System (QGIS) and have developed their own interface.

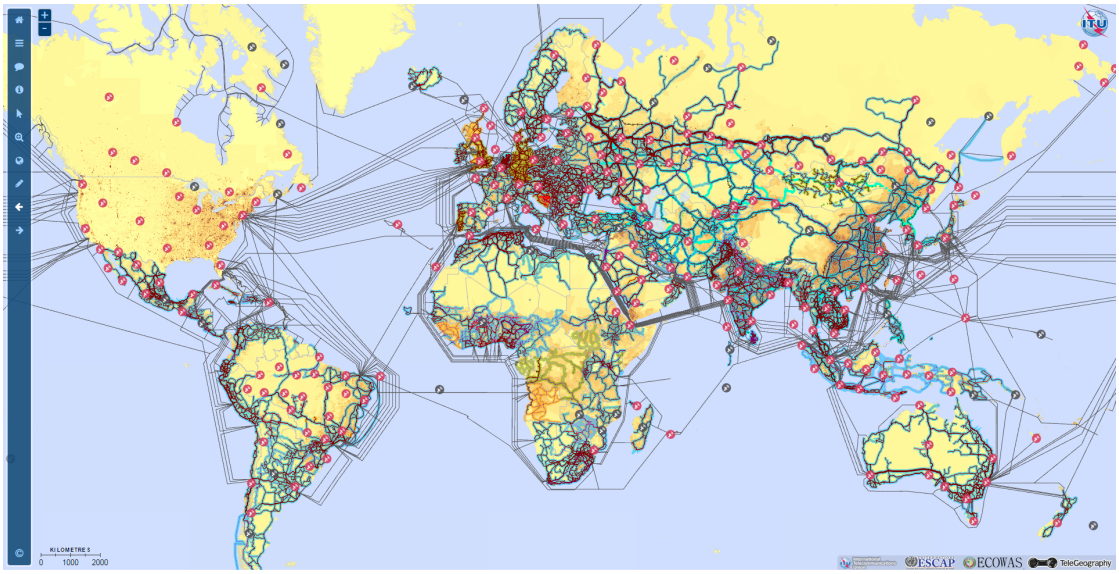
4. ITU-EC Regional Conference for Europe 2016

ITU-EC Regional Conference for Europe on broadband services and infrastructure mapping was held in Warsaw, Poland from 11 to 12 April 2016. The Conference was organized by ITU and the EC in partnership with the Office of Electronic Communications of the Republic of Poland.

The Conference was organized within the framework of the Regional Initiative for Europe on Broadband, approved by the World Telecommunication Development Conference 2014 (WTDC-14). It provided an opportunity for high-level dialogue between ITU-D, the EC, ITU Member States and Sector Members with particular emphasis on national, regional and international broadband services and infrastructure mapping initiatives, as well as the ways that such undertakings may provide value for policy makers, regulators, markets, and end users.

ITU through the Interactive Transmission Maps is taking stock of national backbone connectivity (optical fibre, microwave links and satellite earth stations) as well as of other key metrics of the ICT sector. These maps include fibre and microwave backbone transmission networks as reported by 391 operators worldwide. The map continues to be updated and can be accessed through the following link: http://itu.int/go/Maps.

Figure 1: ITU Interactive Transmission Maps



Source: ITU

5. Albania: AKEP broadband infrastructure mapping tool

As agreed during the Warsaw Conference in Poland, in April 2016, a mission to Tirana, Albania was carried out to discuss broadband infrastructure mapping tools from 29 May to 31 May 2016.

In 2012, AKEP adopted Regullore Nr. 26 of 16 August, 2012[4] (regulation 26), which prescribes content, form, and procedure to register electronic communication networks in Albania. The main objective of the regulation 26 is to ensure and encourage joint use of the facilities and resources to protect the infrastructure of public electronic communications networks and improve capacity. Its provisions are mandatory for all operators providing public electronic communication networks in Albania.

Regarding the content and form of electronic registration, regulation 26, stipulates that AKEP is the responsible entity for ensuring the development, management and maintenance of electronic registration. AKEP covers all costs for the establishment and functioning of the electronic registry for the purposes of registering public electronic communications networks, which consists of base mapping of the territory of Albania and data collected from electronic communications network providers. In this regulation, AKEP prepared guidelines for access to and use of data in the electronic register. The content of the register consists of electronic communications data, cable routes, and radio transmitters. Regulation 26 also defines availability of data with predefined user rights.

The providers of public electronic communication networks have the obligation to submit data via an Internet-based system interface with files fully compatible with the electronic register. The deadline for submitting data may not exceed 30 days from the date of completion of the construction of public electronic communication networks. The providers of public electronic communication networks must update the data on exploited capacity at least once every 90 days.

Regulation 26 stipulates that AKEP can engage external experts to verify the accuracy and reliability of data and that the cost for this is covered by AKEP; however, in the case where it is determined that there are inaccuracies in the data, the owner of the electronic communications network pays the costs.

[4] Për Përmbajtjen, formën dhe funksionimin e regjistrit elektronik të rrjeteve publike të komunikimeve elektronike në Republikën e Shqiperisë

The State Authority for Geospatial Information (ASIG) was established in 2013, according to law 72/2012 "On the organization and functioning of the national infrastructure of geospatial information in the Republic of Albania". The main ASIG objectives are:

- to create a geodetic framework to European standards to support a complete map of the territory of Albania;
- to establish a national infrastructure for geospatial data, through a Geoportal where all Albanians can access geospatial data; and
- to design and develop the field of geo-information standards and their implementation in institutions.

Format of data of electronic communication networks

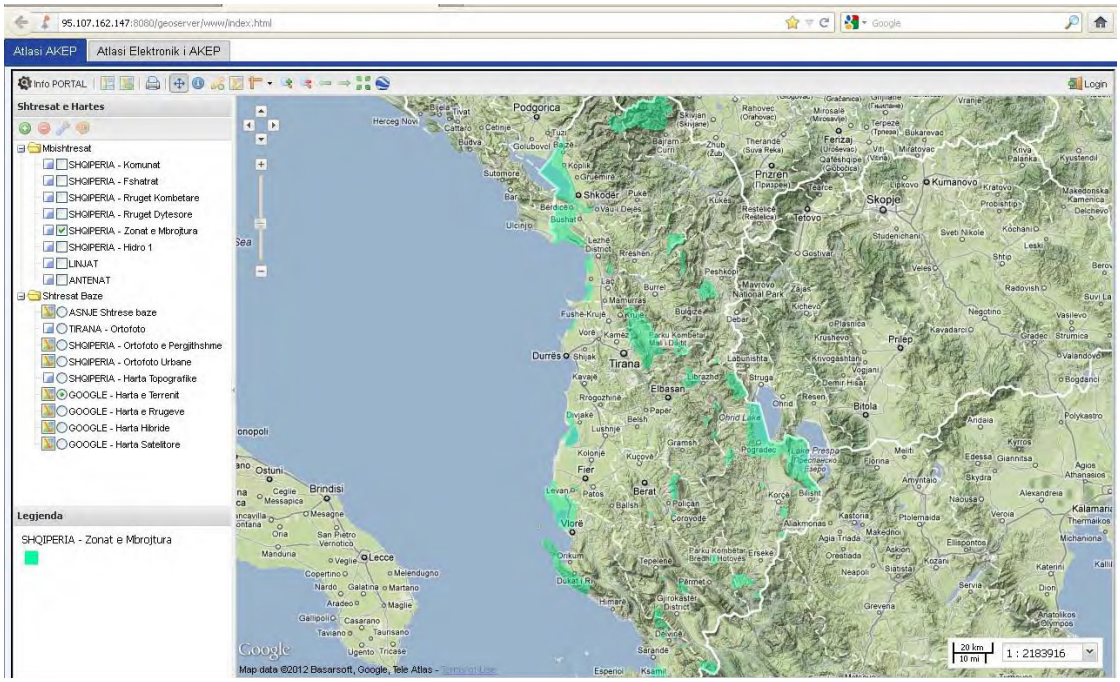
AKEP is continuously collecting data from providers of public electronic communication networks. Based on experience so far, providers are sending data twice a year. Data are sent in *.shp (ESRI Shapefile) or *.dwg format; optionally data for point layers are in *. CSV or *.xls format. The coordination system being used is WGS 84 / UTM zone 34N. Providers can edit and capture their own data via the Internet using the GIS (geographic information system) viewer described below. According to received data, AKEP makes a visual inspection and imports data into the spatial database. The process of reception, control and administration of the data is not systematically regulated.

Atlasi Elektronik i AKEP **viewer**

In order to check and monitor infrastructure, AKEP uses the Atlasi Elektronik i AKEP viewer via the Internet. The application is installed on the spatial data infrastructure server, which is located on AKEP premises. The application was developed by OpenGeo Suite, which is an open source software for managing data and building maps and applications across Internet browsers, desktops, and mobile devices. OpenGeo Suite has a robust and flexible architecture that enables organizations to reliably manage and publish geospatial data. The system includes the use of the following servers, applications, and databases:

- PostGIS: A spatially enabled object-relational database.
- GeoServer: A software server for loading and sharing geospatial data.
- GeoWebCache: A tile cache server that accelerates the serving of maps (built into GeoServer).
- GeoExplorer: An application for composing, styling, and publishing maps.
- QGIS: A complete desktop application for working with geospatial data and maps.

Figure 2: AKEP interface snapshot (GIS viewer)[5]



Source: AKEP

The interface enables:

- graphical overview of data of public electronic communications networks;
- review of attribute data of individual objects;
- filtering the data (SQL queries) and an overview of the data in attribute table;
- data editing (adding, deleting and modifying).

Graphic view consists of the data in Table 1.

[5] The designations employed and presentation of material in this publication, including maps, do not imply the expression of any opinion whatsoever on the part of ITU concerning the legal status of any country, territory, city or area, or concerning the delimitations of its frontiers or boundaries.

Table 1: Graphic view data

Cartography	Line layers	Point layers
• Digital Orto photo (2007 20/35 cm)	• Optical line	• Base stations
• Digital Orto photo (2007 8 cm)	• Cooper line	• Radio transmitters
• State topographic map 1:10.000	• Coax line	• Shafts
• State topographic map 1:25.000	• Ethernet line	• Cabinets
• State topographic map 1:50.000	• Cable duct	
• BING route map		
• BING satellite map		
• BING hybrid map		
• Google road map		
• Google satellite map		
• Google relief map		
• Google hybrid map		

6. Proposed technical specifications for upgrading the AKEP system of broadband infrastructure mapping

This section covers suggestions for upgrading the AKEP system of broadband infrastructure mapping, including:

- upgrades and maintenance of the Atlasi Elektronik i AKEP GIS viewer;
- data format and upgrades for optimal spatial layer management;
- receiving, monitoring, and administration of data from electronic communication networks;
- regular and ad-hoc analysis depending on AKEP requirements;
- technical support for data management and GIS consultancy.

6.1 Upgrades and maintenance of the Atlasi Elektronik i AKEP GIS viewer

GIS viewer upgrade to generate spatial analysis reports

It is recommended that the GIS viewer should be upgraded to enable data analysis. The upgrade should ensure selection of different analyses from pre-generated lists; it should also ensure a review of analyses in tabular form and be able to export the report in a .CSV format.

Initially the upgrade should ensure the following:

- analysis of the data of type and length of cable;
- analysis of data of lines, pipes, cables and routes by owners and length;
- analysis of data of lines, pipes, cables and routes by length and municipalities.

According to their needs, AKEP will define seven more types of analysis to be included in the module upgrade.

GIS viewer upgrade with system of reporting database changes

It is recommended that the GIS viewer should be upgraded to allow greater supervision over content, especially to monitor changes made by users editing data on public electronic communication networks. If data providers delete or edit data, the changes must be recorded in the database, and change logs must contain an accurate and chronologically ordered list of changes for each version of data. Notifications must be recorded within the application and by forwarding electronic mail to database administrators.

GIS viewer upgrade to enable geo-located raster images on the map

In addition to the vector data, AKEP has also at its disposal some raster data (e.g. raster images showing coverages of base stations with data on signal strength). It is recommended that the GIS viewer should be upgraded to provide an overview of raster images. Raster images must be shown on the map as a point layer, and by clicking on a position on the map, individual raster images should be shown.

Establishment of different levels of user access

For user access, it is recommended that:

- multi-level authorisation to data access should be enabled in the GIS viewer;
- the system should allow the setting of user roles and setting specific definitions of viewing rights and editing rights should be enabled for each user;
- the system should also allow registered users to be granted administrator access;
- the system should also allow public access that does not require registration.

Maintenance of GIS viewer

It is recommended that GIS viewer maintenance should include upgrades to platform components, and the necessary upgrade of the system in the case of system breakdown. Especially in case of new versions of web browsers. Maintenance also require elimination of detected errors or bugs.

6.2 Data format and upgrades for optimal spatial layer management

Standard exchange format for public electronic communications networks

AKEP is facing the challenge of the supervision of data provided by electronic communication networks. The process of reception, supervision and administration of the data is currently not automatic, and often data is not provided in the format prescribed.

For the purposes of completing the data management system, it is necessary to prepare a proposal for public electronic communication networks data exchange format to be followed for insertion in the spatial database. The data exchange format must follow the data model implemented in the system for the management of data. For the purposes of easier adoption of the exchange format for revised data, examples of typical data formatting and additional explanations or guidelines should be prepared for data providers to follow.

Upgrade of spatial database for optimal management of spatial layers

In addition to the information provided by the owners of the publicly available electronic communications infrastructure, other supportive data sets are used in maintenance and analysis. For this reason, it is suggested to upgrade the spatial database in a way that will include the possibility

of using the periodically updated data-sets, including different administrative territorial units, such as regions, municipalities, settlements. The system should also enable registration of infrastructure down to the level of house numbers if available in Albania.

In the context of the preparation of data for the purposes of different analyses and public access, implementation of an automated processes should be envisaged. This type of information should be provided in the public access version of the database (distributed), which should be separated from the production version of the database, where the maintenance of data is required.

6.3 Receiving, monitoring, and administration of data from electronic communication networks

In the context of the tasks needed to establish a system for receiving, monitoring, and administration of data of publically available electronic communications networks, the work-register module and the data control module are required.

Work-register module

The system for automatic monitoring of data from receipt to importation into the production database needs to:

- keep a description of received data;
- monitor the processing of data;
- add reason for refusal of data to import into the database;
- add reason for inclusion of data into the database.

Table 2: Data control module

Format control	Data attribute control	Geometric data control	Data importer module
• The adequacy of the data format.	• Checking the completeness of data.	• Topology	• Automated import of data into database
• The presence of all necessary files	• Checking the code table (range).	• Type of geometry	• Automated report of imported data (total of imported object and total length of the lines)
	• Logical controls (combination of attributes)	• Spatial scope	
		• Multipart geometry	
		• Duplication of geometry	
		• Minimum length (> min > 0)	

6.4 Regular and ad-hoc analyses depending on AKEP requirements

The external contractor must provide consultancy and carry out different regular and ad-hoc geographical analysis when required by AKEP, which often needs to perform different geographic analyses for various processes of regulation and supervision of the electronic communications market and the management and control of radio frequency spectrum in Albania. The contractor should also be prepared to carry out analysis with other sectors in the agency. Results of geographical analysis must be provided in tabular form (.csv) and in the form of cartographic displays (e.g. .shp, .png, .jpg).

Examples of possible analysis include definitions of:

- geographic areas according to the number of households / population density;
- rural, suburban, and urban areas in Albania;
- geographic segmentation of owners of publicly available electronic communications networks;
- white spots, etc.

6.5 Technical support for data management and GIS consultancy

The contractor must be able to carry out technical support and provide:

- additional explanations in connection with the management of the data about publicly available electronic communications networks;
- consultancy on the implementation of procedure of maintenance of data from the spatial database;
- substantive support for the use of IT system upon AKEP request;
- technical support to AKEP regarding settings, installation, and re-installation of software in case of damage or data loss due to technical faults on the hardware;
- preventive table cleaning in the database, which are used as working tables (import tables, log tables, error tables);
- educational workshops for AKEP employees using the system;
- general consultancy in the field of spatial data and GIS.

7. Mandatory conditions for AKEP public tender

7.1 Technical skills for AKEP broadband infrastructure mapping system upgrade

Technical skills, knowledge, and experience in each of the following areas require at least one reference certificate, which must not be older than three years when submitting the application:

- composition of exchange formats and implementation of spatial database;
- planning and implementation of spatial system of public infrastructure on telecommunication field;
- design, establishment and maintenance of IT support in the production of spatial databases;
- collecting and analysing spatial data in the field of public infrastructure.

7.2 Human resources skills

The contractor must employ at least the following members of the project team with knowledge and experiences defined above (6.1):

- three employees with expert knowledge of not less than a university degree in the field of geodesy;
- at least two employees from the field of informatics;
- at least two employees to provide support during the contract.

7.3 Quality of performance skills

The contractor must provide quality of performance and data security certification: Certificate ISO9001 or any other equivalent certificate.

8. Proposed contractual obligations

Object of the contract

The objective of the consultancy contract is to carry out an upgrade of the AKEP broadband infrastructure mapping system and for which the number of man-hours cannot be precisely defined in advance by AKEP. The quantity and type of services are indicative, not definitive and must be adaptable to the specific needs and financial resources available to AKEP.

The proposed contract shall be for a period of three years based on an estimation of cost and timing defined in chapter 8 herein.

Proposed contractor commitments

- Perform professional expert services, taking into account regulations and standards in this area.
- Cooperate with AKEP, considering its requirements, in accordance with contractual objectives.
- Give necessary explanations and, where appropriate, solving problems arising from the provision of services under this contract.
- Perform services under this contract economically and for the benefit of AKEP.
- Fulfil obligations within the time and in the manner intended.
- Write a report twice a month on activities carried out under this contract.
- Write a monthly report on work done and relevant time spent by consultants (hours).
- After completion of all activities, write a final report, which should also contain technical details or instructions that AKEP will need for future work.

Proposed AKEP commitments

- Determine areas of consulting.
- Check and approve reports prepared by the contractor.
- Enable contractor to execute the work stipulated under the contract.
- Provide all necessary assistance to contractor to enable it to perform the services under this contract.
- Inform the contractor about any changes and emerging situations that could affect the execution of services.
- Pay all financial obligations arising under this contract.

Proposed purchase technique

Consulting under this contract should be carried out successively in accordance with the needs of AKEP. The contractor shall start the execution of the service based on AKEP written or oral requests. The contractor will be provided by AKEP with oral or written orders, normally by e-mail.

Proposed determination of authorised persons

Authorised persons with responsibility for contractual issues shall be defined by AKEP and the contractor.

Proposed price provision

Contractor will provide consulting services at a cost in Euros per hour without VAT (to be stipulated).

Number of consultancy hours should not exceed 800 hours. Price must be fixed for the duration of the contract.

Proposed payment terms

For services done under this contract, the contractor will issue an invoice based on AKEP approval of the monthly report. The monthly invoice must clearly state how many consultant hours have been charged.

Proposed provision on business secret

The data must be securely stored and must be used only for providing services under this contract. A special Non-disclosure agreement (NDA) should be signed.

9. Estimated costs of upgrading AKEP system

The estimated costs of this project have been provided directly to AKEP. The table below is an indication of the key budget lines. The costs can vary depending on AKEP requirements regarding ad hoc analysis and general consultancy on spatial data. However, it is estimated that a three year project, including 800 man hours, is required: upgrading (500 hours) and maintenance (300 hours).

Estimated costs of implementation
Upgrade and maintenance of Web GIS viewer Atlasi Elektronik i AKEP
- Upgrade of Web GIS viewer with module for generating reports of spatial analysis
- Upgrade of Web GIS viewer with system of reporting changes made on database
- Upgrade of Web GIS viewer to enable displaying geo-located raster images on the map
- Establishment of different levels of user access
- Maintenance of Web GIS viewer
Technical consultancy in supplementing the standard data exchange format for publicly available electronic communications networks and upgrading database for optimal management of spatial layers.
- Consultancy in supplementation of standard exchange format for owner of public electronic communications networks
- Upgrade of spatial database for optimal management of spatial layers
Establishment of a system for receiving, monitoring and administration of data of publically available electronic communications networks
- Work-register Module
- Data control Module

Estimated costs of implementation
- Data importer Module
Implementing regular and "ad-hoc" analysis depending on AKEP requirements
- Establishment of module for generating analyses in table or cartographic views
Providing professional technical support in the data management and GIS consultancy
- General consultancy in the field of spatial data and GIS
- Technical support to AKEP regarding settings, installing, reinstalling the software in case of damage or data loss due to technical faults on the hardware
- Preventive tables cleaning in the database, which are used as working tables (import tables, log tables, error tables)
- Educational workshop for AKEP employees using the system

10. Conclusion

This report falls within the framework of the Regional Initiative for Europe on Broadband, approved by the ITU World Telecommunication Development Conference 2014 (WTDC-14). It has provided an opportunity for high-level dialogue between ITU-D, the EC, ITU Member States and Sector Members with particular emphasis on national, regional and international broadband services and infrastructure mapping initiatives.

Mapping of broadband infrastructure benefits a variety of stakeholders including owners of electronic networks infrastructure and operators of electronic communications services that need large-scale independent measurements to assess network performance. With the importance and benefits of mapping of broadband infrastructure in mind, this report, with the help of ITU, highlights how AKOS has worked with AKEP on the project of mapping of telecommunication infrastructure in Slovenia.

Through an evaluation of the AKEP system and the legislative texts of both countries that apply to telecommunications, this report also details the technical specifications for a system upgrade including the tender process, associated costs, and documentation.

Annex 1 – Agenda of study visit regarding mapping of broadband

Date	From 10 to 11 March 2016
Location	AKOS, Stegne 7, Ljubljana, Slovenia
Participants	Agency for Communication Networks and Services of the Republic of Slovenia - Mr Marko Simončič, Head of mapping project - Mr Aleksander Kmetec, telecommunication expert Electronic and Postal Communications Authority (AKEP) - Mr Shefqet Meda, Director of Authorization and frequency Management Department - Mr Ermin Pina, Head sector of frequency Monitoring and Quality Inspection Department - Mrs Aferdita Elbasani, Expert at the Authorization and Frequency Management Department - Ms Ardiola Allushi, Expert at Information technology and Broadband Department
Objectives of study visit	Sharing knowledge, experiences and solutions regarding mapping of telecommunication infra-structure in Slovenia.

First day, 10th of March 2016

Time	Topic	Place
10:30 – 12:30	Introduction History and background of mapping of telecommunication infrastructure in Slovenia Legal background and key definitions AKOS initiative The Network Termination points mapping database	*AKOS*
12:30 – 13:45	Lunch	*Gostilna MEBA, Ljubljana*
13:45 – 15:00	Supervision process Rights of way and access to passive infrastructure (AKEP)	*AKOS*

Second day, 11th of March 2016

Time	Topic	Place
10:30 – 12:30	Technical parameters Internal web viewer Practical examples and possibility of analysis Lessons learned Discussion	*AKOS*
12:30 – 14:15	Lunch	*Gostilna MEBA, Ljubljana*

Annex 2 – Mapping of broadband infrastructure in Slovenia – AKOS part

AKOS

Mapping of telecommunications infrastructure in Slovenia – AKOS part

Marko Simončič

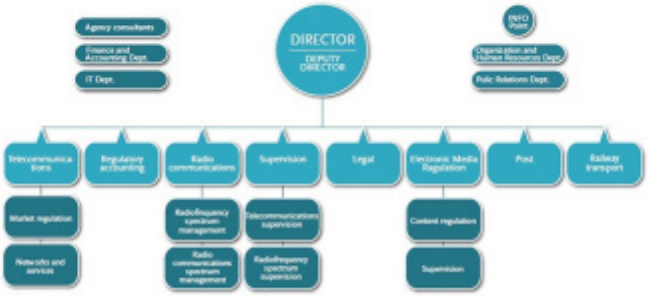
AKOS, 10.3.2016

AKOS

Agency for communication networks and services of the Republic of Slovenia (AKOS)

AKOS is an independent body that regulates and supervises the electronic communications market, manages and supervises the radio frequency spectrum in the Republic of Slovenia, performs tasks in the field of radio and television broadcasting, and regulates and supervises the postal and railway service markets.

- Approx. 80 employees
- Budget approx. 6 mio €
- Around 150 operators of public electronic communications services



AKOS

Agenda of the meeting

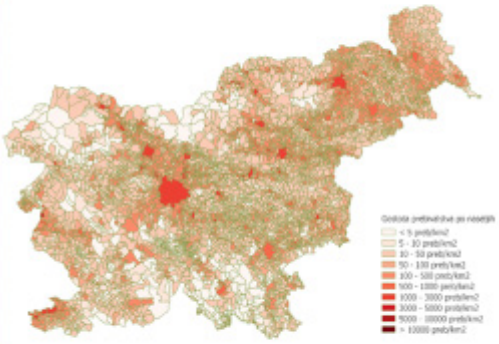
1. DAY
- ✓ Introduction
- ✓ History and background of mapping of telecommunications infrastructure in Slovenia
- ✓ Legal background and key definitions
- ✓ The network Terminations points mapping
- ✓ Supervision process
- ✓ Rights of way and access to passive infrastructure (AKEP)

2. DAY
- ✓ Technical parameters
- ✓ Internal web viewer
- ✓ Practical examples and possibility of analysis
- ✓ Lessons learned
- ✓ Discussion

AKOS

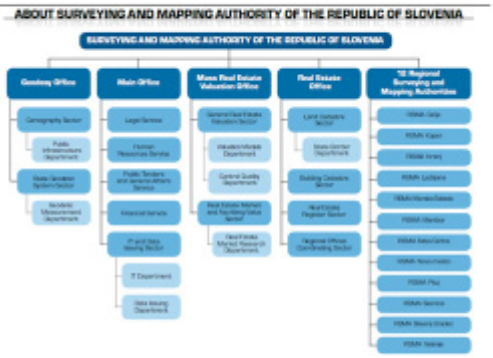
Basic information about Slovenia

Basic statistics about Slovenia	
Population	2.062.874
Area (in km²)	20.274 km²
Number of municipalities	212
Number of urban municipalities	11
Number of settlements	6036
The average population density	102 inh./km²
Average altitude	556.8 m
Highest point	2.864 m
Number of households	851.289
Average household size	2.42



AKOS

The Surveying and Mapping Authority of the Republic of Slovenia (GURS)



ASSIGNMENTS AND OBJECTIVES

The Surveying and Mapping Authority of the Republic of Slovenia is a body within Ministry of the environment and the spatial planning and it comprises the Main office, the Real estate office, the Mass real estate valuation office, the Geodesy office and twelve regional surveying and mapping administrations. These have been set up for the reasons of streamlined operation and the increased accessibility of administrative and professional tasks and services implemented by the Surveying and Mapping Authority of the Republic of Slovenia.

AKOS

History

- 1974 - Land Cadastre Act
- Data on public infrastructure networks and facilities were collected
- Managed for territory of municipalities by a local surveying authority
- Data were not properly maintained and data were incomplete
- Used mainly for the needs of local communities

- After gaining independence in 1991, Slovenia started to redesign the entire legal system.
- The **Spatial Planning Act** was adopted in 2002 (Official Gazette of the RS, No. 110/2002).
- The **Spatial Planning Act** defined the responsibilities and procedures in spatial planning and the types and contents of spatial documents at the **national** and **local levels**. The Act also provided legal basis for the adoption of the basic strategic spatial planning document, namely the Spatial Development Strategy of the Republic of Slovenia (Official Gazette of the RS, No. 76/2004).
- 2005 – Establishment of system of Cadastre of Public Infrastructure
- 2006 – Informatization of system of Cadastre of Public Infrastructure
- The legal basis for spatial planning is the Spatial Planning Act (Official Gazette of the RS, No. 33/2007), which replaced the Spatial Planning Act from the year 2002. The Act clearly regulates the system of national spatial planning documents and their interrelation and precisely defines their contents, adoption procedures and, within this framework, also the procedure of integrated assessment of their environmental impacts.

AKOS

Directorate for the Information Society

REPUBLIC OF SLOVENIA
MINISTRY OF EDUCATION, SCIENCE AND SPORT

Directorate for the Information Society is responsible for accelerated, harmonised and efficient development of the information society based on knowledge and life-long learning. This is in practice reflected in the transfer of knowledge, information and communications technologies and contents to schools and research institutions, public administration and local self-government bodies, the economy and civil society. In its work the Directorate co-operates with various organisations, including those in the field of legislation, security and privacy in the e-world, education, monitoring of indicators of the information society development, promotion of software development and its localisation based on an open and free source, scientific and expert meetings, projects bridging the digital divide and others.

AKOS

Consolidated cadastre of public infrastructure

In 2004 Slovenian Surveying and Mapping Authority started with the development of the central database, called consolidated cadastre of public infrastructure.

Data included:

- Real estate and owners
- Public utility infrastructure, such as roads, railways, sewage, water, electricity, and other
- Electronic communications network connection points

CONSOLIDATED CADASTRE OF PUBLIC INFRASTRUCTURE - February 2013		
Roads	Object	139.543
Railways	Object	7.526
Airports	Object	89
Harbours	Object	1.096
Cable railways	Object	164
Electric energy	Object	1.391.296
Natural gas	Object	387.879
Heat energy	Object	67.738
Oil	Object	214
Water supply	Object	886.337
Sewer	Object	702.296
Waste	Object	3.750
Green surfaces	Object	0
Water infrastructure	Object	7.844
Natural resources	Object	0
Electronic communications	Object	2.427.660

AKOS

Public view of Consolidated cadastre of public infrastructure

AKOS

Legal background for mapping of electronic communications

Slovenian Electronic Communications Act act contains several articles, closely connected to building of the infrastructure.

In the Article 14, the demand to operators to provide data of their network termination points was established.

The same Article provided legal basis for **General act on entry, collection and access to data in the register of infrastructural networks and facilities.**

It is defined:
1. **Who have to report data to the register**
2. **To whom they need to report data**
3. **The time frame for the first reporting and for further changes**
4. **Data status – not public**
5. **Possibility to demand the data on availability of the network elements**

Article 15 gives **supervisory power** to AKOS.

AKOS

Legal background for mapping of electronic communications

Article 14 of Electronic Communications Act (ZEKom-1)
(entry in the register)

(1) The **owner of a communications network and associated infrastructure** referred to in the second paragraph of Article 9 of this Act must supply information on the **types and location of the networks, and of the facilities** as far as they form part of the associated infrastructure, **directly to the body responsible for surveying and mapping**, for the purpose of in the register of infrastructural networks and facilities, in accordance with the regulation governing entry in this register. **Every amendment** to this information shall be reported to the competent body **within three months of its occurrence**.

(2) The **owner of a public communications network and associated infrastructure must, in addition** to the information referred to in the preceding paragraph, **supply information on the existing state of affairs and the capacity of the network termination point directly to the body responsible for surveying and mapping**, for the purpose of entry in the register referred to in the preceding paragraph, in accordance with the regulation referred to in the preceding paragraph. **Every amendment** to this information shall be reported to the competent body **within three months of its occurrence**. The information contained in the record of the existing state of affairs and the capacity of the network termination point **shall not be public**. In addition to the body responsible for surveying and mapping, the **Agency shall have access to all the information** entered pursuant to this paragraph for requirements relating to implementation of this Act, as shall the bodies responsible for the implementation of Article 11 of this Act. The Agency shall, by means of a **general act**, prescribe in detail the information to be entered and the method of collection of the information, determine the categories of other users by method of access to this information in order to provide adequate protection of any business secrets of owners, and regulate other matters arising from implementation of this provision.

(3) The Agency may, for requirements relating to implementation of this Act, require persons liable under the first paragraph of this Article to **supply information on the availability of the networks and facilities** referred to in the first paragraph of this Article, on which it shall keep its own records, and allow interested parties to inspect this information in relation to procedures it is conducting.

Electronic communications act - www.akos-rs.si/files/APEK_eng/Legislation/electronic-communications-act-zekom1.pdf

AKOS

Legal background for mapping of electronic communications

Article 15 of Electronic Communications Act (ZEKom-1)
(supervision)

The Agency **shall oversee the implementation of the provisions** of this Chapter and of the regulations and acts issued pursuant thereto, and cooperate with the inspectorate responsible for construction in doing so.

The Agency has a possibility to act as a supervisor whether the input data is reported or not and if the data is correct.
The fine for the medium or large firm (in case they don't report data) is **from 50.000 - 400.000 €**.

AKOS

Legal background for mapping of electronic communications

AKOS was included into the mapping project in 2012, together with the Ministry of education, science and sport – Directorate for the Information Society and The Surveying and Mapping Authority of the Republic of Slovenia

On the basis of the Electronic Communications Act, AKOS adopted secondary legislation in order to make sure that business secret of the owners of infrastructure will be protected.

General act on entry, collection and access to data in the register of infrastructural networks and facilities.

- Dealing with more detailed prescriptions of the legal demands
- Classification of the users of data
- Exchange Format

Public view
Users with lowest priority: each user of the register has the public view, which contains information if the building has the connection point or not

Owners of the infrastructure
Users with medium priority: owners of the infrastructure who report data can access their own data and public access

Overall access
users with top priority: mapping authority, relevant ministry and NRA; for the purpose of the mapping, analysis, geographic segmentation, designation of white areas; establishing the economic interest database.

Input attributes give the description of the termination point and they need to report: ID number, type of change, cadastral code, code of building inside the cadastral unit, ID of the building address, address connected to the ID, household, type of connection (fibre, coax, copper, wireless), maximum number of possible connections on the building, minimum capacity, active connection (yes/no), ID number of the owner of the broadband connection, coordinates from the state coordinyte system

General act on entry, collection and access to data in the register of infrastructural networks and facilities - http://www.uradni-list.si/1/objava.jsp?urlid=20133890

AKOS

Exchange format

The connection to the building and geolocation

Information about the type, capacity and owner

Atribut	Opis	Tip polja	Obveznost
ID_OPT		18N	Da (v primeru TIP_SPR D ali S)
ID_OPT_UPR		20C	Da
TIP_SPR	Tip spremembe Vrednosti so: D – dodan B – briasan S – spremenjen N – ni sprememben	1C	Da
SIFKO		6N	Da
STEV		11N	Da
STEVDST		8N	Da
STEV_STAN		8N	Ne
HSMID		9N	Da (v primeru, ko ima objekt hišno številko)
INFO_NASLOV		180C	Ne
GOSP		1N	Ne
SIF_VRSTA_SUBJEKTA		1N	Ne
SIF_VRSTA		2N	Da
MIN_ZMOGLJIVOST		8N	Da
PRIKLOP		1N	Da
MAT_ST		7N	Da

AKOS

Exchange format

Information about the type and capacity of the network termination point

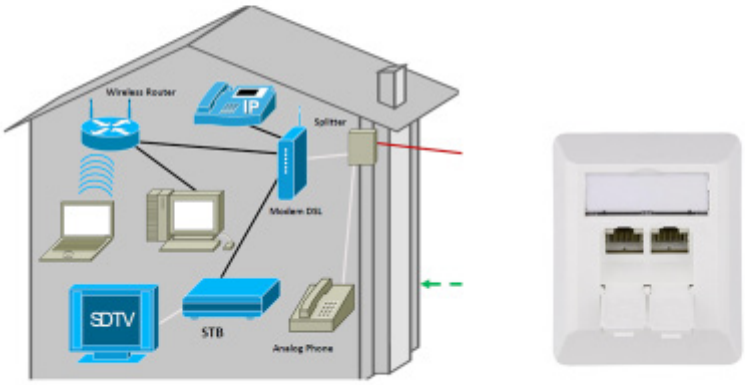
Identity of the owner and geolocation

Atribut	Opis	Tip polja	Obveznost
ID_OPT_ST			
ID_UPR			
TIP_SPR			
SIFKO			
STEV			
HSMID			
INFO_NASLOV			
GOSP			
SIF_VRSTA			
ST_MOZ_PRIKLOP			
MIN_ZMOGLJIVOST			
PRIKLOP			
ID OBJ ZKGJI			
MAT_ST			
Y_D48			
X_D48			

AKOS

The network termination point mapping

'Network termination point' shall mean the physical point at which a subscriber is provided with access to a public communications network; in the case of networks involving switching or routing, the network termination point shall be identified by means of a specific network address, which may be linked to a subscriber number or name.



AKOS

Rules on the land register of the communications network and associated facilities

Guidance and content of cadastre of the communications networks and associated facilities

Type of data needed to be provided directly to the Surveying and Mapping Authority

The installations of communication networks and associated infrastructure which must be recorded in cadastre:

- The communication line of the same type and the same owner on the sam route and the same position withy type indication **(coax, copper, fibre)**
- Cable ducts
- Shaft
- Base stations
- Radio station
- Antenna tower,
- Telecommunications distribution cabinet
- The area of communications facilities

Rules on the land register of the communications network and associated facilities - http://www.pisrs.si/Pis.web/pregledPredpisa?id=PRAV11727

AKOS

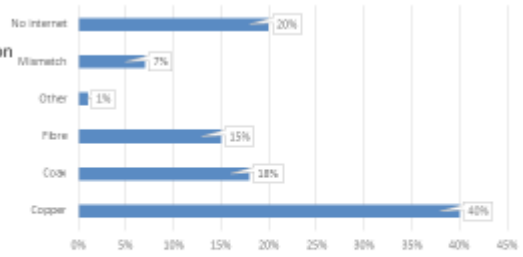
Supervision process and issues

Article 15 gives **supervisory power** to AKOS.

- The amonut of data in the database is Big, so we are not able to check all the data
- AKOS made a **field research** to assess the reliability and the quality of data.
- Representative sample across Slovenia
- 6.8% mismatch
- AKOS started to visit „problematic" owners of infrastructure
- Sending a reminder to all owners of infrastructure

Lessons learned so far:

- Small operators didn't know about the legislation
- Technical issues
- Incorrect or incomplete data
- Motivation!?



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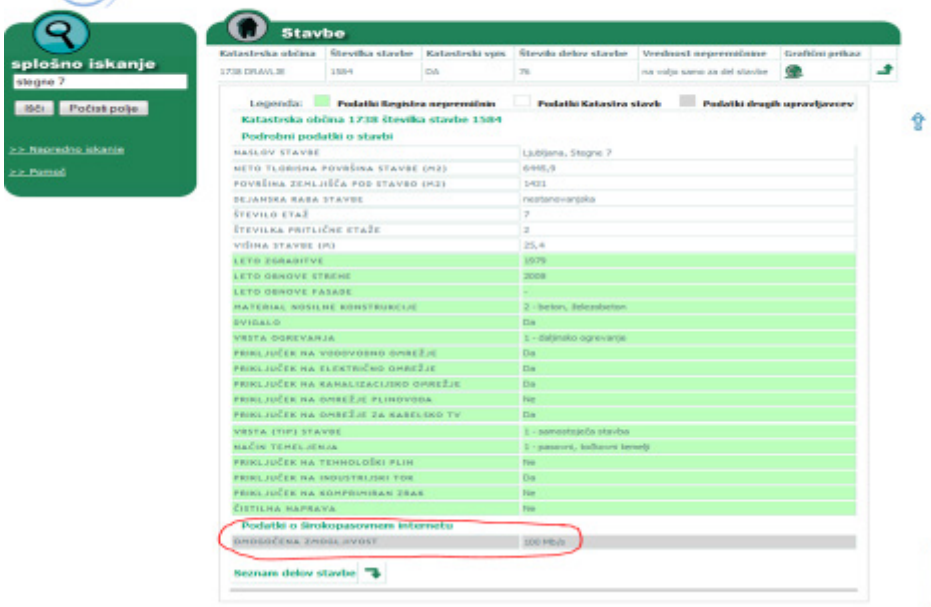
Publically available information about possible capability



AKOS

Technical parameters

AKOS establish its own database, with all the inputs, which are already available and with the additional data collected from owners of electronic communications infrastructure, in order to get complete picture of the networks available in Slovenia.

Own database have a lot of advantages:

- reusing already collected data
- adding different information and various databases (FWBA, base stations, MDFs, etc.)
- responsive database
- flexible
- open source

PostgreSQL

PostgreSQL is a powerful, open source object-relational database system. It has more than 15 years of active development and a proven architecture that has earned it a strong reputation for reliability, data integrity, and correctness.

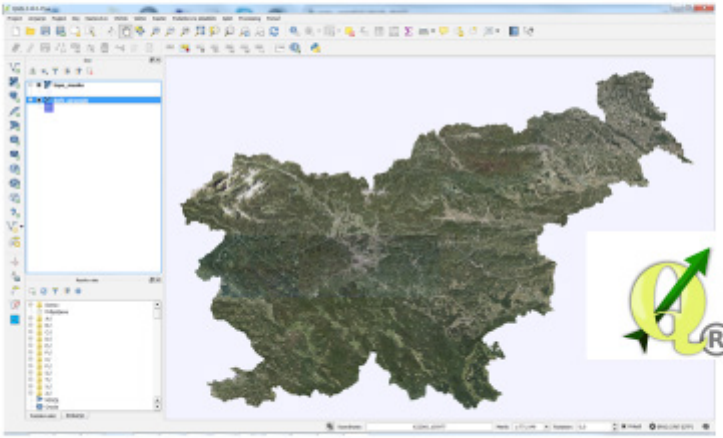
PostGIS

PostGIS is a spatial database extender for PostgreSQL object-relational database. It adds support for geographic objects allowing location queries to be run in SQL.

AKOS

Technical parameters

- AKOS is using **free and open source** Geographic Information System – QGIS as a tool to show results of various analysis and complex research.

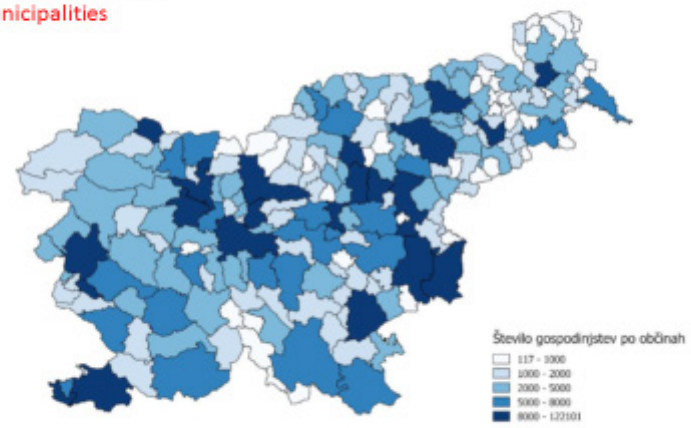


QGIS Trademark

AKOS

Practical examples of analysis

Number of households by municipalities



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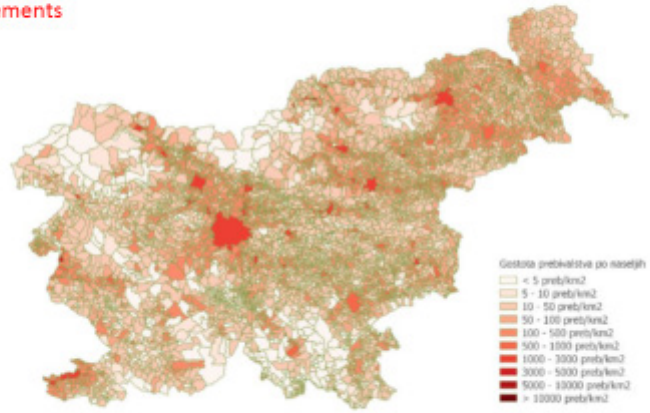
Practical examples of analysis

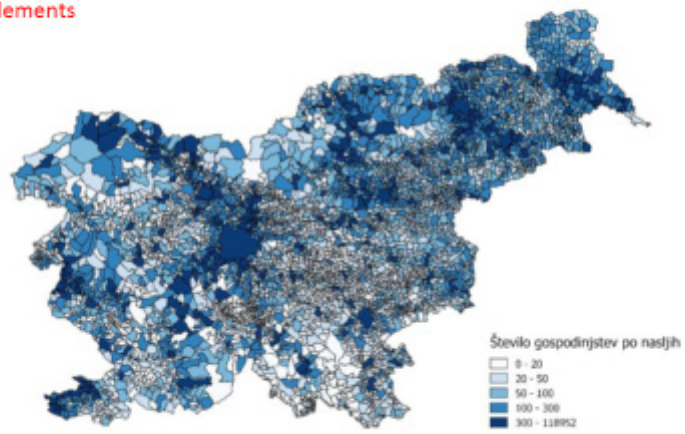
Density of population
by settlements



AKOS

Practical examples of analysis

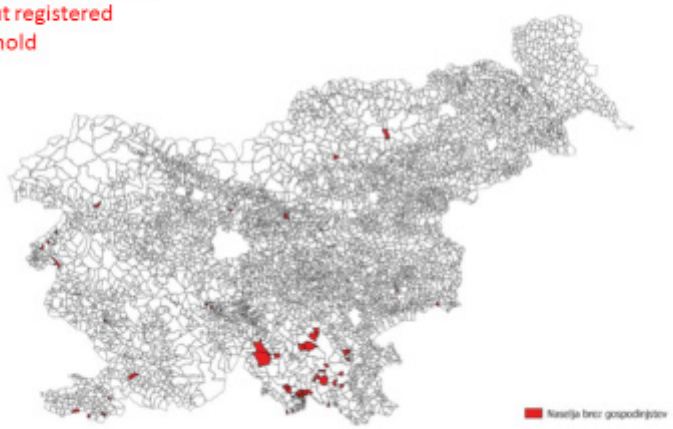
Number of households
by settlements



AKOS

Practical examples of analysis

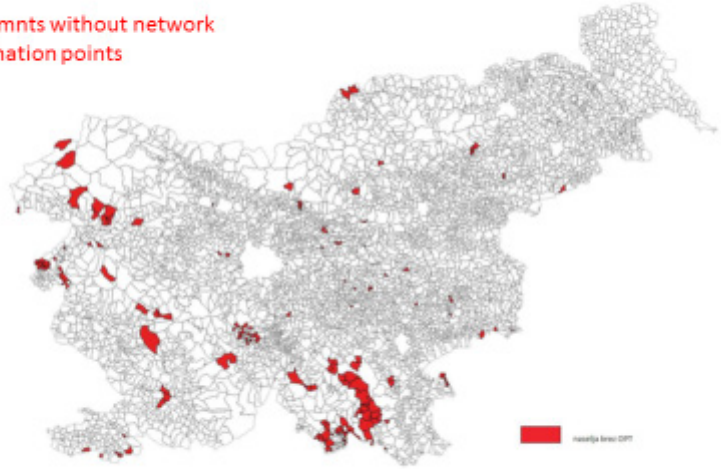
Number of settlements without registered household



AKOS

Practical examples of analysis

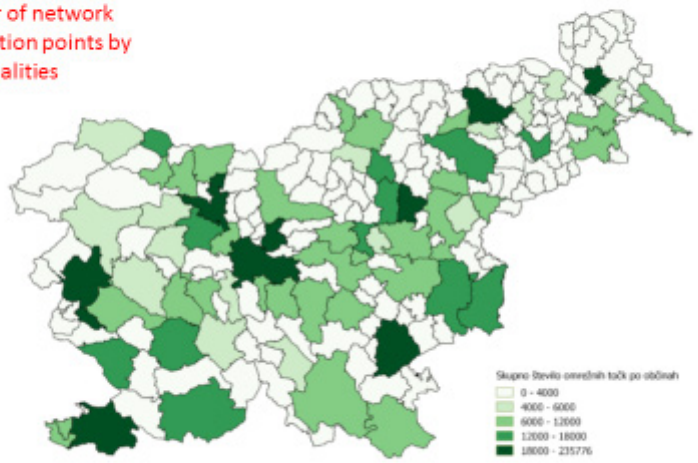
Settlemnts without network termination points



AKOS

Practical examples of analysis

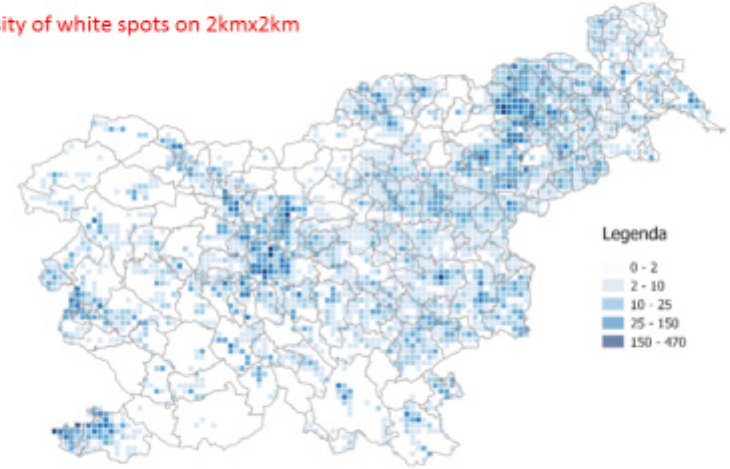
Number of network termination points by municipalities



AKOS

Practical examples of analysis

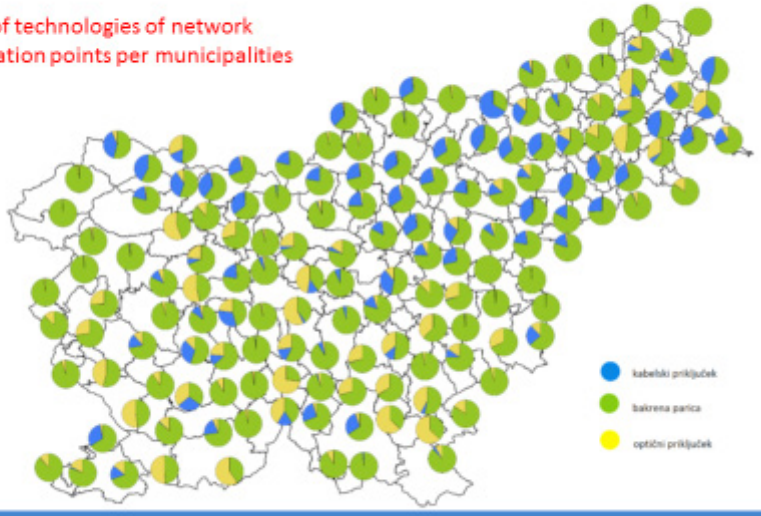
Density of white spots on 2kmx2km grid



AKOS

Practical examples of analysis

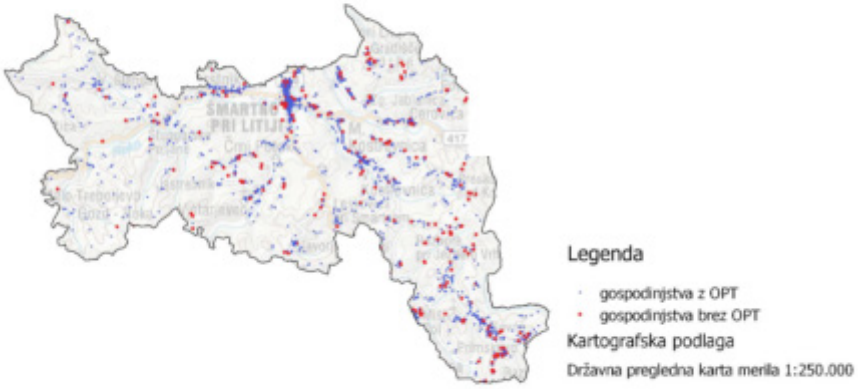
Types of technologies of network termination points per municipalities



AKOS

Practical examples of analysis

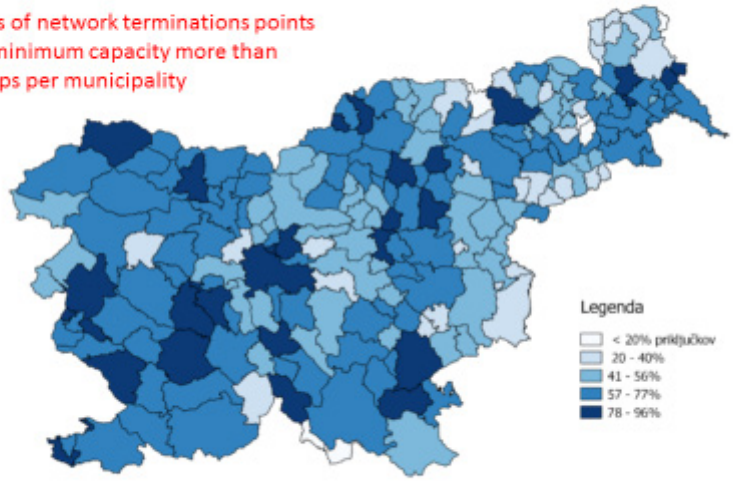
Households in municipality with and without network termination point



AKOS

Practical examples of analysis

Shares of network terminations points with minimum capacity more than 30Mbps per municipality



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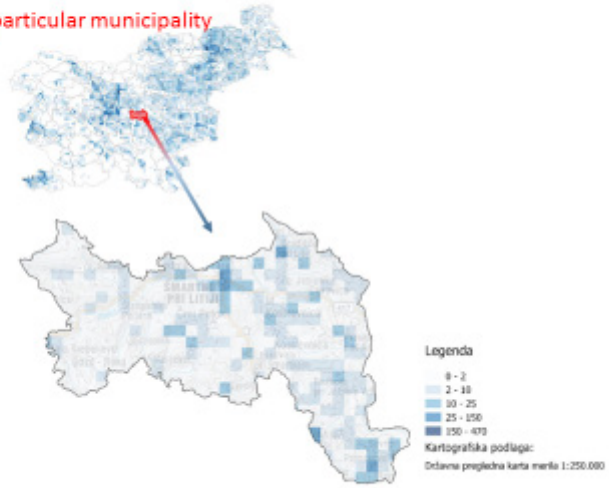
Practical examples of analysis

White spots in particular municipality



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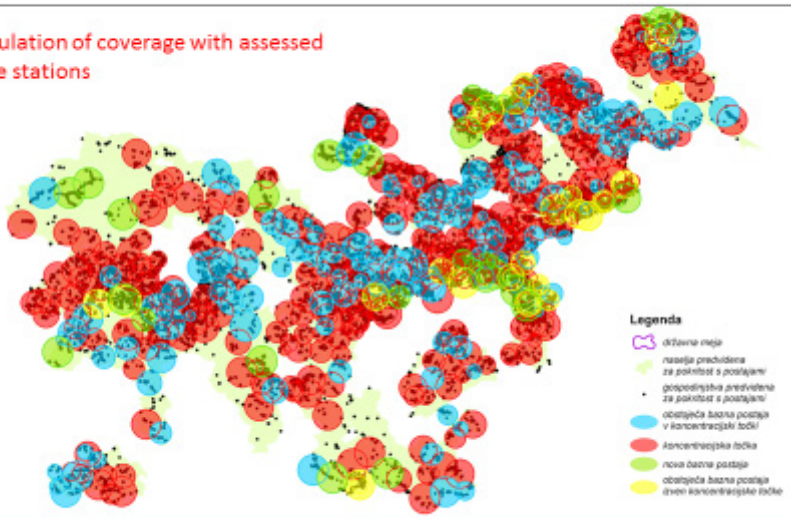
Practical examples of analysis

West – east, statistical regions

AKOS

Practical examples of analysis

Simulation of coverage with assessed base stations



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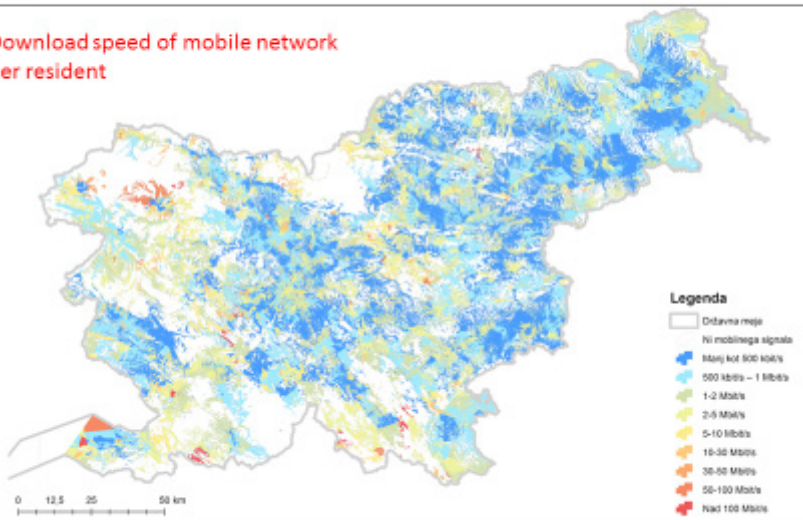
Practical examples of analysis

Download speed of mobile network per resident



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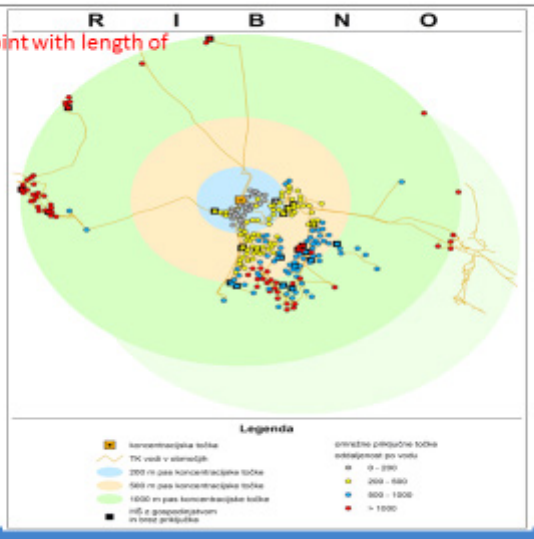
Practical examples of analysis

Concentration point with length of lines



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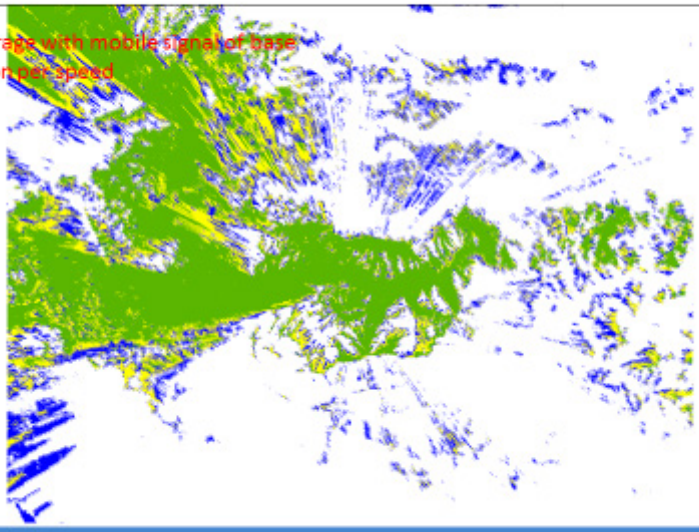
Practical examples of analysis

Coverage with mobile signal of base station per speed



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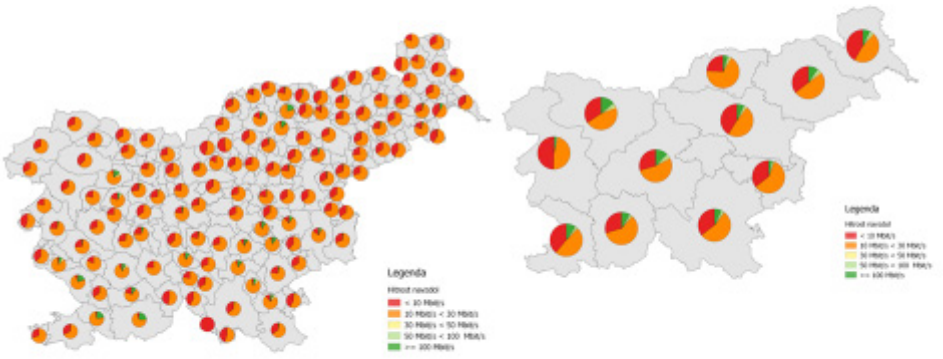
Practical examples of analysis

Analysis by speed



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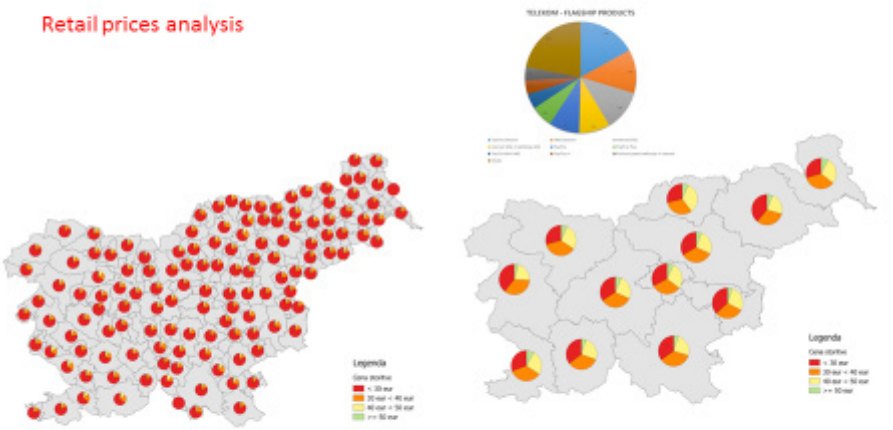
Practical examples of analysis

Retail prices analysis



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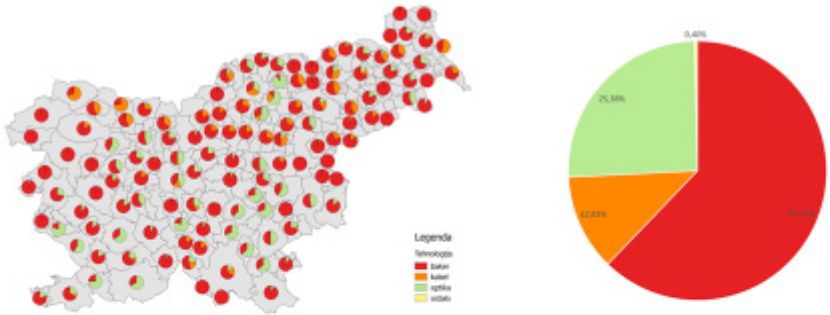
Practical examples of analysis

Analysis by speed



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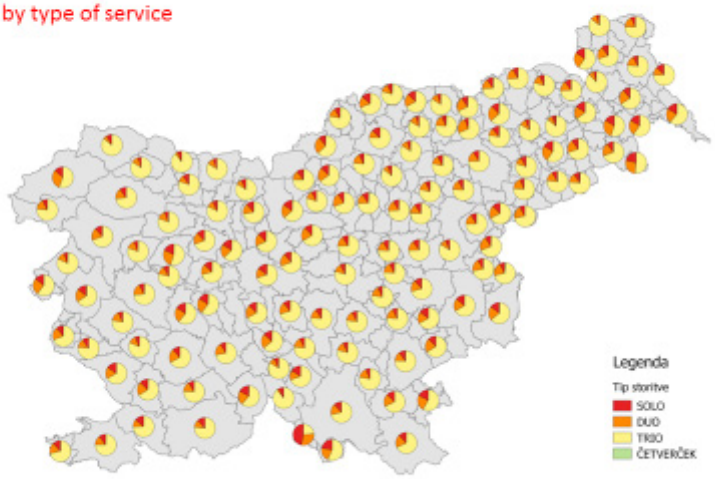
Practical examples of analysis

Analysis by type of service



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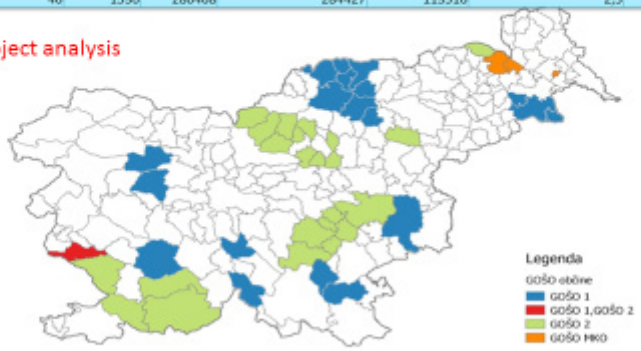
Practical examples of analysis

	Število občin	Število naselij	Število prebivalcev (SURS)	Število stalno prijavljenih prebivalcev (CRP)	Število gospodinjstev (CRP)	Povprečna velikost gospodinjstva	Povprečna gostota prebivalstva
SLOVENIJA	212	6036	2062874	2062633	851289	2,4	101,8
GOŠO	46	1530	280468	284427	113510	2,5	54,1

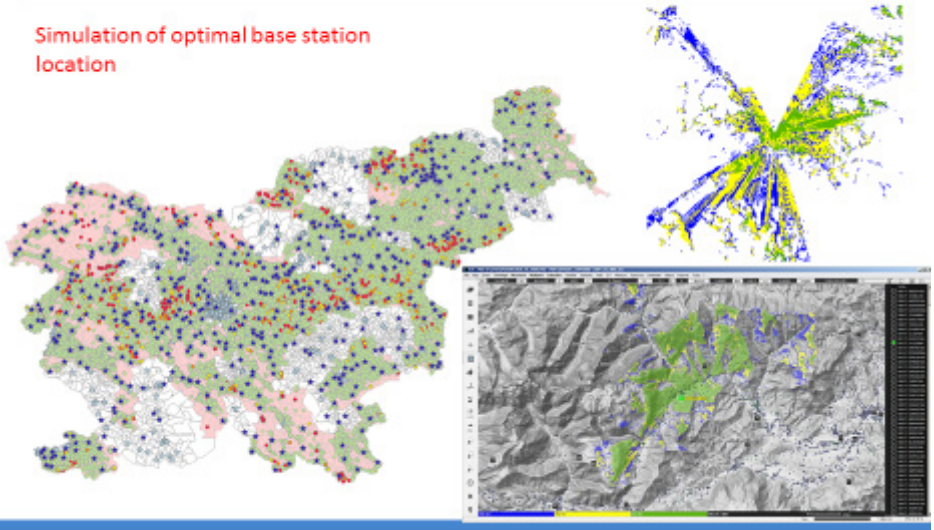
State aid project analysis



AKOS

Practical examples of analysis

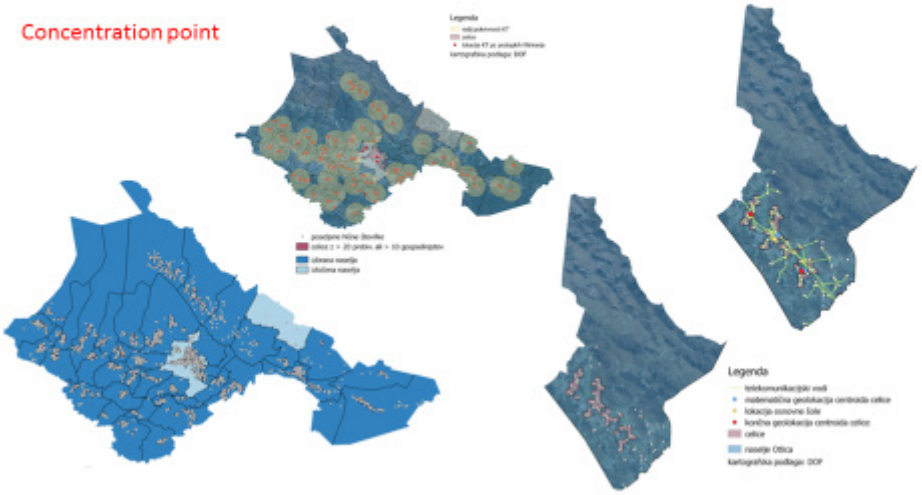
Simulation of optimal base station location



AKOS

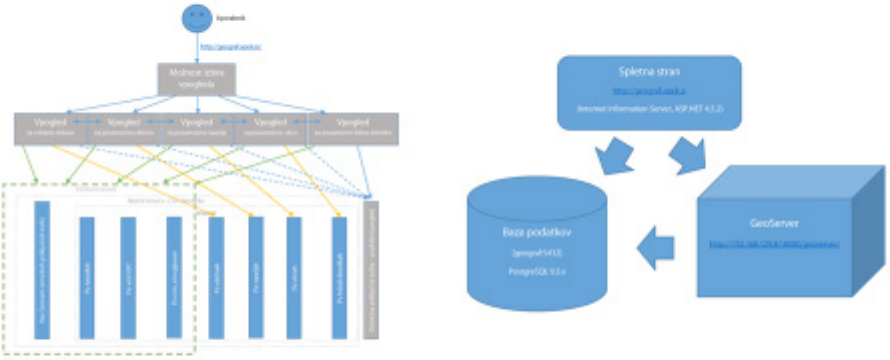
Practical examples of analysis

Concentration point



AKOS

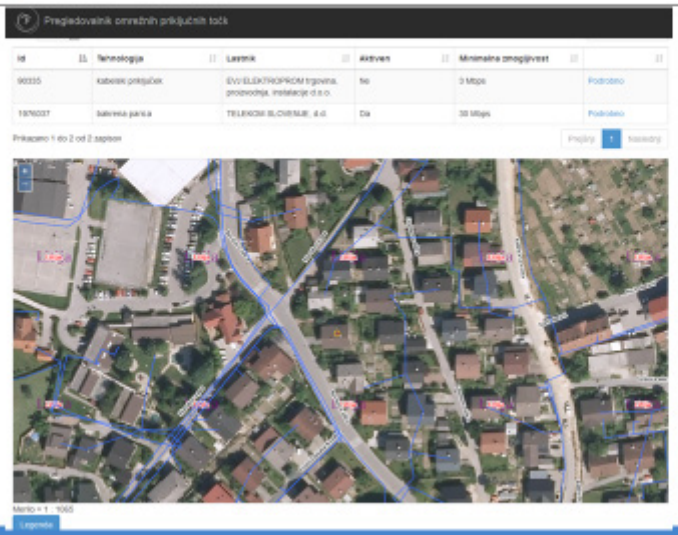
AKOS internal webviewer

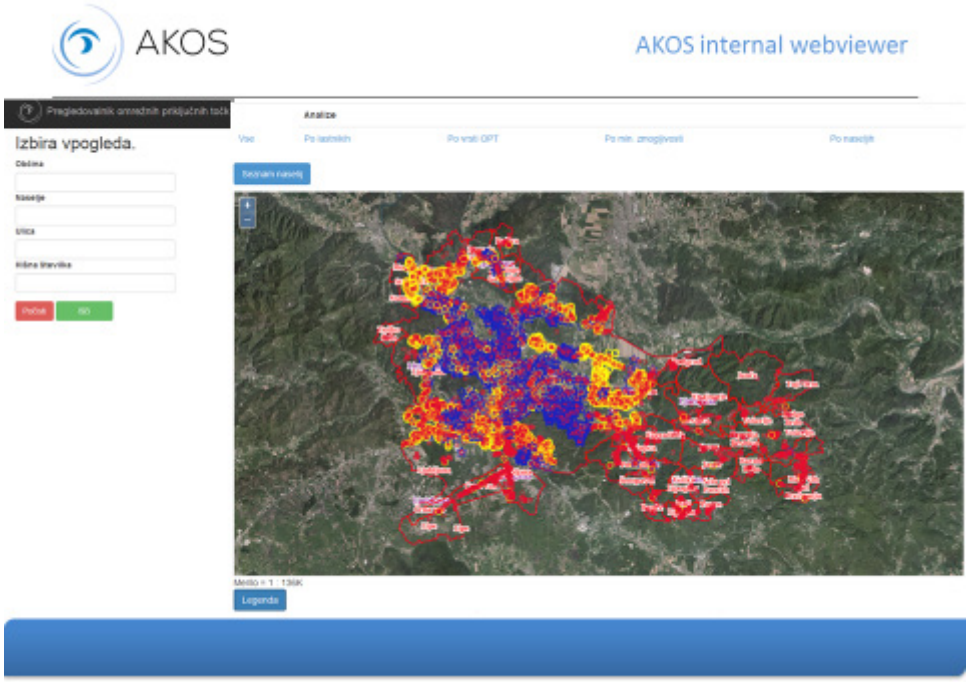


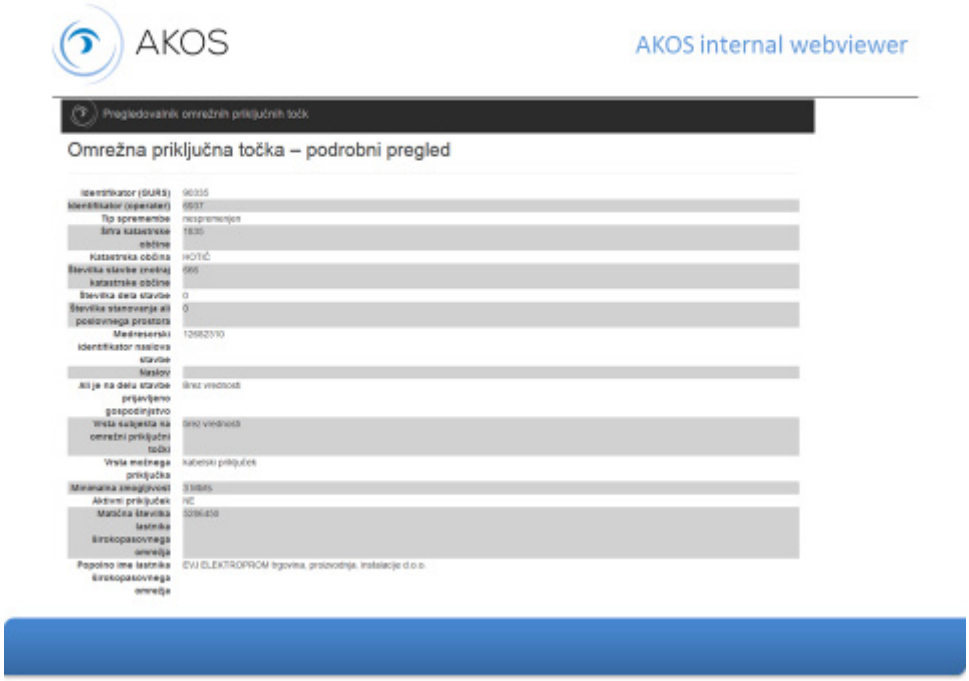
Microsoft Visual Studio 2015
ASP.NET MVC
Microsoft.Net Framework 4.5.2
NuGet

AKOS

AKOS internal webviewer




AKOS
AKOS internal webviewer
Izbira vpogleda.


AKOS
AKOS internal webviewer
Omrežna priključna točka – podrobni pregled

AKOS

Information about public tender

AKOS published public tender in March 2015.

Public procurement for the selection of tenderer for carrying out the consultancy for the establishment of geo-data system, collecting and analyzing data for mapping of infrastructure.
http://www.enarocanje.si/?podrocje=pregledobjave&izpObrazec=379071

Public Procurement Act:
Award of contracts by open procedure (with aim to award the framework agreement)
The open procedure shall be a procedure wherein all parties interested in the public contract award may submit their tenders in accordance with previously defined requirements of the contracting authority specified in contract documents.
Framework agreements
Where a contracting authority enters into a framework agreement with several suppliers the individual contracts can be awarded without reopening competition.

1000 consultants' hours, the lowest price gets 60%, the second the lowest is awarded by 40% (for 4 years)

AKOS

Information about public tender

Technical specifications:

- Acquisition of spatial data from different database utilities infrastructure
- Establishment of a local database, which links existing spatial database and establish a system for capturing and integrating new data into an existing system
- Defining of geographic areas according to the number of households / population density
- Defining of rural and urban areas
- Defining criteria for optimum position of concentration points on a certain number of households / population density
- Determination of the optimal concentration points on a certain number of households / population density
- Collecting data on the availability of capacity of electronic communications operators
- Collecting data on the availability of facilities of other public infrastructure suitable for sharing of electronic communications
- Geographical segmentation: a review of the territory of the Republic of Slovenia and the determination of the number of available access networks, regardless of geographical units.

AKOS

Information about public tender

Requirements:

Technical capacity

1. Knowledge and experience in the planning and implementation of spatial system of public infrastructure on telecommunications field (at least three reference certificate)
2. Knowledge and experience in the design, establishment and maintenance of IT support in the production of spatial databases (at least three reference certificate)
3. Knowledge and experience of collecting and analyzing spatial data in the field of public infrastructure ((at least one reference certificate from telecommunications sector)
4. Knowledge and experience with entry of network termination points in the consolidated cadastre of public infrastructure;
5. Expert knowledge (2 at least university degree in the field of geodesy and at least 2 from the field of informatics)
6. Experiences (key personnel's CV and at least two who will provide support during the contract)
7. Quality of performance, data security (ISO 9001 certificate or equivalent)

AKOS

Information about public tender

May 2015 we publish contract award notice

http://www.akos-rs.si/obvestilo-o-oddaji-javnega-narocila-za-izbiro-ponudnika-za-izvedbo-svetovanj-na-podrocju-vzpostavitve-geo-podatkovnega-sistema,-zbiranja-in-analiziranja-podatkov-za-mapiranje-infrastrukture

Zap. št.	Ponudnik	Ponudbena cena v EUR z DDV
1.	Monolit d.o.o.	41.480,00
2.	TerraGIS, informacijske rešitve d.o.o.	42.700,00
3.	Geodetski zavod Celje d.o.o.	46.360,00
4.	IGEA d.o.o.	48.678,00

AKOS

Information about public tender

In the beginning of the March 2016 we publish new public procurement
http://www.akos-rs.si/javno-narocilo-svetovanje-in-izvedba-geografskih-analiz,-zbiranja-podatkov,-geografske-segmentacije-ter-vzdrzevanje-in-nadgradnja-obstojecega-geo-podatkovnega-sistema-

2000 consultants' hours, the lowest price gets 60%, the second the lowest is awarded by 40% (for 4 years)

We used what we have learned from first public procurement.

Practically the same requirements but much more complex and detailed technical specifications.

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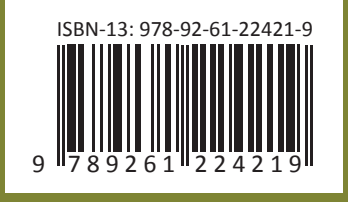

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