



AFRICA-BB-MAPS regional event:

# Africa's National Broadband Mapping Systems

CASE STUDY:

**CROATIA**

*Insights for Africa's Digital Future*

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Abidjan, Cote d'Ivoire

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# CONTENT



- ◆ LEGAL BACKGROUND AND BASICS OF MAPPING ECN
- ◆ ENVIRONMENT NEEDED FOR SUCCESSFUL MAPPING
- ◆ MAPPING SYSTEMS IN CROATIA
- ◆ PROCESS AND SHOWCASES
- ◆ FINAL REMARKS





*"NRAs and/or other competent authorities shall conduct a geographical survey of the reach of electronic communications networks capable of delivering broadband ("broadband networks") by 21 December 2023 and shall update it at least every three years." (Article 22 (1) of Directive (EU) 2018/1972 European Electronic Communications Code)*

For the purposes of:

- **Tasks** under jurisdiction of **NRA** (market analysis, checking obligations from spectrum licenses, statistical reports, etc.). (Article 20 of EECC)
- **Public Funding** - supporting implementation of the state aid rules and guidelines.
- **Investment forecasts** (announcements and their realizations).
- **Monitoring** progress toward Digital Decade targets and its objectives.
- **Public information**



*"Member States shall ensure that, in order to request access to physical infrastructure in accordance with Article 3(2), every undertaking providing or authorized to provide public communications networks has the right to access, upon request, the following minimum information concerning the existing physical infrastructure of **any network operator**: (a) location, and route; (b) type and current use of the infrastructure; and (c) a contact point"*

*(Article 4 of Directive 2014/61/EU, Broadband Cost Reduction Directive)*





## Why do we need to map networks?



**MAPPING** – creating a visual or symbolic representation of data, objects, or relationships between different elements, on a **Map**.

### PHYSICAL INFRASTRUCTURE

### BROADBAND COVERAGE

Gigabit infrastructure Act Regulation (EU) 2024/1309	LEGAL BASIS (EU)	Article 22 of EEC Directive (EU) 2018/1972
INVESTORS IN EC NETWORKS	FOCUSES ON	BENEFITS OF END USERS
All network operators (gas, electricity, sewerage, heating, water, oil and ECN)	SOURCE OF DATA	ECN operators and EC service providers
<b>Lines</b> (infrastructure route) and <b>Points</b> (i.e. location of nodes, manholes, antenna poles, etc.)	GEOMETRY OF COLLECTED DATA	<b>Points</b> (address model), <b>polygon</b> (mobile network coverage)
Record existing and future network physical infrastructure for the purpose of sharing (symmetrical access) or co-investment in network infrastructure between operators and coordination of civil works.	PURPOSE	Analysis of the current broadband coverage and take-up, as well as announced future investments in broadband deployment.
Reduce costs of deployment of EC networks i speed up development of networks and usage of broadband services.	GOAL	Detecting areas of market failure, financial planning of necessary state aid for improving coverage and demand and finally as information of general public interest.
(ECN interest) location of ducts, masts, antenna poles, nodes, manholes, cables as well as other feasible infrastructures (electricity, sewerage).	DATA CONTAINS	Available type of infrastructure at NTP at end user premises (Home passed), access speed (DL/UL), investment forecasts.
State Geodetic Administration (DGU)	SINGLE INFORMATION POINT	HAKOM
<a href="http://ski.dgu.hr">http://ski.dgu.hr</a>	link	<a href="http://mapiranje.hakom.hr">http://mapiranje.hakom.hr</a>
HAKOM	DISPUTE SETTLEMENT BODY	HAKOM





## Environment needed for successful mapping

Involved entities- data sharing



### OPERATORS

#### Data delivered to NRA or CA

- **Broadband coverage** (fixed and mobile networks)
- Number of users of the services
- Infrastructure (fibres, cables, ducts, masts, manholes, poles, etc.)
- Future investment plans

#### Levels of granularity for coverage and take-up:

- Regional
- Local (Municipality)
- **Address**



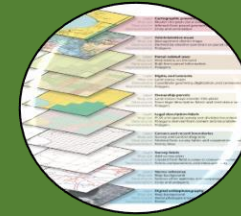
### STATISTICAL BUREAU

#### Socio-economic parameters

- Number of house holds
- Age and other groups
- Population numbers
- etc.

#### Levels of granularity

- National
- Regional
- Local (Municipality)
- **Address**



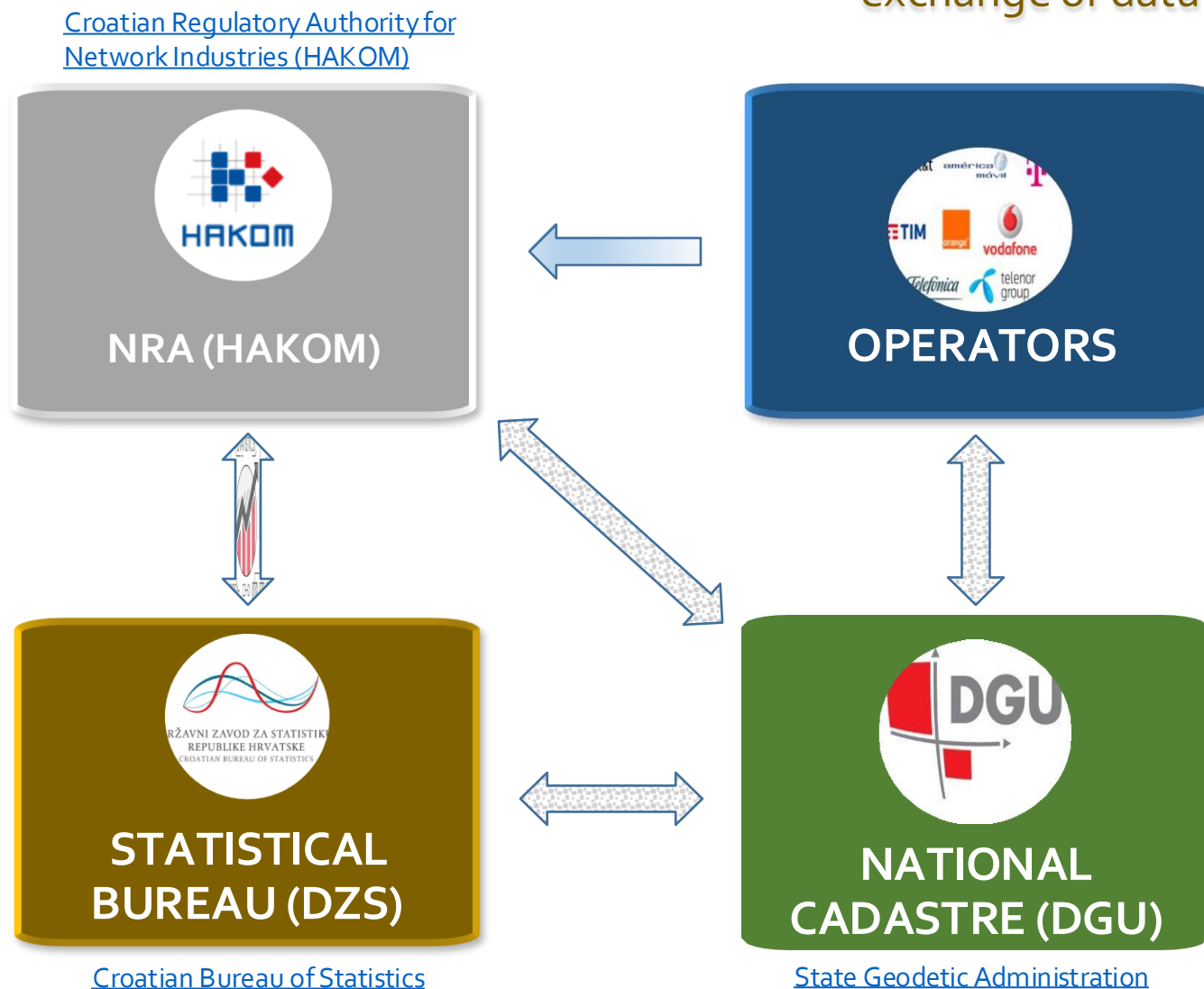
### NATIONAL CADASTRE

#### Digital cartography needed

- Digital orthophoto maps
- Administrative areas (polygons)
- **Addresses (points)**
- Parcels (polygons)
- Infrastructures (lines or points)
- Streets, roads, railways (lines)
- Buildings



## Environment for successful mapping exchange of data between entities







# BEREC Guidelines on Geographical Surveys of network deployments



- The Guidelines give instructions on how to collect data at the EU level - harmonization of collected data.
- Guidelines covers:
  - elements that need to be collected, which describes the characteristics of the network (speed in both directions, access technology, granularity of collection) for fixed and mobile networks
  - cartographic layers that are necessary for spatial analysis of collected data (administrative areas, division into rural and urban areas, areas of public interest, soil types, road routes, census units with socio-demographic data, base maps)
  - recommendations for the establishment of a data collection process on future investments.





### Why we collect broadband data on broadband at address level?

Many addresses, especially in urban areas, are covered with different types of infrastructures from one or more operators or same type of infrastructure (usually fibre) is delivered by two or more operators – “**overbuilding**”.

Only **lowest level of granularity** gives possibility to fully analyse combined data from different operators at same location (address).

This enables precise calculation of real coverage, i.e. we can filter duplication of the data (either by infrastructure or by operators) and provide accurate coverage total for any higher level of granularity (street, municipality, region, country).



**BP: Impose the usage of Official addresses register developed by State Geodetic Administration and make it available to all shareholders.**

**Result:** Harmonized names of house addresses as well as usage of unique address identifier (Address ID) across all entities involved.

Precise targeting of underserved homes, avoid overbuilding where coverage exists, ideal for State aid, Universal Service Obligation and progress tracking.







### Missing puzzle!

After mapping coverage, it is necessary to link the obtained spatial data on coverage with the respective socio-economic and demographic parameters (e.g., households, premises, age-groups, etc.) as those are usually in the focus of monitoring development of the connectivity. (i.e. percentage of households/population covered by...)

In order to make such link possible and perform final calculation, these parameters should be available for each address, so the result contains information respective to mentioned parameters,

Currently, many countries in EU experience this obstacle in form of not receiving statistical parameters at address level from Statistical Offices due to [Regulation 223/2009/EU](#) which prohibits using this type of data in non-statistical purposes.

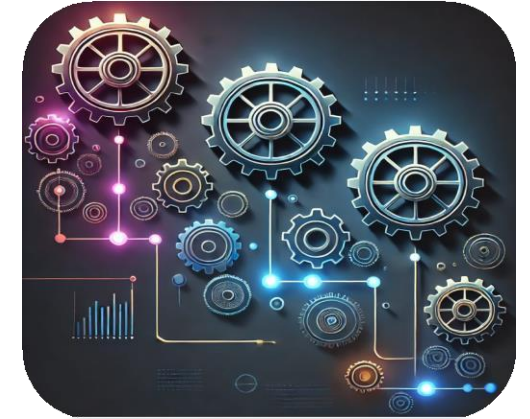
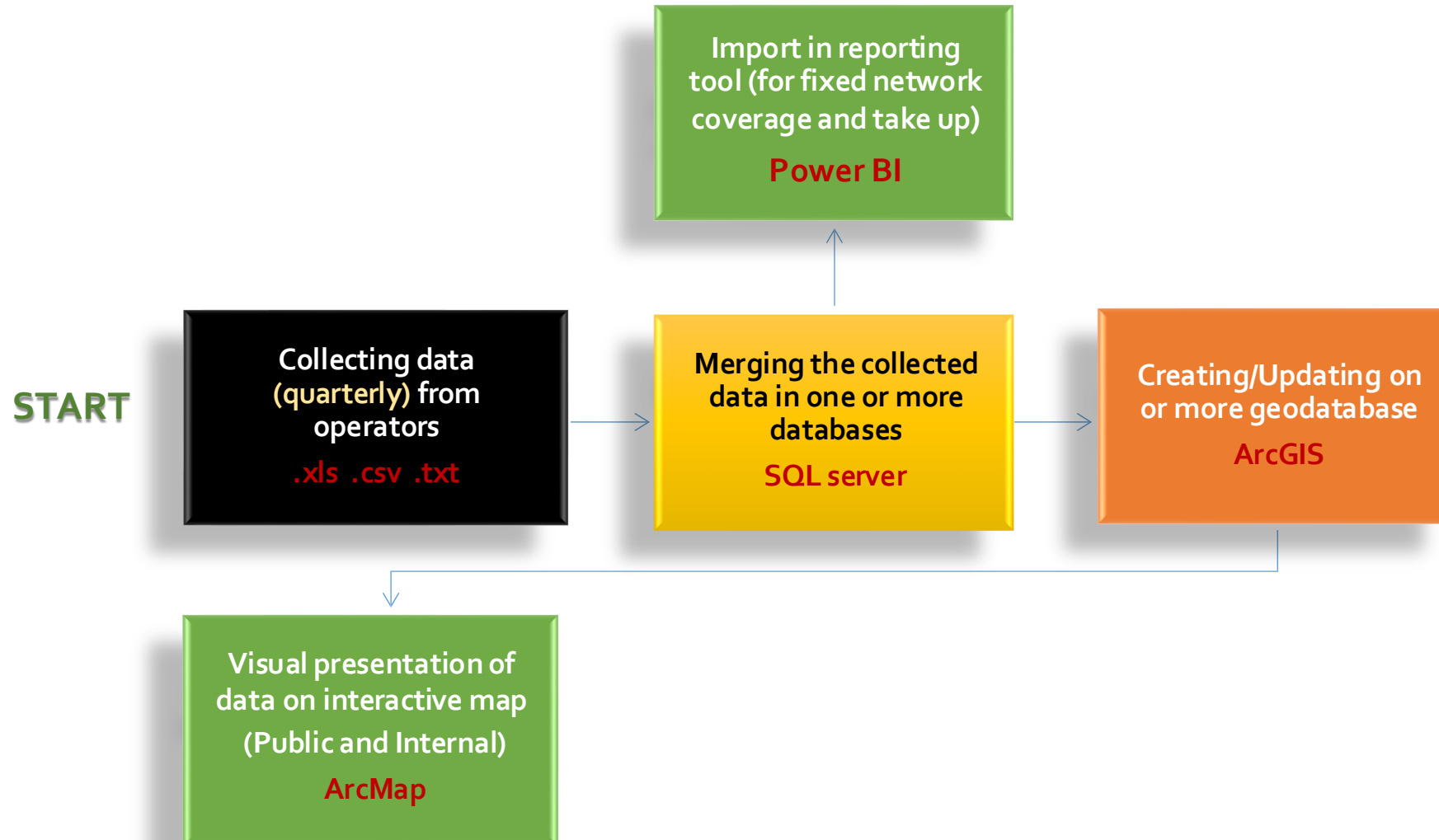
Consequently, **this information is not available to NRA's and CA's** who have jurisdiction over all types network infrastructures.

Nevertheless, beside Statistical Offices, National Banks and Capital Cities are also eligible to create statistical data, therefore those entities have access to those crucial data.





## Mapping broadband coverage and take-up general process





## Mapping broadband coverage in Croatia

### Technologies, layers and coverage speed classes

Oznaka razreda brzine ugovorene s korisnicima	Raspon brzina
0M	[0 Mbit/s, 2 Mbit/s>
2M	[2 Mbit/s, 4 Mbit/s>
4M	[4 Mbit/s, 10 Mbit/s>
10M	[10 Mbit/s, 20 Mbit/s>
20M	[20 Mbit/s, 30 Mbit/s>
30M	[30 Mbit/s, 50 Mbit/s>
50M	[50 Mbit/s, 100 Mbit/s>
100M	[100 Mbit/s, 300 Mbit/s>
300M	[300 Mbit/s, 500 Mbit/s>
500M	[500 Mbit/s, 1000 Mbit/s>
1G	[1 Gbit/s, 10 Gbit/s>
10G	10 Gbit/s i više

Classification of data is more detailed than BEREC Guidelines recommends.

(Important: Design your data system and policies to be future proof in regards of changes in Tech).

Oznaka infrastrukture	Medij	Tehnologija	Topologija	Opis	
P2P Ethernet	Svjetlovod	Ethernet	FTTP P2P	P2P sa MPoP-a	
P2P-PON		P2P PON	FTTP P2P	PON sa zadnjim spliterom u MPoP-u	
P2MP-Ethernet		Ethernet	FTTP P2MP	P2MP sa Ethernet preklopnicima umjesto splitera	
P2MP-PON		P2MP PON	FTTP P2MP	P2MP sa zadnjim spliterom u distribucijskom čvoru	
P2MP-WDM		WDM PON	FTTP P2MP	P2MP PON s primjenjenim WDM-om	
FTTB G.FAST	Bakrena parica	G.FAST	FTTB	G.FAST primijenjen na instalacijama u zgradi	
FTTDp G.FAST			FTTDp	G.FAST primijenjen na privodu	
FTTDp VDSL (VECT) <sup>1</sup>		VDSL (Vectoring)	FTTDp	VDSL (Vectoring) primijenjen na privodu	
FTTB VDSL (VECT) <sup>1</sup>			FTTB	VDSL (Vectoring) na instalacijama u zgradi	
FTTC VDSL (VECT) <sup>1</sup>			FTTC	VDSL (Vectoring) na paricama od kabineta do krajnjeg korisnika	
FTTN VDSL (VECT) <sup>1</sup>			FTTN	VDSL (Vectoring) na paricama s nezavisnog čvora	
VDSL		VDSL	xDSL	VDSL na paricama od centrale do krajnjeg korisnika	
ADSL		ADSL	xDSL	ADSL na paricama od centrale do krajnjeg korisnika	
Docsis 2.x		Koaksijalni kabel	Docsis 2.x	HFC	Docsis 2.x na koaksijalnom kabelu
Docsis 3.x			Docsis 3.x	HFC	Docsis 3.x na koaksijalnom kabelu
FWA-WiFi	Radio	WiFi	FWA	Nepokretni radijski pristup putem slobodnog frekvencijskog područja	
FWA-LTE		LTE	FWA	Nepokretni radijski pristup putem mobilne mreže	
FWA-LTE-A		LTE-A	FWA	Nepokretni radijski pristup putem mobilne mreže	
FWA-5G		5G	FWA	Nepokretni radijski pristup putem mobilne mreže.	
FWA-WiMAX		WiMAX	FWA	Nepokretni radijski pristup putem privatne mreže.	
FMA		FMA	FMA	Nepokretni pristup putem mobilne mreže ("Homebox", "Gigabox", "Pokućni internet" i sl.) za koji se ne garantira brzina pristupa.	
VSAT		Satelit	SAT	Nepokretni radijski pristup putem satelitske veze	
Hybrid		Radio + Bakrena parica	5G/LTE-A+ADSL	Hybrid	Kombinirani pristup putem pokretne i nepokretne pristupne mreže

<sup>1</sup> Kod VDSL tehnologije može biti primijenjena tehnologija vectoringa koja povećava propusnost parice. Ako je primijenjen vectoring u oznaku tehnologije se stavlja

<sup>1</sup> Kod VDSL tehnologije može biti primijenjena tehnologija vectoringa koja povećava propusnost parice. Ako je primijenjen vectoring u oznaku tehnologije se stavlja



# Mapping broadband coverage

## architecture type and throughput speeds

INPUT PARAMETERS		Coordinates of object HTRS96/TM		Data on building (address)						availability to provide broadband acces on OWN infrastructure			Ducting in the street	Ducting to t object
QUARTER	OPERATOR	X	Y	KB_ID	Region (DGU)	Municipality (DGU)	Village (DGU)	Street name (DGU)	House number (number/suf	maximum download speed	upload speed (Mbit/s	type of infrastructure	[DA/NE]	[DA/NE]
Q4 2022	OPERATOR Z Ltd.			2005664	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Andrije Hebranga	2B	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			50731	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Ante Trumbića	1B	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			1450318	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Antuna Branka Šimića	1	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.				Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Antuna Mihanovića	14B	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			50751	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Antuna Mihanovića	8	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			50812	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Augusta Šenoe	6A	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			60864	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Dr. Ante Starčevića	24	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			60852	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Dr. Ante Starčevića	8	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			61374	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Ferde Livadića	4	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			61409	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Ferde Rusana	10	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			61796	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Frana Supila	11	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			61785	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Frana Supila	2	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			61787	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Frana Supila	4	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			63643	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Ivana Gundulića	1	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			63654	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Ivana Gundulića	14	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			63649	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Ivana Gundulića	6	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			64153	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Ivana viteza Trnskog	19	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.			57345	Bjelovarsko-bilogorska županija	BJELOVAR	Bjelovar	Josipa Jurja Strossmayer	2	1.000	1.000	P2P Ethernet	NE	NE
Q4 2022	OPERATOR Z Ltd.											P2P Ethernet	NE	NE

Data is requested and acquired from all commercial EC infrastructural operators.

Around 1 year time was needed for operators to adjust or newly design their own databases according to gathering template and to “learn” categorizing their network data in accordance with provided topology definitions and to import official address databases in their processes.  
(Large operators due to financial resources adapted quicker.)





## Mapping of take-up



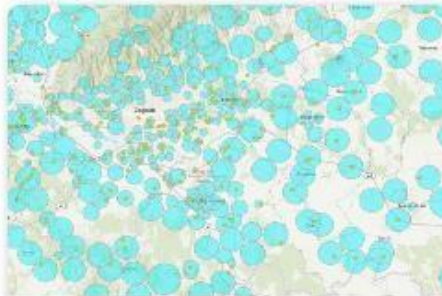
PARAMETRI	Koordinate točaka		Podaci o objektu (adresi)						Podaci o infrastrukturi		Broj ugovorenih privatnih korisnika (kućanstva) na adresi														Broj ugovor					
OPERATOR	X	Y	KB_ID	Županija (DGU)	JLS (DGU)	Naselje (DGU)	Naziv ulice (DGU)	Kućni broj (broj/podbr oj)	Vlasnik infrastrukture	Oznaka infrastrukture	0M	2M	4M	10M	20M	30M	50M	100M	300M	500M	1G	10G	Pristupna brzina nije ugovorno određena	0M	2M	4M	10M	20M		
Operator X d.o.o.			22014095	Grad Zagreb	GRAD ZAGREB	Buzin	Bani	75	Akton d.o.o.	P2P Ethernet																	3	6	18	
Operator X d.o.o.			22067909	Grad Zagreb	GRAD ZAGREB	Zagreb	Selska cesta	93	Akton d.o.o.	P2P Ethernet																			13	
Operator X d.o.o.			22102908	Grad Zagreb	GRAD ZAGREB	Zagreb	Ul. Josipa Marohnića	5	Akton d.o.o.	P2P Ethernet																	5			
Operator X d.o.o.			22135014	Grad Zagreb	GRAD ZAGREB	Zagreb	Strojarska cesta	22	Akton d.o.o.	P2P Ethernet																				
Operator X d.o.o.			22075272	Grad Zagreb	GRAD ZAGREB	Zagreb	Illica	1A	Akton d.o.o.	P2P Ethernet																				
Operator X d.o.o.			22121814	Grad Zagreb	GRAD ZAGREB	Zagreb	Ivana Lučića	2A	Akton d.o.o.	P2P Ethernet																				
Operator X d.o.o.			22122214	Grad Zagreb	GRAD ZAGREB	Zagreb	Radnička cesta	80	Akton d.o.o.	P2P Ethernet																				
Operator X d.o.o.			22121915	Grad Zagreb	GRAD ZAGREB	Zagreb	Ulica grada Vukovara	284	Akton d.o.o.	P2P Ethernet																				
Operator X d.o.o.			22006458	Grad Zagreb	GRAD ZAGREB	Zagreb	Ilica Velimira Škorpik	24	Akton d.o.o.	P2P Ethernet																				
Operator X d.o.o.	487360,45	5022571,02		Sisačko-moslavačka županija	PETRINJA	Jošavica	Jošavica	bb	Akton d.o.o.	FWA-WiFi																	1	17		
Operator X d.o.o.			697893	Zagrebačka županija	KRIŽ	Novoselec	ark hrvatskih mučenik	4	Akton d.o.o.	FWA-WiFi	3			1	28												4		35	
Operator X d.o.o.			22131968	Grad Zagreb	GRAD ZAGREB	Zagreb	Ulica braće Domany	8	Akton d.o.o.	FWA-WiFi					8														55	
Operator X d.o.o.			22010255	Grad Zagreb	GRAD ZAGREB	Hrvatski Leskovac	Stara cesta	43	Akton d.o.o.	FWA-WiFi					1														18	
Operator X d.o.o.	559655.02	5070827.96		Zagrebačka županija	SVETA NEDJELJA	Sveta Nedelja	Kozjak	bb	Akton d.o.o.	FWA-WiFi					6														29	
Operator X d.o.o.	574918.49	5080872.82		Grad Zagreb	GRAD ZAGREB	Zagreb	Slijemska cesta	bb	Akton d.o.o.	FWA-WiFi					3															
Operator X d.o.o.			1198383	Zagrebačka županija	VELIKA GORICA	Velika Gorica	Trg grada Vukovara	9	Akton d.o.o.	FWA-WiFi			5														56			
Operator X d.o.o.			2133955203	Grad Zagreb	GRAD ZAGREB	Vugrovec Gornji	Vugrovečka ulica	51	Akton d.o.o.	FWA-WiFi																			9	

Data is required from all internet service providers.

**Never enough information:** Requesting information on the ownership of infrastructure through which service is provided and distinguishing private and business users.

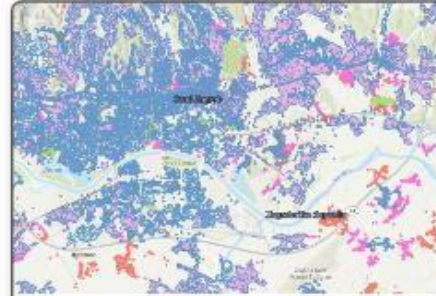


## HAKOM e-maps



Objedinjeni plan operatora pokretnih komunikacija  
Grafički dio objedinjenog plana svih operatora pokretnih komunikacija u RH.

Pokreni preglednik



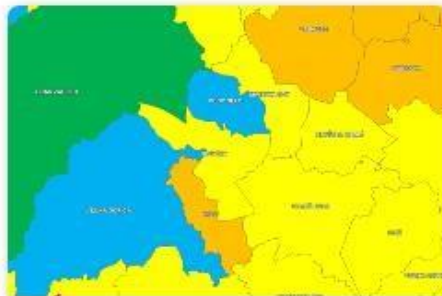
Dostupnost širokopojasnog pristupa  
Obuhvaća prikaz podataka o dostupnosti širokopojasnog pristupa.

Pokreni preglednik



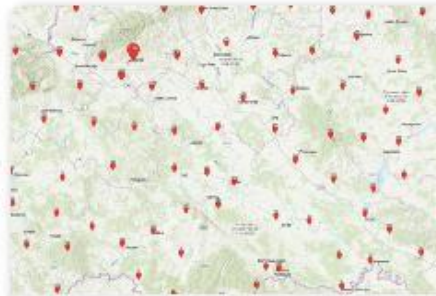
Objave namjere postavljanja (gradnje) svjetlovodne distribucijske mreže  
Prikaz namjere gradnje svjetlovodne distribucijske mreže i plana razvoja širokopojasne infrastrukture.

Pokreni preglednik



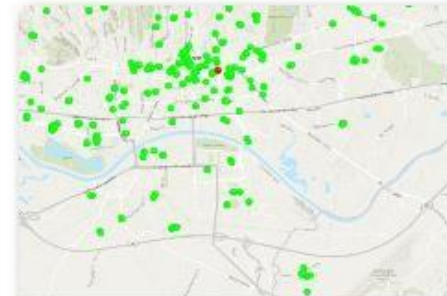
Prikaz korištenja brzina širokopojasnog pristupa  
Prikaz podataka o postocima korištenja brzina nepokretnog širokopojasnog pristupa.

Pokreni preglednik



Radijske postaje  
Prikaz baznih postaja u javnim mrežama pokretnih komunikacija i radijskih postaja u radiodifuzijskoj službi.

Pokreni preglednik



Mjerenja EMP-a  
Sadrži informacije o rezultatima mjerenja razina elektromagnetskih polja obavljenih od strane HAKOM-a.

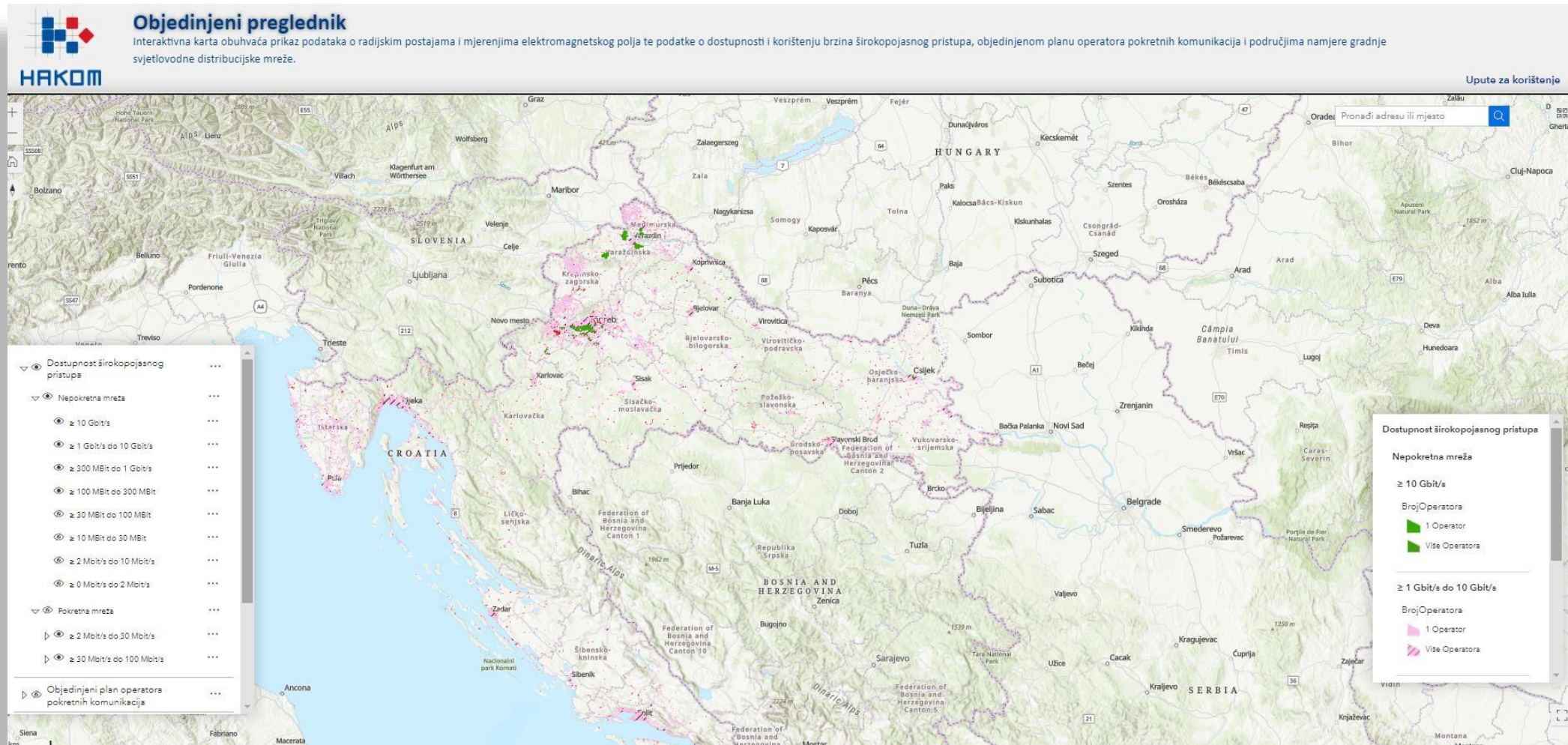
Pokreni preglednik





# HAKOM's Interactive GIS portal

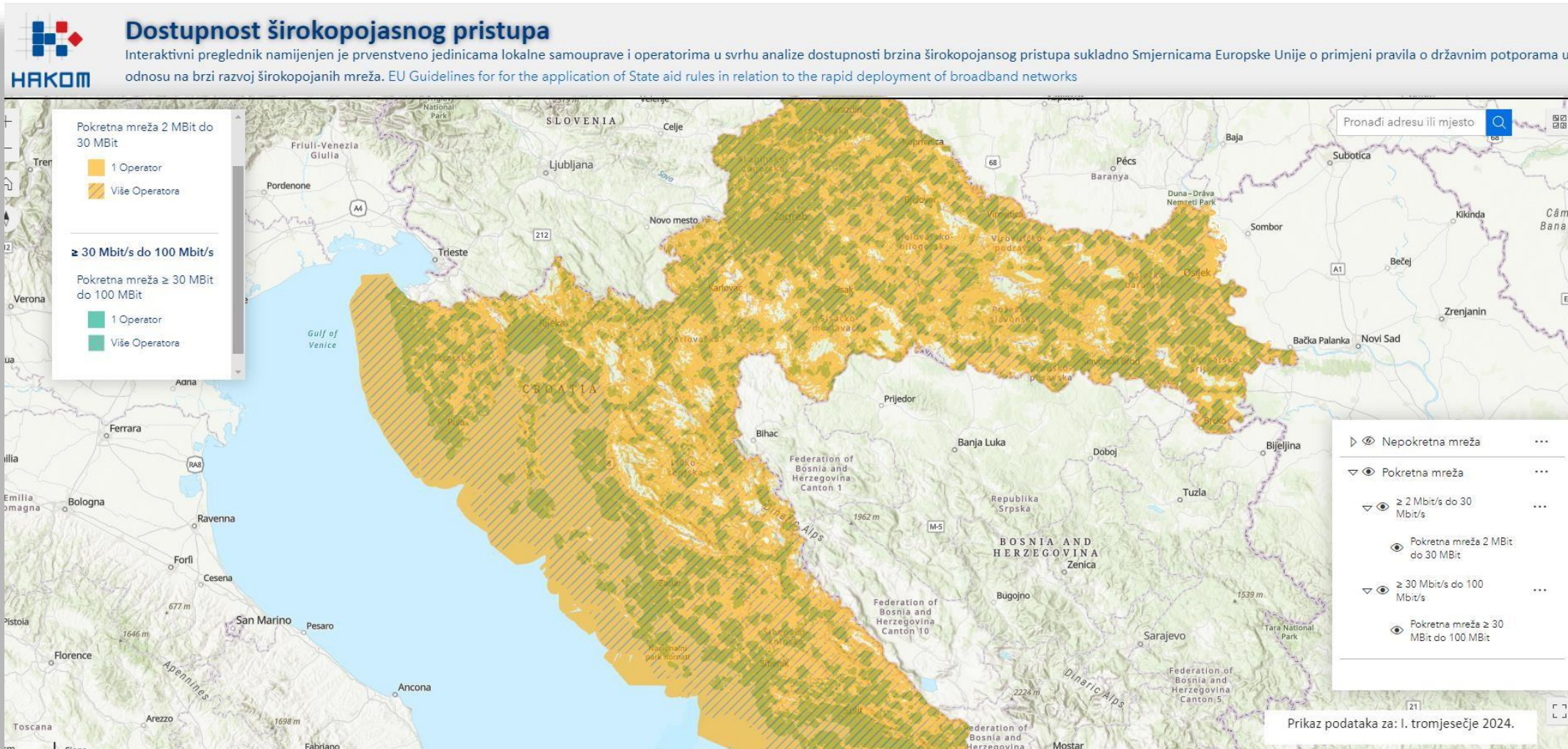
## Mapping of broadband coverage





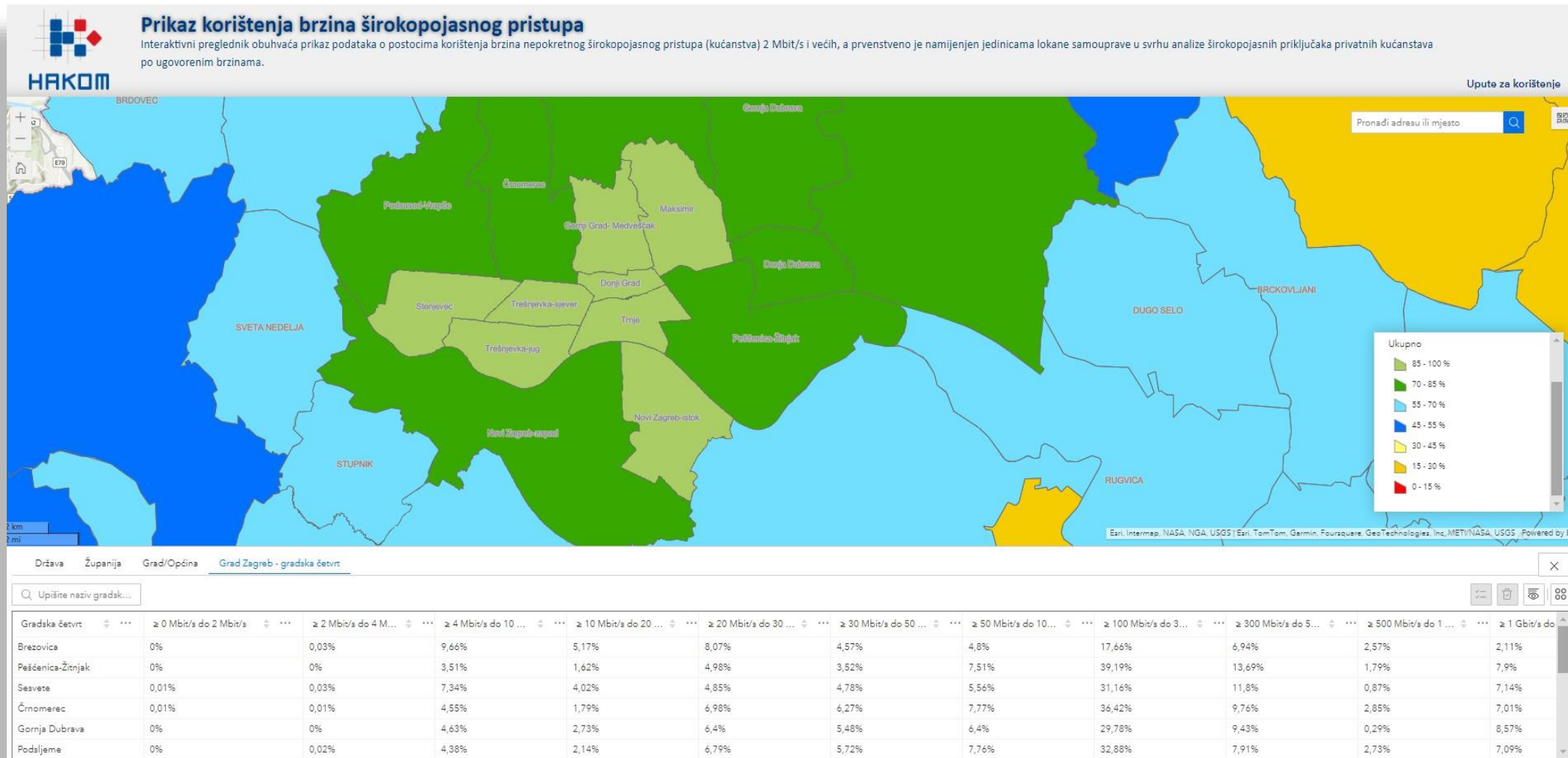


## Mapping of broadband coverage





## Mapping of take-up rate

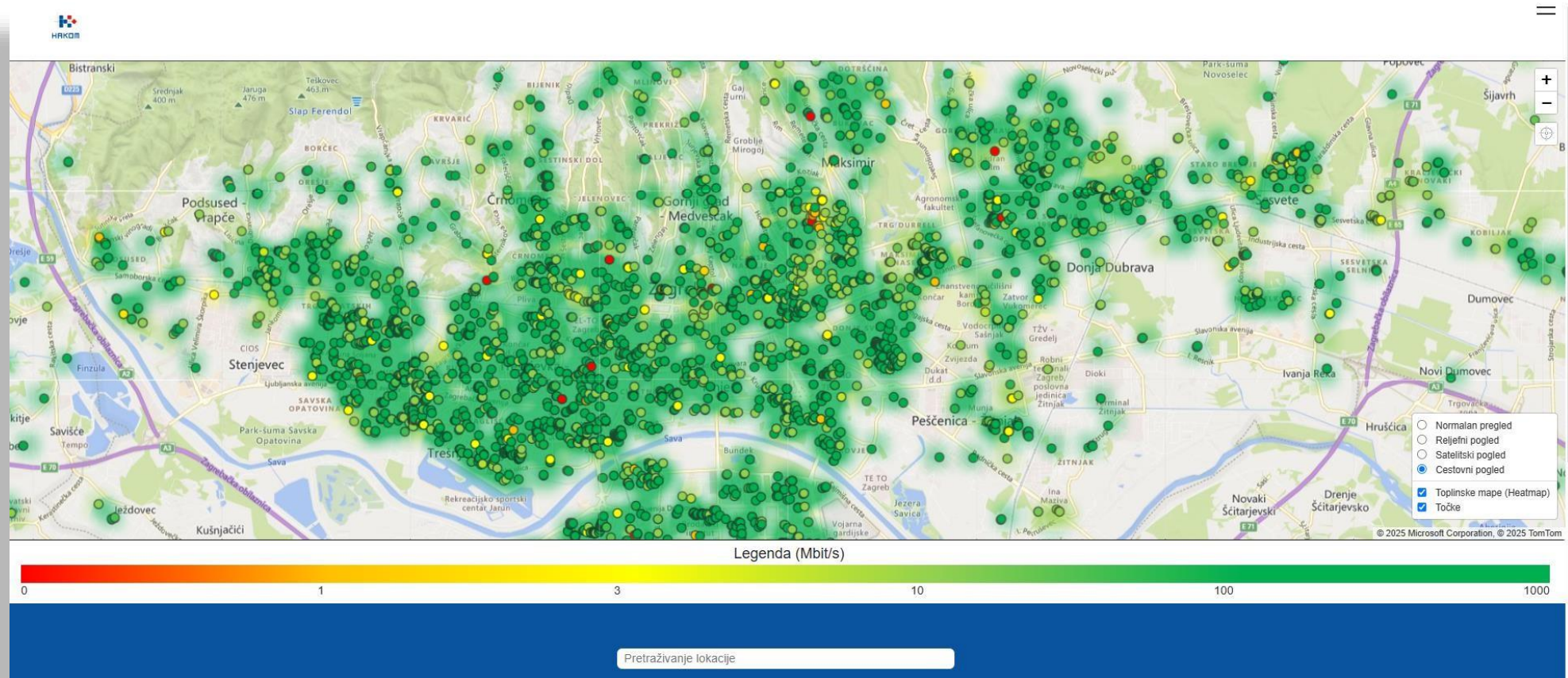






# HAKOMetar and HAKOMetar+ Public portal

Mapped measurements with HAKOMs application  
Live update!

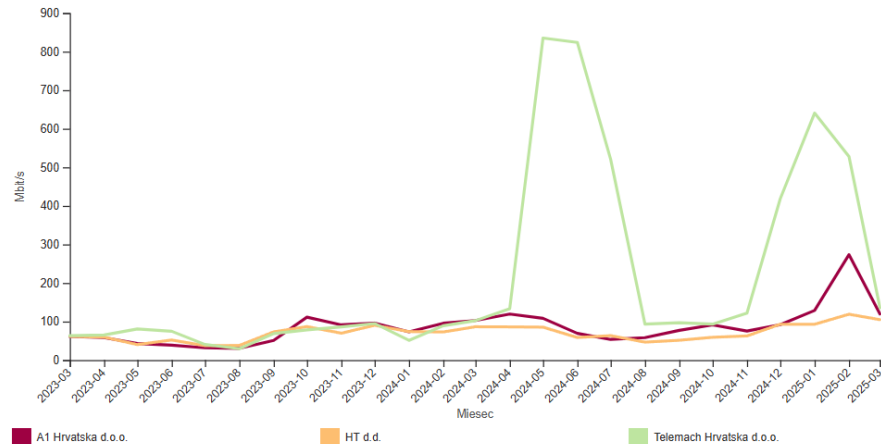




# HAKOMetar and HAKOMetar+

## Mapping measured QoS of mobile networks from user device

Prikaz izmjerenih brzina po operatoru u traženom periodu



Početni datum

2023-03

Krajnji datum

2025-03

● Prosječna brzina preuzimanja (Mbps)

○ Prosječna brzina učitavanja (Mbps)

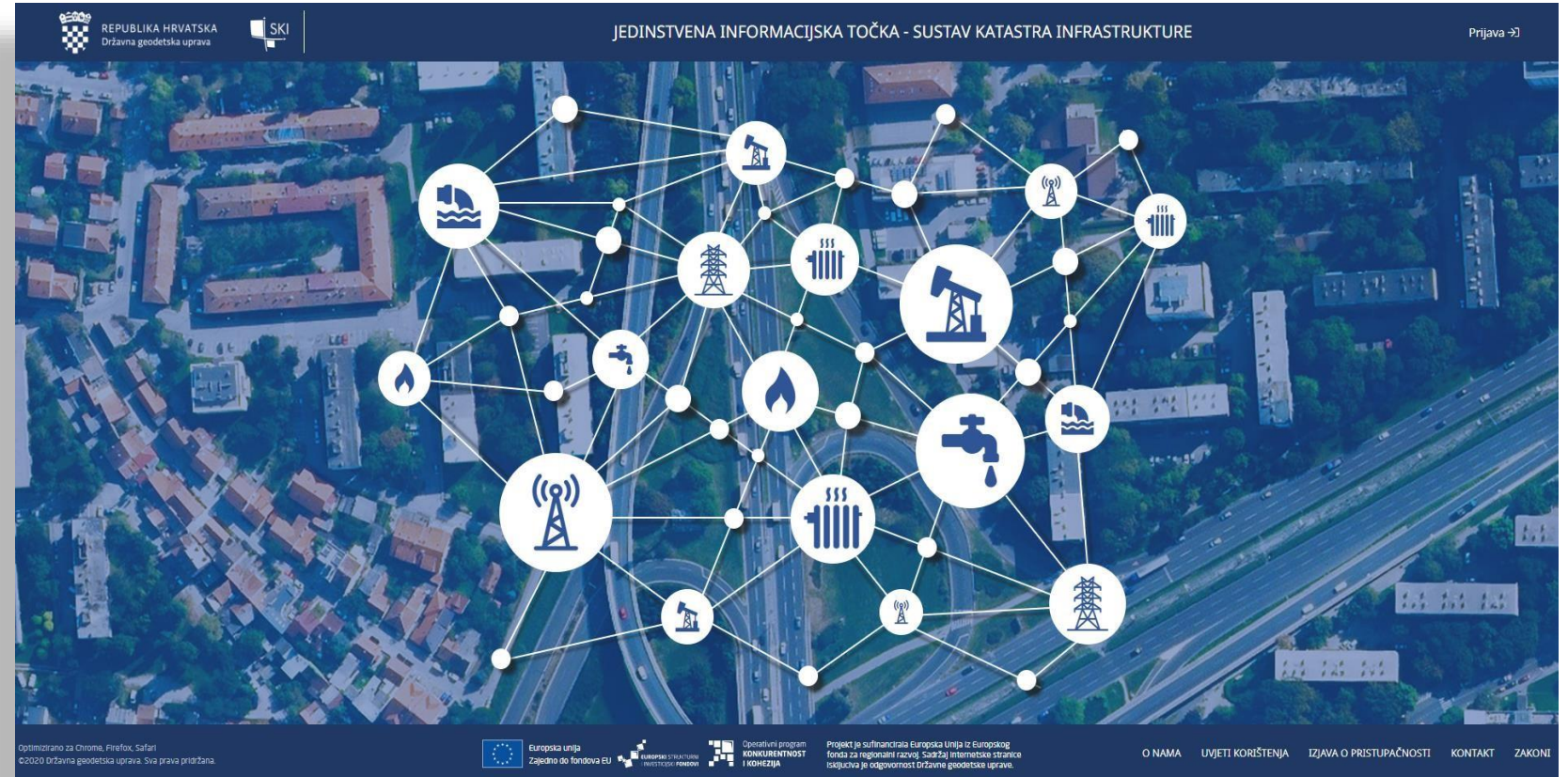
Uređaj	Preuzimanje (Mbit/s)	Učitavanje (Mbit/s)	Ping (ms)	Signal (dBm)	Brojač
M2007J3SY	505.19	71.56	17.65	-93	25329
SM-G988B	382.30	64.75	14.95	-74	16365
SM-G973F	232.38	41.31	26.88	-100	12660
iPhone11,6	79.91	49.87	32.06		11168
SM-G986B	109.71	35.90	21.05	-84	5954
SM-G950F	45.53	14.07	29.00	-96	4824
SM-G955F	34.28	18.80	24.99	-91	4003
SM-G970F	11.42	3.23	32.93	-101	3916
SM-N960F	19.34	18.43	32.02	-88	3771
Galaxy A5(2017)	20.61	5.47	30.44	-98	3728
SM-A528B	66.22	13.11	31.39	-97	3726
SM-A715F	30.28	8.62	29.93	-103	3723
VOG-L29	45.44	10.50	30.09	-99	3687
Galaxy S7	23.80	4.76	31.90	-98	3427
Galaxy S7 Edge	33.26	5.94	30.32	-100	3123
SM-G960F	32.72	6.86	32.00	-100	3092
iPhone 7 (GSM)	28.07	9.73	39.98		2860
SM-A605FN	7.71	1.77	38.59	-101	2853
M2103K19PG	119.98	27.49	16.13	-92	2820
SM-N770F	52.63	22.83	25.01	-95	2735
Galaxy S6	11.05	3.44	37.87	-100	2591
CLT-L29	29.78	10.08	32.02	-95	2581
SM-A505FN	22.72	6.74	32.06	-101	2431
SM-A705FN	47.73	9.22	30.99	-100	2359
SNE-LX1	25.84	8.62	31.23	-99	2248





## Infrastructure Cadastre System

- Implementation of Broadband cost reduction Directive EU (2014/61/EU)
- **First project** of State Geodetic Administration (DGU) which is financed with EU structural and cohesion fund in 2014. – 2020 MFF.
- **20.12.2017.** - Grant Agreement signed.
- Implementation: 37 months, released in full capacity - July 2024.
- Cost = **EUR 1.632.490,54** , of which EUR 1.387.616,96 was grant.
- Contains cadastral data of following infrastructure: gas, electricity, water, sewerage, heating, oil and electronic communication infrastructure.
- Fully running and operating under jurisdiction of SGA.



Source: DGU, A. Bakija Lopac



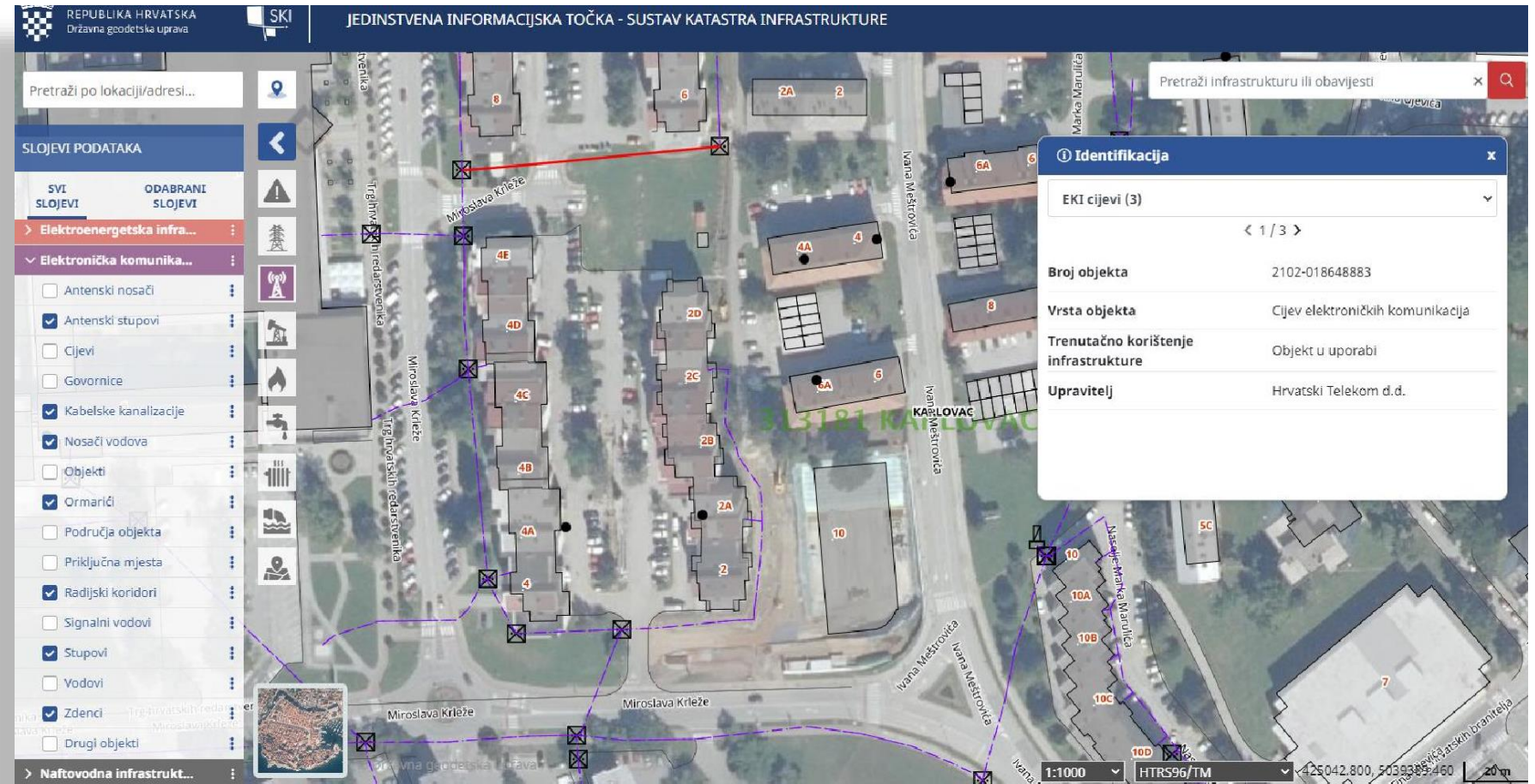


## Mapping infrastructures - Single Information Point



The **Single Information Point** (JIT) of the Infrastructure Cadastre System (SKI) is an application solution that enables users to issue public documents and data as well as search of metadata and spatial data of the infrastructure cadastre.

Through system users can electronically submit the geodetic study of the infrastructure to the competent cadastral office for review and confirmation, as well as to search, receive and distribute information about current or planned civil works and export notification to the owners/managers of the infrastructure for publication on their websites.



Source: DGU



- Establishing broadband mapping systems require significant amount of time and patience in order for all involved in the process align with the established set of rules. (HAKOM started developing mapping systems in 2013. with lots of setback and obstacles)
- All entities involved needs to cooperate and its necessary to establish legal framework which will make easier the cooperation and exchange of data standardized.
- Generally, always use Official data instead the ones provided by private entities (who doesn't hold any responsibility on their accuracy). If they are not accessible, create the legal framework to make them available.
- Make statistical data from National Statistical Bureaus available to NRAs and other CAs, under MoU and confidentiality agreement.
- The more detailed data collected, more analysis can be performed, hence „better“ decisions on policies can be made.
- Design system on collecting data to be future proof and expect that changes will be needed with technologies development.
- Implement BP from other countries where it is applicable or create BP yourself.
- Don't wait for perfection — start, iterate, grow!



***„To go fast - go alone.... to go far - go together!“***





Croatia's system is available for knowledge-sharing!

We're happy to support your journey!

Mapping is a team effort — globally and locally!

**Thank you!**

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