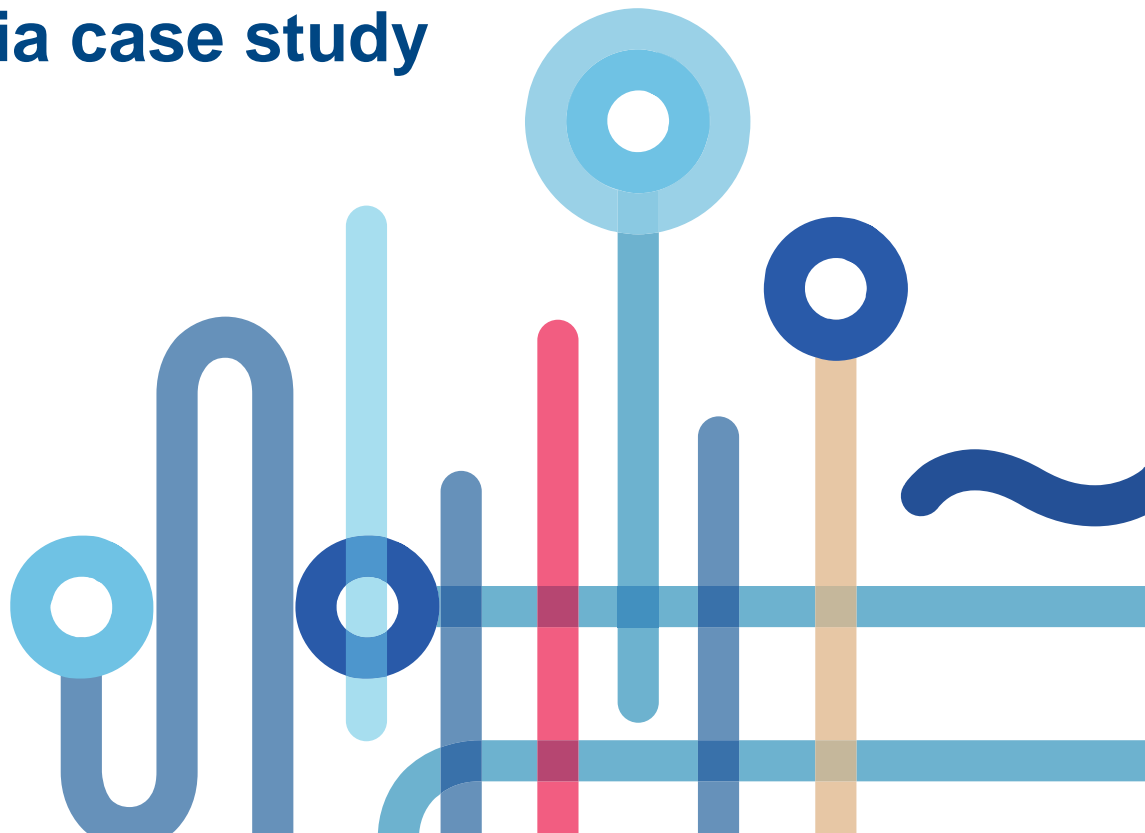


# Electromagnetic Field level and 5G Roll-out – Serbia case study

ALEKSANDAR BORIĆ



Republika Srbija  
**RATEL**  
Regulatorna agencija za  
elektronske komunikacije  
i poštanske usluge



# EMF levels

---

f (MHz)	E (V/m)
10 - 400	11,2
400 – 2.000	0,55vf
2000 – 10.000	24,4
10.000 – 300.000	24,4

---

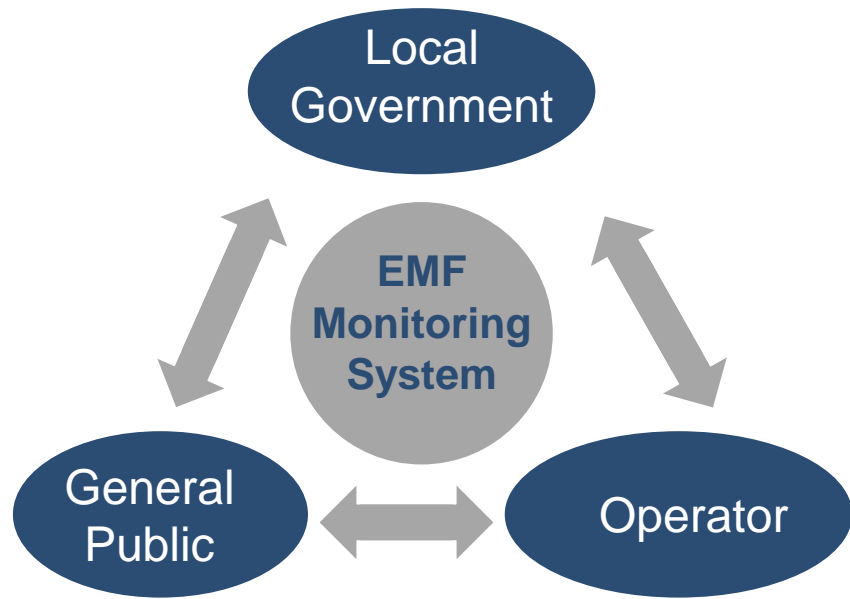
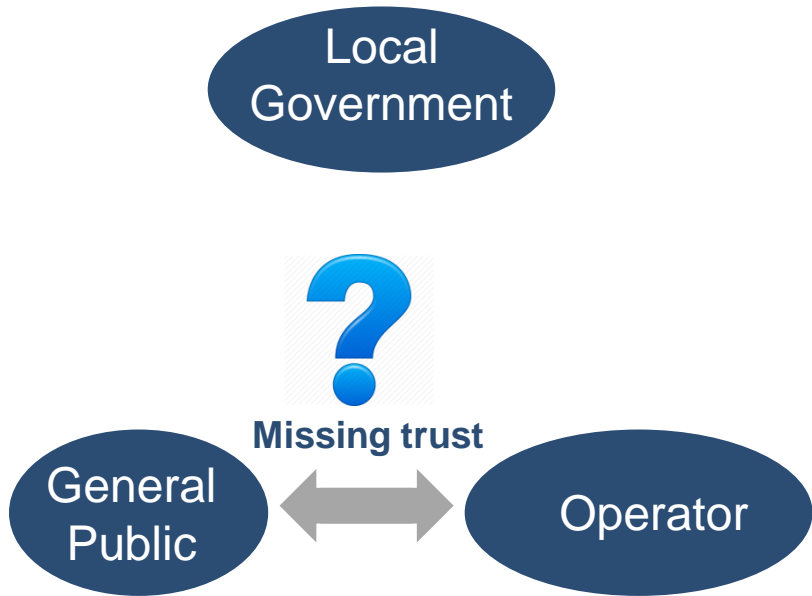


# EMF Measurements

---

- For all locations pre and post instalation measurement is required
  - Sensitive locations: Kindergardens, hospitals, schools, Leaving quarters,
  - If the EMF level for Sensitive locations is  $\geq 10\%$  of the limit, measurement is required every 2 years
- 





# The objective of the project

---

## RATEL's INITIATIVE:

Development of the system for monitoring the level of EM field radiation in the environment

- Monitoring EM field radiation of Electronic Communications networks equipment
- Transparent results of EM radiation
- Contributing to the establishment of trust (public, operators, authorities)
- Public education



# Project Scope

## 4 phases:

I year (19 + 2)

II year (16 + 2)

III year (26 + 4)

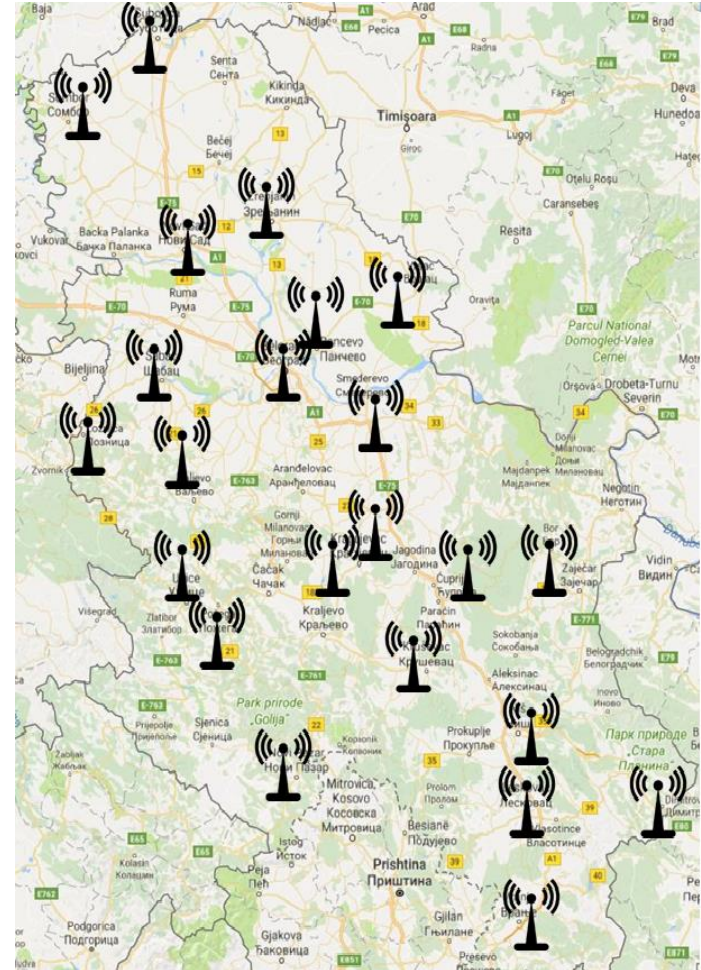
IV year (30 + 0)

## 100 monitors:

- 92 wide band area monitors
- 8 selective area monitors

## Locations criteria:

- Measured EM values
- Sensitivity locations (schools, hospitals, kindergardens)



# Narda Area Monitors

## Wide Band Area Monitor AM-8059

---

- Frequency range: 100 kHz to 7 GHz
- One frequency band
- Solar and AC/DC Power Supply
- Measurement range: 0.2 V/m – 200 V/m
- Measurement resolution: 0.01 V/m
- Communication: 2G, 3G, WiFi, Ethernet, USB



# Narda Area Monitors

## Band Selective Area Monitor AMS-8061

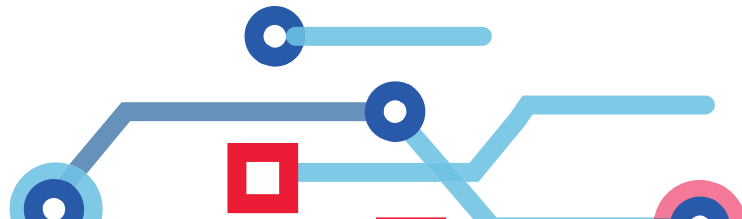
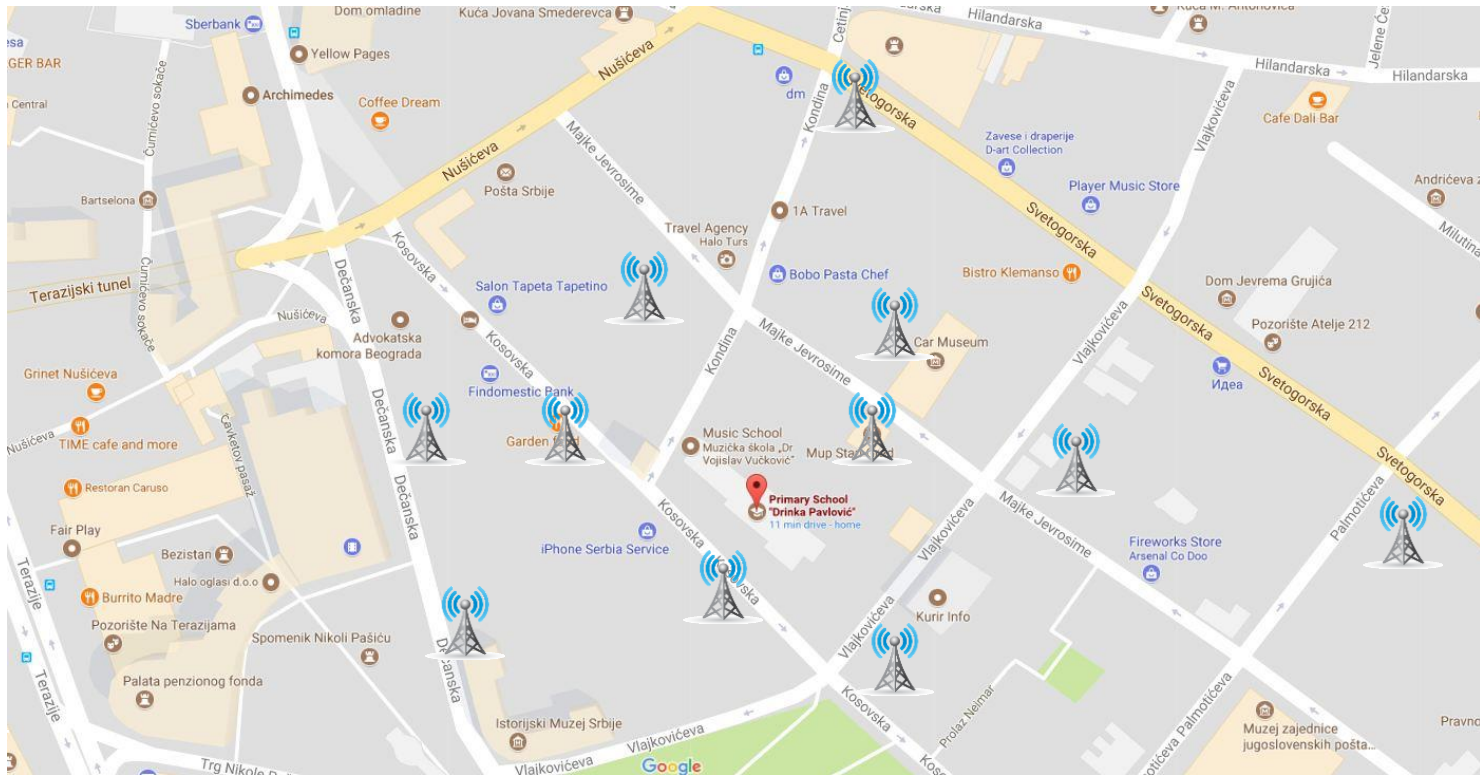
---

- Frequency range: 100 kHz to 6 GHz
- Up to 20 frequency bands
- Solar and AC/DC Power Supply
- Measurement range: 0.01 V/m – 200 V/m
- Measurement resolution: 0.01 V/m
- Communication: 2G, 3G, WiFi, Ethernet, USB





- 39 Radio systems
- 11 Locations
- Value (V/m): 3,4 - 3,8



# Publishing results

Check [www.ratel.rs](http://www.ratel.rs)  
on December 1st 2017

- Transparent results of EM radiation
- Open to implement new sensors from different institutions

## Continuous EMF monitoring



# Future plans

---

- Possibility of external participation in the project
- Municipalities
- Airports



# Way to change EMF level limits

---

- End User device emitted radiated power is higher if the BS is at a distance
- Serbian incumbent operator had a short TV campaign in which this correlation was explained
- Correlation between QoS and EMF level limits



# Thank you !

Aleksandar Borić

[aleksandar.boric@ratel.rs](mailto:aleksandar.boric@ratel.rs)

+381-64-8776055



Republika Srbija  
**RATEL**  
Regulatorna agencija za  
elektronske komunikacije  
i poštanske usluge

