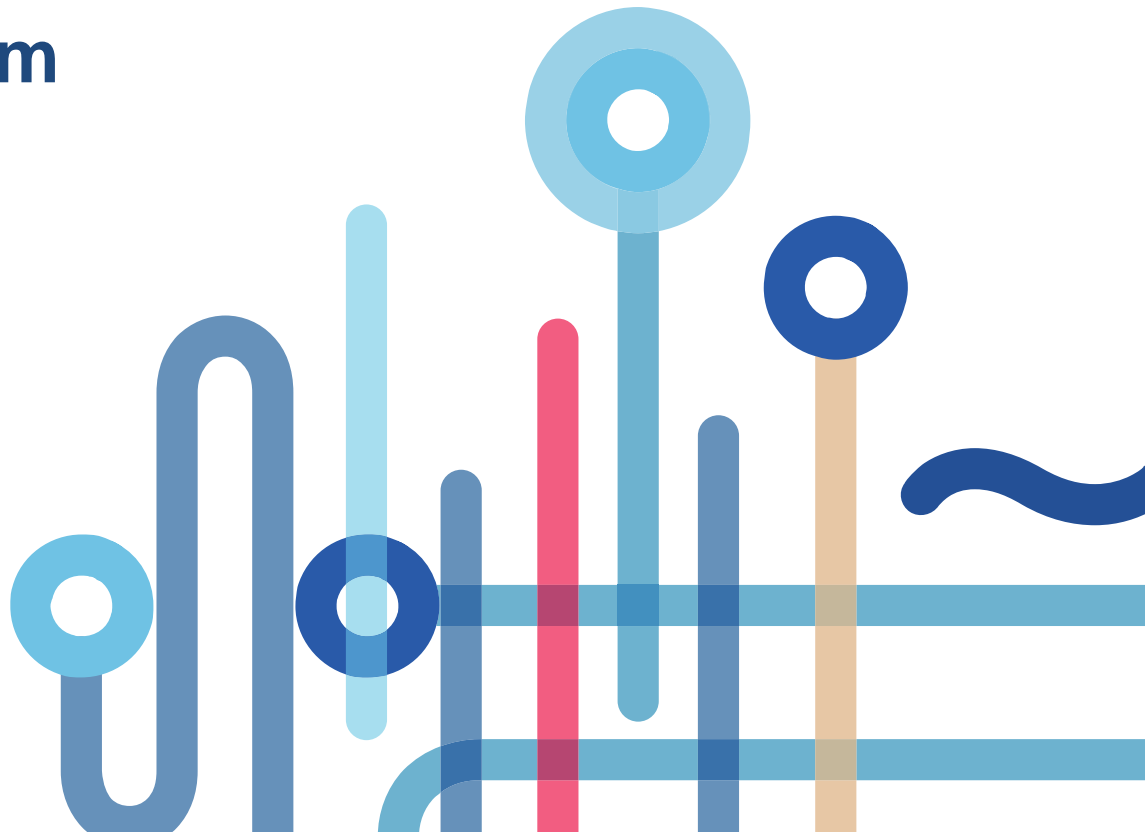


Development of the RF Spectrum Monitoring System

VLADICA TINTOR, PhD

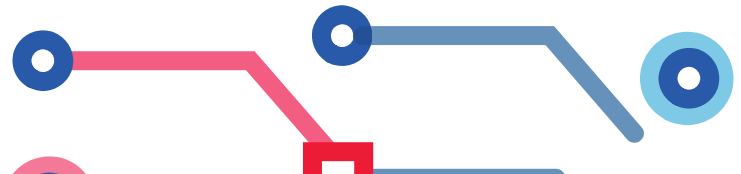


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RF Spectrum Monitoring

- Detection of radio emissions in the air
- Measurement of specific parameters of these emissions
- Detection of interference made to legal emissions, caused by illegal intentionally generated emissions or components of unwanted spurious emissions
- Occupancy check of specific bands in the RF spectrum



RF Spectrum Monitoring System

Traditional approach

Monitoring centres: Manual measurements of radio signals

- Fixed monitoring stations
- Mobile monitoring stations
- Portable monitoring stations

Limitations:

Absence of continuous monitoring

Long response

Inefficient use of resources

Modern approach

Controlled from one or more monitoring centers: Automated measurements of radio signals



Current RF Spectrum Monitoring System

Central office in Belgrade

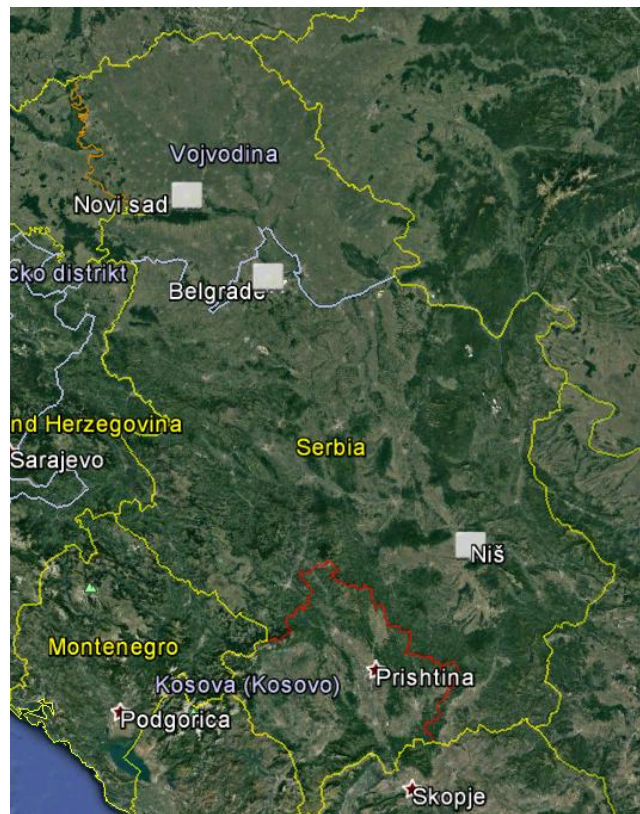
Two monitoring centers

- Dobanovci (nearby Belgrade)
- Niš

TDOA sensor network

Covering Belgrade, Novi Sad and Niš

4 mobile monitoring stations



Monitoring centers

2 monitoring centers in Dobanovci and Niš



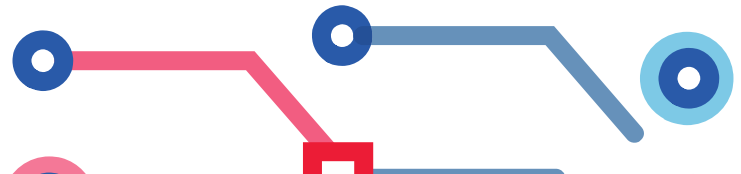
Dobanovci

Two 30m-high masts:
directed antennas
30 - 4500 MHz frequency range



Niš

One 30m-high mast:
directed antennas
30 - 1300 MHz frequency range



Measurement equipment

- Measurement receivers
- Spectrum analyzers
- TV signal analyzers

- Monitoring vehicle
- Mobile monitoring stations
- Remotely controlled sensor stations



Future RF Spectrum Monitoring System

4 year plan

- 20 remotely controlled measurement stations
- 3rd monitoring center in the North of Serbia
- Upgrade of the existing monitoring centers
- Expansion of the existing TDOA sensor system



Future RF Spectrum Monitoring System

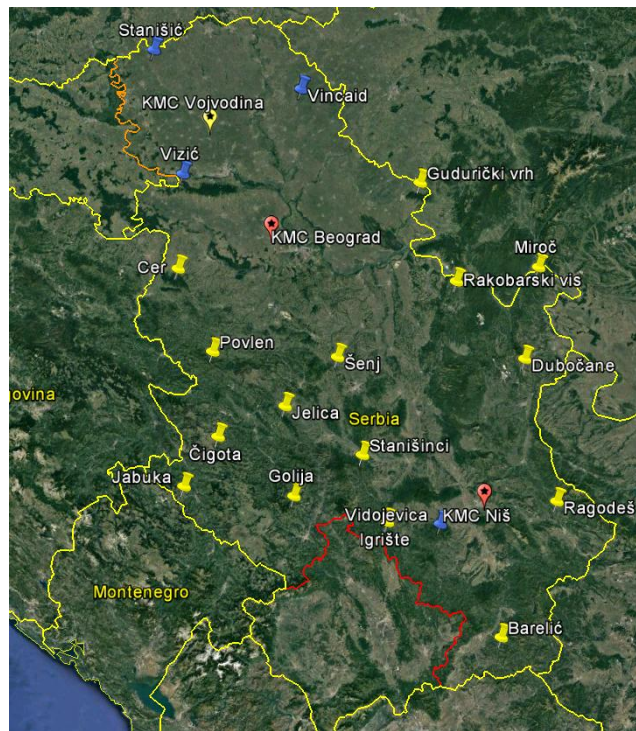
2017 plan

- 4 locations for remotely controlled monitoring stations
- Acquisition done
- 30-year lease contracts signed
- Project designs done
- Construction licenses provisioning ongoing



Future RF Spectrum Monitoring System 2018 - 2020 plan

- 3 monitoring centers
 - Operational: Belgrade, Niš (red)
 - Ongoing location acquisition: Vojvodina (yellow)
- Remotely controlled stations
 - Stanišić
 - Vincaid
 - Vizić
 - Vidojevica
 - Other locations acquisition ongoing (yellow)



Remotely controlled monitoring station construction

- Site surface 10x10 m
- 24m or 36m high antenna mast, depending on the location
- Container for equipment
- Directional antenna system
 - 2 antennas in back to back configuration (80 MHz to 3600 MHz range)
- Two measuring receivers (for RF spectrum occupancy check and ITU measurements)
- Control PC, UPS System, Fire alarm system
- Video surveillance with NVR recorder and Surveillance Centre (SC) control
- Weather station with early thunderstorm alert system
- Microwave link to the first telecommunications node



Future RF Spectrum Monitoring System

2020 onwards plan

- Further development of the monitoring system by adding new monitoring stations
- Establishment of the local office in the SW Serbia
- Placing a remotely controlled station in every large town in Serbia
 - Stations will be able to perform hybrid geolocation (AOA/TDOA) of RF signal source, in combination with a mobile station or fixed monitoring station
- Implementation of DVB-T2 network monitoring system on a national level



Thank you!



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