Mobile Spectrum Monitoring

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CEPT Workshop on
How Measurement of Spectrum Occupancy Can Help Spectrum Management
Organised by the Working Group Frequency Management (WG FM) of the ECC
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The Joint Research Centre

The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies.

7 Institutes in 5 Member States

IRMM - Geel, Belgium
Institute for Reference Materials and Measurements

ITU - Karlsruhe, Germany
Institute for Transuranium Elements

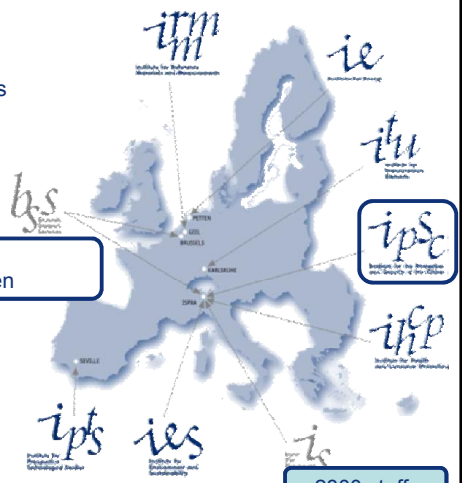
IE - Petten, The Netherlands
Institute for Energy

IPSC - Ispra, Italy
Institute for the Protection and Security of the Citizen

IES - Ispra, Italy
Institute for Environment and Sustainability

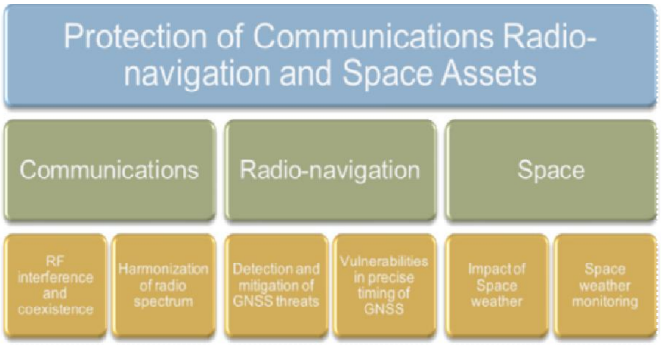
IHCP - Ispra, Italy
Institute for Health and Consumer Protection

IPTS - Seville, Spain
Institute for Prospective Technological Studies



~ 2800 staff

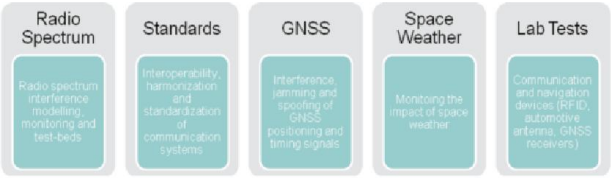
The CORSA Group



Activities related to potential threats to communications and navigation

Policy support and collaboration with different European Organization are key elements of our activities

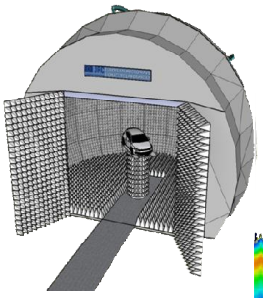
Main costumers:
- DG ENTR
- DG HOME
- DG CNECT
- ETSI and CEPT

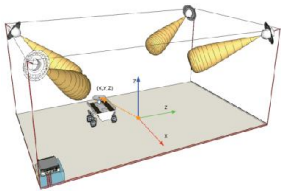


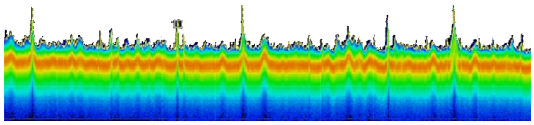
Research Centre

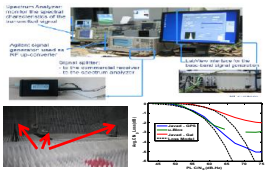
JRC Expertise: Key experimental facilities

for tests and measurements to support regulation and standardization









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JRC Mobile Spectrum App

Objectives:

Policy support based on spectrum use

Exploit pervasive smart consumer devices (smart phones, tablets, …)

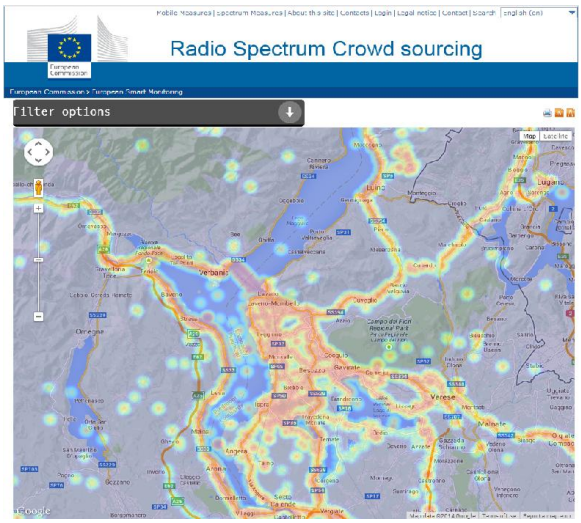
Easy to deploy, easy to use, gives added value

Low life-cycle cost

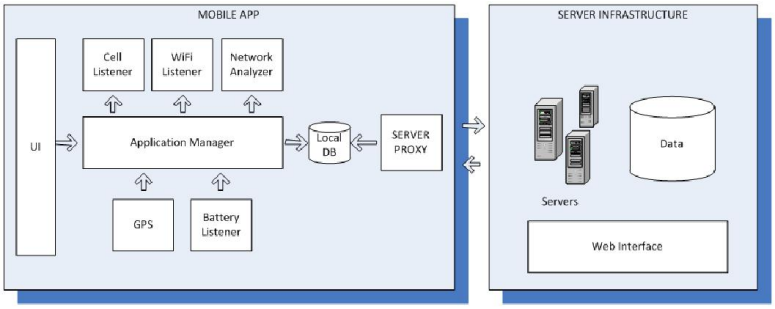
Long-term maintainability

Respect of privacy and security policies

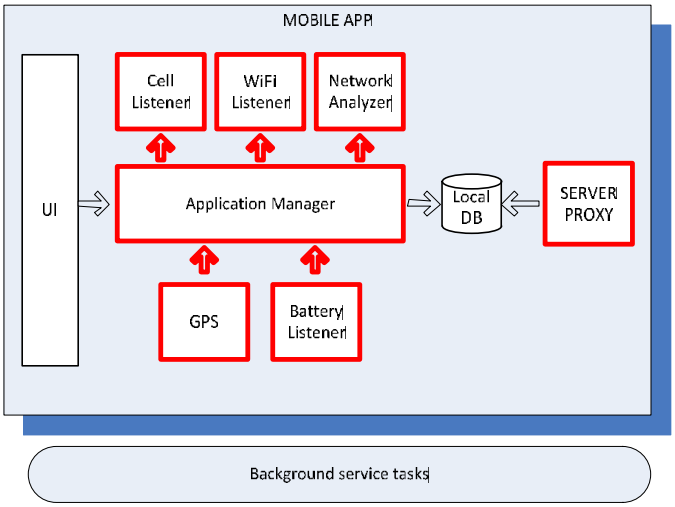
Sample visualization



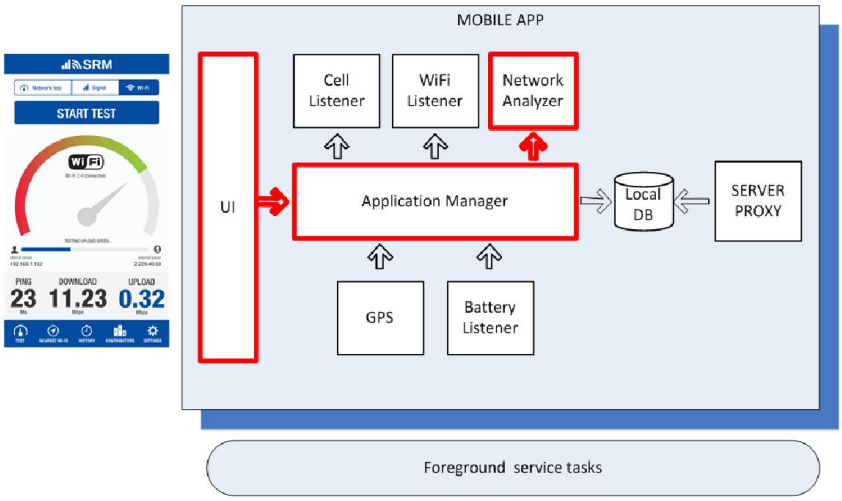
Application architecture



Mobile application back-end



Mobile Application Front-end



Measured parameters

Local GSM / UMTS signal strength

Local WiFi 2.4 and 5 GHz access point signal strength, sid and characteristics (used channel, security protocols, sid, etc..)

Speed test: Download and upload data transfer rates

Latency, ping and DNS lookup test

Network neutrality test (voip, nat, p2p, etc..)

Application optimizations

The application is:

Optimized for battery usage

Optimized for Bandwidth consumption

Takes measurements only when location is available

Measurements are made based on battery state and location availability

Uploads measurements to the server when the preferred connection is available

Application user data is fully anonymised.

User interaction

User can:

Launch manual speed tests

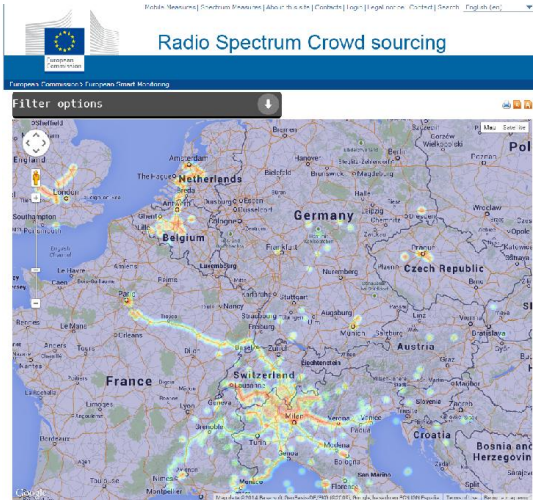
View cells and wifi hotspot measured by the device

Search for wifi access point and best signal strength

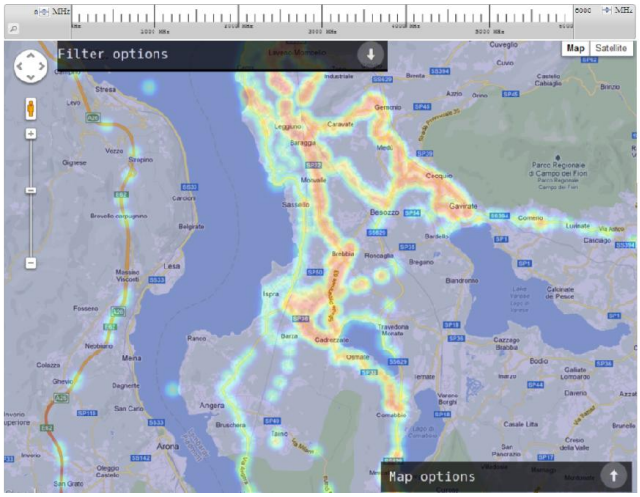
Optionally, register by a nick name

- Associated with a unique and anonymous identifier
- Browse own historical measurements

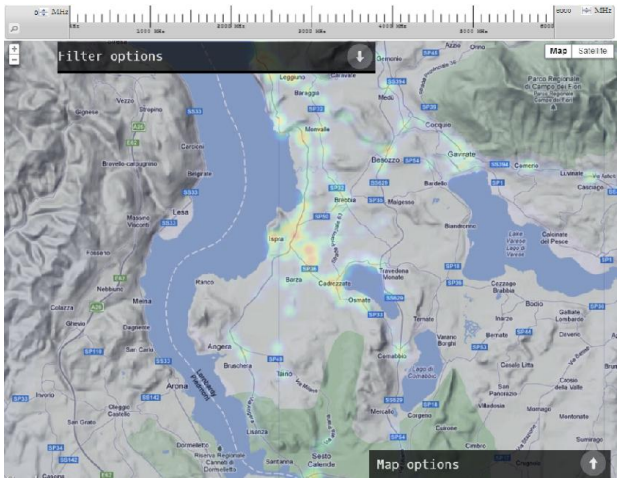
Sample visualization



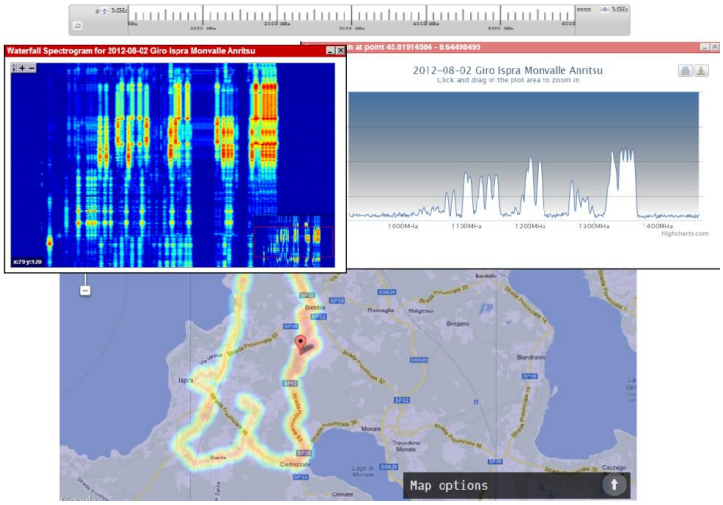
Signal strength heat map



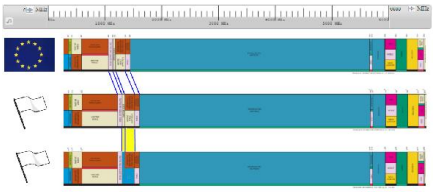
Service channel occupancy

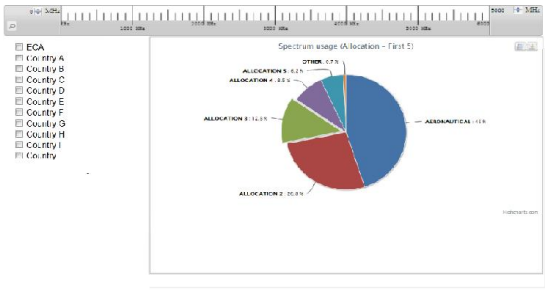


Spectrum analyser map



Allocation Comparison





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Towards a European Network for Radio Spectrum Monitoring

Multiple data sources
- Multiple frequency bands
- scalability
- **low cost**
- compact
- Fixed, mobile, …
- robust
- easy to use (well packaged)

User Motivation
Benefits for user
Privacy protection
Battery power
Ownership of monitored data?

Technical
Network Neutrality
Interoperability
Data quality

Promote policy decisions
- Unexpected applications
- mobile consumer devices
- Value for effort !

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Summary

- Measurement of spectrum use is key to evidence-based policy making
- For many frequency bands, the measurements have to be over wide geographic area
- Need for low-cost / free-of-cost spectrum monitoring
- New approaches to spectrum measurement are needed such as crowd sourcing
- Modern consumer devices already have embedded spectrum sensors (for limited number of frequency bands)
- The JRC Mobile Spectrum App measures policy-relevant attributes
- Challenges are: crowd participation (user benefits, privacy), data quality and massive data management.

Thank you

Further information:

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