

MapEM

ELECTROMAGNETIC MAP

Last years have seen a very important development of the mobile telephony, contributing with many benefits, but also creating some concerns about:

- Its coverage and quality of service
- Its effects on the electromagnetic environment

The **MapEM** system allows the user to get access to technical information in both aspects. Until now there was no system in the market able to do so.

Exhaustively mapping a territory by continuously monitoring the electric field intensity (V/m), allows getting a “picture” of the electromagnetic radiation levels.

On the other hand, the **MapEM** system enables to simultaneously measure the coverage level and the quality of service of the different wireless service providers’ networks.

Whether your goal is to audit the network or to manage the electromagnetic environment of your city or territory, the MapEM tool will provide you with the right data to set up the networks with a good coverage and quality of service at the lowest field levels possible.



MapEM SYSTEM

Mobile unit

Equipped with field sensors, GPS, communication equipment and a computer to automate all the process.

Software

The acquisition and control software automates all the process, receiving, storing and managing the measured data in two ways:

- Linking the received data with the exact GPS position.
- Displaying the data on the cartography by coding the levels in colours and the coverage and the quality of services in layers, in order to get visual and easily understandable results.

APPLICATIONS

Electromagnetic management

Determination of the radiation level:

To collect real data on the electromagnetic field levels found on the city streets in order to guarantee that those levels do not exceed the human exposure limits specified in national and international standards.

Determination of the coverage level and the quality of service:

To have the right technical data to guarantee that the population is being provided with a good coverage level and the expected quality of service along the territory under test.

That information may be used to detect areas having less coverage or a poor quality of service.

GEOGRAPHIC INFORMATION SYSTEM (GIS)

The obtained data is displayed on maps of the territory under test by means of an internal GIS tool.

Coverage and Quality of Service (QoS)

The following data is available, on the GIS display tool, for each measurement point:

- **Receive level (Rx) – Coverage**
Receive level of the RF signal from the BTS (Base Transceiver Station). The higher the Rx level, the better the coverage.
- **BTS level**
Provides information on the level each BTS is emitting around it. We can see what the level is and how far each BTS coverage is detected.
- **Main or active BTS location**
It allows knowing what the active BTS at each point is, i.e., the BTS providing service at that point.

Clicking at any point on the map opens a window showing the following data:

- **ARFCN** (Absolute Frequency Channel Number)
- **RSSI** (Received Signal Strength Indication)
- **Rx level** (Receive level)
- **PLMN code** (Public Land Mobile Network)
- **Cell ID**
- **NCC** (Network Colour Code)
- **BCC** (Base Station Colour Code)
- **RACH** (Max. power in dBm)
- **Rx_Access_Min** (Min. level to access the BTS)
- **C1** (Cell selection algorithm)

The following QoS data is also available:

- **Block Call Rate** (% of calls that are not given access to a communication channel)
- **Drop Call Rate** (% of calls that are unexpectedly ended)

GIS (geographic information system)

Data is displayed on a GIS (geographic information system) that enables to check the information on different layers.

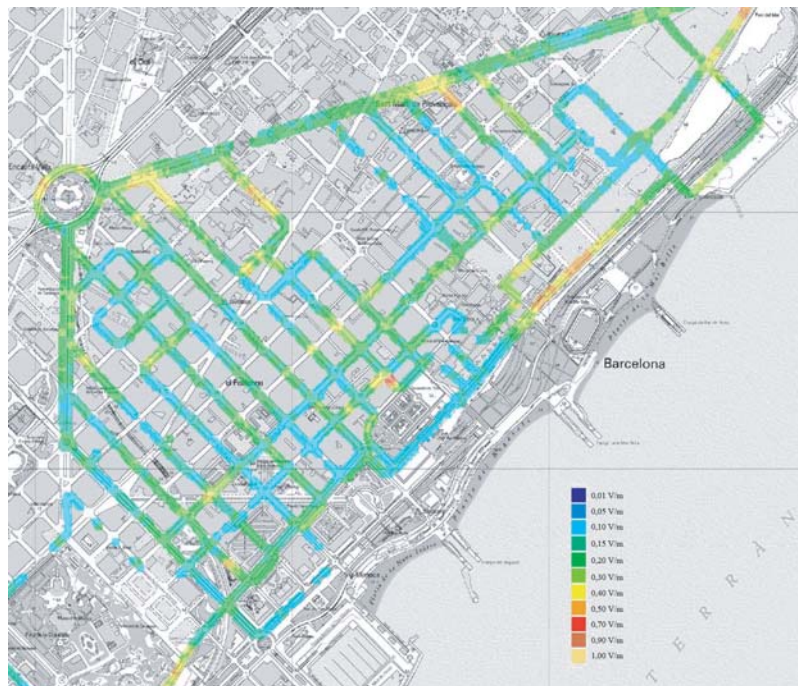
Available layers:

- Total electromagnetic field level in V/m
- Rx - coverage (a layer per service provider)
- BTS level (a layer per service provider)
- Main BTS (a layer per service provider)

Electromagnetic field level

Determination of the radiation level:

- The field level is measured using electromagnetic isotropic field probes, i.e., measuring the radiation coming from all directions.
- Levels are measured in V/m, so it is very easy to compare the registered values with the limits lines specified by all national and international standards related to human exposure to high frequency electromagnetic fields (ICNIRP, European Union recommendation, etc.)



Example of a field level map covering an area of Barcelona. The colours indicate the points showing higher or lower electromagnetic field intensity.

The internal GIS tool allows placing the measured data on its exact position on the map.

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