Electromagnetic Field Measurement Method to Generate Radiation Map

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September 28, 2012

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Introduction

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- Spectrum managements, and standards and regulations for Non-ionizing radiation need to be implemented in each country where wireless telecommunications demand is being increased continuously like in Colombia.

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- Segmentation of the city.
- Extracting a map of georeferenced antennas in the city.
- Definition of measurement routes.
- Determination of type of electromagnetic field region.
- Determining the field to be measured (electric and/or magnetic).
- Selection of equipment and probes for broadband measurement.

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Measurements And Results

# Antennas	Service Type	Approximate frequency
78	Celular Teleohony	850, 900 1900 MHz
12	Broadcasting on FM	90 – 104 MHz
11	Broadcasting on AM	880 – 1390 KHz
2	Trunking System	800 Mhz

Table: Antennas inventory inside and outside of Bucaramanga city.

Figure: Measurement System[1].

[1] Copy to Electromagnetic field measurement method to generate radiation map, Page 4

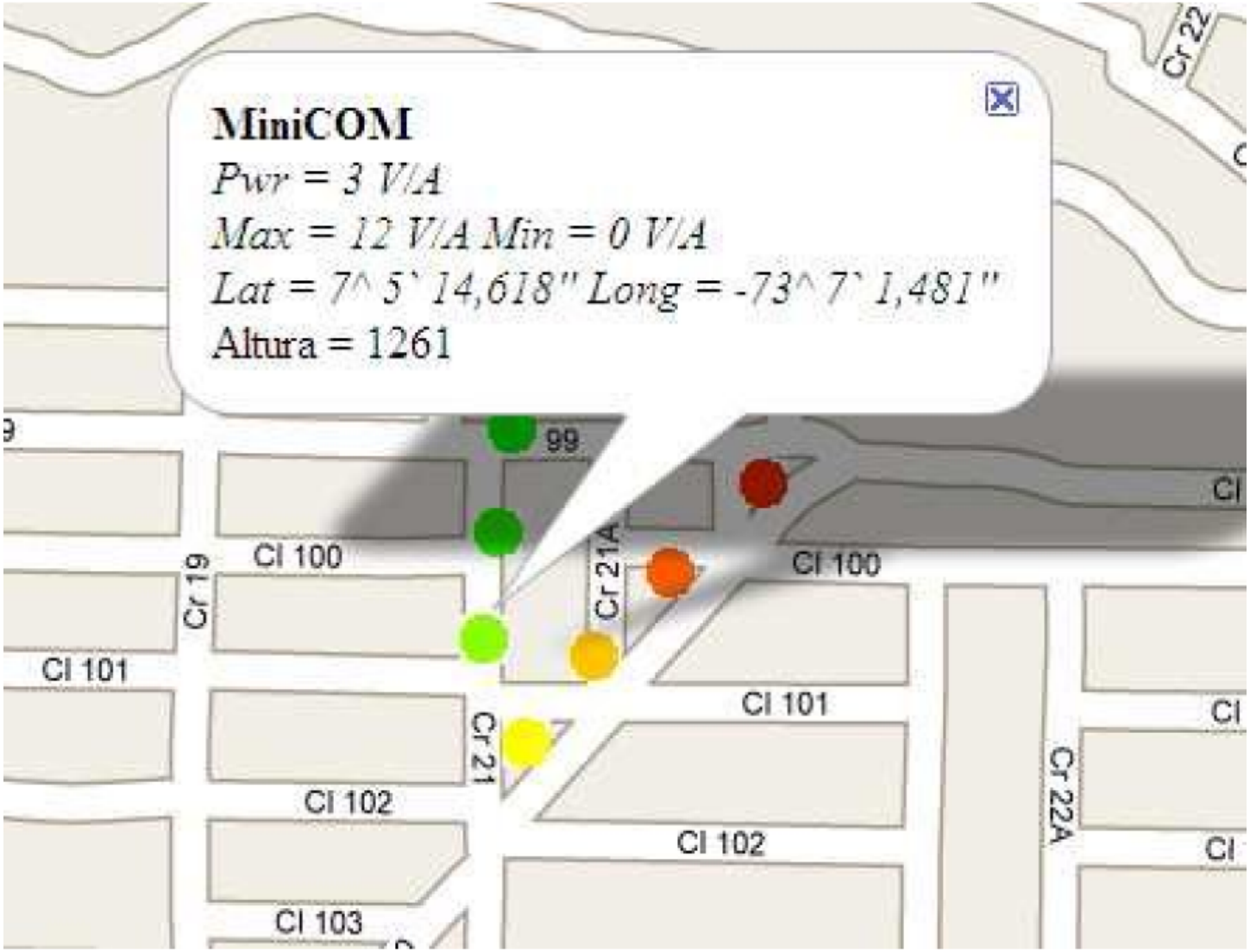

Figure: Map generated by Georadscaner.

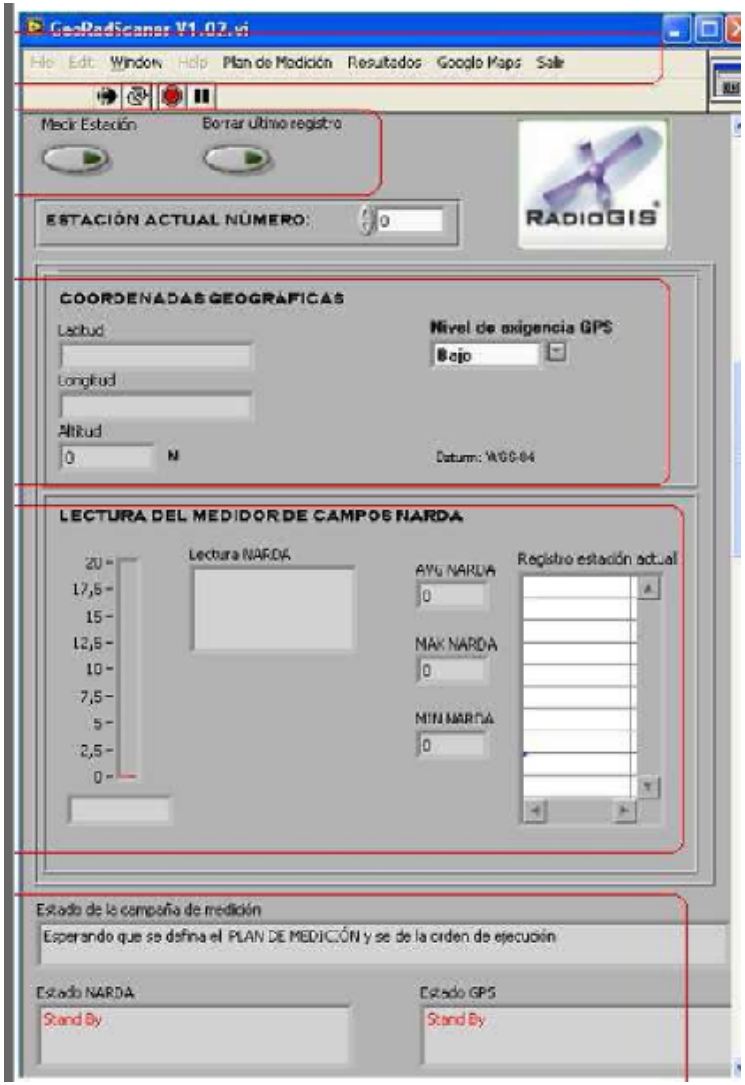

Figure: Window main Georadscaner.

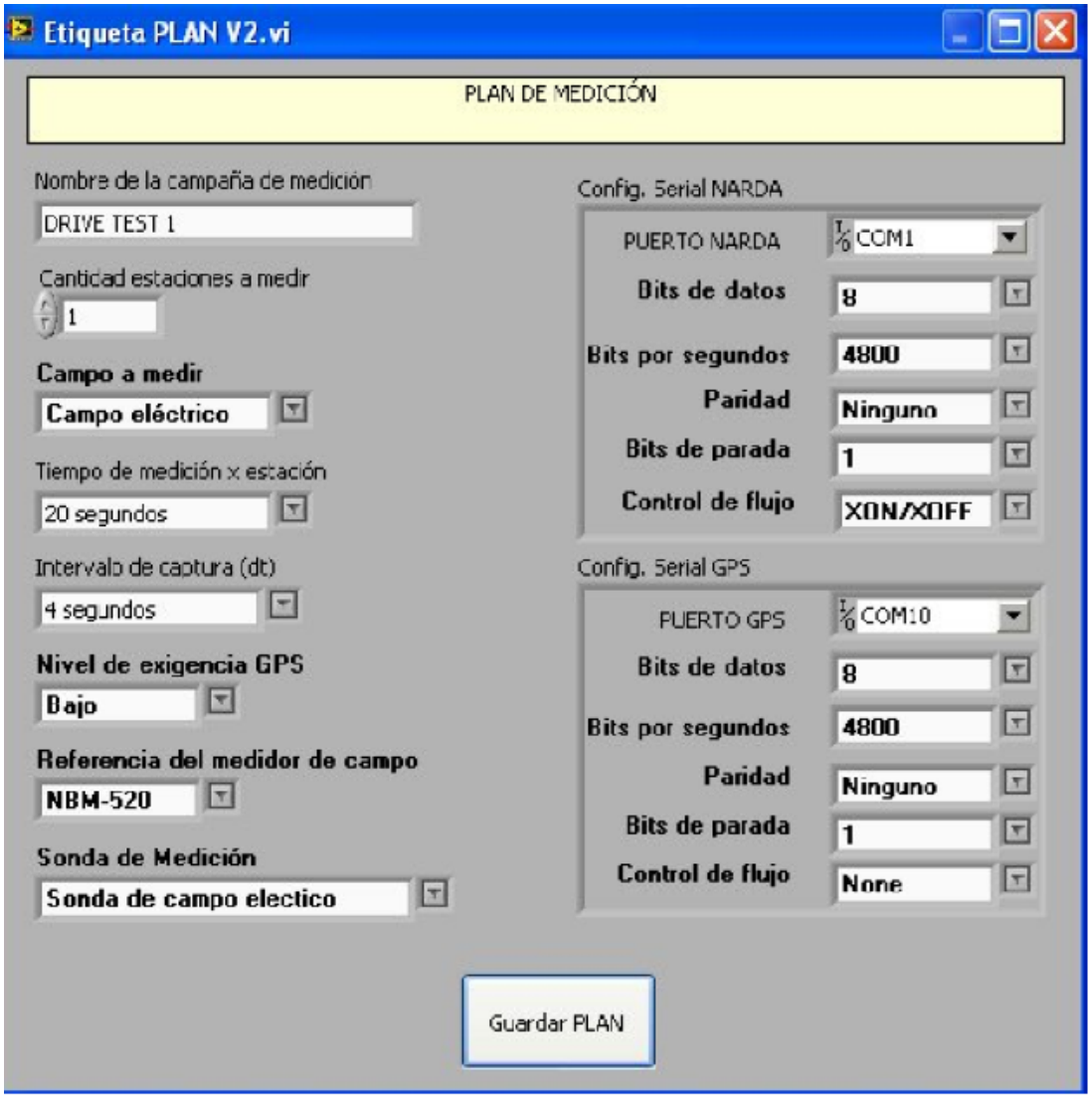

Figure: Window to set the measurement plan.

Measurements And Results

Radiation Level	Range [V/m]	Description
Low	0-0.8	Residential and educational areas and four main hospitals. North zone.
Medium	0.8-2.0	Business district and shopping areas at old city (commercial areas). West central, east and south zones.
High	over 2.0	Specific sites: Court house, city hall and around 2 important shopping centers.
Hotpoint	over 28	None

Table: Radiation level of Bucaramanga city

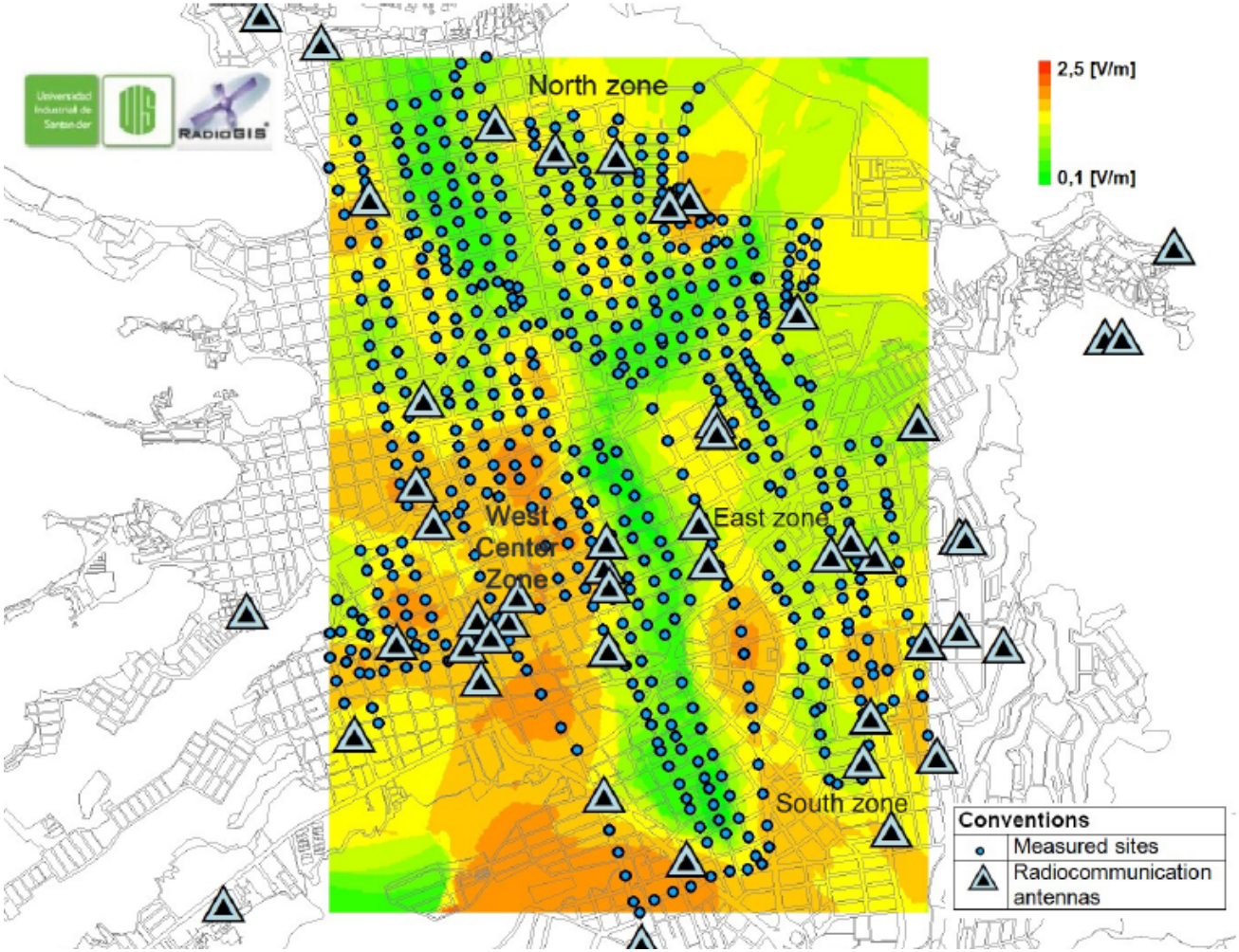

Figure: Map of non-ionizing electromagnetic radiation in Bucaramanga city[2]

[2]Copy to Electromagnetic field measurement method to generate radiation map, Page 6

Conclusions

- A radiation monitoring method was designed and tested during measurement campaigns at city urban zones by covering 70% of Bucaramanga city area; it was registered around 52 points per Km2 for a total amount of 564 measured points. An iterative and agile process was explained and accomplished into a practical and semi automatic way to record field strength of electromagnetic waves by using both broadband field meter and spectrum analyzer in order to establish whether regulation norms are being met and to know which factors are contributing to radiation level increasing by means of a spectral view. Also a telecommunications service was developed to measure, send and request online for measured data in real time and integrated into a Geographic Information System supported by RadioGis R&D Group with a web platform of Telecommunication services.

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