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The radio electric coverage for mobile telephony :an alternative solution to reduce exposition to EMFs

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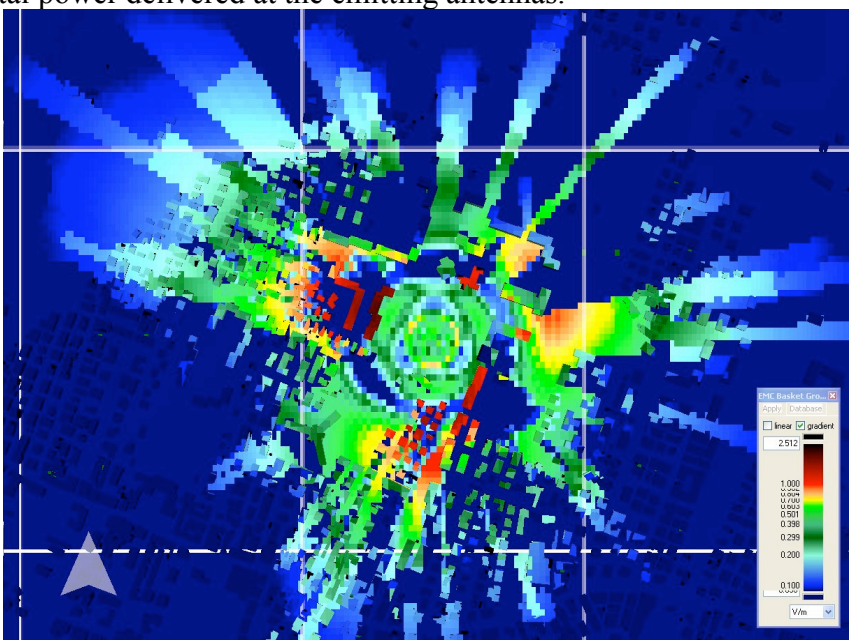
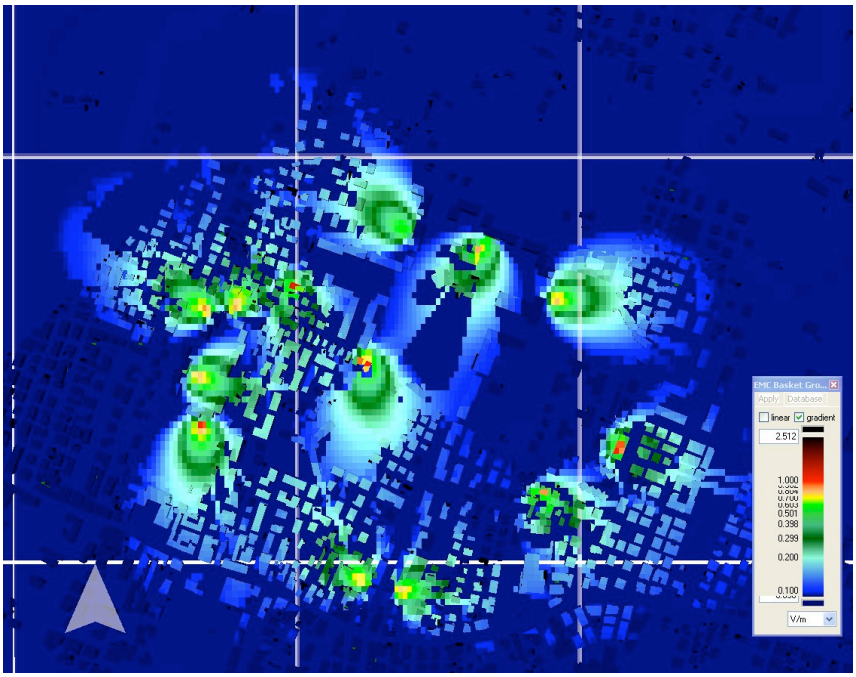
The aim of this work is to propose a network of microcellular BTS, in alternative of a conventional macro-site actually designed in the city of Venice (Italy), and to achieve:

- minimization of exposition to EMFs
- minimization of esthetic impact
- reduction of perceived risk

and maintaining (or incrementing) service and coverage standards.
The results in term of exposition of the buildings in proximity of the macro-plant are resumed in the next two image, obtained by use of a commercial software (QuickPlan by T.e.S srl) for the calculation of the intensity of the electric field with the ray-tracing technique. The calculation is made with the total power delivered at the emitting antennas.

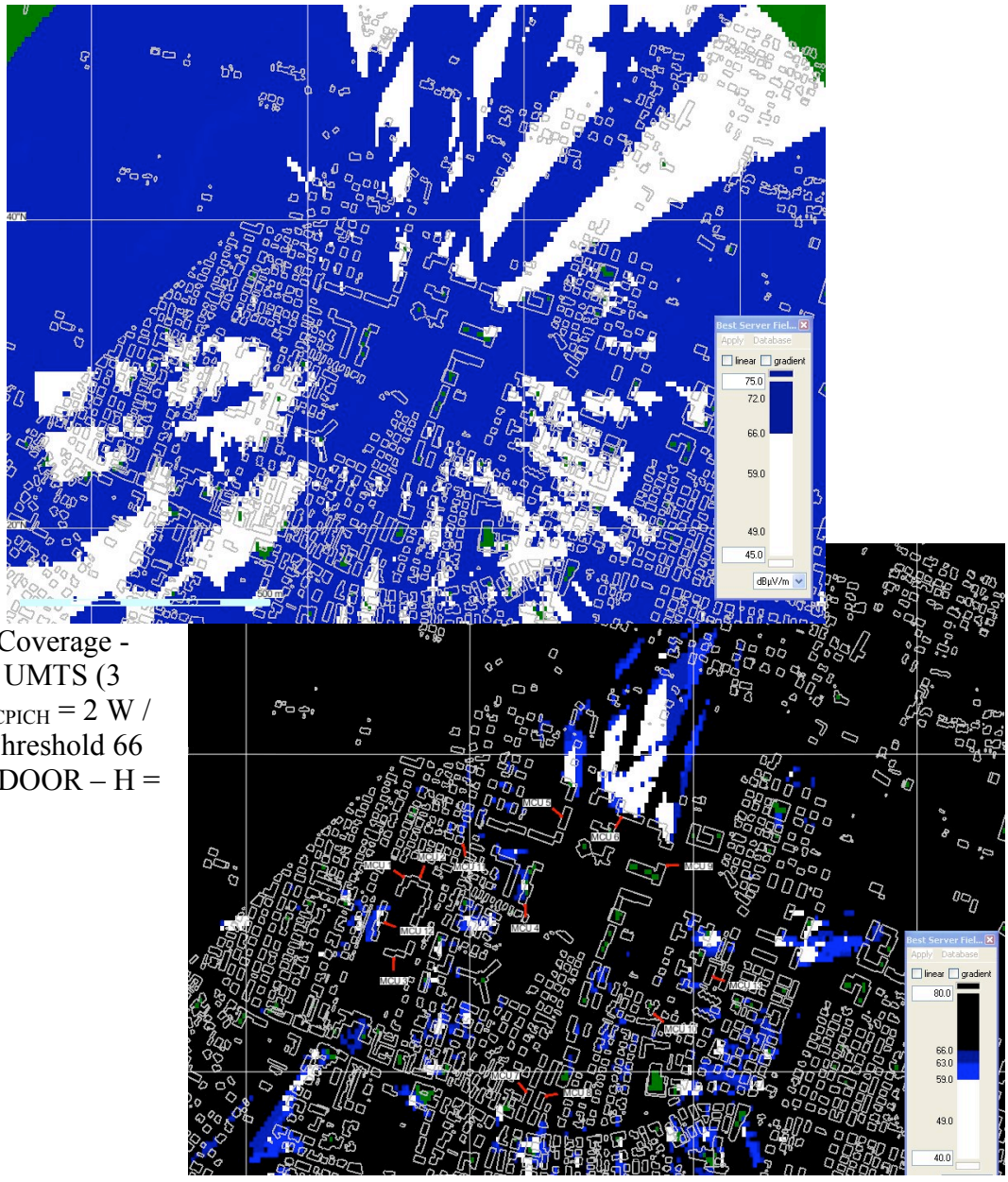


Exposition - Macro-site UMTS (3 sectors) – P_{TOT} = 20 W / sector



Exposition - Microcells UMTS (13 mc) - P_{TOT} = 2,5 W / cell
Antennas on the rooftops

To evaluate the indoor coverage of the two solutions we calculate with QuickPlan the received electric field in the best-server configuration. The threshold is the same proposed by the provider to guarantee the service in the same area.



Coverage - Macro-site
UMTS (3 sectors) -
P_{CPICH} = 2 W / sector
Threshold 66 dBµV/m –
INDOOR – H = 1,5 m

Coverage - Microcells UMTS (13 mc) - P_{CPICH} = 0,250 W / cell
Threshold 66 dBμV/m – INDOOR – H = 1,5 m - Antennas on the rooftops

Then the conclusions are:

- Using microcellular network in total or partial substitution of conventional BTS permit a substantial reduction of human exposition to electromagnetic fields.
- The esthetical and emotional impact of the micro-cells is reduced in comparison to the conventional site by use of little antennas appropriately collocated.
- An accurate design of the microcellular network guaranties the achievement of the coverage goals.