ITU Workshop on Human Exposure to Electromagnetic Fields (EMFs)
Turin, Italy, 9 May 2013

EMFs Exposure Monitoring and SAR Certification in Telecom Italia

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Italian Laws on EMFs Exposure Limits for Population

Laws

Three Limits have been defined in Italy. Cumulative and flat in the range of 100 KHz – 300 GHz:

1. Exposure Limit: level not to be exceed in every exposure condition
2. Attention Value: level not to be exceed in long term exposure condition (at least 4h/day)
3. Quality Target: level not to be exceed in outdoor intensely frequented areas

Limits

Limits have been established in 1998 and confirmed in 2003 and they must be considered as an average in each interval of 6 minutes (close to the peak level):

1. Exposure Limit: 20 V/m
2. Attention Value: 6 V/m
3. Quality Target: 6 V/m

A new law, issued in dec2012 ,has established that the 6V/m must be averaged in an interval of 24 hours

In common practice the 6 V/m is the limit considered almost everywhere

Max 6V/m

New s Dec

TELECOM ITALIA

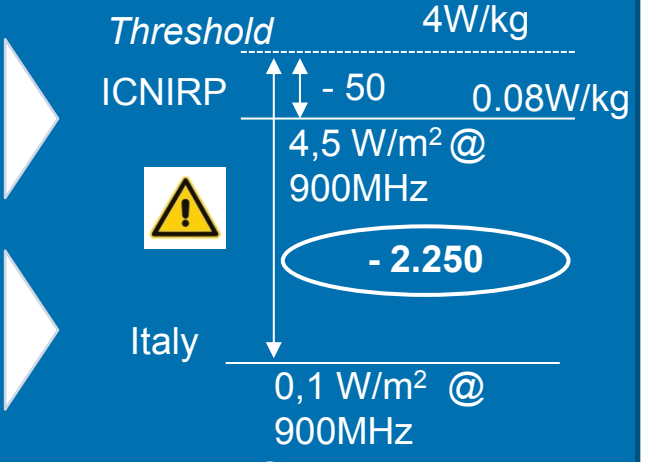
Comparison between Exposure Limits applied in Italy and recommended in Europe

- ICNIRP established exposure limits that are:
  - Frequency-dependent
  - Not discriminatory between short and long term exposure
- The majority of the European States and also other Countries use the ICNIRP limits in their regulations

Reduction Factor Criteria for Exposure Limits Definition

ICNIRP has established a **reduction factor of 50** with respect to «*the threshold for irreversible effects in even the most sensitive tissues*»

The Italian Limits of 6V/m corresponds to a **reduction factor of 2250** with respect to the above *threshold* at 900MHz



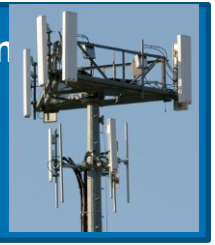
Note: the EM Limits are established through an equivalence relation between SAR and Electromagnetic Power Density

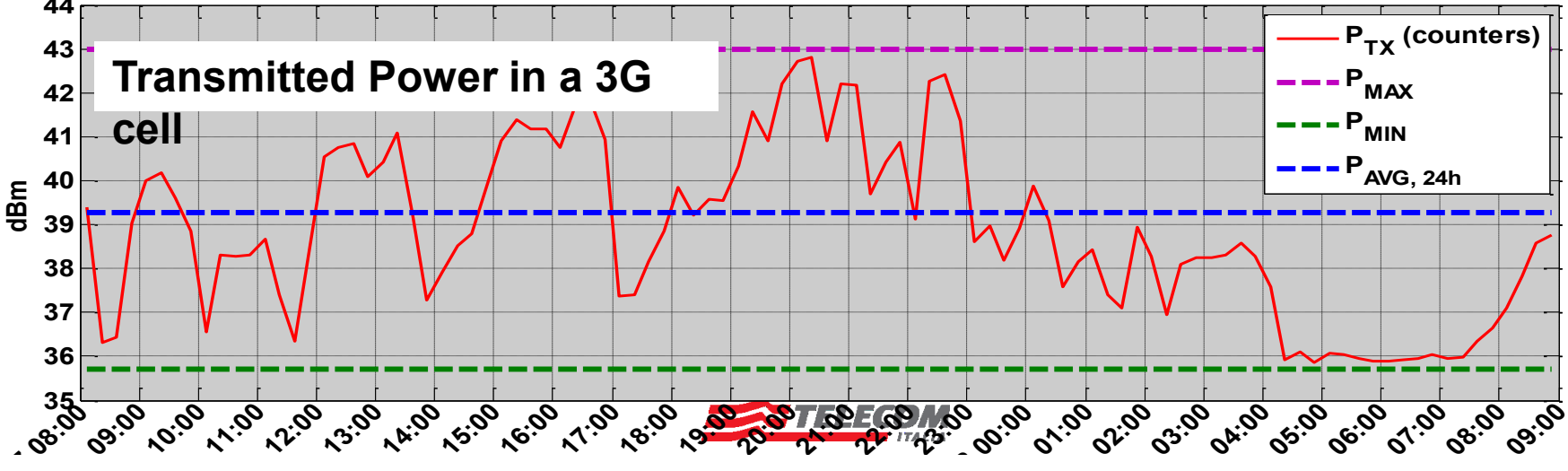
Transmitted Powers & EMFs Monitoring

- New Italian Regulation imposes to measure and calculate the EMF exposure by considering the average value over an interval of 24 hours:
  - Measurements should be performed with instruments able to store data continuously in 24 hour
  - Calculations have to be executed by considering the average transmitted power that depends on traffic variation and power control mechanisms

Average transmitted power have to be stored by considering the instantaneously transmitted power coming from network counters for all sites, all systems and all frequencies

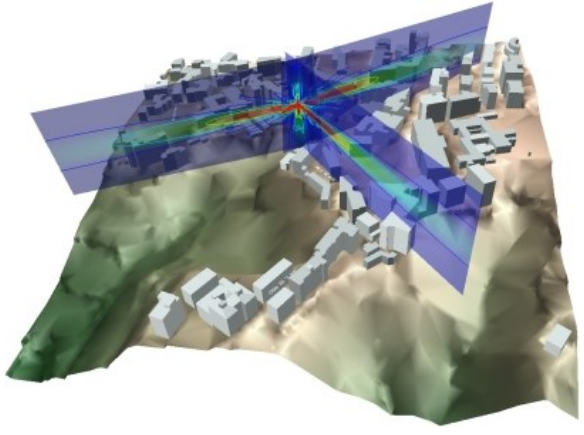
about 0.5 million of antennas in Italy: compliance procedures are going to become more and more complex and exper

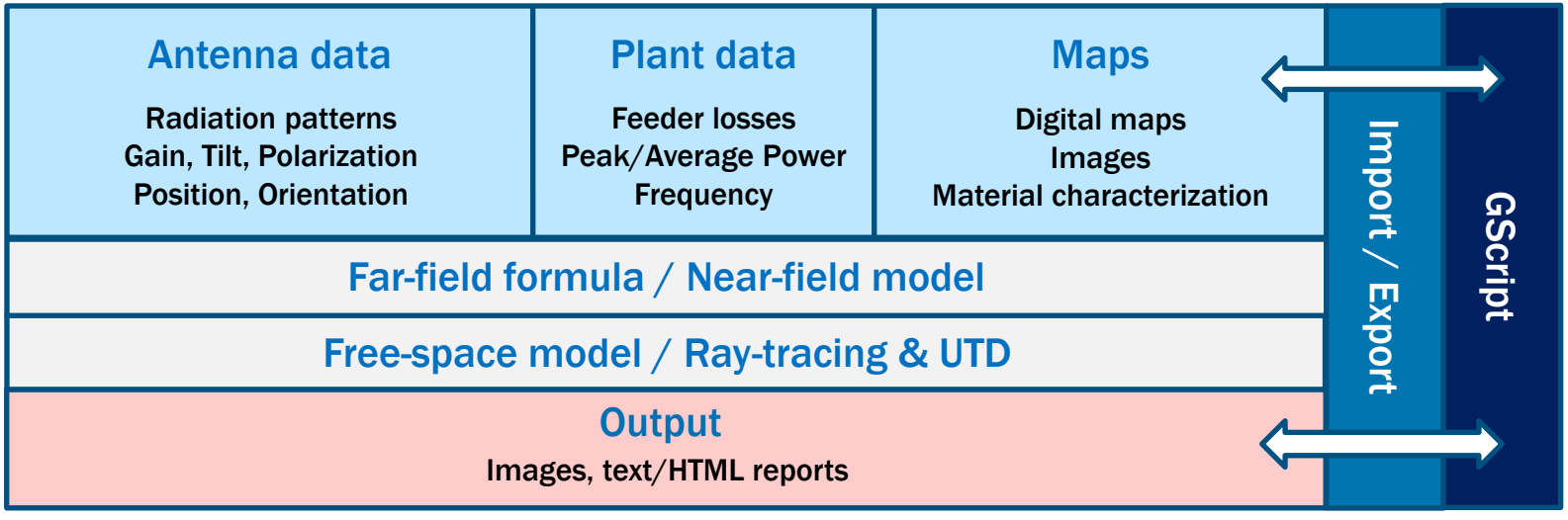




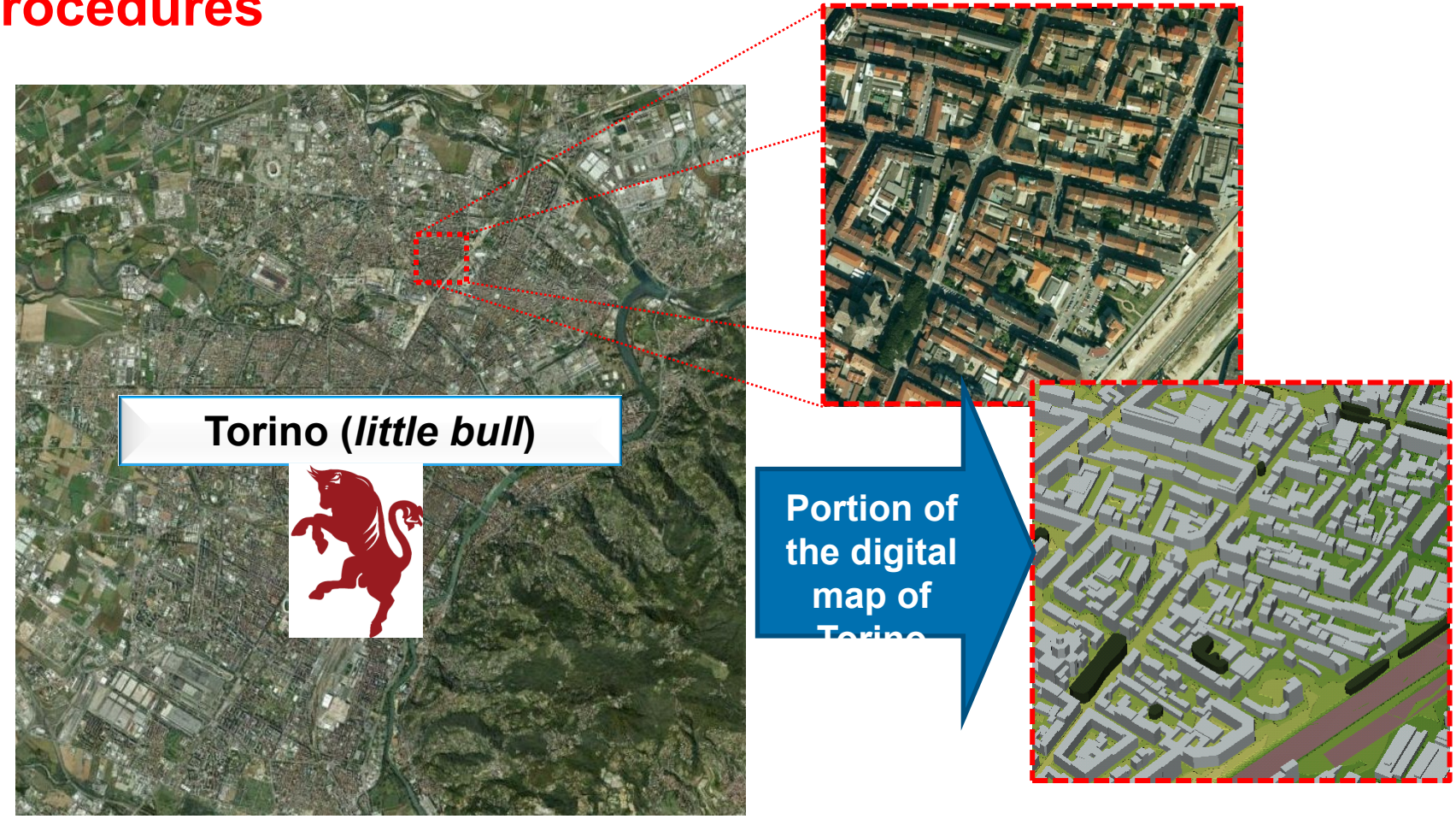
Radio-base Station compliance monitoring in Telecom Italia

GUARDIAN (**G**raphical **U**ser **A**pplication for the **R**a**D**iated Intensity in the **A**ntenna **N**eighbourhoods): deterministic tool developed and used by Telecom Italia for verifying, certifying, monitoring the compliance of the radio-base stations with the electromagnetic exposure limits in force





3D Digital Maps are used for EMFs exposure compliance procedures



Compliance Boundary at 6V/m and peak power in antenna

Analysis performed in a tri-sectorial site where GSM, UMTS and LTE technologies are considered:

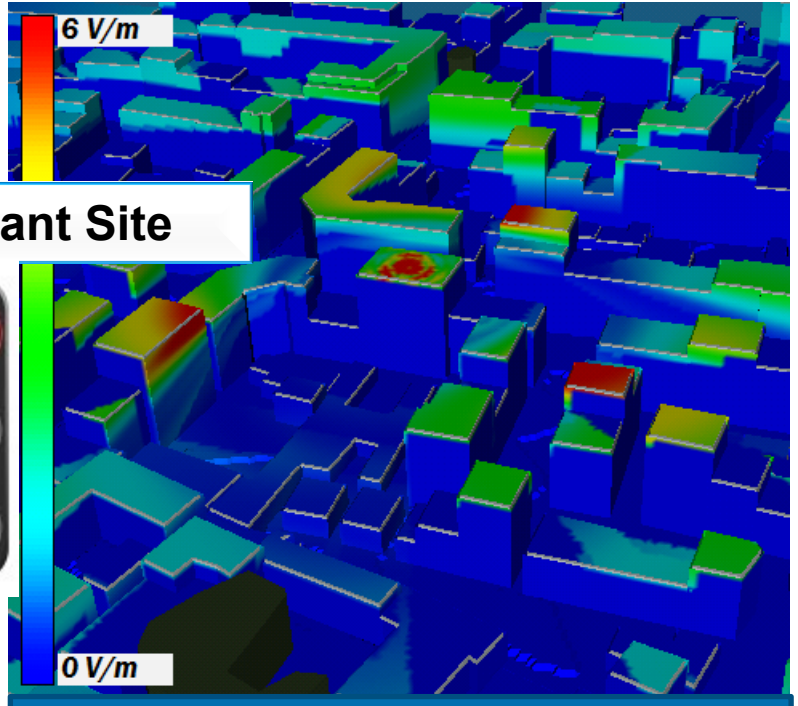
Calculations are made by considering **6V/m as threshold** and **Peak Power in antennas**

Compliance Boundary

Peak power, threshold 6V/m

Not Compliant Site

Electric-field Distribution



Peak power, threshold 6V/m

Compliance Boundary at 6V/m and average power in antenna

Analysis performed in a tri-sectorial site where GSM, UMTS and LTE technologies are considered :

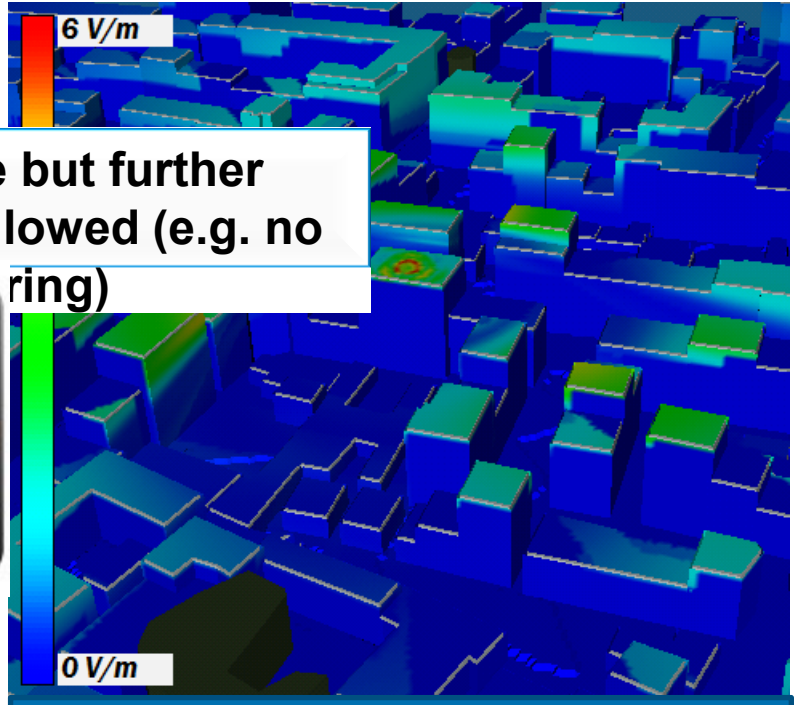
Calculations are made by considering **6V/m as threshold** and **Average Power in antennas**

Compliance Boundary

Average power over 24h, threshold 6V/m

Compliant Site but further extensions not allowed (e.g. no site ring)

Electric-field Distribution



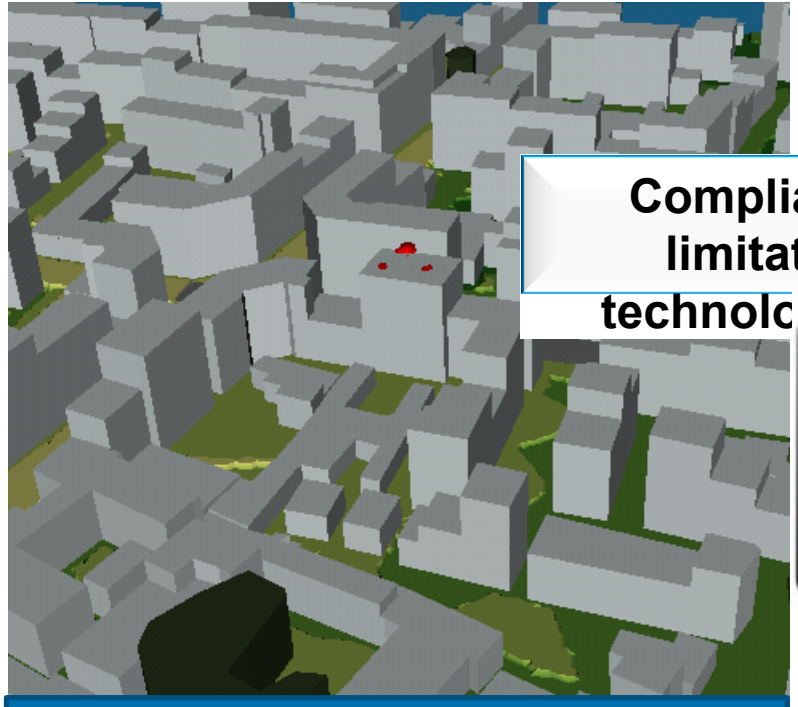
Average power over 24h, threshold 6V/m

Compliance Boundary at 40V/m and peak power in antenna

Analysis performed in a tri-sectorial site where GSM, UMTS and LTE technologies are considered :

Calculations are made by considering **40V/m as threshold** and **Peak Power in antennas**

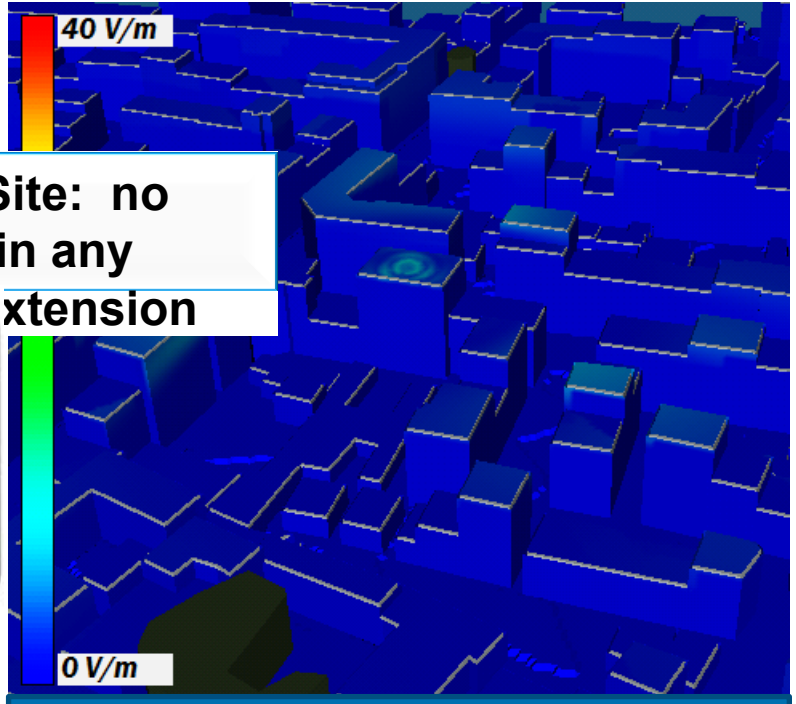
Compliance Boundary



Peak power, threshold 40V/m (ICNIRP)

Compliant Site: no limitation in any technolo xtension

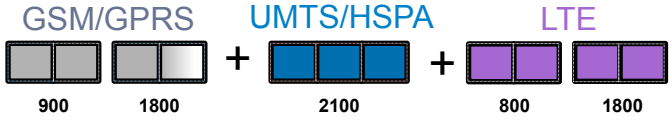
Electric-field Distribution

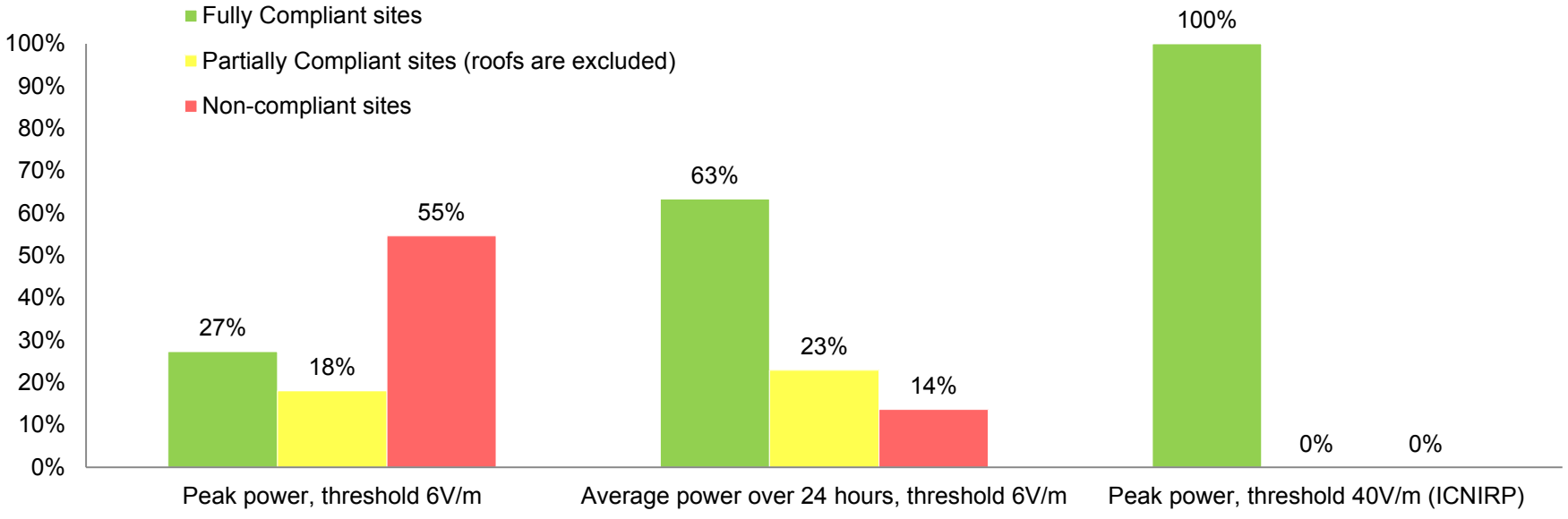


Peak power, threshold 40V/m (ICNIRP)

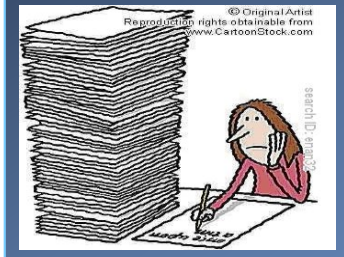
Expected Compliance Assesment in Torino in different scenarios

Simulation considering all systems/frequencies in all TIM sites in Torino





Telecom Italia internal process for devices certification



- TI is directly involved in 3GPP/IEC standardization activities
- Internal definition of device requirements

- Definition of test list and test environment to check the compliance to requirements
- Test Execution
- Results discussion with manufacturer

- Final technical and commercial approval for the device to be sold with TIM brand
- Quality control based on sampled supplies

TI SAR laboratory activities: accreditation

- Telecom Italia SAR laboratory accredited by Italian body ACCREDIA (ex SINAL)
- Accreditation according to ISO/IEC 17025:2005
- Possibility to perform SAR compliance campaigns not only for internal clients
- ACCREDIA latest successfully audit performed in October 2012

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

ilac-MRA

CERTIFICATO DI ACCREDITAMENTO
Accreditation Certificate

Accreditamento n° / *Accreditation n°*: **0105** Rev. **0**

Si dichiara che / *We declare that*: **TELECOM ITALIA SpA - TELECOM ITALIA LAB - LAP**
Appartenente all'ente:
TELECOM ITALIA SpA
Sede:
Via G. Reiss Romoli 274 - 10148 Torino TO

è conforme ai requisiti della norma / *meets the requirements of the standard*: UNI CEI EN ISO/IEC 17025:2005 "Requisiti generali per la competenza dei Laboratori di prova e taratura" / *EN ISO/IEC 17025:2005 "General Requirements for the Competence of Testing and Calibration Laboratories" standard*

quale / *as*: **Laboratorio di Prova** / ***Testing Laboratory***

L'accreditamento attesta la competenza tecnica del Laboratorio relativamente allo scopo riportato nelle schede allegato al presente certificato. Le schede possono variare nel tempo. I requisiti gestionali della ISO/IEC 17025:2005 (sezione 4) sono scritti in un linguaggio idoneo all'attività dei laboratori di Prova, sono conformi ai principi della ISO 9001:2008 ed allineati con i suoi requisiti applicabili.
Il presente certificato non è da ritenersi valido se non accompagnato dalle schede allegate e può essere sospeso o revocato in qualsiasi momento nel caso di inadempienza accertata da parte di ACCREDIA.
La vigenza dell'accreditamento può essere verificata sul sito WEB (www.accredia.it) o richiesta direttamente ai singoli Dipartimenti .

The accreditation certifies the technical competence of the laboratory limited to the scope detailed in the attached Enclosure. The scope may vary in the time. The management system requirements in ISO/IEC 17025:2005 (Section 4) are written in a language relevant to Testing laboratories operations and meet the principles of ISO 9001:2008 and are aligned with its pertinent requirements.
The present certificate is valid only if associated to the annexed schedule, and can be suspended or withdrawn at any time in the event of non fulfilment as ascertained by ACCREDIA.
The in force status of the accreditation may be checked in the WEB site (www.accredia.it) or on direct request to appointed Department.

Data di 1ª emissione / *1st issue date*	Data di modifica / *Modification date*	Data di scadenza / *Expiring date*
1995-10-31	2011-09-27	2015-06-25

Il Direttore Generale / *The General Director* (Dr. Filippo Trifiletti)
Il Direttore di Dipartimento / *Department Director* (Dr. Paolo Bianco)
Il Presidente / *The President* (Cav. del Lav. Federico Grazioli)

SAR Measurement Technical Standards contribution

Working groups:

- IEC TC106 MT 1, Maintenance of IEC 62209-1
- ICES TC34, Wireless Handset SAR certification (SC1: Experimental Techniques)

Latest face to face Meeting held in Turin: September 11th-14th 2012

Fast SAR and test reduction techniques

- Great effort in introducing new FAST SAR methods and procedures to reduce overall measurement time*
- A statistical based approach is introduced by TI, to reduce the time needed to perform SAR measurements in the case of GSM900, DCS1800 and UMTS band I handsets**

*M.G. Douglas, S. Gabriel, C. Bucher, D. Iliev, J. Kastrati, C. Leubler, M. Meili, K. Pokovic and N. Kuster: "Fast SAR Methods for Electromagnetic Exposure Evaluation of Wireless Devices" EuCAP 2011 Meeting, Rome, April 2011

**M. Francavilla: "Time reduction to demonstrate SAR compliance of GSM/UMTS mobile phones" BEMS 2011 Meeting, Halifax, CA, June 2011