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# EMF Exposure and 5G network development: an industry perspective

## Electromagnetic Field Level and 5G Roll-out Expert Meeting

2-3 November 2017

Rome, Italy

ITU Regional Initiative for Europe on Development  
of Broadband Access and Adoption of Broadband



# ATDI

Hosted by



Ministero dello Sviluppo Economico

BROADBAND POLICIES  
& STRATEGIES

FUTURE 5G NETWORKS  
INTERNET OF THINGS IoT

BASE STATIONS  
DEPLOYMENT COSTS

HEALTH ISSUES  
STAKEHOLDERS

Organised by





# AGENDA

ATDI's Activities on EMF

EMF in 5G Environment

Topics for Discussion



## ATDI's activities on EMF

## ATDI as a Sector Member of the ITU-D, ITU-R

- WTDC-17 Resolution 62 on “Assessment and measurement of human exposure to electromagnetic fields”
- ITU-D Study Group 2 Question 7/2 on “Strategies and policies concerning human exposure to electromagnetic fields”
- ITU-R Study Group 1. New Question 239/I on “Electromagnetic field measurements to assess human exposure” is studying:
  - What are the measurements techniques to assess the human exposure from wireless installations of all types?
  - How can measurement results be presented?

ATDI & Rohde Schwartz propose a new Draft Report to ITU-R Working Party 1C, June 2017 meeting.

Correspondence Group on the development of this draft new Report ITU-R SM.[EMF-MON. Chairman: Haim Mazar (Madjar) ([mazar@ties.iu.int](mailto:mazar@ties.iu.int); [h.mazar@atdi.com](mailto:h.mazar@atdi.com))



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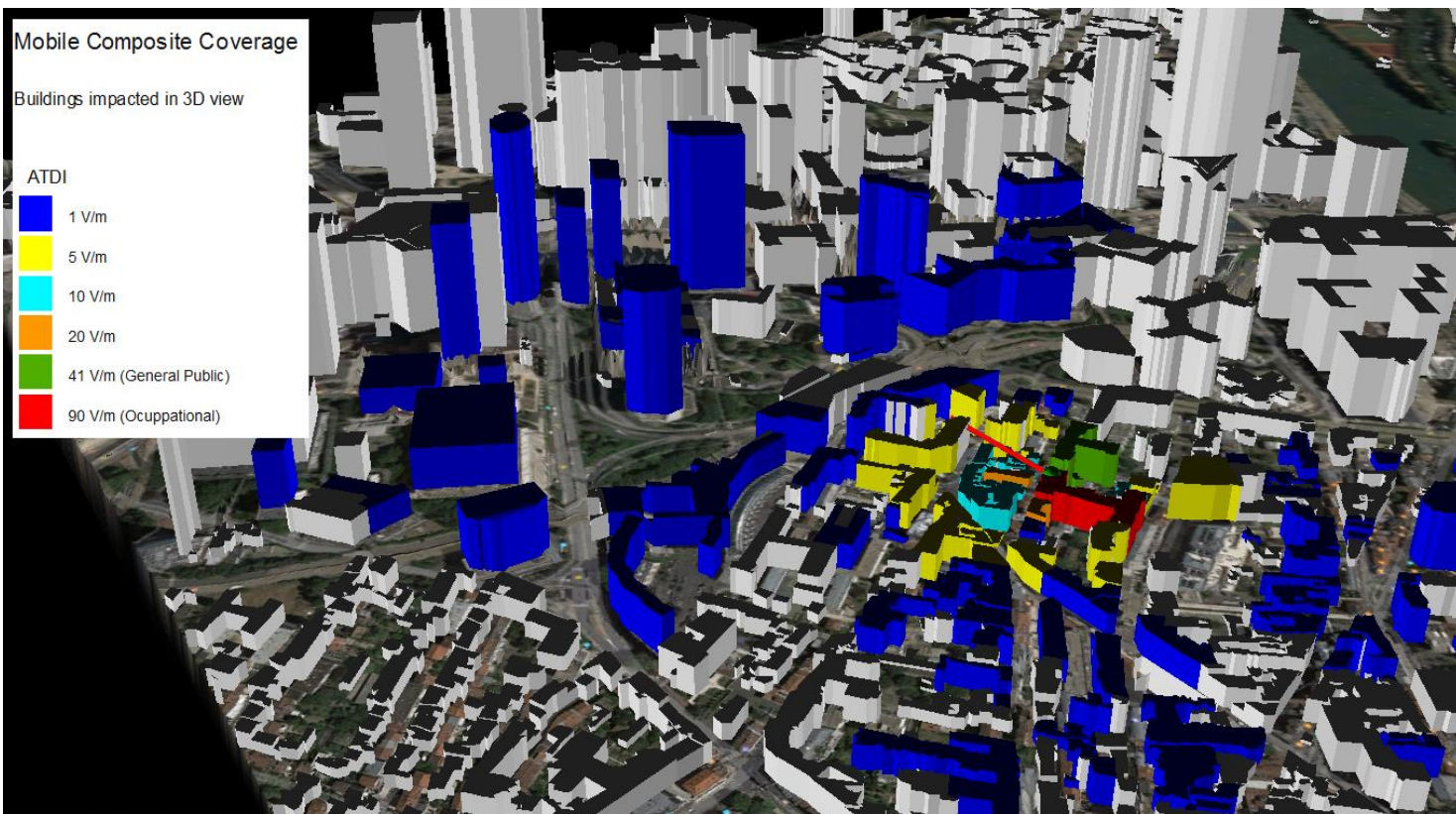
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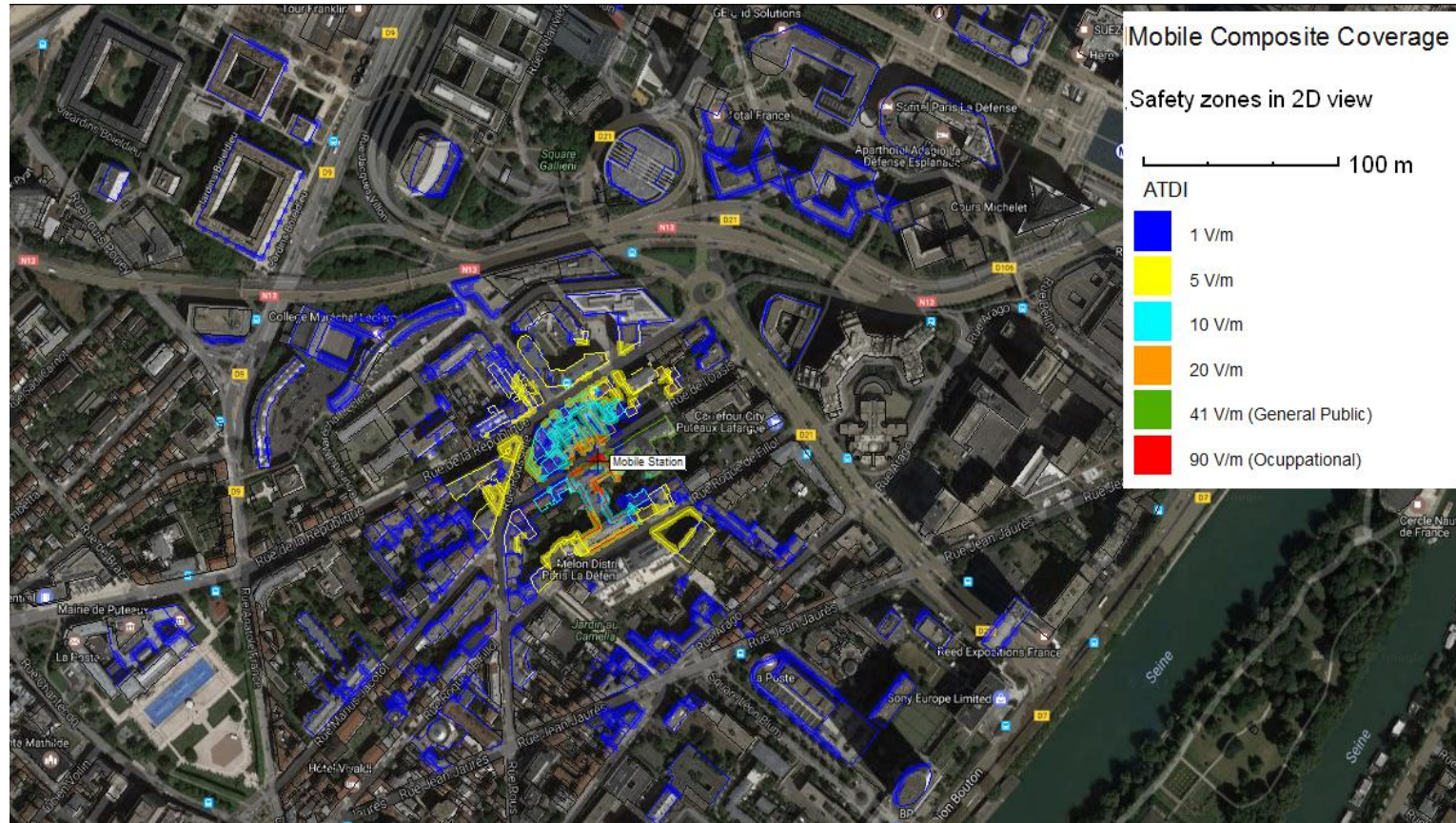
## Example: 4G base station mobile safety distances showing buildings impacted

For max. downlink power of 100 W at 900 MHz, ant gain (including losses) 17 dBi, eirp is 5 kW



## Example: Two dimensions satellite view of cellular exposure-distances

For max. downlink power of 100 W, ant gain (including losses) 17 dBi, eirp is 5 kW

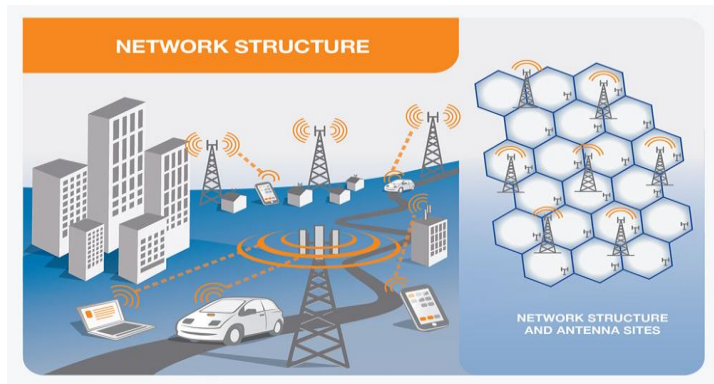




# Going Forward



- ATDI seeks the collaboration with ITU membership on developing the Draft New Report on “Electromagnetic field measurements to assess human exposure” via the Correspondence Group chaired by Dr. Haim Mazar (Madjar) to be completed by mid-2018.
- ATDI seeks for inputs on 5G network parameters and topologies for the simulation of possible use cases of 5G networks



Source: GSMA

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## EMF in 5G Environment



## EMF Exposure Limits and their Impact on 5G Network Planning

- Reduction of site sharing opportunities
- Restrictions on site location, and specifically on buildings
- Excessive investment costs in BS infrastructure, and increased associated rental and energy costs
- Overload and delays in the licensing process on the operator and regulators' sides
- Higher levels of public concern due to a larger number of base stations
- Less flexibility in optimising the BS distribution and parameters

***The above, and other applicable considerations, should be quantified in applicable use cases in relevant countries in order to determine the desired EMF restriction levels. However, For the moment, the technical standards for the 5G networks and devices are still under development.***

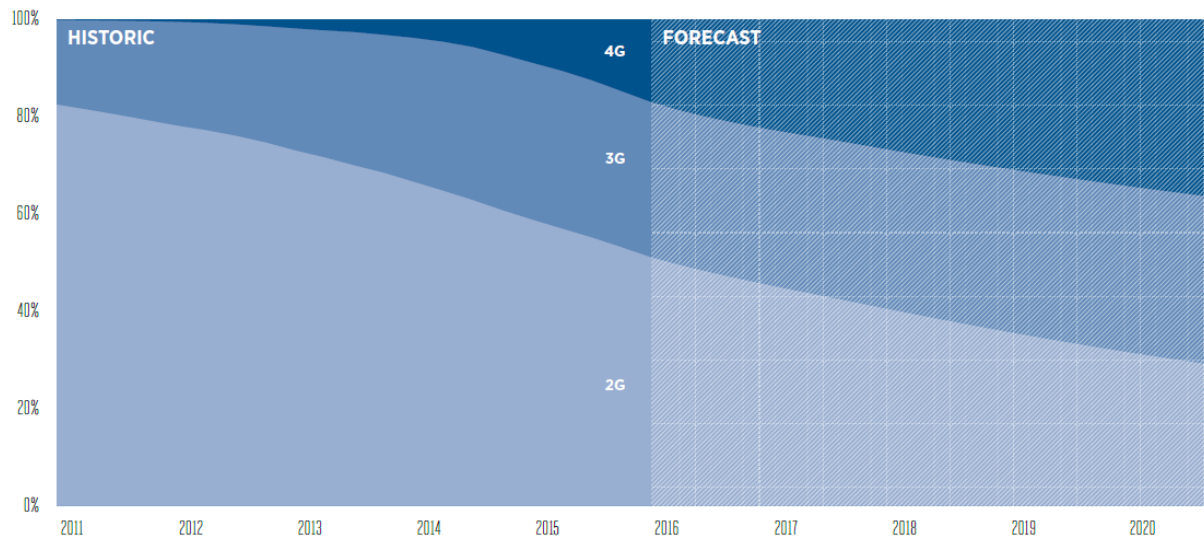
## ICNIRP Levels and 5G

- 5G to expand into above 24 GHz (e.g. the “26 GHz band”): wider bandwidth channels (100–500 MHz or more) for significantly higher data rates to be delivered in areas of very high MBB traffic density.
- Above 10 GHz, the basic restriction of ICNIRP levels is changing from SAR (W/Kg) to power density (W/m<sup>2</sup>). A study<sup>1</sup> was made that to be compliant with the exposure limits at frequencies above 10 GHz, P<sub>max</sub> for a device used in close proximity of the body might have to be several dB below the power levels used for current cellular technologies.
- ICNIRP is periodically revising the limits; next outcome of revision in 2018

***Relevant to the majority of countries in Europe***

# Shutdown of 2G, 3G

Generational shift – projected split of mobile connections base



Source: GSMA: 5G, the Internet of Things, and Wearable Devices: Radio Frequency Exposure

Primary reasons are to save on infrastructure costs, and free up spectrum, however could also assist with respecting EMF exposure limits





## Topics for Discussion

## Proposed topics for discussion

1. Experience gained in complying with EMF exposure levels before the roll out of 3G/4G networks, now going forward to 5G
2. Current status of 5G agenda as part of reviewing national EMF levels