

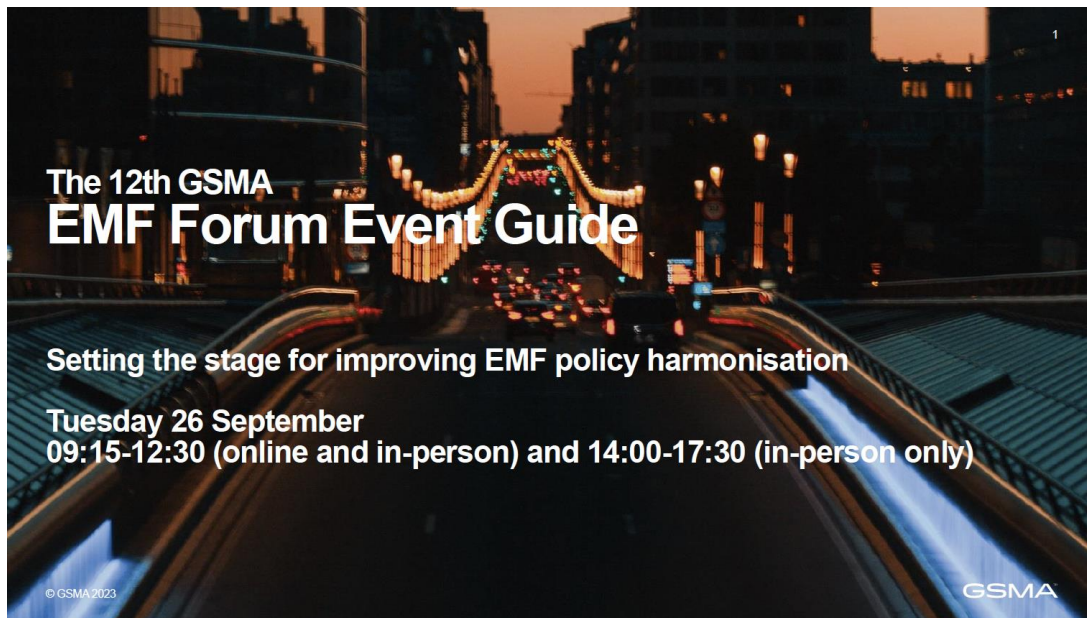
The 12th GSMA EMF Forum Event Guide

Setting the stage for improved EMF policy harmonisation

Tuesday 26 September
Brussels, Belgium

09:15-12:30 (online and in-person) and 14:00-17:30 (in-person only)

Download the EMF Forum Event Guide



Lunch and Networking

All sessions from 14:00 until 17:30 are only available in-person in Brussels

Chatham House Rule

When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.'

ICNIRP (2020) adoption – mobile networks (public)

2020

Ireland
Uganda

2021

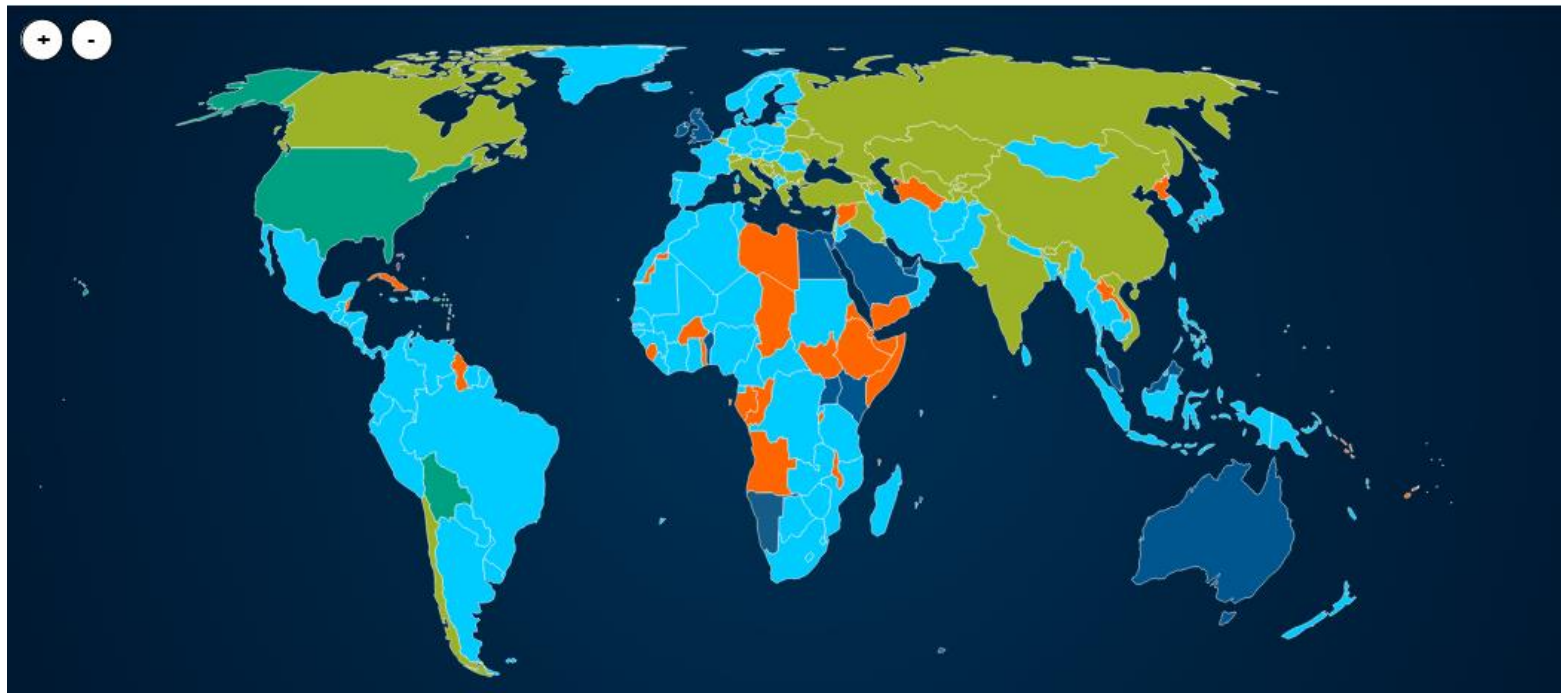
Australia, Benin, Malaysia, Malta, Mauritius,
Saudi Arabia, United Arab Emirates, United Kingdom

2022

Egypt
Kenya

202?

Brazil
Trinidad and
Tobago



ICNIRP



ICNIRP 1998



FCC 1996



Other



Unknown

PANEL DISCUSSION

Progress in the adoption of ICNIRP (2020) and IEC 62232:2022



Facilitator: Dimitra Gaitanidou, EMF expert in Technology, Deutsche Telekom



Christophe Grangeat, EMF Mitigation Lead and Principal System Architect, Nokia



Mike Wood, Telstra – Chair GSMA EMF and Health



David Scerri, Senior Manager, Malta Communications Authority



Thomas Daskalou, Health & Environmental Supervisor, Victus Networks



INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

RF EMF exposure assessment methods for base stations

Status of IEC 62232 standard & IEC TR 62669 case studies

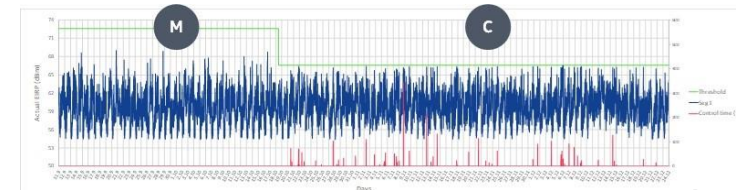
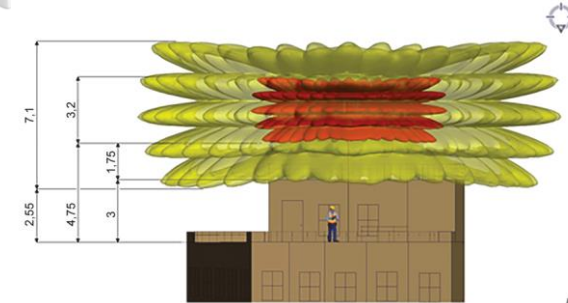
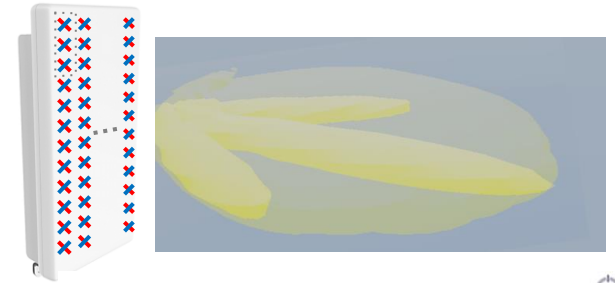
12th GSMA EMF Forum, Brussels, 26.09.2023



Christophe Grangeat, Nokia
EMF Mitigation Lead
Principal System Architect

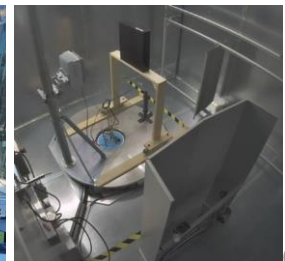
Convenor of IEC TC106 MT3

- IEC 62232:2022 Ed. 3.0
 - ❑ “Determination of RF field strength, power density and SAR in the vicinity of base stations for the purpose of evaluating human exposure”
 - ❑ Referenced in many countries/regions (totally or partially)
- Scope
 - ❑ Specify both measurements and computation techniques for assessing RF exposure from base stations
 - ❑ Extended frequency range up to 300 GHz
 - ❑ Compatible with multiple applicable exposure limits, including ICNIRP-1998, ICNIRP-2020, IEEE C95.1:2019 and SC6:2015
- Content
 - ❑ Product compliance boundaries
 - ❑ Product installation compliance boundaries (including pre-existing exposure)
 - ❑ Methods for implementing the actual maximum approach and validating monitoring and control features
 - ❑ Measurement methods (in-situ compliance, extrapolation, features validation)
 - ❑ Computation methods



- IEC TR 62669:2019 Ed. 2.0 (published)
 - “Case studies supporting IEC 62232 - Determination of RF field strength, power density and SAR in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure”
 - Describes examples of exposure assessment campaigns performed at various stages of the implementation IEC 62232:2022
 - 16 case studies from 8 national committees

- IEC TR 62669 Ed. 3.0 (committee draft)
 - Additional case studies addressing
 - The actual maximum approach: implementation and validation
 - Extrapolation techniques of 5G massive MIMO signal
 - Emerging laboratory measurement methods related to ICNIRP 2020
 - 33 case studies from 12 national committees
 - Planned adoption in 2024 and publication in 2025

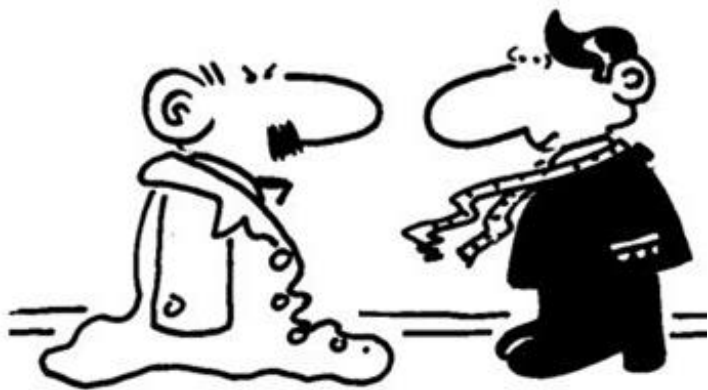


Adoption of ICNIRP 2020 and IEC62232:2022

Case Study for Malta



MALTA COMMUNICATIONS AUTHORITY



Regulatory Framework

- “The authorised undertaking shall comply with any radiation emission standards adopted and published by the International Commission for Non-Ionising Radiation Protection (ICNIRP) or any other appropriate standards as may be specified by law or by the competent public health authorities...”

Ninth Schedule of the Electronic Communications Networks and Services (General) Regulations (S.L. 399.28)

- The Licensee shall comply with any radiation emission standards adopted and published by the International Commission for Non-Ionising Radiation Protection (ICNIRP) and any other appropriate standards as may be specified by law or by the Authority.

Spectrum Licences

MCA to monitor and ensure that the levels of non-ionising radiation from radio transmitting apparatus are within the predefined levels

EMF Policy

3 Key Aspects

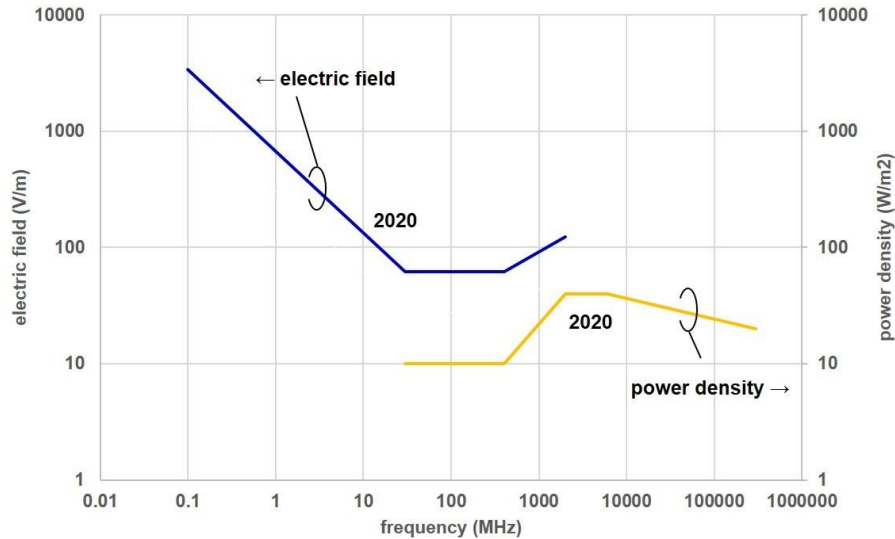
- (1) EMF Exposure limits
- (2) Measurement Methodology
- (3) Ensuring Compliance

EMF Exposure Limits (1)

Steps in *preliminary* adopting ICNIRP 2020 Recommended limits:-

- Understand the changes brought forward by ICNIRP 2020 / Council Recommendation (1999/519/EC) / Existing EMF Policy
- Consult with Superintendent of Public Health on the adoption of ICNIRP 2020
- Align the EMF policies and procedures to reflect ICNIRP 2020

EMF Exposure Limits (2)



- Reference levels for time averaged general public exposures of ≥ 6 min to electromagnetic fields from 100KHz to 300 GHz - Whole Body Exposure
- The same exposure limits apply above 30 MHz whatever technologies emit the non-ionising radiation (2G, 3G, 4G, 5G, DTTV, Digital & Analogue radio)
- Near Field and Far Field Distinctions - Use of reference levels possible in the far field only
- ICNIRP 2020 Table 5 refers to reference levels averaged over 30 mins

Measurement Methodology

- Alignment of MCA measurement methodology
- Guidelines for industry adopted in April 2021

Measurement Methodology according to ICNIRP 2020 Recommendations & IEC 62232 international accepted standards and other IEC, ECC & ITU best practices

Methodology to be adopted by Wireless Broadband Providers for the Adherence to Radio Communication Obligations Established in General Authorisation (Radiocommunications Apparatus) Regulations

Ensuring Compliance

- MCA maintains a team of experts with access to state-of-the-art tools who undertake audits in line with aforementioned measurement methodologies.
- MCA carries out ongoing field audits to ensure that radiocommunications stations are operating as per legislation.
- Field Audits are performed at pre-established test points distributed nationally, Radio transmitting equipment installations, customer residences as well as nationwide wideband audits.



Thank You



MALTA COMMUNICATIONS AUTHORITY

ICNIRP (2020) and IEC 62232:2022 adoption - Greek case study

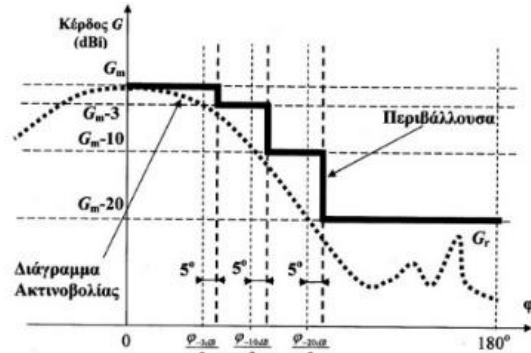
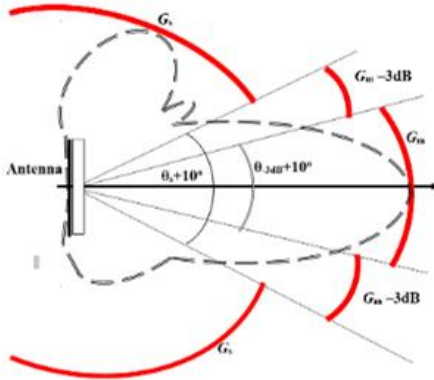
Thomas Daskalou

Victus Networks EMF Supervisor

(co Authors: *Cosmote, Vodafone, NOVA*)

EMF calculations in Greece

GAEC Technical Standard (Mandatory) – revised in 202



Compliance= “in all accessible areas (highest level) it must be proven that <60% of ICNIRP limits are met”

Total Exposure Ratio (T.E.R.) < 1 in the 3 “regions” (points) on the nearest accessible level assuming:

1. Maximum antenna gain in the area
2. Minimum distance from antenna center

$$S = \frac{P \cdot 10^{0.1G}}{4\pi R^2} u^2 \quad \xrightarrow{u=1.6-2} \quad S = \frac{P \cdot 10^{0.1G}}{\pi R^2} \quad \xrightarrow{\text{T.E.R. (Total Exposure Ratio)}} \quad \sum_f \frac{S_f}{S_{f,\max}} \leq 1$$

GAEC Standard Overestimations

1. Max Reflection Coefficient ($u=1.6$)
2. Gain/angles overestimations (up to 30dB)
3. All areas are assumed to be accessible by the general public (heavy urban environments, tiled roofs)
4. Include in calculations all transmitters within 50m

EMF limits in Greece



Limits for General Public

Current limits used as per law requirements:

- ✓ Maximum exposure limits equal to **60% of ICNIRP** guidelines for base stations located less than 300 m from kindergartens, schools, hospitals or nursing homes for the elderly (base stations cannot be located at any of the said premises).
- ✓ Limits equal to **70% of ICNIRP** apply in all other areas.
- ✓ Conservative Greek approach: All calculations consider 60% limit.

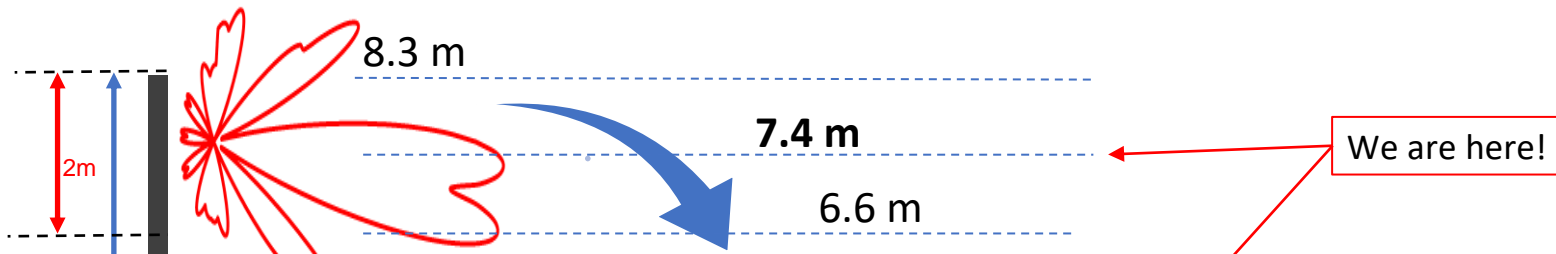
Occupational Limits

- No reduction factors are taken for occupational safety (100% ICNIRP - occupational)
- No standard procedure for exclusion zones for every BS (as part of licensing approval)

BS classes:

- 1. Macro BS (>164Weirp)** -> EMF study based on GAEC Standard (approval needed)
- 2. Micro BS (<164Weirp)** -> EMF Study (no approval from GAEC needed)
- 3. E0/E2/E10 small cells (<10Weirp)** -> No EMF Study (mostly indoor installations)

Adopting IEC 62232:2022 in EMF algorithm in Greece



EMF safety compliance distance (minimum height / Hm) evolution		
BS with active sharing + cband		
Old GAEC Standard 60% ICNIRP	New GAEC Standard* 60% ICNIRP	New GAEC Standard and 100% ICNIRP
8.3 m	7.4 m	6.6 m
$\Delta h=0.9\text{ m}$		$\Delta h=0.8\text{ m}$

- *Greece adopts the following IEC 62232:2022 recommendations:**
1. Reflection coefficient reduction to 0.6 ($u=1.6$)
 2. Use of "Actual Maximum Power" for active antennas

Results – Necessity of adopting ICNIRP (2020)

1. Adoption of ICNIRP 2020 guideline in 100% of roll out cases (300m radius should not be included)

Forbidden heights due to Archaeology / public reactions / heavy urban topography

2. Adoption of realistic Gain values in the horizontal and vertical diagrams (MSI files to be used from vendors)

Realistic heights (~1m shorter than now)

3. Capability to use any existing measurements (as background), or EMF simulation tools results, to support the EMF compliance and theoretical EMF studies

Avoid unnecessary overestimations irrelevant to public safety / EMF compliance

EMF VALUES (W/m ²)	RURAL AREAS	URBAN AREAS	ROOFTOPS	
MEASUREMENTS*	0,0001	0,001 - 0,005	0,01 - 0,1	* Source: GAEC
EMF CALCULATIONS**	0,001- 0,009	0,009 - 0,09	0,5 - 3,1	** Source: Providers

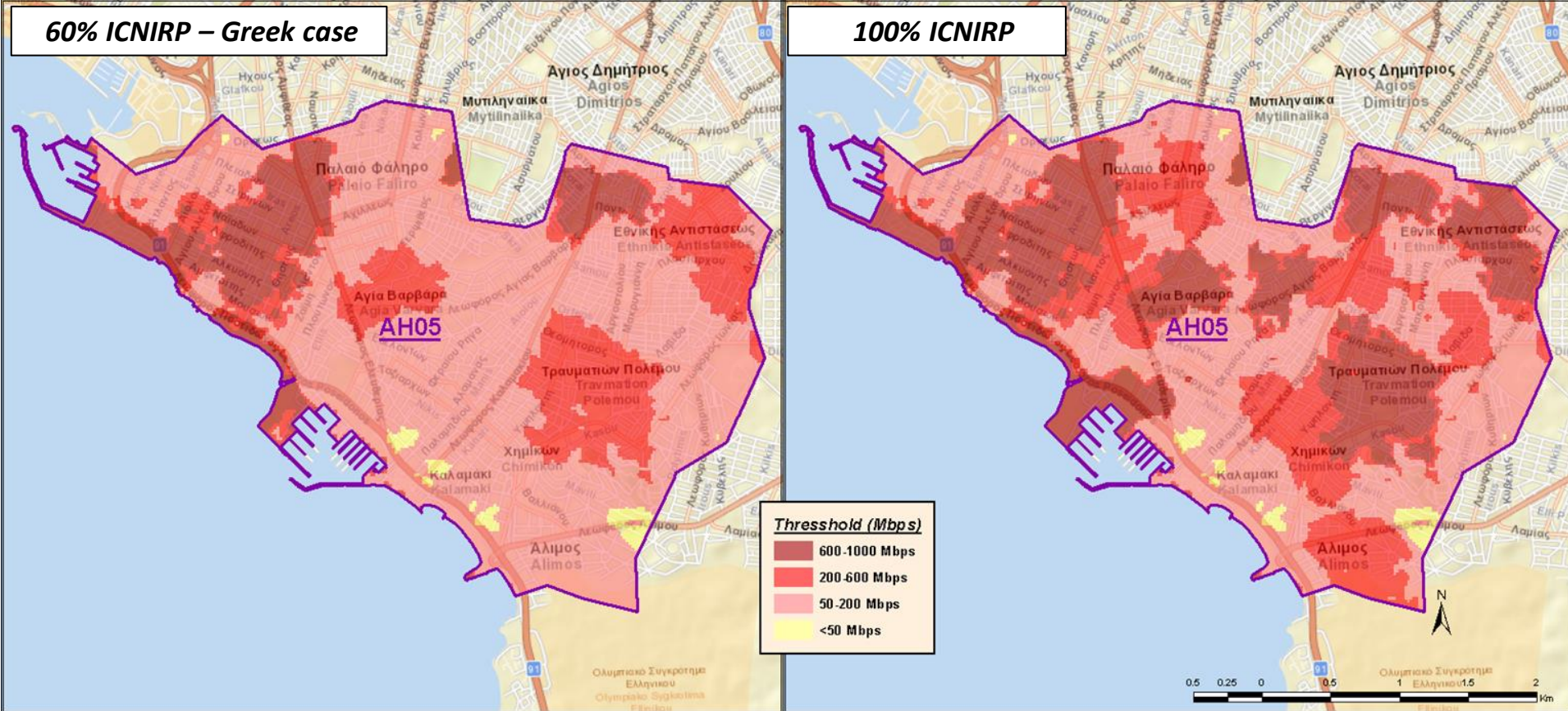
4. Overestimations between EMF calculations and measurement results.

EMF Measurements approximately 1% - 5% of EMF calculations

Map of throughput coverage - Area 1 (Northern Athens)

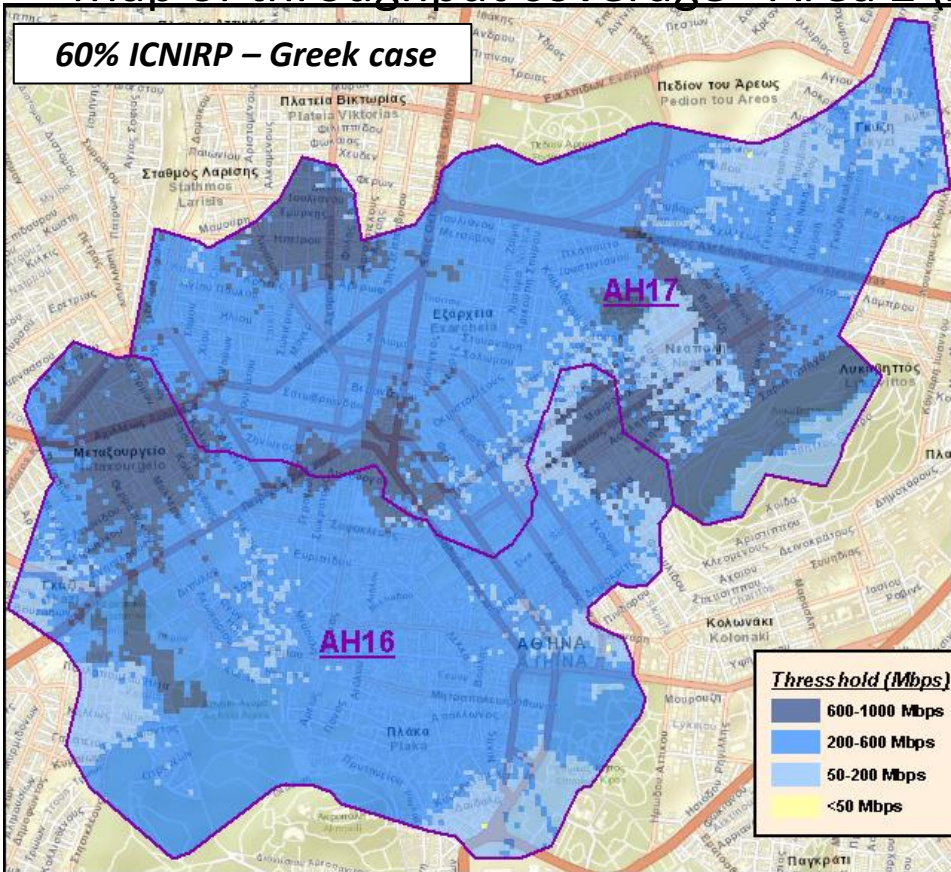
60% ICNIRP – Greek case

100% ICNIRP

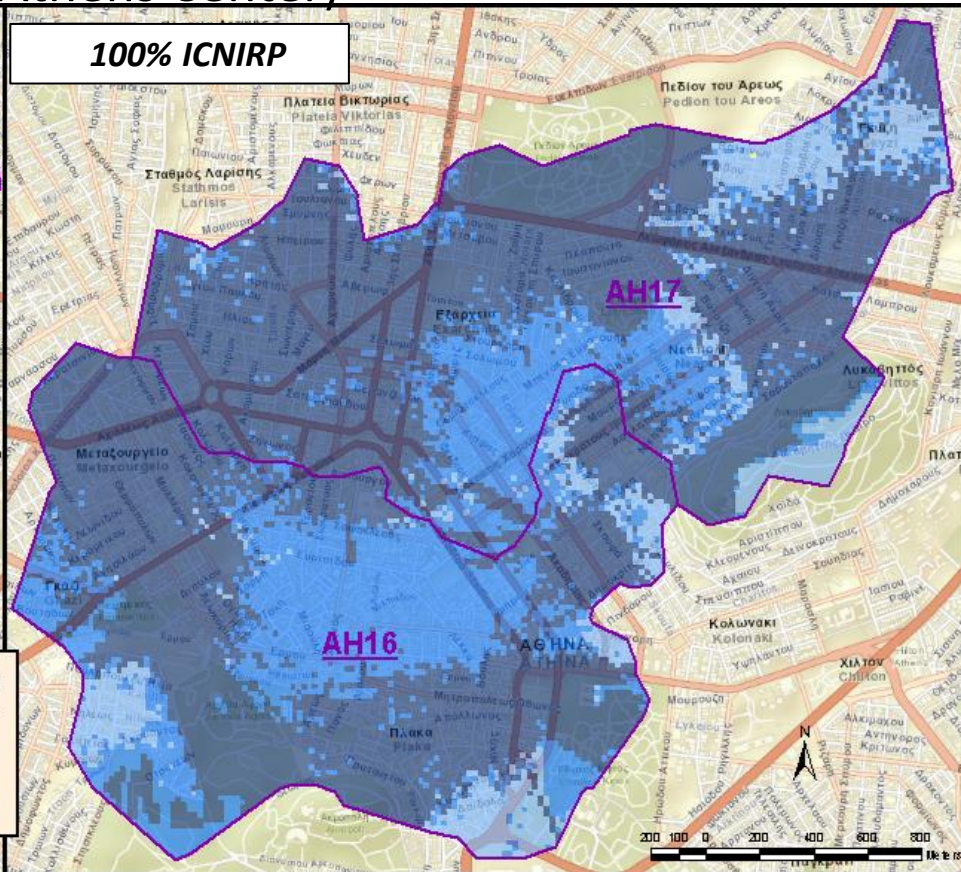


Map of throughput coverage - Area 2 (Athens Center)

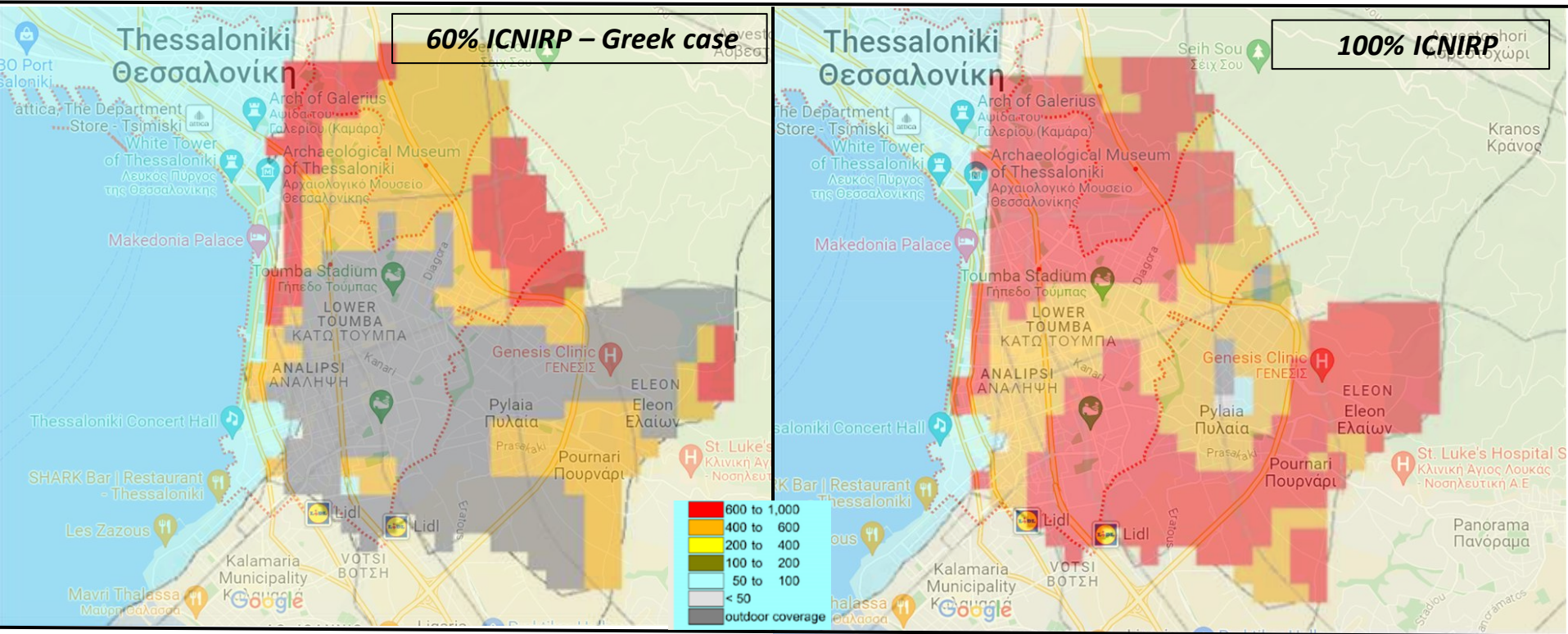
60% ICNIRP – Greek case



100% ICNIRP



Map of throughput coverage - Area 3 (Southern Thessaloniki)



Throughput coverage comparison

		Throughput Thresholds (coverage in maps)					
		Greek EMF Limits [60% of ICNIRP]	ICNIRP EMF Limits	Greek EMF Limits [60% of ICNIRP]	ICNIRP EMF Limits	Greek EMF Limits [60% of ICNIRP]	ICNIRP EMF Limits
		Area 1 (Southern Athens)		Area 2 (Center of Athens)		Area 3 (Southern Thessaloniki)	
Throughput Main target: 600-1000Mbps		13.10%	29.10%	18.20%	65.10%	16%	66%
Standard Throughput	200-600 Mbps	19.70%	25.20%	67.00%	25.30%	35%	32%
	50-200 Mbps	65.70%	44.30%	14.70%	9.60%		
	<50 Mbps	1.40%	1.40%	0.02%	0.01%	49%	2%



Thank you!

Coffee break

PANEL DISCUSSION

WHO RF Task group progress and activities



Facilitator: Patricia Martigne,
EMF & Health Officer Orange –
GSMA WHO EMF Project
Group

PANEL DISCUSSION

Looking to the future of RF-EMF exposure and communication



Facilitator: Sami Gabriel
Distinguished Engineer, Vodafone Group
– Deputy Chair GSMA EMF and Health

FIRESIDE CHAT
Wrap-up of the Day



Mike Wood,
Telstra – Chair
GSMA EMF and
Health



Dr Jack Rowley,
Senior Director
Research &
Sustainability,
GSMA