



“INTERNATIONAL TECHNICAL WORKSHOP ON 5G AND EMF EXPOSURE FOR ADMINISTRATIONS”

April 17, 2019

ANFR, Maisons-Alfort, France

Attendees: 44 participants from

12 countries: Germany, Belgium, South Korea, Spain, Finland, France, Japan, Norway, Netherlands, United Kingdom, Sweden, and Switzerland

5 French administrations: ANFR, ANSES, ARCEP, DGPR, and DGS

2 international organizations: WHO and ICNIRP

1 external guest: Nokia

The day, which brought together administrations from all over the world, unfolded in several times: a general introduction by WHO, discussions around 4 themes punctuated by a presentation of ICNIRP on the revision to its guidelines and a presentation on 5G by Nokia who did not participate in the debates.

Mrs. Emilie van Deventer from the World Health Organization introduced the day by recalling the definition of health that the WHO adopted in its constitution in 1948 "Health is a complete state of physical, mental and social well-being and not merely the absence of disease or infirmity". She also raised a number of questions regarding the arrival of 5G, and underlined the importance of being able to assess exposures and of managing public information.

In general, the discussions showed that the subject of public exposure to electromagnetic fields (EMF) remains very significant in many countries. The arrival of 5G raises many questions, particularly on the possible need to revise certain national regulations, on the update of the in situ EMF measurement protocol, on the definition of compliance boundaries for 5G base stations and on numerical simulation methods of exposure. The exchanges were very intense and of excellent quality around these 4 major themes.

- **National regulations:** Countries with a level of attention lower than the limits proposed by ICNIRP have the question of making it evolve. The Belgian Institute for Postal Services and Telecommunications (BIPT) published in September 2018 a study on the impact of Brussels radiation standards on the deployment of mobile networks. In this study, BIPT concludes that the current

Brussels standard of 6 V/m does not allow the deployment of 5G and strongly discourages a cumulative limit of less than 14.5 V/m for a frequency of 900 MHz. In Switzerland, the Ordinance on Protection against Electromagnetic Radiation sets preventive emission limits in places of sensitive use that vary between 4 V/m and 6 V/m for mobile telephony. A working group, under the aegis of the Federal Office for the Environment (FOEN), was created in September 2018 to analyse the needs of mobile telephony and radiation risks, in particular within the framework of the introduction of 5G. This working group is expected to present a report and recommendations by mid-2019. In France, ANFR used as a criterion an overall level of exposure greater than or equal to 6 V/m to define atypical points, i.e. places where the level of exposure to electromagnetic fields substantially exceed those generally observed nationally. ANFR is reflecting on the evolution of future exposure. The trend is towards an increase in the number of atypical points in very dense urban areas, with a larger number of base stations.

- **In-situ measurement protocol:** most countries are using the international standard IEC EN 62232 "Determination of RF field strength, power density and SAR in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure" for in-situ measurements. Work is ongoing in the IEC working group to take into account the specificities of 5G. Preparatory work for the revision of the standard was conducted and resulted in a technical report in April 2019 (IEC TR 62669). In situ measurement protocol meets 2 distinct needs: to assess conformity of exposure levels in a given location and to assess an indicator of the actual exposure levels generally observed. South Korea has proposed to the international community a method of extrapolation of the maximum traffic measurement based on the power measurement of reference signals. Different countries are helping to test and complete this measurement method to check compliance with the regulatory limit values. With regard to the actual exposure indicator, France has so far used the results of a broadband probe exposure assessment. The large variability of 5G could limit the representativeness of the measurement with the broadband probe. France therefore proposes to define a new 5G exposure indicator based on a usage hypothesis. The proposed usage hypothesis is a download of 1 GB of data over 6 minutes in a given direction with a hypothesis of average speed of 500 Mbps. This assumption allows an initial definition which will have to be consolidated with the commercial opening of the 5G networks.
- **Compliance boundaries:** the IEC EN 62232 standard also deals with the problem of defining compliance boundaries around base stations. Until now, in most countries these compliance boundaries were evaluated by considering the maximum rated power of the antennas. However, this approach risks becoming excessively conservative with 5G, whose spatial and temporal variability should be increased. This great variability motivates the introduction of statistical approaches. The technical report IEC TR 62669 therefore proposes to define a real maximum power based on measurements or simulations of average power over 6 minutes. The use of a maximum real power to define the compliance boundaries is conditioned by the obligation of the operators to be able to guarantee that this maximum real power is in practice never exceeded on average over six minutes. Generally, countries do not oppose the principle of using this new approach but

are attached to the usual conservative approach as the tools to ensure that the actual maximum power is not exceeded are not available.

- **Numerical simulation of exposure :**

Numerical simulation tools are becoming more efficient, but the uncertainties related to the buildings modelling, the different attenuation and reflection coefficients, the positioning and the characteristics of the transmitters remain. The power to consider is a key point of numerical simulations. To obtain a good indicator of exposure, a reduction coefficient must be applied to the maximum power to take account of traffic. With 5G, an additional specific coefficient will be added to account for the variability induced by the use of massive MIMO antennas.

The conference resulted in a common enrichment of knowledge related to the issues of public exposure assessment.

The activity related to the deployment of 5G in many countries will intensify in the coming months and the ANFR has already announced its willingness to renew this type of conference in the future.

To go further :

- [Introduction by Emilie Van Deventer, WHO](#)
- [The draft ICNIRP radiofrequency guidelines by Eric Van Rongen, ICNIRP](#)
- [The 5G NR by Christophe Grangeat, Nokia](#)