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New Technologies (including UMTS): Protection of the Public from Electromagnetic Fields

Recommendation by the German Commission on Radiological Protection

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Empfehlung der Strahlenschutzkommission

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In the event of any doubts about the meaning, the German original as published shall prevail.

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1 Introduction

Exposure of people to various electromagnetic fields has increased in everyday and professional life for years. The present situation is characterised by a dynamic development and rapid implementation of new technologies, which – besides the ones already existing – generate additional electromagnetic fields in our environment which often show new characteristics as well.

In connection with the imminent large-scale introduction of the new UMTS[1] mobile telecommunication technology, the Commission on Radiological Protection (SSK) was requested by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety to evaluate if, due to novel emissions from single sources or to their overlapping with the emission of existing sources, there is a need for action with regard to the protection of the public from excessive electromagnetic field exposures.

The SSK considers the knowledge of the emission data of the new technologies that are relevant to the evaluation to be indispensable for being able to fulfil its task of protecting the public.

However, the SSK is concerned that in several cases these data could only be collected with great difficulty, although manufacturers would be obliged to determine the emissions of electromagnetic fields of their products and to include this aspect in the risk analysis of their products (e. g. according to labour protection laws [4], law on medical devices [5], law on the safety of equipment [6], law on radio transmitters and telecommunication devices [7]).

The reasons why not all field and emission characteristics could be collected were e. g.

- Even new technologies that are already in the introductory phase have not yet been defined sufficiently in many technical details
- Not all possible fields of application of new technologies are completely foreseeable in the beginning
- In some cases, on the side of the manufacturers, not enough attention was paid to the problem of emission of electromagnetic fields
- In some cases emission data were held back by manufacturers.

2 Present Situation

The data collected by the SSK show that the new technologies have already found their way into many spheres or are on the brink of being launched, respectively, such as e. g.

[1] UMTS: Universal Mobile Telecommunication System

- Telecommunication (e. g. introduction of UMTS technology, wireless data communication based on WLAN and Bluetooth technology)
- Radio and television engineering (e. g. transition to digital technology)
- Identification and product security systems (e. g. introduction of smart labels for wireless monitoring of goods for anti-theft protection, storekeeping, and access control)
- Technologies in traffic systems (e. g. anti-collision radar, wireless traffic management systems, magnetic levitation technology)
- Applications in industry and trade (e. g. electromagnetic machining and production processes)
- Applications in households and offices (e. g. wireless data circuits, devices with thyristor-driven power regulation induction ovens)
- Technologies for medical, diagnostic, and therapeutic applications (e. g. high field magnetic resonance imaging, telemedicine), and
- Sovereign applications (e. g. TETRA[1] police mobile telecommunication, military ultra-wide-band applications).

On the basis of the evaluation of the new technologies and their use the SSK summarises the ongoing developments as follows:

- In the high-frequency range: increased application of wireless communication systems, which is associated with a more intensive use of existing and also with the use of additional frequency bands (up to the upper GHz range) and the rededication of existing frequency bands for new technologies. This is also associated with the use of novel modulation techniques and signal structures
- In the low-frequency range: increasing appearance of additional frequencies and frequency mixtures in addition to the frequencies of electric power supply
- In both frequency ranges:
  - Increase in simultaneous use of several sources
  - increased application of mobile sources.

Additionally the SSK has to state that

- The current standardisation permits that single devices may be designed in such a way that they alone for themselves already completely exhaust the immission limit values, and
- That there is an increasing number of applications for which there are currently no legal limit values to protect people.

[1] TETRA: Terrestrial Trunked Radio

3 Recommendations for Precautionary Protection of the Public from Electromagnetic Fields

Due to the dynamic development of the new technologies and the identified deficiencies, the SSK sees the necessity to affirm anew the SSK recommendation "Grenzwerte und Vorsorgemaßnahmen zum Schutz der Bevölkerung vor elektromagnetischen Feldern" ("Limit Values and Precautions for the Protection of the Public from Electromagnetic Fields") [3] and to extend it with regard to the specific problems with the introduction of the new technologies.

1. The SSK recommends to make the minimisation of exposures as a quality criteria for developing devices and erecting facilities.

2. The SSK demands that, in due time and prior to the introduction of new technologies, manufacturers and operators have to lay open the emission data required for a health risk assessment.

3. The SSK demands that those responsible for placing a product on the market include appropriate product information in the instructions of use for all devices and facilities causing relevant exposures.

4. The SSK points out that, in particular in the introduction of new technologies, risk communication in due time is indispensable. It recommends to inform the public about the emissions of electromagnetic fields and potential impacts on health prior to and accompanying the introduction of new technologies.

5. The SSK recommends to call appropriately the manufacturers´ attention to the fact that evaluating the emission of their devices´ electromagnetic fields must be a component of their risk assessment. This evaluation must include both the intended use and the simultaneous presence of other devices to be expected.

6. The SSK demands to consider possible impairments to health due to generated electromagnetic fields as an evaluation criterion prior to an approval for introducing large-scale applications (such as granting mobile telecommunication licences, erection of toll collecting systems, vehicle- anti-collission radar).

7. The SSK recommends to exert an influence that appropriate, standardised measuring methods be developed for the evaluation of exposure.

8. The SSK recommends to develop appropriate monitoring strategies, in order to be able to detect and avoid in due time impermissible increases in exposure of the public to electromagnetic fields, in particular due to the co-action of several sources.

9. The SSK recommends the national implementation of the EU Council Directive on the Limitation of Exposure of the General Population to Electromagnetic Fields [2], since many of the new applications are not covered by the Ordinance on Electromagnetic Fields [1] and the simultaneous exposure to several sources is currently not sufficiently considered.

10. The SSK recommends to include the investigation of the potential impact of novel fields on health (e. g. very short ultra-wide-band impulses) in the research programme.

11. The SSK recommends, in particular with respect to the dynamic development of the new technologies, to have a status report about new technologies regularly elaborated.

4 References

[1] 26. Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Verordnung über elektromagnetische Felder – 26. BImSchV) vom 16. Dezember 1996 (BGBl. I, S. 1966)

[2] Council Recommendation 1999/519/EC of July, 12, 1999 Limiting the Public Exposure to Electromagnetic Fields (0 Hz to 300 GHz)

[3] Strahlenschutzkommission: Grenzwerte und Vorsorgemaßnahmen zum Schutz der Bevölkerung vor elektromagnetischen Feldern, Empfehlung der Strahlenschutzkommission mit wissenschaftlicher Begründung, Berichte der SSK, Heft 29, Urban Fischer, München, Jena 2001

[4] Gesetz über die Durchführung von Maßnahmen zur Verbesserung der Sicherheit und des Gesundheitsschutzes der Beschäftigten bei der Arbeit (Arbeitsschutzgesetz – ArbSchG) vom 7. August 1996 (BGBl. I S. 1246)

[5] Gesetz über Medizinprodukte (Medizinproduktegesetz MPG) in der Fassung der Bekanntmachung vom 11. Mai 2001 (BGBl. I S. 866)

[6] Gesetz über Funkanlagen und Telekommunikationsendeinrichtungen (FTEG) vom 31. Januar 2001 (BGBl. I S. 170)