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**Human Exposure to RF**  
**A comparison of Draft ICNIRP Guidelines**  
**2018 vs 1998**

**White Paper**

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# Human Exposure to RF

## A Comparison (Draft) ICNIRP Guidelines 2018 vs. ICNIRP 1998

The (Draft) ICNIRP Guidelines are for the protection of humans exposed to radiofrequency electromagnetic fields (EMFs) in the range 100 kHz to 300 GHz. This version of 2018 replaces the radiofrequency part of the 1998 guidelines (ICNIRP 1998).

The main objective is to establish guidelines for limiting exposure to EMFs that will provide a high level of protection for all people against known adverse health effects from direct, non-medical exposures to both short- and long-term, continuous and discontinuous radiofrequency EMFs.

I studied the (Draft) ICNIRP Guidelines 2018 and its limits and compared these with the ICNIRP 1998 and there are no essential differences in the limits between the 1998 ICNIRP Guidelines and the (Draft) ICNIRP 2018 Guidelines. The basic restrictions are the same for both versions.

The only differences between ICNIRP 1998 and ICNIRP 2018 are:

1. The limits of the frequencies below 100 kHz are deleted and are published in ICNIRP 2010.
2. The reference levels for the lower frequencies are increased.
3. Current density is deleted in the frequency range 0.10 - 10 MHz, only SAR (=Specific Absorption Rate) limits are shown.
4. The basic restriction limits go up to a frequency of 300 GHz, while the 1998 limits go up to 10 GHz.
5. The reference levels now mention that these are valid for whole body exposure while the 1998 just mentions "Reference levels".
6. In the 2018 version there are now two extra tables extra for reference levels for local exposure for time intervals.
7. For the RAIN frequencies the newer guidelines show no different results only that the reference levels for whole body exposure now show that averaging is allowed over 30 minutes for  $E^2$  and  $H^2$  while the 1998 ICNIRP Guidelines show an averaging time over 6 minutes.

I have consulted an expert and he told me that SAR measurements must be performed if we want to be sure that we are in compliance with the 2018 ICNIRP Guidelines (as well as the 1998 ICNIRP Guidelines). Calculations are not possible close to the antenna because we are still in the near field where the far field starts at approx. 66 cm for the 915 MHz.

- At 1 m the calculations can be performed for the whole-body exposure.

**NOTE:** At this moment if a company applies for European compliance and for the General Public Exposure, then the EU Council Recommendation of 1999/519/EC limits still have to be used. For Occupational Exposure the Directive 2013/35/EU limits are valid. Both are equivalent to ICNIRP 1998.

The above opinion is to provide guidance on the need for testing for the protection of humans exposed to radiofrequency electromagnetic fields and a comparison between the 1998 and 2018 versions of the standard. Expert advice should be considered before implementing any information above. The RAIN RFID Alliance is not responsible for any decisions based on the above opinion.

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## ABOUT RAIN RFID ALLIANCE

The RAIN RFID Alliance is an organization supporting the universal adoption of RAIN UHF RFID technology. A wireless technology that connects billions of everyday items to the internet, enabling businesses and consumers to identify, locate, authenticate and engage each item. The technology is based on the EPC Gen2 UHF RFID specification, incorporated into the ISO/IEC 18000-63 standard. For more information, visit [www.RAINRFID.org](http://www.RAINRFID.org). The RAIN Alliance is part of AIM, Inc. AIM is the trusted worldwide industry association for the automatic identification industry, providing unbiased information, educational resources and standards for nearly half a century.



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