



## Exposure assessment of RF fields emitted by IoT devices

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### Extended Abstract

Since Internet of Things (IoT) interconnects physical and virtual things, extensive usages are expected compared to those by conventional mobile phones or smart phones. In order to realize communication systems for IoT enabling low power consumption and low cost, enhanced Machine Type Communication (eMTC) and Narrow Band IoT (NB-IoT) have been standardized by the 3<sup>rd</sup> Generation Partnership Project (3GPP) [1] for example. Therefore it is expected that IoT devices will be rapidly increasing in our real environment. At the same time it is very important for us to evaluate RF fields emitted by the devices from radio protection point of view.

In this case IoT devices may be categorized into a distance from the human body. There are two types of devices whether these are used close to the human body or not. In other words near field and far field exposure we have to consider. Examples of the former are wearable and health care devices mounted on the body. The latter are a smart meter, security camera, and so on which are usually installed far away from the body.

International Electrotechnical Commission (IEC) Technical Committee (TC) 106 has standardized methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure and published relevant international standards so far. Probably a couple of IEC standards by TC106 can be also used for the exposure assessment for IoT devices. For the near field exposure the Specific Absorption Rate (SAR) measurement procedure, i.e., IEC 62209 [2] can be used within 20 cm from the body. On the other hand, concept of IEC 62232 [3] is suitable for far field exposure.

In this presentation near field and far field exposure assessment methods will be introduced based on the IEC standards and some results of case studies will be also shown.

### References

1. D. Flore, "3GPP Standards for the Internet-of-Things," GSMA MIoT, Feb. 2016. ([http://www.3gpp.org/images/presentations/3GPP\\_Standards\\_for\\_IoT.pdf](http://www.3gpp.org/images/presentations/3GPP_Standards_for_IoT.pdf))
2. IEC 62209-2 ed. 1, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)," March 2010.
3. IEC 62232 ed. 1, "Determination of RF field strength and SAR in the vicinity of radio communication base stations for the purpose of evaluating human exposure," May 2011.