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|  | **Radiocommunication Study Groups** |  |
| **INTERNATIONAL TELECOMMUNICATION UNION** |  |
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| Source: Document 1A/TEMP/26 (edited) | **Annex 17 toDocument 1A/60-E** |
| **14 June 2016** |
| **English only** |
| Annex 17 to Working Party 1A Chairman’s Report |
| Liaison statement TO EXTERNAL ORGANIZATIONS[[1]](#footnote-1) |
| Increasing Levels of RF Noise in the Environment and Consequent InterFERence to Radiocommunication Services |

# 1 Introduction

Working Party 1A has become aware of growing concerns among Standards Developing Organizations about increasing levels of RF noise radiated or superimposed along the electrical mains supply and the consequent increase in instances of EMI. Much of this arises in the 2‑150 kHz frequency range as a result of the ubiquitous use of high frequency switching techniques in all sorts of electrical and electronic equipment for power supplies and power conversion, nearly everything in fact. The problems encountered now include many new types of equipment coming into common use, such as inverters used in conjunction with solar panel arrays, where power levels range from 1 to 100 kVA. Small converters, chargers and power supplies for domestic electronic equipment as well as higher power household appliances, from induction cookers to washing machines, are also involved.

Such problems have been highlighted as an important issue of mutual concern during liaison activities between ITU and the CLC/TC 210 group of CENELEC as a result of consideration of the third edition of the CLC/SC205A Study Report on *Electromagnetic Interference between Electrical Equipment/Systems in the Frequency Range below 150 kHz.* Rising levels of EMI in the frequency range 2-150 kHz situation will be of concern to several radio services and ITU-R Working Parties:

* Broadcasting service (ITU-R Working Party 6A)
* Amateur services (ITU-R Working Party 5A)
* Radionavigation service (ITU-R Working Party 5B)
* Maritime mobile service (ITU-R Working Party 5B)
* Fixed service (ITU-R Working Party 5C)
* Standard frequency and time signal service (ITU-R Working Party 7A)

# 2 Disturbances to electronic communications systems

The CENELEC study reported on cases of EMI via the radiated path, thus confirming radiated EMI as an EMC issue over the whole frequency range 2-500 kHz, with EMI victims like broadcast time signal systems and also wired non-mains communication systems like xDSL. It was noted that broadband services, xDSL and PLC etc. are widely used in customers’ premises and are sensitive to radiated disturbances from multiples of non-mains communicating equipment emissions on switching frequencies.

One conclusion from this study is that there is a need for standardizing requirements for both conducted and radiated disturbances in the frequency range from 9 kHz to 150 kHz and 150 kHz to 30 MHz taking account of:

* the variety of types of EMI sources like grid connected power converters, LED lighting devices, direct current charging for electric vehicles and wireless power transmission, which will be much more in commercial use in near future;
* the wide spread of types of EMI victims including non-radio services as smart meter, xDSL and sensitive electric/electronic medical equipment.

Working Party 1A was also advised of instances of EMI to low frequency to high frequency electronic article surveillance systems, typically operating between 1.75 and 9.5 MHz (many units in Europe operating at 8.2 MHz) and RFID near field systems at operating at 13.6 MHz.

# 3 Sources and cause of increasing levels of EMI

As well as poor design and manufacturing practices, ageing of components in power conversion stages and thermal stress on those components was identified as a key factor in increasing levels of EMI: In fact there is a vicious circle by which raised levels of RF voltages on mains supplies contribute to thermal stress and consequent ageing of components, resulting in more RF emissions and so on and so forth. A potent source of RF emissions and consequent EMI through this mechanism is LED lighting units and systems, with RF emissions far above the general EN 55015/55011 limits and EN 50065 spurious emission limits having been observed.

One effect of RF voltages being superimposed on mains supplies is that key components in the switch mode power conversion stages suffer increased thermal stress, resulting in further deterioration of those key components and causing additional RF noise to be superimposed on mains supplies; thereby creating a vicious circle of rising RF noise levels.

# 4 Future work

Working Party 1A understands that work is in progress in several SDOs on combatting rising levels of RF noise emissions in general and the particular problems associated with LED lighting units and systems, and would like to be informed about initiatives in this area.

However, Working Party 1A would caution against moves to prioritize the costs of modifying equipment in the field or the costs of aiming for a zero tolerance approach to RF noise emissions at the design and manufacturing stages against the disbenefits of denial of service to a wide range of electronic communications services.

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| **Status:** For information and action, as appropriate. |
| **Deadline:** If possible one week prior to the next meeting of Working Party 1A planned to be held on 22 to 30 November 2016. |
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1. External organization with an interest in conducted and radiated emissions form electrical and electronic equipment CENELEC-CLC/TC210, ETSI, IEC and IEEE. [↑](#footnote-ref-1)