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| **PLENARY MEETING** | **Document RA19/PLEN/29-E** |
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| Brazil (Federative Republic of) | |
| draft new QUESTION ITU-R  [B/IMPACT\_UNINTENTIONAL\_ELECTROMAG] | |
| Impact of unintentional electromagnetic energy generated by electrical or electronic apparatus to the radiocommunication services | |

# 1 Introduction

Modern electrical or electronic apparatus and their systems - including those not intended to telecommunications - can produce relevant electromagnetic disturbances. These occurrences are related to the operational dynamics of its electronic systems, the presence of switched power supplies, nonlinear loads, electromechanical devices, logic circuits, among others. These electrical influences can be manifested both in radiated and in conductive ways and, if not mitigated at its source, can degrade and pollute the electromagnetic spectrum.

Considering that such technologies tend to fast increase, spread and being pervasive and ubiquitous, this context is potentially serious to existed and future incumbent radiocommunications services, especially in a residential environment, rich in density, quantity and diversity of electro-electronic equipments that can directly affect the functionalities of radiocommunications services in the user’s or consumer’s area.

Due to the characteristics of these electromagnetic perturbances and installations, interferences could be detected in a wide range of frequencies, affecting several radiocommunications services and spread over long distances, affecting several stations, receivers or terminals simultaneously, including those used for safety communications.

# 2 Previous reports

This issue recently gained strong interest; first reports have been developed within ITU-R Working Groups, with several liaisons to IEC/CISPR.

During its meeting on June 2017, WP 1C considered a number of liaison statements citing concerns on increasing levels of RF noise in the environment and the consequent increase in instances of electromagnetic interferences through a variety of mechanisms.

The administrations were asked to report briefly on the occurrences of such harmful interferences related to LED lighting, switching power supplies, electric appliances, photovoltaic installations, cable signal leakage and other issues.

Interferences were cited in the Document [1A/213](https://www.itu.int/md/R15-WP1A-C-0213) as reaching frequencies up to 2.1 GHz, from to co-channel to harmonic domain in distances up to 2 km depending the case; affecting LTE/GSM/UMTS networks, Maritime (COSPAS-SARSAT), Sound and TV Broadcast, Digital Audio Broadcasting, Police/Rescue/Fire department networks, aeronautical radiocommunication, Amateur Radio, Citizen Band, PMR, medical (ultrasonic) appliances, wireless microphones and Mobile Service.

Studies linked to the Document [1A/171-E](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-WP1A-C-0171) included the detection of interferences, several hundred MHz wide, impacting aeronautical radio channels (119.975, 127.8, 306.2 and 353.5 MHz). The source was determined to be LED lighting approximately 2.5 km away. Other systems like GNSS and radars were considered in the document as very noise-floor limited and, in order to protect such systems, interference sources should be limited such as do not result in unacceptable increase in the noise floor, citing not only individual sources but also the aggregated impacts of potential interfering networks.

Interferences effects of LED lighting systems was covered for on-board marine vessels in Document [5B/700-E](https://www.itu.int/md/R15-WP5B-C-0700/en), taking account reports of poor reception on VHF maritime frequencies used for Global Maritime Distress and Safety System (GMDSS), search and rescue, radiotelephone, Digital Selective Calling (DSC), and Automatic Identification System (AIS). The conclusion exposes the problem as a recent major widespread marine safety hazard because it essentially blinds the receivers in the AIS and the marine radios used for GMDSS. Document [5B/369-E](https://www.itu.int/md/R15-WP5B-C-0369/en) also covers the general increase of HF radio noise at sea.

In 2019, an evaluation of radiated electromagnetic disturbances of household appliances over an IoT network was performed and covered in Document 1A/454-E, [Annex 12](https://www.itu.int/dms_ties/itu-r/md/15/wp1a/c/R15-WP1A-C-0454!N12!MSW-E.docx). This study considered the effect of these interferences on the Received Signal Strength Indication (RSSI) and Packet Error Rate (PER) in a Wireless Sensor Network around 915 MHz.

Broadcasting services were also affected according Document [1A/55-E](https://www.itu.int/md/R15-WP1A-C-0055/en) and an ITU workshop was developed in 2018 (Doc. [1A/433](https://www.itu.int/md/R15-WP1A-C-0433/en)), raising awareness to the risk of interferences to DAB (Digital Audio Broadcasting) in the VHF range.

Extensive exchanges of liaisons were developed between ITU-R Working Parties and CISPR. Recent studies (see Doc. [5B/721-E](https://www.itu.int/md/R15-WP5B-C-0721/en)) indicated that some devices that are causing interference were complied with CISPR standards, raising concerns on the traditional way of setting certain limits on radiated or conducted disturbances.

Measurements of the increase of man-made noise floor are in Document [1A/400-E](https://www.itu.int/md/R15-WP1A-C-0400/en). An update and more complete summary of the evolution of this issue with more studies is found in Document [1A/438-E](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-WP1A-C-0438), Chapters 5 and 6.2.

# 3 Proposal

Taking account the previous studies that indicates the serious rising of interferences and noise floor produced by electrical or electronic apparatus that could compromise the availability and existence of current and future radiocommunication services, the proposal aims to stimulate applied studies to better understand these interferences taking account the protection of the radiocommunication services, considering their real practical operational environment and looking for technical and regulatory approaches to reduce the amount of the electromagnetic noise in the environment, safeguarding the RF spectrum and providing effective protection to the radiocommunication services.

draft new QUESTION ITU-R   
[B/IMPACT\_UNINTENTIONAL\_ELECTROMAG]

Impact of unintentional electromagnetic energy generated by electrical or electronic apparatus to the radiocommunication services

(2019)

The ITU Radiocommunication Assembly,

considering

*a)* that electrical and electronic technologies development is an on-going process that opens new ways for creation, design and composition of devices and their systems;

*b)* that electrical or electronic apparatus and their systems could be not designed or installed in such a way that radiation will be minimized;

*c)* that such technologies tend to increase, spread and being pervasive and ubiquitous, especially on residential areas where the use of the radiocommunications services are intense and also in development;

*d)* that radiation from such apparatus and systems, including those not devoted to perform radiocommunication, may cause interference to radiocommunication services, particularly at LF, MF, HF, VHF and UHF;

*e)* that the radio noise sets a practical limit to the performance and the existence of the radio systems and radio astronomy service;

*f)* that radiocommunications services must be protected against interferences from any kind according RR n. 15.12, 15.13, and such task requires further and continuum studies within ITU,

decides that the following Questions should be studied

1How the development and proliferation of electrical or electronic apparatus and their systems are affecting the man-made noise levels in the radio spectrum?

2 How should the development and proliferation of electrical or electronic apparatus and their systems affect the way in which their interferences are measured, taking into account the real operating environment with their typical proximity to radiocommunication equipments and systems?

3 What technical characteristics and limits should apply to electrical or electronic apparatus and their systems so as to avoid harmful interferences to radiocommunications services and not increase the noise floor?

4 What regulatory provisions are needed to provide effective protection for radiocommunications services against harmful interferences from such apparatus and their systems to keep the noise floor as low as possible?

further decides

1 that the results of the above studies should be included in one or more Recommendation(s) and/or Report(s);

2 that the above studies should be completed by 2023.

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