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| **Radiocommunication Study Groups** |  |

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Subject: Response to 1A/TEMP/47 (Rev.1) **English only**

Institute of Electrical and Electronics Engineers, Inc.

CONTRIBUTION to working party 1A
 on standards referenced in the working document towards a preliminary draft new Recommendation
on Optical Wireless Communication

# 1 Source information

IEEE 802 LAN/MAN Standards Committee (LMSC) respectfully submits these responses to ITU-R Working Party 1A (WP 1A). IEEE 802 is a committee of the IEEE Standards Association and Technical Activities, two of the Major Organizational Units of the Institute of Electrical and Electronics Engineers (IEEE). IEEE has over 400,000 members in over 160 countries and engages in public policy in order to advance the mission and vision of securing the benefits of technology for the advancement of society. In submitting this document, IEEE 802 acknowledges and respects that other components of IEEE Organizational Units may have perspectives that differ from, or compete with, those of IEEE 802. Therefore, this submission should not be construed as representing the views of IEEE as a whole[[1]](#footnote-1).

###### 2 Discussion

IEEE 802 thanks ITU-R WP 1A for the liaison statement regarding standards for Light Communications under IEEE 802.

IEEE 802 published in 2011 IEEE Std 802.15.7TM-2011 IEEE Standard for Local and metropolitan area networks – Part 15.7: Short Range Wireless Optical Communication Using Visible Light and has now been integrated in IEEE Std 802.15.7-2018.

IEEE 802. published in 2018 IEEE Std 802.15.7TM-2018 IEEE Standard for Local and metropolitan area networks – Part 15.7: Short-Range Optical Wireless Communications and is in IEEE Std 802.15.7-2018.

The IEEE 802.15 Working Group has formed Task Group TG13 in 2017 to write a new standard IEEE 802.15.13 that accommodates: Standard for Multi-Gigabit per Second Optical Wireless Communications (OWC) , with Ranges up to 200 meters , for both stationary and mobile devices.

The IEEE 802.11 Working Group has formed Task Group TGbb in 2017 to specify a new amendment to IEEE 802.11 that specifies an IEEE 802.11 PHY layer and MAC modifications to enable operation of wireless light communications (LC).

The IEEE 802.15 Working Group has formed a Task Group TG7a in 2020 to write a revision to IEEE 802.15.7-2018 that accommodates High Data Rate Optical Camera Communications (OCC)

In addition to adding the information related to the standards, IEEE 802 has also provided comments to the overall document, please see text below in red.

IEEE 802 would like to be kept informed on the development of a new recommendation on “Complementing current radio frequency delivery mechanisms using optical wireless communication”.

**3 Summary**

We applaud the efforts of the participants in WP 1A for undertaking this work and giving IEEE 802 the opportunity to respond to the visible light communication related matters.

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ANNEX 1

Working document towards a PRELIMINARY DRAFT new RECOMMENDATION ITU-R SM.[OPTICAL WIRELESS]

Complementing current radio frequency delivery
mechanisms using Optical wireless communication

(20XX)

Optical Wireless Communication (OWC) may ease the pressure on the radio spectrum that is now in use. OWC technologies offer a promising solution for indoor and in some cases wireless broadband communication over a distance up to a few meters. Other methods besides OWC can be used to reduce the constraints of conventional radio frequency (RF) delivery mechanisms, but the unique feature of OWC is its similarity to traditional RF approaches in terms of management, planning~~,~~ and maintenance.

Scope

This Recommendation contains elements to be taken into account when implementing OWC for broadband communications. Four main OWC variants can be distinguished: Free Space Optical Communications (long range point to point), Wireless Local Area Communications using Light (short range, multiple access), Optical Camera Communications (low date rate unidirectional), Ultra-violet (UV) communication

Keywords

Optical wireless communication, Free Space Optical Communications, Optical Camera Communications, light communication, radio frequency

Abbreviations/Glossary

EMF electromagnetic field

FSO free space optical

ICU intensive care unit

IEC International Electrotechnical Commission

IEEE Institute of Electrical and Electronics Engineers

IR infrared

LC wireless local area networking using light communications

LED ID light emit diode Identification

nm nanometre

OCC optic camera communication

OWC optical wireless communication

RF radio frequency

Related ITU Recommendations and Reports

Report ITU-R SM.2422 – Visible light for broadband communications

The ITU Radiocommunications Assembly,

considering

*a*) that the radio spectrum is a limited resource;

*b)* that electromagnetic waves above 3000 GHz are not included in the ITU-R Radio Regulations;

*c)* that OWC uses the visible spectrum (wavelengths between 390 nm and 750 nm) or infrared spectrum (wavelengths between 780 nm and 1 mm) or the ultraviolet spectrum (wavelengths between 200nm and 280nm) to provide wireless communications These frequencies are commonly known as THz frequencies;

*d)* that OWC has the potential to ease pressure on lower frequency spectrum bands since light spectrum can be used as additional spectrum for broadband communications;

*e)* that OWC could be seen as complementary to existing broadband wireless access systems;

*f)* that OWC is subject to different propagation characteristics relative to the wavelengths;

*g)* that OWC could be especially useful in environments where the use of radio spectrum is (or will be) less feasible because of a combination of factors, e.g. spectrum scarcity, need for very high capacity, legislation, RF hostile environments and others;

*h)* that OWC based solutions may provide benefits over RF spectrum based solutions with respect to suitability for dense employment, alleviation of current coexistence situations, enhanced security and more robustness against jamming;

*j)* that inside houses, offices, and buildings OWC might be an installed technology in the future;

*k)* that electromagnetic interference (EMI) sensitive environments (e.g. hospitals especially intensive care units (ICU), airplanes, certain industry applications) could benefit from OWC based solutions because they are not sensitive to the EM radiation from radio communication systems .

*l)* that OWC can also be applied for; indoor navigation systems, connected cars, and autonomous vehicles in order to support Intelligent Transport System messaging, underwater communication, eHealth, IoT(M2M/D2D/smart-factory)

recognizing

*a)* Report ITU-R SM.2422 on Visible light for broadband communications;

*b)* that ITU-T Study Group 15 is responsible in ITU-T for the development of standards for the optical transport network, access network, home network and power utility network infrastructures, systems, equipment, optical fibers and cables;

*c)* that the IEEE 802.15 Working Group completed IEEE Std 802.15.7-2011 IEEE Standard for Local and metropolitan area networks – Short Range Wireless Optical Communication Using Visible Light in 2011, and has now been integrated in IEEE Std 802.15.7-2018.

*d)* that the IEEE 802.15 Working Group completed in 2018 IEEE Standard for Local and metropolitan area networks – Part 15.7: Short-Range Optical Wireless Communications and is in IEEE Std 802.15.7-2018.

*e)* that the IEEE 802.15 has formed a Task Group 7a in 2020 to write a revision to IEEE 802.15.7-2018 that accommodates: Short-Range Optical Wireless Communications Amendment defining High Data Rate Optical Camera Communications (OCC);

*f)*  that the IEEE 802.11 Working Group has formed Task Group bb (TGbb) in 2017 to specify a new IEEE 802.11 PHY layer and modifications to the IEEE 802.11 MAC that enable operation of wireless light communications (LC).

*g)* that the IEEE 802.15 has formed a Task Group 7a in 2020 to write a revision to IEEE 802.15.7-2018 that accommodates: Short-Range Optical Wireless Communications Amendment defining High Data Rate Optical Camera Communications (OCC);

noting

that with regard to eye-safety, due regard should be given to relevant safety limits information provided by several organizations, e.g. IEC 60825-12:2019 “Safety of laser products - Part 12: Safety of free space optical communication systems used for transmission of information”, IEC 62471 “Photobiological safety of lamps and lamp systems”, Recommendation ITU-T G.996 Amd. 1, national standards of administrations and/or in Advisory Circulars as issued by several aviation authorities,

recommends

1 that OWC systems should preferably comply with international standards, e.g. the standards referenced under recognizing and noting and at the same time comply with the law and regulations of the individual countries where the systems and devices are used;

2 that, in order to improve industry acceptance and user deployment, OWC uses, as much as possible existing solutions and standards;

3 that, while designing and constructing road infrastructure, offices, public spaces, and houses, the potential of OWC is taken into account for the delivery of communications facilities in addition to the usual fixed (wired) infrastructure;

4 that the standardization bodies involved in OWC closely cooperate with those in the traditional radio applications and the ones involved in traditional radio applications closely cooperate with those involved in OWC, in order to improve the potential of those technologies working together;

5 that because the OWC technology is continuously developing, new technologies are continuously considered.

6 that because OWC technology and the light spectrum are easily reused and do not interfere with currently deployed RF systems, the use of the light spectrum for communication should remain license exempt.

1. This document solely represents the views of the IEEE 802 LAN/MAN Standards Committee and does not necessarily represent a position of either the IEEE, the IEEE Standards Association or IEEE Technical Activities. [↑](#footnote-ref-1)