P802.15.7a

Submitter Email: bheile@ieee.org
Type of Project: Amendment to IEEE Standard 802.15.7-2011
PAR Request Date: 28-Sep-2014
PAR Approval Date:
PAR Expiration Date:
Status: Unapproved PAR, PAR for an Amendment to an existing IEEE Standard

1.1 Project Number: P802.15.7a
1.2 Type of Document: Standard
1.3 Life Cycle: Full Use

2.1 Title: Standard for Local and Metropolitan Area Networks--Part 15.7: Short-Range Wireless Optical Communication Using Visible Light --Amendment for a Physical Layer Supporting Optical Camera Communications

3.1 Working Group: Wireless Personal Area Network (WPAN) Working Group (C/LM/WG802.15)
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3.2 Sponsoring Society and Committee: IEEE Computer Society/LAN/MAN Standards Committee (C/LM)
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4.1 Type of Ballot: Individual
4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot: 11/2016
4.3 Projected Completion Date for Submittal to RevCom: 05/2017

5.1 Approximate number of people expected to be actively involved in the development of this project: 100
5.2.a. Scope of the complete standard: This standard defines a PHY and MAC layer for short-range optical wireless communications using visible light in optically transparent media. The visible light spectrum extends from 380 nm to 780 nm in wavelength. The standard is capable of delivering data rates sufficient to support audio and video multimedia services and also considers mobility of the visible link, compatibility with visible-light infrastructures, impairments due to noise and interference from sources like ambient light and a MAC layer that accommodates visible links. The standard adheres to applicable eye safety regulations.

5.2.b. Scope of the project: This amendment defines a Physical Layer (PHY) supporting Optical Camera Communications (OCC) using light frequencies over the spectral range of 10,000nm (Infra-Red (IR)) to 190nm (near Ultra-Violet (UV)) and any MAC changes specifically required to support this PHY. Transmitting devices include such sources as displays, typically found on cameras and mobile devices, and other LED based sources such as flashes, flashlights, LED Tags, LED/Laser sources, display/image patterns(like QR codes), and some current generation projectors to name but a few. Receivers are devices such the lens and image sensors typically found in a camera or mobile device as well as other light sensors that may be present in these or other kinds of devices. Techniques are put forward which do not require any hardware modifications for many classes of applications in existing mobile and/or other devices such as those defined above, as well as techniques which may require some level of hardware modification to support new capabilities.

5.3 Is the completion of this standard dependent upon the completion of another standard: No
5.4 Purpose: The purpose of this standard is to provide a global standard for short-range optical wireless communication using visible light.

The standard provides (i) access to several hundred THz of unlicensed spectrum; (ii)
immunity to electromagnetic interference and noninterference with Radio Frequency (RF) systems; (iii) additional security by allowing the user to see the communication channel; and (iv) communication
augmenting and complementing existing services (such as illumination, display, indication, decoration, etc.) from visible-light infrastructures.

5.5 Need for the Project: There is a growing need to increase the degree of connectivity of mobile and other classes of devices, both new and existing, to support a growing set of applications, but doing so without overloading existing RF spectrum or requiring additional hardware. Off-loading is an important part of today's mobile networking infrastructure.

OCC based solutions to this problem address a significant opportunity, extending to billions of existing devices, to provide secure non Radio Frequency (RF) based communications capability between devices and/or between devices and fixed infrastructure on either a one to one, or one to many or many to one basis. Using light frequencies rather than RF allows for significant additional unlicensed bandwidth without RF interference. The ability to use existing or minimally modified hardware for many applications contains the cost.

This amendment addresses things such as (i) the reception of modulated or coded light signals using camera sensors, (ii) spatial separation of light sources through the lens associated with the camera, (iii) communications augmenting and complementing existing services, such as illumination, display screens, digital signage, etc.

Potential applications include secure point-to-point communication, Location Based Services (LBS), secure point-to-multipoint communication (office, hospital, air plane), Intelligent Transportation Systems (ITS), General Information Broadcasting, Line-of-Sight (LOS) marketing, LED-ID, Device-to-Device (D2D), IoT, digital signage, Augmented Reality, and many more.

As a secondary benefit, derived from the presence of a camera lens and the formation of an image in some devices, is the ability to achieve spatial separation of multiple sources opening up the possibility of multiple data transmission such as MIMO (Multi input multi output) or multi-LED arrays for a variety of more sophisticated applications.

5.6 Stakeholders for the Standard: Smart device, camera manufacturers and users, Location Based Services suppliers and users, component suppliers like lighting manufacturers, silicon providers etc, other service providers, infrastructure operators.

Intellectual Property
6.1.a. Is the Sponsor aware of any copyright permissions needed for this project?: No
6.1.b. Is the Sponsor aware of possible registration activity related to this project?: No

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7.1 Are there other standards or projects with a similar scope?: No
7.2 Joint Development
Is it the intent to develop this document jointly with another organization?: No

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8.1 Additional Explanatory Notes (Item Number and Explanation): none