

**CRITERIA FOR STANDARDS DEVELOPMENT (CSD)**  
**IEEE 802.15.13 Standard for Multi-Gigabit/s Optical Wireless**  
**Communications with Ranges up to 200 meters, for both stationary and**  
**mobile devices**

## **1. IEEE 802 Criteria for Standards Development (CSD)**

The CSD documents an agreement between the WG and the Sponsor that provides a description of the project and the Sponsor's requirements more detailed than required in the PAR. The CSD consists of the project process requirements, 1.1, and the 5C requirements, 1.2.

### **1.1 Project Process Requirements**

#### **1.1.1 Managed objects**

Describe the plan for developing a definition of managed objects. The plan shall specify one of the following:

- a) The definitions will be part of this project. **Yes. Any managed objects that are required will be defined as part of the project.**
- b) The definitions will be part of a different project and provide the plan for that project or anticipated future project.
- c) The definitions will not be developed and explain why such definitions are not needed.

#### **1.1.2 Coexistence**

A WG proposing a wireless project shall demonstrate coexistence through the preparation of a Coexistence Assurance (CA) document unless it is not applicable.

- a) Will the WG create a CA document as part of the WG balloting process as described in Clause 13? (yes/no) **Yes**
- b) If not, explain why the CA document is not applicable.

## **1.2 5C Requirements**

### **1.2.1 Broad market potential**

Each proposed IEEE 802 LMSC standard shall have broad market potential. At a minimum, address the following areas:

- a) Broad sets of applicability.  
**There is a growing need to increase the degree of connectivity among devices at high data rates and high levels of security, but doing so without overloading existing RF spectrum. The most immediate need is in Industrial Applications, but Commercial/Business environments are expected to be right behind that.**

Optical wireless based solutions to this problem address this significant opportunity, which extends to billions of existing devices, to provide secure non Radio Frequency (RF) based communications capability between industrial devices and/or between industrial 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 and electromagnetic radiation. The inability of signals to penetrate optically opaque walls also provides an inherent wireless communication security.

Potential applications include control of mobile robots in manufacturing cells or on assembly lines, automated guided vehicles system in Industrial environments, small cell backhaul, network access in airplanes and trains, security monitoring in petrochemical plants, secure communications in nuclear facilities and hospitals, and many more.

b) **Multiple vendors and numerous users**

The large variety of institutions and companies participating in the IEEE P802.15.7REV1 Task Group and the increasing interest in published research results in this area demonstrate a broad interest in the utilization of non-fiber based light communication technologies. Participating and supporting members in the existing OWC task group include industrial devices manufactures, system integrators, silicon providers, lighting vendors, aircraft and transportation manufacturers, car manufacturers, and academic researchers. A significant number of these have expressed interest in developing this new standard.

### 1.2.2 Compatibility

Each proposed IEEE 802 LMSC standard should be in conformance with IEEE Std 802, IEEE 802.1AC, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 WG prior to submitting a PAR to the Sponsor.

- a) Will the proposed standard comply with IEEE Std 802, IEEE Std 802.1AC and IEEE Std 802.1Q? **Yes**
- b) If the answer to a) is no, supply the response from the IEEE 802.1 WG

### 1.2.3 Distinct Identity

Each proposed IEEE 802 LMSC standard shall provide evidence of a distinct identity. Identify standards and standards projects with similar scopes and for each one describe why the proposed project is substantially different.

This project is distinguishable from all other IEEE 802 standards due to the fact it utilizes Optical Wireless Communications (OWC) in transparent media. As we have learned through direct experience, it is also substantially different than IEEE Std 802.15.7. For the past 2 years, the attempt has been made to implement data rates between 1 Mbit/s and 10 Gbit/s, to provide point to point and point to multi-point communications in both non-coordinated and coordinated topologies, to provide adaptation to varying channel conditions, and to maintain connectivity during mobility. These capabilities are needed to properly support the intended

applications in Industrial and Commercial/Business settings. The result has been the need for massive changes to the 15.7 MAC which are in opposition to the need for a light weight MAC suitable for the 15.7 application set. The 15.7 MAC is similar to 15.4 in general structure and simplicity, but optical rather than RF oriented. It was not intended for this type of project, as has been learned the hard way. The best way to address these substantial differences is to create a new OWC Standard with a MAC optimized and appropriate to this task

#### 1.2.4 Technical Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence that the project is technically feasible within the time frame of the project. At a minimum, address the following items to demonstrate technical feasibility:

Demonstrated system feasibility:

Devices are available in the entire frequency range. Tests, demonstrations, measurements and simulations have been conducted for selected wavelengths from UV to IR by both academic and commercial institutions, verifying that the OWC capabilities of distance and speed needed for this standard are feasible over the full frequency range.

- a) Proven similar technology via testing, modeling, simulation, etc.

The components used for optical wireless communication are widely used in illumination and other applications and are produced in large volumes, showing that the technologies required are proven. Fabrication and testing techniques are used for volume manufacture of optoelectronic components, showing that the testing required is reasonable.

#### 1.2.5 Economic Feasibility

Each proposed IEEE 802 LMSC standard shall provide evidence of economic feasibility. Demonstrate, as far as can reasonably be estimated, the economic feasibility of the proposed project for its intended applications. Among the areas that may be addressed in the cost for performance analysis are the following:

- a) Balanced costs (infrastructure versus attached stations)

Similar to the installation of Ethernet, IEEE Std 802.15.4, or IEEE Std 802.11 based networks. In other words very reasonable in terms of the required functionality.

- b) Known cost factors

OWC technology is well characterized in terms of cost and is intended for devices, such as fixed assets and mobile devices, which are also well known and characterized in terms of cost.

- c) Consideration of installation costs.

See a)

- d) Consideration of operational costs (e.g., energy consumption).

The added energy cost to support OWC is minimal

- e) Other areas, as appropriate.

None