# CRITERIA FOR STANDARDS DEVELOPMENT (CSD)

**IEEE 802.15 Standard for High Rate OCC Study Group**

# 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, 0.

## Project Process Requirements

### **Managed objects**

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

1. The definitions will be part of this project. Yes.
2. The definitions will be part of a different project and provide the plan for that project or anticipated future project.
3. The definitions will not be developed and explain why such definitions are not needed.

### **Coexistence**

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

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

## 5C Requirements

### **Broad market potential**

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

1. Broad sets of applicability.

There is a growing need to increase the degree of connectivity of mobile devices, both new and existing, to support a growing set of high-speed applications, but doing so without overloading existing radio frequency (RF) spectrum or requiring additional hardware. Off-loading is an important part of today’s mobile networking infrastructure.

Broadening the wavelengths of operation and adding Artificial Intelligent (AI)-based high speed optical communications for cameras to this standard addresses a significant additional opportunity, extending to billions of existing devices, to demand effective and high-speed signal processing for different complex and challenged scenarios using AI concept, to provide secure non RF based communications capability between mobile devices and/or between mobile 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 hardware for many applications contains the cost.

Potential applications include automous vehicles, advanced driver-assistance systems (ADAS), Intelligent Transportation Systems (ITS), high-speed railway (HSR) communications, drone-to-drone communications, marine communications, logistics automation, medical instruments, control of mobile robots in a manufacturing cell or assembly line, automated guided vehicular systems, small cell backhaul, patient monitoring in hospitals, security and processes monitoring in manufacturing factories, petrochemical plants, chemical factories, nuclear facilities or semiconductor fabrication plants, secure and safety communications in nuclear facilities and hospitals, etc.

1. Multiple vendors and numerous users

The various institutions and companies participating in the AI-enabled High Rate OCC Study Group demonstrate the broad interest in the utilization of non-fiber based light communication technologies. Participating members in the study group include wireless carriers, system integrators, consumer electronics companies, automotive manufacturers, locomotive manufacturers, ship manufacturers, drone and aircraft manufacturers, logistics companies, robot manufacturers, robot manufacturers, mobile device manufacturers, lighting manufacturers, chemical manufacturers, silicon providers, potential end users, and academic researchers.

### **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.

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

### **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.

With the indoor and outdoor condition, this project is distinguishable from all other IEEE 802 standards due to its unique spectral band from 190 nm to 1 mm in wavelength (VLC to IR) and the fact that it is physical media independent. Due to the safety issues using optical channel for autonomous vehicles, high-speed railway (HSR) communications, drone-to-drone communications, marine communications, seaside communications, logistics automation, ITS system, robotics, manufacturing facilities, nuclear plants, and medical applications, the project focuses on the high rate optical camera communication using both single carrier and multi-carrier modulations. The standard includes adaptation to varying channel conditions and maintaining simultaneous long distance multiple connectivity during mobility.

### **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:

1. Demonstrated system feasibility:  
   There have been sufficient test results, demonstrations, measurements and simulations, both academic and commercial, verifying that optical camera communication capabilities needed for this standard are feasible.
2. Proven similar technology via testing, modeling, simulation, etc.

The components used for optical camera 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.

### **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:

1. Balanced costs (infrastructure versus attached stations)

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

1. Known cost factors

OCC 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.

1. Consideration of installation costs.

See a)

1. Consideration of operational costs (e.g., energy consumption).  
   The added energy cost to support OCC is minimal
2. Other areas, as appropriate.

None