# IEEE 802 LAN/MAN STANDARDS COMMITTEE (LMSC)

# CRITERIA FOR STANDARDS DEVELOPMENT (CSD)

Amendment defining High Data Rate Optical Camera Communications (OCC)

# 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.

## 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 applications requiring higher data rates without overloading existing radio frequency (RF) spectrum or requiring additional hardware. Adding MIMO based high speed OCC to this standard addresses a significant additional opportunity, extending to billions of existing devices to provide secure non RF based communications capability between industrial devices and/or between consumer 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 substantially broadens the available market and contains the cost.

1. Multiple vendors and numerous users.

Applications include autonomous 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. This translates to a large community of vendors and users especially with the ability to retrofit into existing applications.

### 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.

The review and response is not required if the proposed standard is an amendment or revision to an existing standard for which it has been previously determined that compliance with the above IEEE 802 standards is not possible. In this case, the CSD statement shall state that this is the case.

### 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 focuses on high data rate, long range (up to 200m) OCC using both single carrier and multi-carrier modulations. This is unique in the 802 OWC activities. Additionally, the amendment includes adaptation to varying channel conditions and maintaining simultaneous long range multiple connectivity in high mobility situations.

### 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 OCC capabilities needed for this amendment are feasible.

1. Proven similar technology via testing, modeling, simulation, etc.

The components used for OCC 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 demonstrating 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:

Balanced costs (infrastructure versus attached stations).

Since the primary target is adding capability to existing applications and hardware, this amendment in no way upsets the existing acceptable cost balance

Known cost factors.

This amendment serves a market of billions of existing devices as well a new one. Cost factors are well known

Consideration of installation costs.

Primarily firmware upgrades

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

No real change over current operational costs in existing applications

Other areas, as appropriate.

None