**IEEE P802.15**

**Wireless Specialty Networks**

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| Project | IEEE P802.15 Working Group for Wireless Specialty Networks (WSNs) |
| Title | **Revised CSD for 802.15.4w LPWAN PHY** |
| Date Submitted | [March 7, 2018] |
| Source | Joerg Robert | E-mail: joerg.robert@fau.de |
| Re: |  |
| Abstract | **Revised CSD for 802.15.4w LPWAN PHY including the comments from James Gilb, IEEE 802.3, and IEEE 802.11.** |
| Purpose | **CSD for 802.15.4w LPWAN PHY** |
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CRITERIA FOR STANDARDS DEVELOPMENT (CSD)

Based on IEEE 802 LMSC Operations Manuals approved 13 November 2015

Last edited 3 December 2015

**Amendment to IEEE Std 802.15.4:**

Amendment for a Low Power Wide Area Network (LPWAN) extension to the LECIM Physical layer (PHY)

# 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 substantial commercial interest in LPWANs on the part of Wireless Carriers, Utilities, Smart Cities, Smart Agriculture and many others around the world, as part of their Internet of Things (IoT) arsenal. According to analyst reports, LPWANs are increasingly being use to achieve cost-effective connectivity for billions of devices spread over large areas where low power (i.e. long battery life or harvested energy) and long range are important factors and where date rate and low latency are not.

1. Multiple vendors and numerous users.

There are many silicon and system vendors already producing devices and systems based on IEEE Std 802.15.4, for use in the Internet of Things (IoT). Applications for LPWAN includes: Smart Grid, Smart City, Infrastructure and Environmental monitoring, Agriculture and numerous others encompassing billions of sensors.

### 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? While the standard shall comply with IEEE Std 802, it cannot comply with IEEE Std 802.1Q and IEEE Std 802.1AC because IEEE Std 802.15.4 uses 64-bit MAC addresses.

b) If the answer to a) is no, supply the response from the IEEE 802.1 WG. Compliance with IEEE Std 802.1Q and IEEE Std 802.1AC is not possible due to IEEE Std 802.15.4 using 64-bit MAC addresses

* + 1. 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.

The proposed project enhances and is limited to the existing 802.15.4 LECIM FSK PHY. It uniquely provides a combination of capacities in low data rate, latency tolerant applications not available in any other standard, such as enhanced link margin and long range, while delivering high immunity to interference and still maintaining a multiyear battery life.

### 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 are several proprietary solutions that deliver varying degrees of performance, but can be improved in known ways. In addition there have been several research projects demonstrating workable methods. These need to be reduced to a standard and IEEE Std 802.15.4 provides an excellent base to do that.

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

See a)

### 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).

This project can be implemented with no hardware changes and therefore to the existing cost basis which has been demonstrated, through billions of shipped devices.

1. Known cost factors.

See a)

1. Consideration of installation costs.
2. This project can be implemented with no hardware changes and therefore to the existing implementation costs which has been demonstrated, through billions of shipped devices. Consideration of operational costs (e.g., energy consumption).

There are already devices using IEEE Std 802.15.4 in volume shipment operating in the same frequency bands and PHY modes. The proposed enhancements included in this project have zero to minimal impact on these well-known operational costs.

1. Other areas, as appropriate.