**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | **IEEE 802.15 ULP Study Group 5 Criteria** | |
| Date Submitted | [] | |
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| Re: | [Request to IEEE 802.15 for an ultra low power PHY amendment to IEEE 802.15.4.] | |
| Abstract | [During the March 2012 IEEE 802 Plenary the ultra low power Study Group was formed to study and submit a Project Authorization Request along with the supporting 5 Criteria.] | |
| Purpose | [Submit the PAR to the P802.15 Working Group] | |
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**IEEE 802.15.4q Ultra Low Power Study PHY Layer Amendment Functional Requirements Standards Development Criteria**

The IEEE 802.15.4q Ultra Low Power Study Group reviewed and completed the required IEEE Project 802 Functional Requirements, Standards Development Criteria (a.k.a. the Five Criteria). The Five Criteria responses are in Italics below.

**1. BROAD MARKET POTENTIAL**

**a) Broad sets of applicability**

*Wireless connectivity is already used for a number of different applications including home networking, home automation, health care, industrial/environmental monitoring, digital signage, inventory management, commercial building automation and smart utility. An ultra low power PHY amendment would be beneficial to all those applications.*

**b) Multiple vendors and numerous users**

*The membership of IEEE 802.15 demonstrates the interest in WPANs. Members include international wireless industry leaders, academic researchers, semiconductor manufacturers, communication equipment manufacturers, system integrators and end users.*

*There are at least 14 semiconductor manufacturers that are already providing chipsets for IEEE 802.15.4. The 802.15.4 based solutions are being used in a wide range of applications.*

**c) Balanced costs (LAN versus attached stations)**

*The Ultra Low Power (ULP) solutions are a reasonably small fraction of the cost of the target applications.*

**2. COMPATIBILITY**

**IEEE 802 LMSC defines a family of standards. All standards should be in conformance: IEEE Std 802, IEEE 802.1D, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 Working Group. In order to demonstrate compatibility with this criterion, the Five Criteria statement must answer the following questions.**

**a) Does the PAR mandate that the standard shall comply with IEEE Std 802, IEEE Std 802.1D and IEEE Std 802.1Q?**

**b) If not, how will the Working Group ensure that the resulting draft standard is compliant, or if not, receives appropriate review from the IEEE 802.1 Working Group?**

The PAR does not mandate compliance with IEEE Std 802, IEEE Std 802.1D or IEEE Std 802.1Q.  However, the base standard and this amendment are compliant with the draft D1.5 IEEE 802, which says  "... traffic between EUI-64 and EUI-48 addressed networks needs to be routed at a layer above the DLL."  Hence, the current IEEE Std 802.1D and IEEE Std 802.1Q are not applicable as they only support EUI-48.

In the case "in which EUI-64s can be bridged to a network with EUI-48s is the case in which the EUI-64s are assigned only from a 48 bit space, e.g., by assigning the last (or middle) 16 bits of the EUI-64 to always be the same number.", then IEEE Std 802.1D and IEEE Std 802.1Q would be supported fully.

**3. DISTINCT IDENTITY**

**a) Substantially different from other IEEE 802 standards.**

*IEEE 802.15.4 inherently supports wireless sensor and control in low data rate applications. However, coin cell batteries cannot be used to power the majority of the existing 802.15.4 chipsets in these applications. Coin cell battery pulse current is often lower than transmit/receive currents of the vast majority of the existing chipsets. This 802.15.4 PHY amendment allows the use of smaller battery form factors such as coin cell batteries. As such it is distinctly different from other IEEE 802.15 standards.*

**b) One unique solution per problem (not two solutions to a problem).**

*The proposed amendment to IEEE 802.15.4 will provide a unique solution for ultra low power applications.*

**c) Easy for the document reader to select the relevant specification.**

*The proposed amendment for IEEE 802.15.4 will be clearly identified as an amendment for the ultra low power WPAN design.*

**4. TECHNICAL FEASIBILITY**

1. **Demonstrated system feasibility**

*A number of ultra low power approaches as well as working chipsets have surfaced in the market over the past few years. A well thought out approach in IEEE 802.15.4 along with advances in wireless sensor networks makes it possible to achieve an ultra low power radio design.*

**b) Proven technology, reasonable testing**

*Many examples of ultra low power radios as well as working prototypes with very long battery lives have been published in the literature and demonstrated in laboratories worldwide.*

**c) Confidence in reliability**

*There are many proprietary and standard low power solutions available in the targeted frequency bands. One can be confident that a reliable ultra low power solution is feasible.*

**Coexistence of 802 wireless standards specifying devices for unlicensed operation**

*An appropriate coexistence assurance document will be created.*

**5. ECONOMIC FEASIBILITY**

**a) Known cost factors, reliable data**

*IEEE 802.15.4 ULP devices will make use of the existing high volume applications in the targeted frequency bands.*

**b) Reasonable cost for performance**

*Performance and costs associated with low power solutions for the targeted frequency bands have been shown to be reasonable.*

**c) Consideration of installation costs**

*One of the IEEE 802.15.4 standard objectives includes low cost installation with minimal or no operator intervention. This amendment supports that capability.*