**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **IEEE802.15.4 IG SRU Working Draft RRMM-usecases and 5C** |
| Date Submitted | [15 May, 2013] |
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| Re: |  |
| Abstract | [ Preliminary material to start discussing on RRMM-usecases & 5C of SRU for revision to IEEE802.15.4 ] |
| Purpose | [ To stimulate the discussion of stair up to SG focusing on RRMM ] |
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**IEEE P802.15 IG-SRU usecases and underlying common focus on RRMM (Radio Resource Measurement & Management)**

The IEEE P802.15.4 Interest Group for Wireless Personal Area Networks (WPANs) IG-SRU (Spectrum Resource Usage) collected the typical usecases requiring SRU functions and is continuing the review of each application space. So far, IG-SRU found that the lack of standardized RRMM protocol and pertaining explicit definitions of RRMM parameters are a common underlying challenge and have to be focused. The finding also suggests the commonality and difference with the successor RRMM standards, e.g. WLAN and Bluetooth. The purpose of this document is to report the above conclusion of IG-SRU activity with a draft five criteria and to request to start IEEE802 Study Group, of which aim is to prepare IEEE802 Project Authorization Request (a.k.a. PAR) and pertaining Standards Development Criteria (a.k.a. the Five Criteria).

**1. Hospital/Medical/Healthcare Application Space**

IEEE802.15 has been involved in the hospital/medical/healthcare application space in wide extent and IEEE802.15.4 alone is including several specific PHYs and MACs for each usecase within this important application space. The proposed RRMM protocol may address to facilitate not only the reliable operation of densely deployed scenario as in hospital but also the efficient usage of spectrum resource in public as well as private area.

**a) Hospital Heterogeneous Wireless Networks. (IEEE802.15.4, as well as IEEE802.15.1, IEEE802.11)**

*Medium to large scale network consists of the IEEE 802.15.4 including RTLS TAG, WLAN and Bluetooth network. The area may be lightly controlled to prohibit the usage of personal wireless gadgets and computing devices.*

**b) Medical Wireless (IEEE802.15.4, IEEE802.15.4j)**

*Application of the medical sensors and the diagnostic systems attached to an individual patient for professional usage, either in the lightly controlled area like a clinic or the private area where various sort of wireless gadgets and computing devices may exist.*

**c) Health/Geriatric care (IEEE802.15.4, IEEE802.15.4f, IEEE802.15.4j)**

*Application of the healthcare and geriatric supporting systems for the personal usage can be proliferated either in the private or in the public area, where the people are using various sort of wireless gadgets and computing devices.*

**2. Industrial Automation and Control Application Space**

Industrial automation includes diverse application scenarios, each of which includes the common challenges of mutual interference between sub-networks, between a control network and an IT network for office work. Hence, the efficient SRU in the controlled private area of the plant, factory or workshop, whatever the areal size and the network node count.

*The proposed revision to IEEE 802.15.4 will provide a unique solution of RRMM for the efficient SRU and enhanced reliability, resiliency and security, and will include a recommended specification for the RRMM protocol and pertaining definitions of RRMM parameters.*

**3. Building Automation Systems**

 *Light control systems*

 *HVAC*

 *House-keeping Systems*

*Electrical Power (Usage) Managing Systems*

*Security Systems (Condominium Security System)
 Fire Alarm Systems*

 *\*\*\* Need more inputs \*\*\**

**4. Social Infrastructural Application Space**

**a) Smart Utility Network.**

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**b) Critical Infrastructure Monitoring Network.**

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**c) Other Infrastructural Networks.**

*IoT Internet of Things*

*(M2M, D2D)*

*?? IoT = M2M + Big Data ??*

 *\*\*\* Need more inputs \*\*\**

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**IEEE P802.15.4 Low Rate Wireless Personal Area Networks Study Group Functional Requirements, Standards Development Criteria (Initial Draft)**

The IEEE P802.15.4 Interest Group for Wireless Personal Area Networks (WPANs) started to discuss and draft the required IEEE Project 802 Functional Requirements, Standards Development Criteria (a.k.a. the Five Criteria). The IEEE 802.15 WPAN Five Criteria response is in Italics below.

**1. BROAD MARKET POTENTIAL**

**a) Broad sets of applicability**

*Wide application spaces of the IEEE 802.15.4, including Hospital/Medical/Healthcare, Industrial Automation and Social Infrastructure systems, require a set of standardized definitions and protocol for Radio Resource Measurement & Management (RRMM), which enables each strategy and policy of Spectrum Resources Usage (SRU) for the reliable system operation. The SRU strategy and policy required by each application space may diverse and sometimes unique, while pertaining RRMM protocol to measure and manage the wireless environment has to be crafted such that maximize the commonality for each application spaces and eventually enhance the reliability, resilience and securities.*

**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 10 semiconductor manufacturers that are already providing chipsets for IEEE 802.15.4. The 802.15.4 based solutions have been used and are being used in a wide range of applications.*

**c) Balanced costs**

*The proposed revision to 802.15.4 will be developed with the aim such that the additional cost of RRMM capabilities could be a negligible fraction of the entire cost of target applications.*

**2. COMPATIBILITY**

**IEEE 802 defines a family of standards. All standards shall be in conformance with the IEEE 802.1 Architecture, Management, and Interworking documents as follows: 802 Overview and Architecture, 802.1D, 802.1Q, and parts of 802.1f. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with 802.**

**Each standard in the IEEE 802 family of standards shall include a definition of managed objects which are compatible with systems management standards.**

*This revision will not affect the IEEE 802.15 standards' compliance with the IEEE 802 Architecture, Management, and Interworking documents as required, and will be in conformance with the IEEE 802.1 Architecture, Management, and Interworking documents.*

**3. DISTINCT IDENTITY**

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

*IEEE 802.15.4 is well suited for networks which are sharing same frequency spectrum in same area and are managed utilizing acquired RRMM information. This 802.15.4 revision for low rate WPANs maximizes the areal SRU efficiency and minimizes performance degradation due to mutual interference.*

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

*The proposed revision to IEEE 802.15.4 will provide a unique solution for the RRMM and eventual SRU.*

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

*The proposed revision for IEEE 802.15.4 will include the definitions of RRMM parameters as well as the communication protocol.*

**4. TECHNICAL FEASIBILITY**

1. **Demonstrated system feasibility**

*A variety of network management entities utilizing the proprietary RRMM information have been deployed as the utilitarian exercise in order to improve SRU in operational networks.*

**b) Proven technology, reasonable testing**

*Many examples of the RRMM information utilization have not only been published in the literature and demonstrated in laboratories worldwide, but have deployed in operational networks.*

**c) Confidence in reliability**

*Confidence in reliability by RRMM protocol has been consistently demonstrated in currently deployed IEEE802 based solutions other than IEEE802.15.4, for example IEEE802.11k.*

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

*An appropriate coexistence assurance document which shows the effectiveness for the coexistence of IEEE802 wireless standards and the efficiency of SRU will be created.*

**5. ECONOMIC FEASIBILITY**

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

*IEEE 802.15.4 devices, implementing RRMM protocols, will make use of the existing high volume applications in the shared and license exempt frequency bands including 2.4GHz and 915MHz bands. The incremental cost for implementation is expected to be minimal.*

**b) Reasonable cost for performance**

*Performance and costs associated with RRMM solutions have been shown to be minimal.*

**c) Consideration of installation costs**

*One of the IEEE 802.15 standard objectives includes low cost installation with minimal or no operator intervention and RRMM facilitates achieving the objectives.*