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| **Radiocommunication Study Groups** |  |
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| Institute of Electrical and Electronics Engineers, Inc. (IEEE) |
| Response to ITU-R WP 5A on “Mobile Wireless access systems providing telecommunications for a large number of ubiquitous sensors and/or actuators scattered over wide areas in the land mobile service” |
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# Source Information

This contribution was developed by IEEE Project 802®, the Local and Metropolitan Area Network Standards Committee (“IEEE 802”), an international standards development committee organized under the IEEE and the IEEE Standards Association (“IEEE-SA”).

The content herein was prepared by a group of technical experts in IEEE 802 and was approved for submission by the IEEE 802.16™ Working Group (WG) on Wireless Metropolitan Area Networks, the IEEE 802.18 Radio Regulatory Technical Advisory Group, and the IEEE 802 Executive Committee, in accordance with the IEEE 802 policies and procedures, and represents the view of IEEE 802.

# Introduction

IEEE 802.16 WG thanks ITU-R Working Party 5A for the liaison statement (Document 5D/TEMP/294) of 22 June 2011 regarding “Wide area sensor and/or actuator network (WASN) systems.”

The IEEE 802.16 WG has assigned a Task Group (TG) to develop machine-to-machine (M2M) specific wireless techniques, through development of the project IEEE P802.16p, initiated on 30 September 2010. The IEEE 802.16 M2M TG focuses on developing M2M techniques based on both WirelessMAN-OFDMA and WirelssMAN-Advanced systems. The scope of IEEE P802.16p includes enhancements to the IEEE 802.16 medium access control (MAC) layer and minimal modifications to the IEEE 802.16 physical layer (PHY). The technical scope of IEEE P802.16p is well aligned with that of ITU-R WP 5A’s WASN activities.

# Proposal

IEEE 802.16 WG would like to propose inclusion of the WirelessMAN-OFDMA and WirelessMAN-Advanced in Section 7 in the PDN Report – “System design guidelines for wide area sensor and/or actuator network (WASN) systems” as technologies that could be used for M2M applications. The related text is provided in Annex 1.

IEEE 802.16 WG would also like to propose a new section to be included in this PDN Repor, as indicated in Annex 2.

IEEE802.16 WG is looking forward to continuing the fruitful cooperation with ITU-R WP5A.

# References

[1] Document 5D/TEMP/294, LS to EOs on “Wide area sensor and/or actuator network (WASN) systems”.

[2] Document 5A/TEMP/282, PRELIMINARY DRAFT NEW REPORT ITU-R M.[LMS.WASN STUDY] on “System design guidelines for wide area sensor and/or actuator network (WASN) systems”.

# Annex 1

# (Additional bullet in page 8 of [2])

**7 Wireless system applications**

The wireless systems should support the service applications and satisfy the above characteristics.

Potential example systems are as follows:

* VHF-band WASN system;
* GSM/EDGE/UMTS/HSPA/LTE mobile systems for WASN
* IEEE WirelessMAN-OFDMA and WirelessMAN-Advanced mobile systems for WASN
* IMT systems used to support WASN applications.

# Annex 2

# (New section between “GSM/EDGE/UMTS/HSPA/LTE mobile systems for WASN” and “IMT systems used to support WASN applications” in page 21 of [2])

# 7.3: IEEE WirelessMAN-OFDMA and WirelessMAN-Advanced mobile systems for WASN

As stated throughout this document, WASN aims to bring communication technologies and services to the market in a large scale with minimal operational and capital expense using pre-existing networks. The IEEE 802.16 mobile system is able to serve as a technical ground for providing both management of a WASN network and WASN service specific technologies enabling. The objective of the IEEE P802.16p project is to enable a range of WASN applications that are automated rather than human-controlled and which require Wireless Metropolitan Area Network (WMAN) communication in licensed bands. These applications have network access requirements that may be significantly different from those used to support standard cellular connections. Some of the WASN applications of interest include secured access and surveillance, tracking, tracing and recovery, public safety, vehicular telematics, healthcare monitoring of biosensors, remote maintenance and control, smart metering, automated services on consumer devices, and retail digital signage.

IEEE P802.16p specifies enhancements to the IEEE 802.16 medium access control (MAC) layer and minimal modifications to the IEEE 802.16 WirelessMAN-OFDMA and WirelessMAN-Advanced physical layers (PHY), which are based on orthogonal frequency division multiple access (OFDMA).



Figure N. M2M service system architecture

As shown in Figure N, data to be collected by the M2M server may be gathered directly by the IEEE 802.16 M2M devices or by non-IEEE 802.16 M2M devices, which then IEEE 802.16 M2M devices will forward to the M2M server. The Access Service Network (ASN) manages its subordinate M2M devices according to results of communication with the M2M server. The Connectivity Service Network (CSN) stores collected data from M2M devices for access by M2M client applications.

The IEEE 802.16 Working Group (WG) is developing a project IEEE P802.16p, with expectation to improve the system specifically for WASN networks, while retaining compatibility with the previously-specified IEEE 802.16 mobile networks. The M2M Task Group of the IEEE 802.16 WG has specified system design criteria and functional requirements, including applicable use case scenarios, as delineated in the “Machine to Machine (M2M) Communications Technical Report (IEEE 802.16p-10/0005)”. To meet the requirements, the following considerations are taken into account in the IEEE P802.16p project:

1. Provision of reliable network accessibility for large number of M2M devices
2. Improvement on low power consumption for fixed/nomadic/mobile/grouped M2M devices
3. Provision of group management operation for large number of M2M devices
4. Support efficient resource scheduling depending on type of task (e.g., predictable task, time tolerant task etc) of M2M device
5. Possible service requirements to optimize M2M Devices depending on traffic type of WASN application
6. Support of M2M specific traffic patterns (e.g., small/large data bursts)
7. Improvement on security provision between the BS and individual or groups of M2M devices

Technical descriptions may be found in the following specifications. The system requirements of IEEE P802.16p can be found in the System Requirements Document (SRD), which is still under development.

IEEE Std 802.16-2009 IEEE Standard for Local and Metropolitan Area Networks - Part 16: Air Interface for Broadband Wireless Access Systems

IEEE Std 802.16m-2011 Amendment to IEEE Standard for Local and Metropolitan Area Networks - Part 16: Air Interface for Broadband Wireless Access Systems - Advanced Air Interface

IEEE 802.16p-10/0004r2 IEEE 802.16p Machine to Machine (M2M) System Requirements Document (SRD)