

Proposal for IEEE 802.16m Support for Self Organizing Networks

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*<<http://standards.ieee.org/faqs/affiliationFAQ.html>>

Re: IEEE 802.16m-08/040 – Call for Comments and Contributions on Project 802.16m System Description Document (SDD), on the topic TGM
SDD: SON

Purpose: Adopt the proposal into the IEEE 802.16m System Description Document

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Introduction

- This contribution proposes the support of SON that address the TGm SRD (IEEE 802.16m-07/002r6) requirements defined in Section 9.4.
- The following aspects of the SON support are proposed:
 - Self configuration
 - Self maintenance and optimization

Self Configuration

- Self configuration allows the BS to configure its PHY/MAC parameters after power on with minimum manual interruption
- From 802.16m perspective, only procedures that requires over-the-air support need to be defined.
- Many of the self configuration procedures can be carried out over the backhaul by communicating with other BSs or SON server. For example:
 - Initial neighbor list establishment based on BS location
 - Network wide system configuration, e.g. CP length, TDD ratio, frequency partitioning, legacy support enable/disable etc.
- BS can also assist in choosing certain PHY parameters after power on. For example, the BS can scan the signal strength of various preamble sequences and select its own preamble sequence to avoid collision. This avoid the need for preamble sequence planning.

Self Maintenance and Optimization

- Once the self configuration is completed, the BS is in operation and continue to perform self maintenance and optimization.
- This includes:
 - Resource and load management
 - Interference, transmit power management
 - On-going neighbor discovery

Resource and Load Management

- The BS adapts the following resources based on loading condition:
 - Partitioning between 16m/legacy zones
 - Partitioning between distributed resource and localized resource
 - Frequency partitioning for FFR
 - Amount of UL control channels resource assigned to each MS
- The adaptation is based on on-going monitoring of MSs' channel condition feedback, loading condition within the sector, inter-BS coordination as well as communicating with the SON server on overall network loading condition.

Interference/Transmit Power Management

- Downlink:
 - DL interference management can be in the form of FFR where the transmit power of each frequency partition can be adjusted based on MSs' feedback to the serving BS of interference condition and coordination between serving BS with its neighbor BSs.
 - For the case of femto BS, in order to control the DL transmit power of a femto BS, thus the interference caused by the femto BS to the MSs of an overlaid macro BS, an MS can be instructed by its serving macro BS to measure and report the signal strength of specific neighbor femto BSs.
- Uplink:
 - UL interference management can be in the form of IoT management and UL power control. IoT management can be performed via BS coordination over the backhaul or through over-the-air signaling from interfering BS to the MS.
 - The serving macro BS can also use the signal strength reports from the MS to estimate the relative proximity of the MS to the neighbor femto BSs, in order to decide whether to limit the UL transmit power of the MS to reduce its UL interference to a neighbor femto BS.

Neighbor Discovery

- During self configuration, initial neighbor list can be established based on information obtained from the SON server.
- On-going update/optimization of the neighbor list can then be performed based on MSs' measurement report. BS can selectively instruct the MS to report the signal strength of specific neighbor BSs or any BSs that the MS can detect that has signal strength above certain threshold.

Proposed SDD Text

- Add the content of slides 3 to 7 to section 18 of the SDD.