Interference Reduction and Power Saving Mechanism for Femto

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Venue:

Re:TGm SDD: Femtocells. in response to the TGm Call for Contributions and Comments 802.16m-08/040 for Session 58

Base Contribution:

This is the base contribution.

Purpose:

To be discussed and adopted by TGm for the 802.16m SDD

Introduction

- Multiple femto BSs may be deployed in very close proximity.
- All femto BSs operates on the same carrier frequency.
- Location of femto BSs could be changed without any notification and it can be turned on and off, rebooted by the end user randomly.
- Therefore, It is not feasible to have a very sophisticated interference mitigation algorithm in order to manage interference.
- In reality, it is possible that femto BSs are transmitting SCH/BCH/Broadcast information even though there is no MS attached to it and creates unnecessary interference.
- It is advisable that femto BS should be turned off when not needed to conserve power and reduce interference.
- This proposal provides multiple interference reduction and power saving schemes by detecting whether MS is attached or not attached to its femto BS(s).

Proposal 1- Switch on/off of Femto BS

- MS and network keeps the mapping of its own home femto BS and overlay macro BS.
- When MS leaves the overlay macro BS coverage area, the home femto BS is switched off.
- When MS enters the overlay macro BS coverage area, the home femto BS is switched on.
- More detailed procedures are proposed in the next slide.

Movement of MS during connected and Idle state

- MS in connected state
  - When MS leaves the overlay macro BS coverage area, the network detects such event based on Handover, and sends "switch off" signal to MS's home femto BS.
  - When MS enters the overlay macro BS coverage area, the network detects such event based on Handover, and sends "switch on" signal to MS's home femto BS.
- MS in idle state
  - When MS leaves the overlay macro BS coverage area, it always performs location update (please refer C80216m-08/xxx), which triggers the network to send "switch off" signal to MS's home femto BS.
  - When MS enters the overlay macro BS coverage area, it always performs location update, which triggers the network to send "switch on" signal to MS's home femto BS.

Proposal 2 - Low Power State for Femto BS

- When MS(s) attached to the femto BS enters idle state, the femto BS can also get into sleep mode to save power and reduce interference.
- The femto BS only wakes up its air interface side during paging listening intervals for all the MSs attached.
- The femto BS also wakes up to transmit SCH/BCH and listening to the ranging channel. If no ranging request is received, it can goes to sleep.

Proposed SDD Text

Section 10.x: Femto BS Support

[Insert following text in section 10.x]

Section 10.x.1: Interference Reduction and Power Saving

When MS leaves or enters the overlay macro BS coverage area, the network may signal the femto BS to “switch off” or “switch on” respectively. Such operation may be triggered by handover signaling when MS is in connected state, or location update signaling when MS is in idle state.

Section 10.x.2 Low power state for Femto BS

When MS(s) attached to the femto BS enters idle state, the femto BS may goes in to low power state (sleep state) to save power and reduce interference. The femto BS wakes up during paging listening interval of the attached MSs or during ranging interval to transmit SCH/BCH and listening to the ranging channel. If no ranging request is received, Femto BS can return to low power state (sleep state).