

Paging in 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

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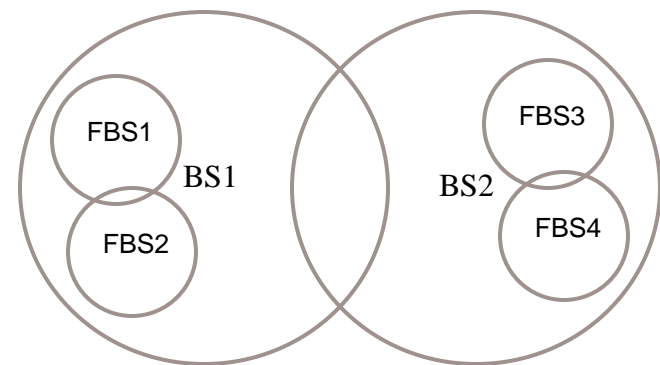
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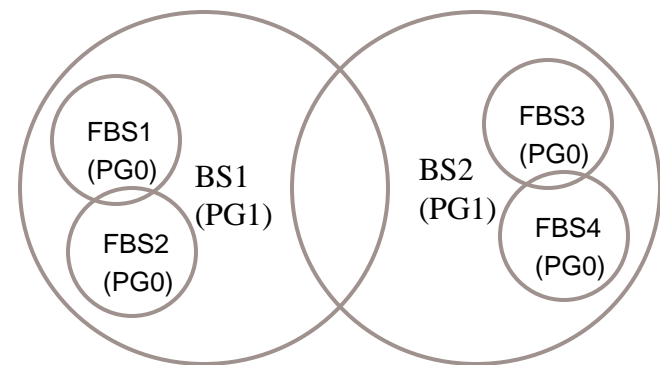
Motivation

- Femto BS can be deployed by end users at home, small office or enterprise to provide closed access to one or more users.
- These femto BSs are all termed as home femto for an user.
- There could be tens/hundreds of femto BSs deployed under a macro BS coverage area.
- Normally users may stay in their home femto BSs for quite long time.
- How to page MSs in femto cells effectively with less system overhead is an important aspect to consider.



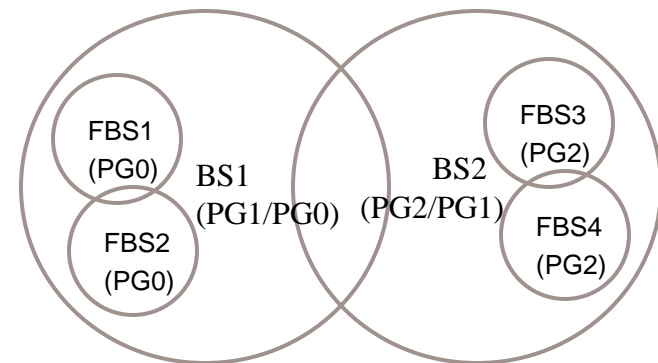
Proposed Solution – Option 1

- An unique paging group id (e.g., PG0) is assigned to femto and shared by all the femto BSs in the network.
- The paging controller stores the mapping between an MS and its home femto BS(s).
- When an idle MS moves into or out of its home femto coverage area, it performs location update.
 - By doing that, the paging controller is aware that if the MS is in its home femto coverage or not.
- When paging is needed, the paging controller decides which paging group to page based on the information it stores.
 - If MS is in home femto, the paging message is only sent from its home femto BS(s).
 - Otherwise, the normal .16m paging procedure applies.
- This scheme reduces overhead due to unnecessary paging in macro cells when MS is in femto coverage area, with the cost of possible ping-pong location update signalling when MS is moving in and out of femto coverage.



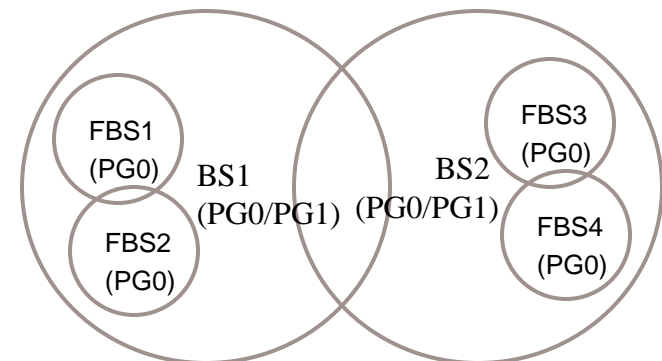
Proposed Solution – Option2

- An unique paging group id is assigned to all the femto BSs in the coverage area of a macro BS.
 - E.g, PG0 for all the femto BSs in BS1, and PG2 for all the femto BSs in BS2
- The paging controller stores the mapping between an MS and its home femto BS(s), and the overlay macro BS(s).
- The overlay macro BSs is also assigned with the femto BS paging group in addition to its own paging groups.
 - E.g., BS1 is assigned with both PG0 and PG1, BS2 is assigned with both PG2 and PG1.
 - The MS doesn't need to perform location update when moving between overlay macro and femto BS, but performs location update once moving out of the overlay macro BS to another macro BS.
- When paging is needed, the Paging controller decides which paging group to page.
 - If MS is in the vicinity of home femto coverage, the paging message is sent from the home femto BS(s) as well as its overlay macro BS(s).
 - Otherwise, the normal .16m paging procedure applies.
- This scheme reduces the ping-pong location update signalling when MS is moving in and out of femto coverage, however with the cost of big number of paging groups.



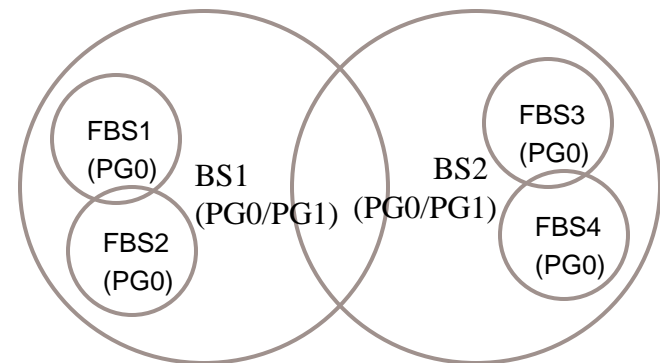
Proposed Solution – Option3 (1)

- An unique paging group id (e.g., PG0) is assigned to femto and shared by all the femto BSs in the network.
- The paging controller stores the mapping between an MS and its home femto BS(s), and the overlay macro BS(s).
- The overlay macro BSs is also assigned with the femto BS paging group (PG0) in addition to its own PG(s).
 - E.g., BS1 is assigned with both PG0 and PG1.
 - The MS doesn't need to perform location update when moving between overlay macro and femto BS.
- When paging is needed, the Paging controller decides which paging group to page.
 - If MS is in the vicinity of home femto coverage, the paging message is sent from the home femto BS(s) as well as its overlay macro BS(s).
 - Otherwise, the normal .16m paging procedure applies.



Proposed Solution – Option3 (2)

- When MS moves out of the coverage area of the overlay macro BS and detects a different macro BS even with the same PG (i.e. PG0), it performs location update.
 - E.g, when MS whose home femto BS is FBS1 moves from BS1 to BS2, although BS2 also belong to PG0, MS still performs location update.
 - In such way, the paging controller is aware that MS already moves out of its femto and overlay macro BS, and won't page the MS in these cells.
- This scheme reduces overhead due to unnecessary paging in non-overlay macro cells and non-home femto BS when MS is in its femto coverage area, while at the same time reduces the ping-pong location update signalling when MS is moving in and out of femto coverage.
- This is the preferred solution.



Proposed SDD Text

Section 10.x: Femto BS Support

Section 10.x.y: Paging in Femto

- An unique paging group id (PG-Femto) is assigned to femto and shared by all the femto BSs in the network.
- The overlay macro BSs is also assigned with the femto BS paging group (PG-Femto) in addition to its own paging groups.
- The paging controller stores the mapping between an MS and its home femto BS(s). It also records if the MS is in its femto vicinity area (i.e. femto and overlay macro BS coverage area).
- When MS stays in home femto vicinity coverage area, the paging message is only sent from its home femto BS(s) and overlay macro BS(s).
- When MS moves out of home femto vicinity coverage area and detects a different macro BS even with the same PG id (i.e. PG-Femto), it always performs location update.