Acceleration of MS Ranging and Network Entrance Processes to Femtocell BS

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Venue:

IEEE 802.16m-08/040 Call for Comments and Contributions on Project 802.16m SDD; TGm SDD: Femtocells

Base Contribution:

IEEE C802.16m-08/1422

Purpose:

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

Notice:

Release:

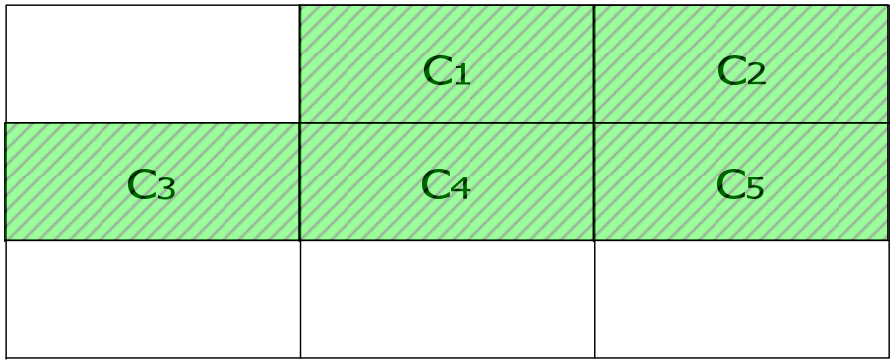
Patent Policy:

Introduction

- In the legacy system, all the MSs have equal opportunity to access the BS during the ranging process.
- However, in Femtocell system, it is highly desirable to grant higher priority to the MSs belonging to the owner of the Femtocell BS (FBS), in particular to an FBS with open group of users.
- In this contribution, we propose a new Femtocell ranging and network entrance process such that the latency of the MSs accessing their FBS is shortened.

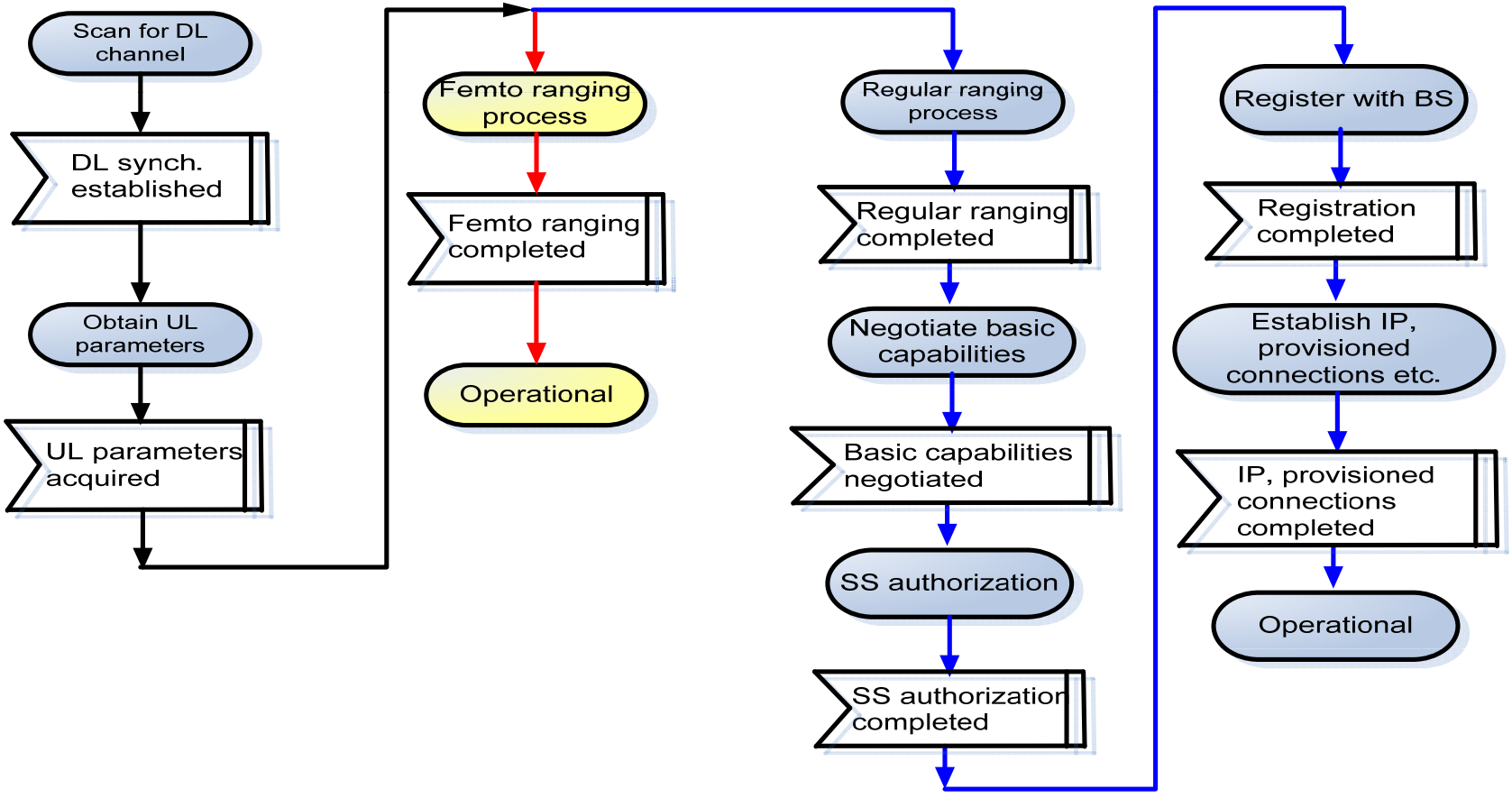
Femtocell Ranging Process

- In the ranging region, an FMS (Femtocell MS) sends ***multiple*** ranging codes generated from a cryptographically secure pseudorandom number generator (CSPRNG) known only by the FBS (Femtocell BS) and the FMS.
  - The probability of successful ranging via multiple ranging codes is increased and thus reduce the ranging latency.
  - Moreover, other MSs that do not know the secret between the FBS and the FMS cannot take advantage of Femtocell ranging process.
- Detection of multiple ranging codes at FBS:
  - As long as a portion of codes are detected, the FMS ranging codes can be identified.
  - FBS can further verify whether an identified sequence of codes are from the same FMS by checking their transmission time delays (TDDs).



Femtocell Network Entrance Process

- After successful detection of femtocell ranging codes, FBS grants an UL allocation to FMS to send RNG-REQ with CMAC TLV.
- Upon receipt of this RNG-REQ, the FBS can verify it and send an RNG-RSP message with CMAC TLV back to the FMS.
- FMS verifies the received RNG-RSP from the CMAC value and finishes the NE process.



Proposed SDD Text

[Insert the following new subclause to the section 17 (Support for Femtocell)]

17 Support for Femtocells

17.X Femtocell Ranging Process

A Femtocell MS (FMS) can access its FBS via the Femtocell ranging process in which the FMS sends multiple ranging codes generated from a cryptographically secure pseudorandom number generator (CSPRNG) in the common ranging region of an UL subframe. The random number can be derived only by the FMS and the FBS based on a shared secret.

17.Y Femtocell Network Entrance Process

After an FBS recognizes a sequence of Femtocell ranging codes with approximately the same transmission time delay (TDD) from an FMS, it grants an UL allocation to the FMS to send an RNG-REQ message with the CMAC value. Upon receipt of the RNG-REQ, the FBS verifies whether the message is from the identified FMS and sends an RNG-RSP message with CMAC value back to the FMS. The FMS verifies the received RNG-RSP from the CMAC value as well and finishes the mutual authentication process. After this step, the network entrance state at FMS becomes operational.