Slides for "Paging Group Update procedure for Mobile RS"

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Purpose:

The purpose of this slide set is to introduce contribution C802.16j-06_194. This contribution is proposing a paging group update procedure for mobile RS to support MS idle mode. Changes in the standard are described in contribution C802.16j-06_194.pdf.

Outline

- Introduction

- Mobile RS Paging Group Update procedure to support MS Idle Mode.

- Advantages and Disadvantages

- Summary

Introduction

- In the usage model where RS and MS are mobile (E.g. Bus, Train, Ferry etc), MRS and its subordinate MSs are moving <u>together</u> from one PG area to another PG area (Group Mobility).
- When MRS crosses the PG area boundary, the subordinate MSs will initiate LU almost at the same time.
  - It will increase contention and congestion in the access and relay link which causes delay in the LU Procedure.
- This contribution proposes a scheme for MRS and its subordinate MSs that will reduce contention on the relay and access link.
  - It is not expected to have Idle Mode for RS therefore, it is proposed that this procedure should be called MRS Paging Group Update procedure instead of Location update procedure.
- It will also reduces the number of LU performed by subordinate MSs.
- MS attached via FRS/NRS may follow the existing LU procedure as defined in IEEE Std. 802.16-2004/802.16e-2005.

Proposed MRS Paging Group Update procedure for RS and subordinate MS in MMR (1)
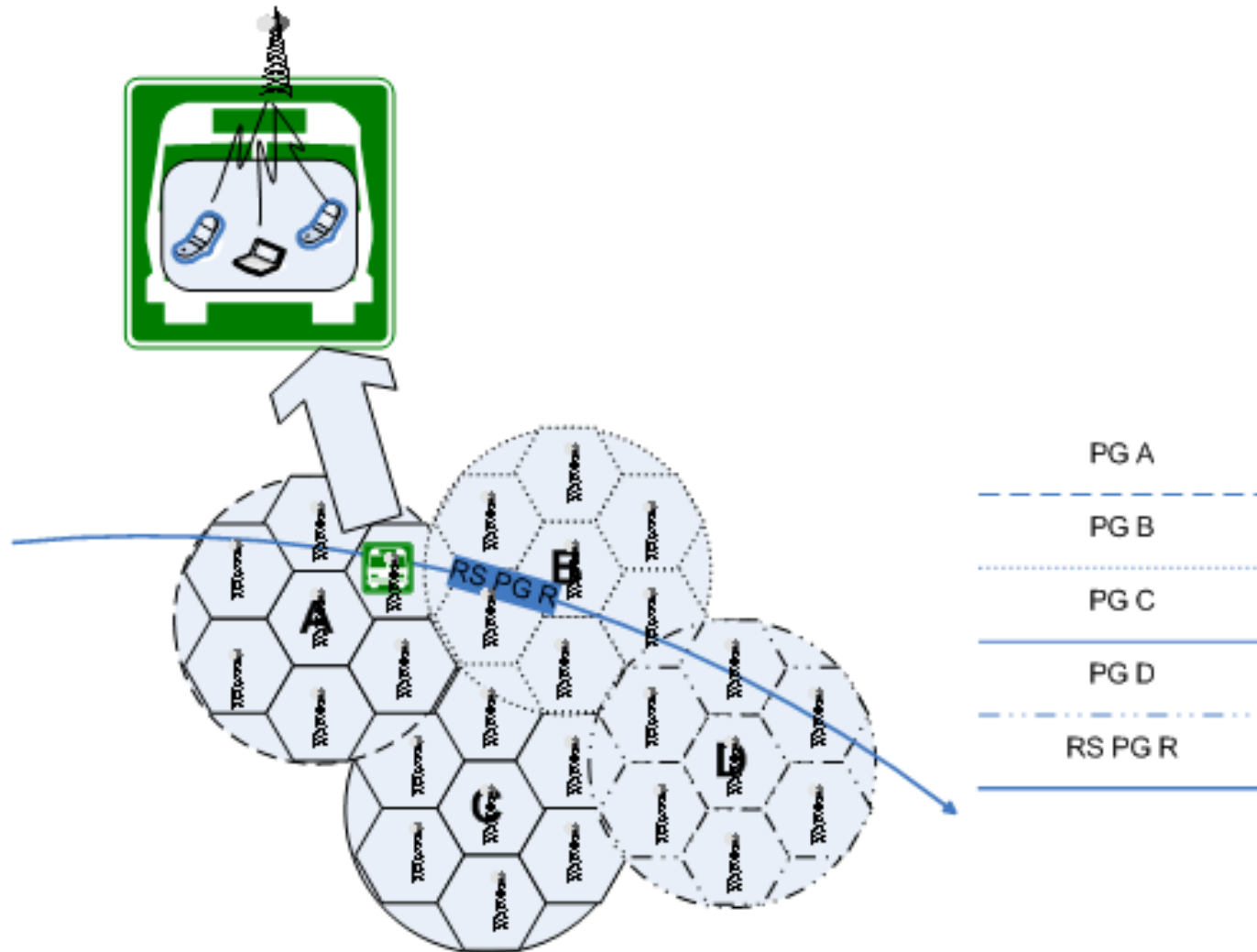

Figure1: Example view of PG in the MMR system & path of MRS through different PG area

Proposed MRS Paging Group Update procedure for RS and subordinate MS in MMR (2)

- MRS will have its own PG_ID (e.g. RS PG_ID = R)
- When MRS is powered on or crosses PG area boundary,
  - MRS will exchange signaling (RNG_REQ/RNG_RSP) with the BS to add MRS PG_ID (R) to the PG_ID list of BS's in the new PG area.
  - In case MRS Handover is also being performed, MRS PG_ID (R) will be added to RNG_REQ.
  - While RS and BS exchange signaling, RS as an option can also add RS PG_ID (R) to relay DCD/MOB_PAG_ADV message or block the transmission of DCD/MOB_PAG_ADV message.
    - Required so that idle MS attached to mobile RS can not see PG change.
- BS exchange backbone message with other BS's in the old PG area, to remove the MRS PG_ID from BS's PG_ID list.
  - This will require in order to avoid unnecessary transmission of PAGING messages for subordinate MS from BS's in old PG area.

Proposed MRS Paging Group Update procedure for RS and subordinate MS in MMR (3)

- Initially MS might have different PG_ID assigned by the BS. It is proposed that when MS perform the LU procedure via MRS (as access RS), BS will allocate to MS same PG_ID as that of MRS.
  - All subordinate MS attached to MMR network via MRS will also have PG_ID same as MRS (I.e. MS PG_ID = R)
  - BS or other network entity (e.g .Paging Controller) also keeps the information about the MRS location so that it can have exact location of MS in case network needs to page MS.

- As long as sub-ordinate MS moving along with MRS,
  - Subordinate MS attached to MRS will not see change of PG and therefore will not initiate LU.
  - MRS will perform the Paging Group Update procedure that will update the location of all the subordinate MS

Proposed MRS Paging Group Update procedure for RS and subordinate MS in MMR (3)

TBS | MRS | MS1 | MS2

DCD (with new PG_ID)

MRS monitor change in PG_ID, It start PG_UPDATE procedure with BS. Also modify DCD to add RS PG ID.

DCD (with new PG_ID, RS PG_ID) or Block DCD

CDMA Ranging

CDMA_Alloc_IE

RNG_REQ (RS PG_ID)

BS himself or with the help of network entity, co-ordinate to add RS PG_ID in its own or all the BSs PG list

RNG_RSP (success)

DCD (with new PG_ID, RS PG_ID)
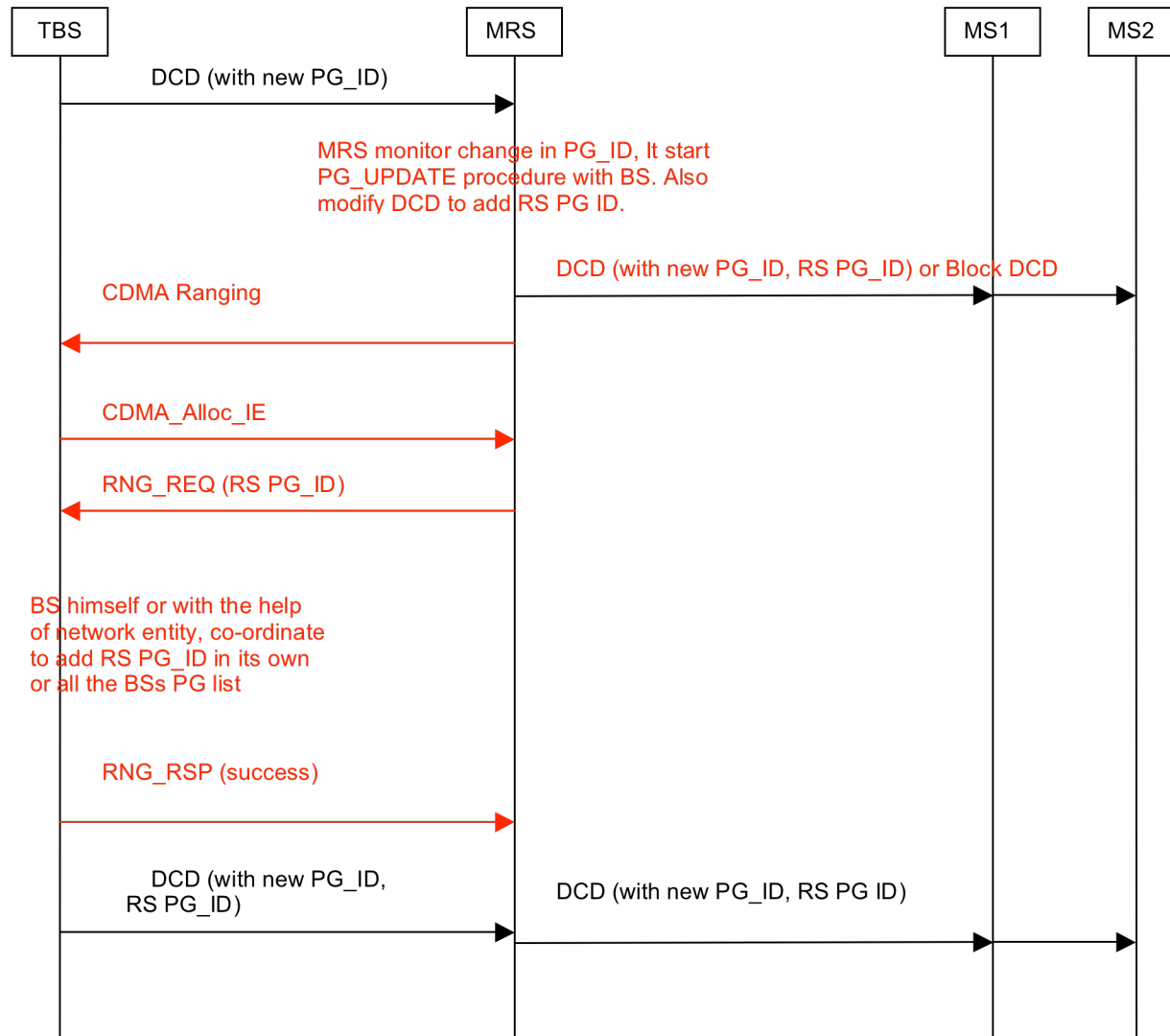
DCD (with new PG_ID, RS PG ID)

Figure 2: Air Interface Message sequece for the proposed MRS PG update procedure

Advantages and Disadvantage

Advantage:

• Spectrally efficient signaling by minimizing the number of location update attempt by MS. One MRS Paging group update will update the location of all the sub-ordinate MS attached to Mobile RS.

• Congestion is reduced and distributed on the multiple BS-RS and RS-MS link.

• Overall latency for MS location update in the MMR system is reduced because of low congestion.

• Probability of loosing Paging messages for MS during transition period is lower.

• Required very minimum changes on the air interface (one TLV in both RNG_REQ and RNG_RSP)

Disadvantage:

• Depending upon the implementation option, either one BS or all the BS in the PG needs to transmit PG_ID of MRS (2 bytes) in every DCD message (transmit every 10 sec by default).

Summary

- Discussed issues of contention on the access and relay link in case of Group Mobility.

- MRS Paging Group Update procedure is proposed to tackle the issue.

- Proposed solution is aim to reduce no. of LU from sub-ordinate MS as long as they are moving along with MRS.

- It also distribute the LU load over the different BS as and when MS enter or leave the MRS PG area.

- Detailed description of MRS Paging Group Update procedure and "changes to the specs" are defined in contribution C802.16j-06_194.pdf.