Slides for "RS support for OFDMA Based Ranging"

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Base Document:

IEEE C802.16j-06/193r1 http://dot16.org/CSUpload//upload/Relay_db/C80216j-06_193r1.pdf

Purpose:

The purpose of this slide set is to introduce our contribution C802.16j-06_193r1. This contribution is proposing RS support for OFDMA Based Ranging of MS. Changes in the standard are described in contribution C802.16j-06_193r1.pdf.

Outline

- Introduction
- RS support for OFDMA Based Ranging procedure for MS
- Signaling procedure for different types of scheduling
- Summary

Introduction

- OFDMA Based Ranging (CDMA Initial and Periodic Ranging) is performed between MS and BS.
- It may takes multiple iterations over the air interface
  - Link between BS and MS needs to be adjusted (power, time, frequency etc) before BS can make allocation for MS to send complete RNG_REQ or allocate CIDs.
- With Relays, the ranging procedure has to traverse multiple hops of the air interface.
  - ranging procedure serves the function of timing advance power adj, as well as CID establishment. Therefore can't be just done with the access RS, without involving BS.
  - If ranging procedure is fully controlled by MMR-BS, it would cause increased delay and spectrally inefficient.
  - While the timing and power adjustments are desired from the access RS, the CID establishment and RNG_REQ processing is desired at the BS.
- This contribution proposes a fast, spectral efficient Ranging procedure.

RS support for OFDMA Ranging procedure of MS (1)

- When RS(s) is introduced between BS and MS, access RS shall perform the part of Ranging procedure.
  - RS transmit its own preamble.
  - MS shall perform the ranging with RS. (MS can't differentiate between RS and BS. It does the ranging with station which is strongest and suitable)
- RS as part of ranging procedure for MS,
  - process the CDMA ranging request messages
    - Locally adjust the access link and manages the power/timing/frequency of MS.
    - RS can performs the bandwidth request to upstream node (BS/RS) to get the UL allocation and use that allocation to transmit MS's complete RNG_REQ.
  - RS relays all the other messages (including complete RNG_REQ) to and from between MS and BS.
    - MS context shall be anchored at BS, all the allocation of parameters (Basic, primary CID etc.) for MS is done by BS.

RS support for OFDMA Ranging procedure of MS (2)

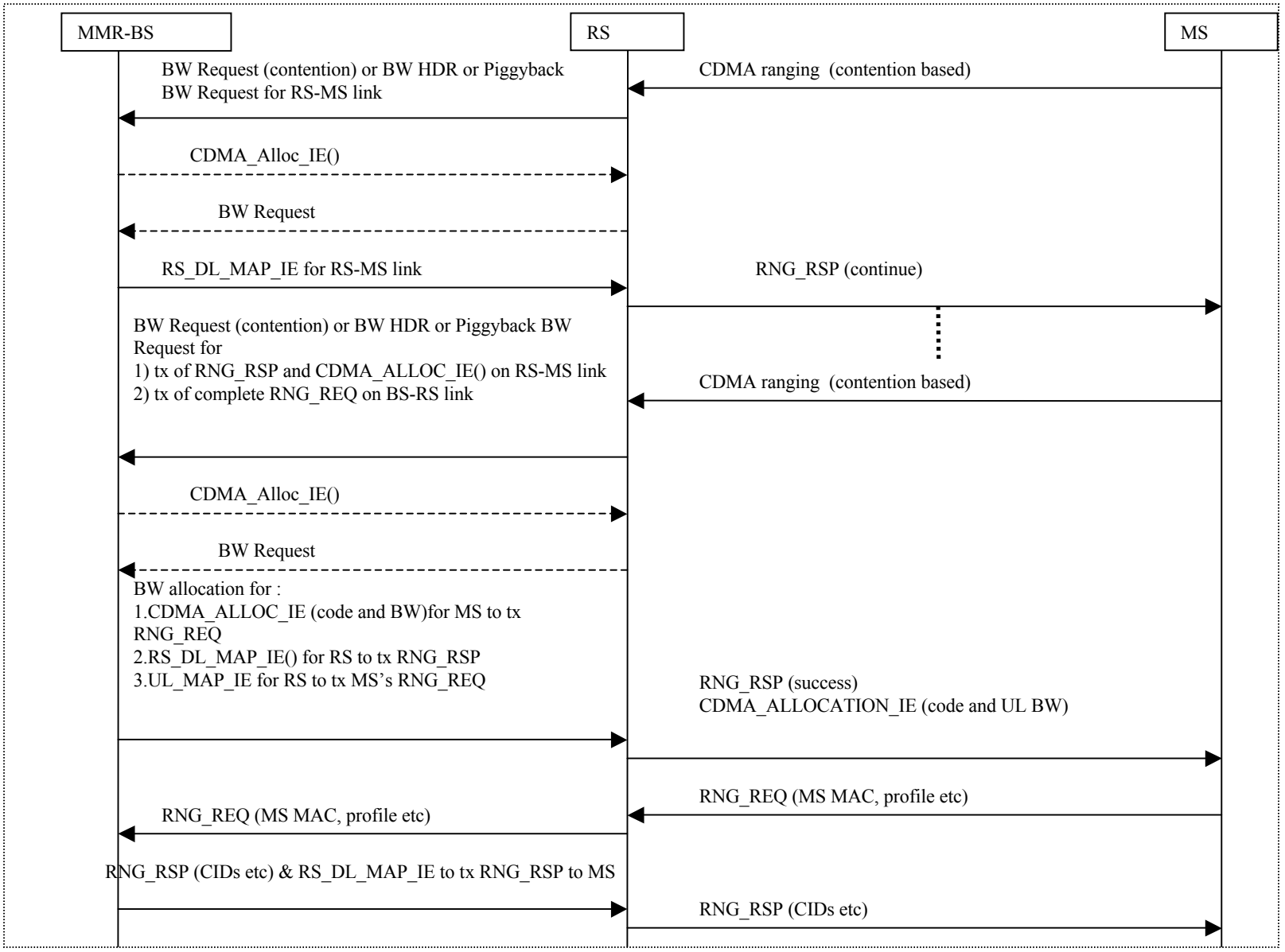
Bandwidth request and scheduling

- For messages on access link
- RS required to send
  - RNG_RSP of CDMA ranging request (Initial or periodic ranging)
  - CDMA_ALLOCATION_IE for MS to send complete RNG_REQ.

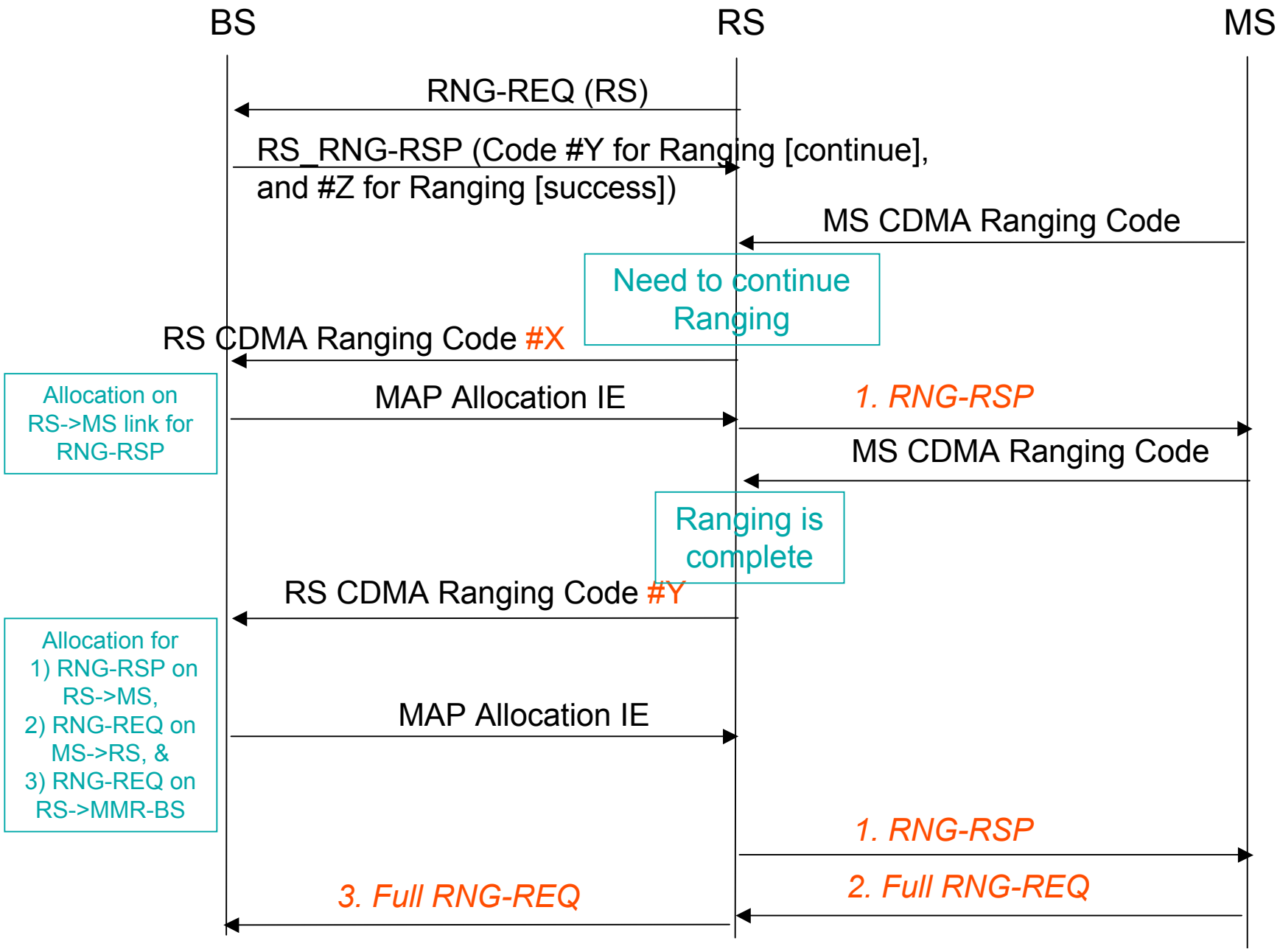
- In case of centralized scheduling,
  - RS request transmission opportunity from BS using existing procedure
  - or utilizes the fast resource request methods defined in contribution C802.16-06_189.pdf
- In case of distributed scheduling, RS can schedule this messages on its own.

- For messages on relay link
  - RS uses the already specified methods (Bandwidth request) to request resources to send complete RNG_REQ to BS
  - or utilizes the fast resource request methods defined in contribution C802.16-06_189.pdf

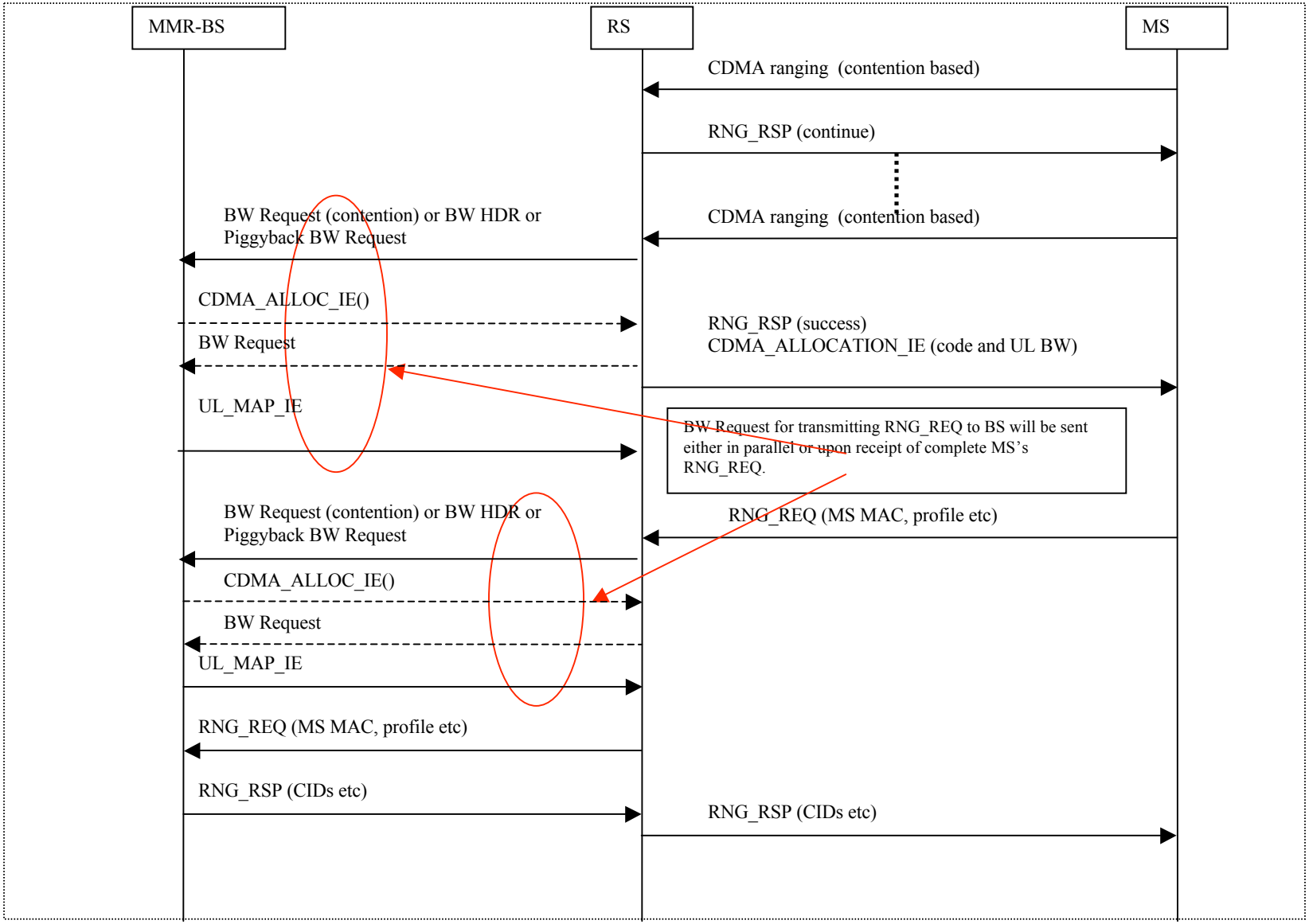
Signaling Procedure - Centralized Scheduling



fast resource request method using Assigned RS CDMA Codes



Signaling Procedure - Distributed Scheduling



Summary

- Identified the issues of delay and bandwidth inefficiency associated with the CDMA ranging in multi-hop system and discussed the RS support to tackle the issue.

- Proposed solution does not require RS to relay CDMA Ranging codes and adjustment parameters back to BS, therefore it is spectrally efficient. It saves bandwidth on both DL and UL.

- Reduced overall latency for MS's initial ranging process. The main time consuming step of back and forth ranging with CDMA code is done only on the access link.

- Utilize already defined procedure, therefore required minor changes in specs

- Detailed description of Relay Station support for OFDMA Based ranging procedure and required "changes to the specs" are defined in contribution C802.16j-06_193r1.pdf.