

MS Handover support in Transparent RS

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IEEE C802.16j-06/XXX http://dot16.org/CSUpload//upload/Relay_db/C80216j-06_XXX.pdf

Purpose:

The purpose of this slide set is to introduce contribution C802.16j-06_XXX. This contribution describes the MAC procedure for supporting MS handover in Transparent RS. Changes in the standard are partially described in contribution C802.16j-06_XXX.pdf.

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Outline

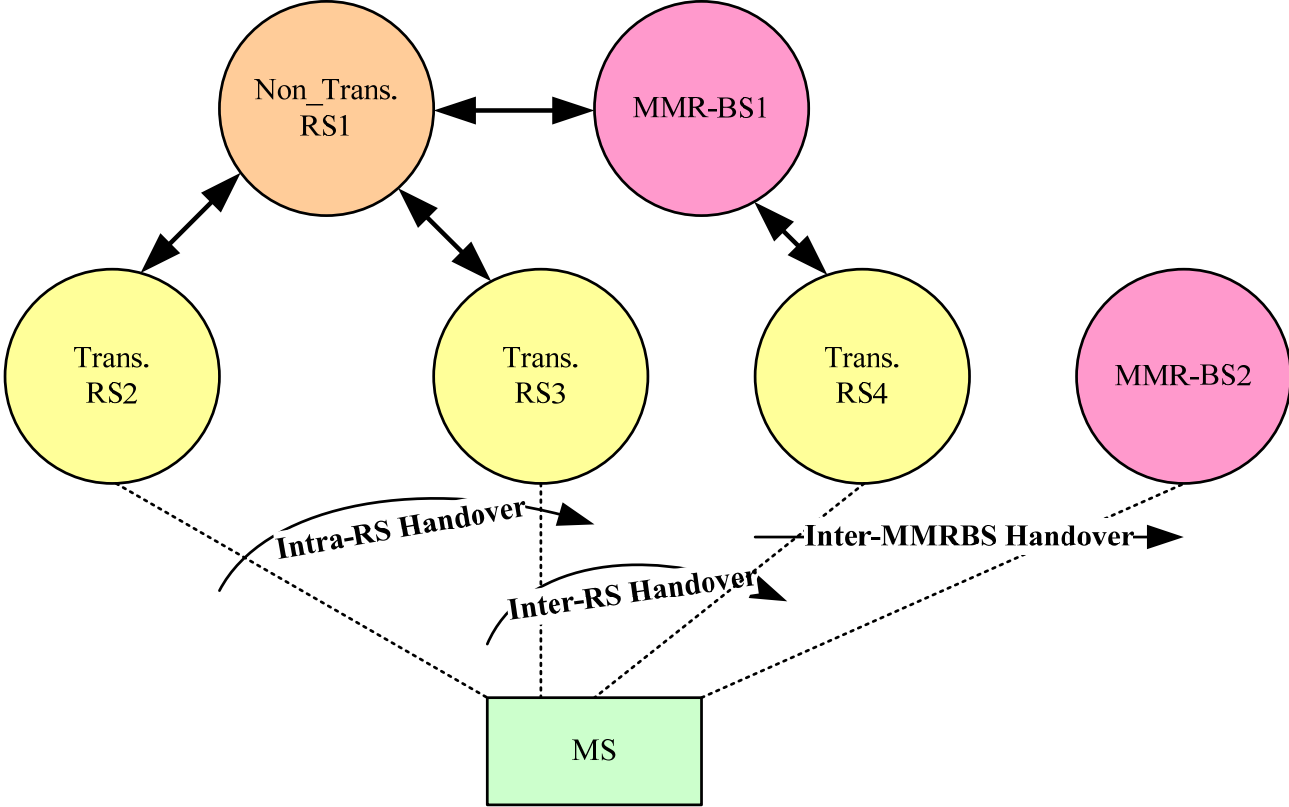
- Introduction
- Problem Statement
- Intra-RS Handover
- Inter-RS/MMRBS Handover
- Summary

Introduction

- From MS's point of view:
 - Transparent RS
 - Doesn't transmit preamble and MAP signal, or just transmit the same preamble and MAP signal with its superior anchor station;
 - MS can not sense the existence of transparent RS at all;
 - Transparent RS is a low capability RS, which is controlled by its anchor station;
 - Non-Transparent RS
 - Generate and send its own preamble and MAP signal;
 - Non-transparent RS act as a BS to MS;
 - Non-transparent is a high capability RS, and has the ability of resource scheduling, it can be the anchor station of a transparent RS;

Introduction

- **Inter-MMRBS Handover:**
 - The serving access node and the target access node belong to different MMR-BS;
- **Intra-MMRBS Handover:**
 - The serving access node and the target access node belong to the same MMR-BS;
- **Inter-RS Handover:**
 - The serving access node and the target access node belong to the same MMR-BS, but the different anchor station. That is, from the MS point of view, it recognizes the serving access node and the target access node as different BS;
- **Intra-RS Handover:**
 - The serving access node and the target access node belong to the same MMR-BS, and the same anchor station;



Problem Statement

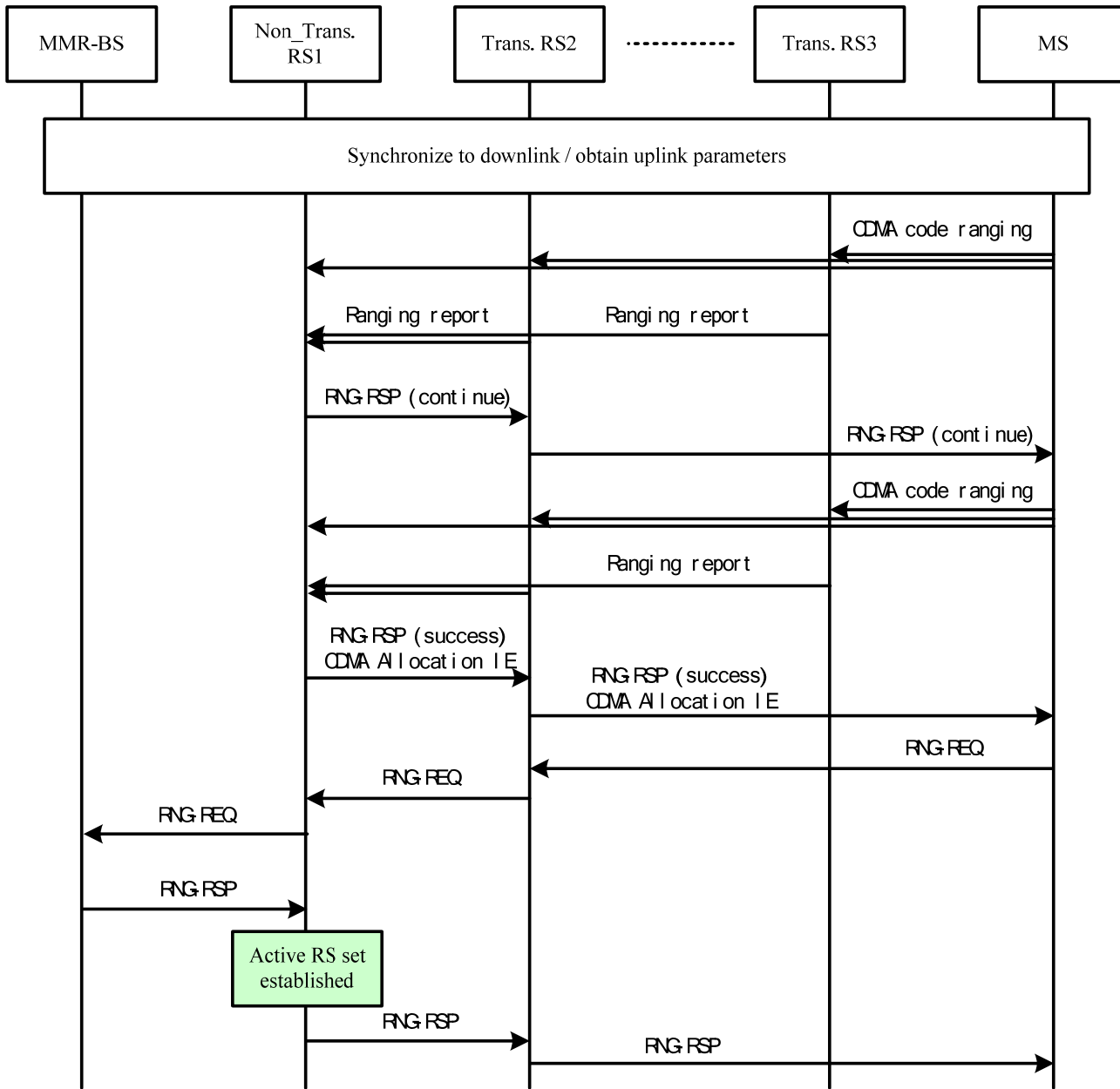
- Problem in intra-RS handover:
 - MS can not sense the transparent RS
 - No downlink signal can be used to trigger the intra-RS handover as legacy 16e;
 - MS can not distinguish the difference between the serving access node and the target access node
 - MS can not participate the handover procedure, the whole handover procedure can only be fulfilled and managed at anchor station and MMR-BS;
 - MS can not sense the intra-RS handover procedure
 - It's very important to have a reliable and fast intra-RS handover mechanism, so as to not deteriorate the QoS of MS;

Intra-RS Handover

- Candidate station set (CASS) is established and maintained in its anchor station for each MS;
 - CASS is defined as an aggregate transparent RS belonging to the same anchor station (including anchor station itself), and can reach the MS;
- At intra-RS handover, a new access station should be selected from the candidate station set and assigned to the MS;
 - A new MAC management message should be defined, in order to terminate the old access station and start up the new access station;
- After indicated by the anchor station via MAC management message, the new assigned access station will take on the relaying function for the MS;
- In one word, the intra-RS handover procedure is actually the procedure of assign a new access station for the MS in the CASS;
- 2 fundamental problem of intra-RS handover;
 - How to establish the CASS;
 - How to dynamic maintain the CASS;

Intra-RS Handover

- The CASS can be established in the anchor station during MS network entry / reentry, or inter-RS / inter-MMRBS handover procedure;
 - In MS network entry procedure:
 - CDMA code ranging is performed;
 - The transparent RSs who have received the CDMA initial ranging code will report to their anchor station, and the anchor station logs all the ranging report it received;
 - After the success of the CDMA code ranging procedure, RNG-REQ message is sent from the MS with its MAC address, then MMR-BS and anchor RS can identify the MS;
 - The anchor station establish the CASS for the MS, and the most suitable RS is selected from the CASS as MS's access station;



Intra-RS Handover

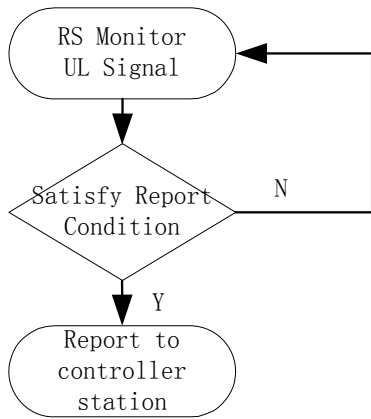
- In inter-RS / inter-MMRBS handover procedure:
 - The establishment of candidate station set is similar with that in initial network entry procedure;
 - The major difference is that MS can use dedicated ranging channel instead of contention based ranging channel -> The anchor station can identify the MS from the received CDMA code and ranging region;
 - So the CASS can be established as soon as the ranging report is received.
- In summary, the CASS is established based on the monitoring of MS's CDMA ranging code signal and the report to the anchor station.

Intra-RS Handover

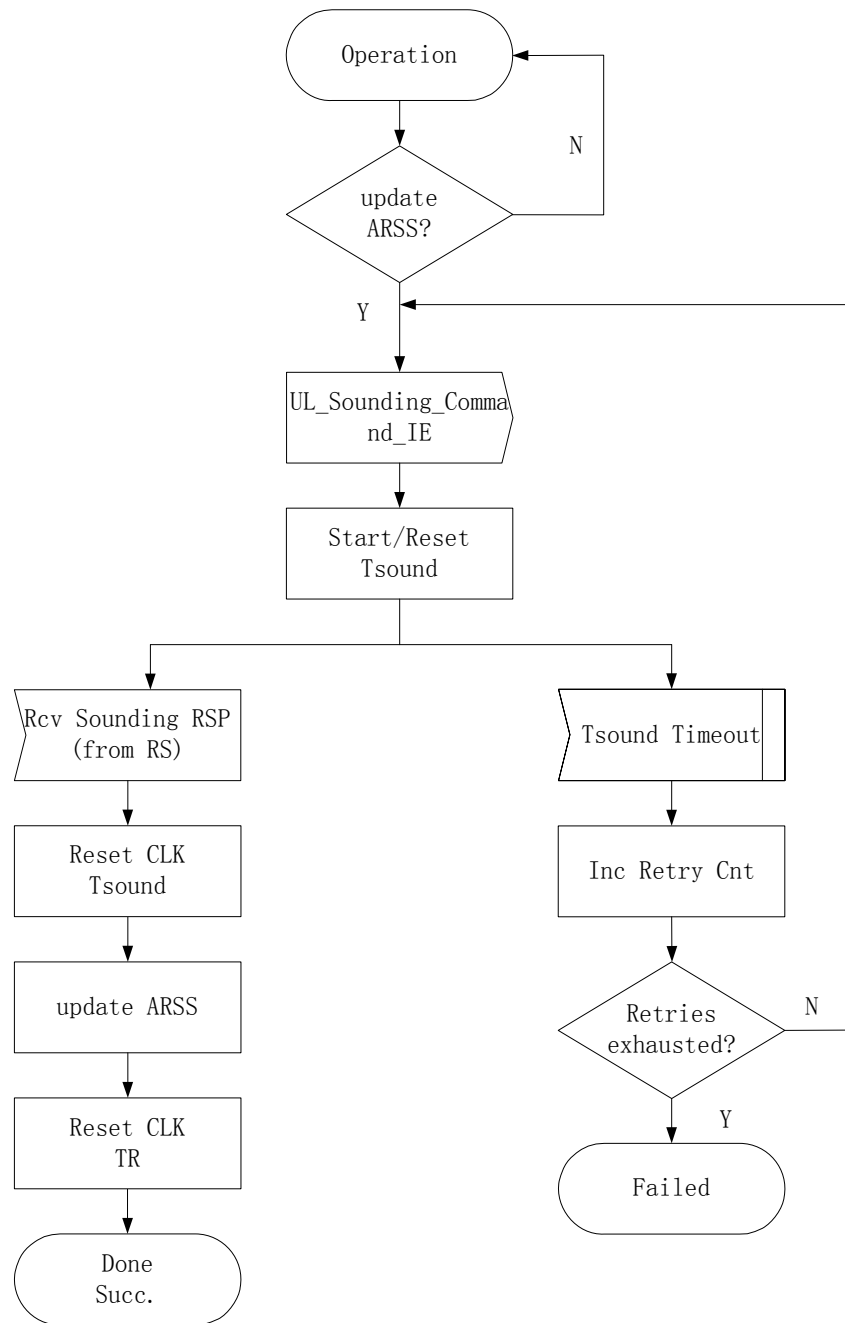
- 2 ways to update the CASS
 - Passive updating triggered by the monitoring report of the uplink signal:
 - All the transparent RS will monitor MS's uplink signal
 - When a RS detect a new MS's uplink signal (SINR or RSSI, etc.) exceed Add threshold, or MS's uplink signal fall below the Del threshold, the RS will generate report information to the anchor station;
 - The anchor station will use this report information to update the CASS;

Intra-RS Handover

- Active updating controlled by anchor station or MMR-BS:
 - Anchor station will send unsolicited UL_Sounding_Command_IE defined in 16e to MS in order to initiate MS reporting its channel quality;
 - When MS reporting its channel quality or transmitting a unicast signal, all the RS can monitor this uplink signal and report to its anchor station;
 - The CASS is updated according to the uplink signal monitoring report;
 - The triggering of the active updating can be timers expire, or anchor station makes decision according to its strategy;



RS monitoring MS's uplink signal dialog (RS side)



CASS update message dialog (anchor station side) - Anchor station initiated

Inter-RS/MMRBS Handover

- In Inter-RS / Inter-MMRBS handover scenario:
 - MS can sense the handover procedure, so the legacy 16e handover mechanism can be reused with some modification for these scenarios;
 - When inter-Bs or inter-MMRBS handover occurs, CASS needs to be established in the target anchor station;
 - If no transparent RS associate with the target anchor station, the CASS can be simplified;
 - At case of MDHO and FBSS, multiple CASS need to be established in the correspondence anchor stations;

Summary

- In intra-BS handover
 - CASS needs to be established and maintained in the anchor RS;
- In inter-RS/MMRBS handover
 - CASS needs to be established and maintained in the target anchor station;
- In MDHO and FBSS
 - Multiple CASS need to be established and maintained in the correspondence anchor stations;