MS Handover Support in Relay Mode

IEEE 802.16 Presentation Submission Template (Rev. 8.3)

Document Number:

    IEEE S802.16j-06/280

Date Submitted:

    2006-11-13

Source:

    Gang Shen, Kaibin Zhang, Shan Jin

	Voice:	+86 21 58541240 8194
Alcatel, Research & Innovation	Fax:	+86 21 50554550
388#, Ningqiao Road, Shanghai, P. R. C. E-mail:		gang.a.shen@alcatel-sbell.com.cn

Venue:

    IEEE 802.16 Session #46, Dallas, TX, USA.

Base Document:

    IEEE C802.16j-06/280

Purpose:

.   Propose handover schemes for IEEE802.16j

Outline

- Classification of handover
- Target access station selection
- MS handover process
- Summary

Classification of Handover

- **Intra MMR-BS handover**: MS or RS handover between two RSs controlled by the same MMR-BS or between an MMR-BS and one of its subordinate RSs.

- **Inter MMR-BS handover**: MS or RS handover between two RSs controlled by different MMR-BSs or between an MMR-BS and an RS controlled by a different MMR-BS.

Handover procedure and complexity is depended on the relay frame structure

Handover in Different Relay Frame Structures

- Strategies of broadcast info. transmission in different relay frame structures

  - **Uniform-broadcast info. frame structures**

    - **No broadcast info. relay**: Subordinate RS does not send broadcast information
    - **Simulcast same broadcast info. relay**: BS and subordinate RS send the same broadcast information

    MS is synchronized to the same preamble before and after the intra-BS handover

  - **Different-broadcast info. frame structures**

    - BS and subordinate RS send different broadcast info.
    - In-band or out-of-band

    MS is synchronized to different preamble before and after the intra / inter-BS handover
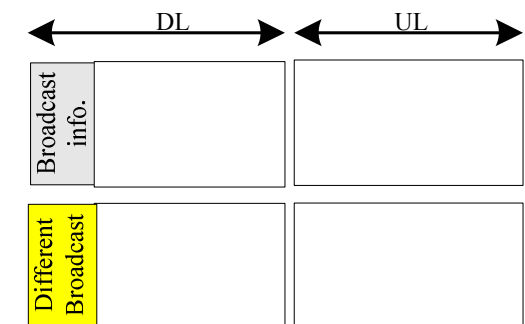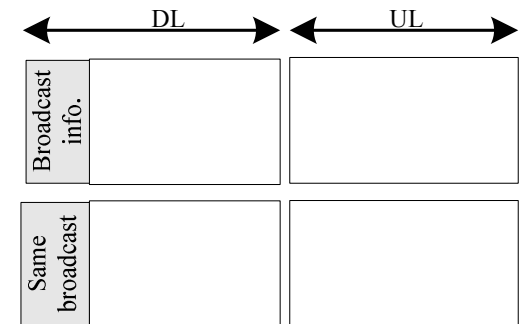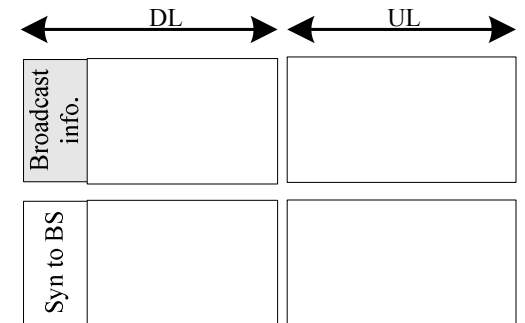
Procedure of Handover

- MS is synchronized to the same preamble as that of the source access station after HO
  - MMR-BS makes the decision to select a target access station
  - MS adjust its parameters to adapt to target access station

- MS is synchronized to a different preamble after HO
  - MMR-BS makes the decision to select a target access station
  - MS performs a legacy 16e handover process

Target access station selection is the key procedure for HO

Target Access Station Selection

- Target access station selection: BS decides whether RS or MMR-BS, and which RS is required for a specified MS relaying in MS initialization and handover
  - Based on whole path evaluation instead of the access link only
    - Evaluate the path composed of MS access link and optimal RS-BS path, where an optimal RS-BS path can be calculated according to the RS topology table maintained in BS
  - Requires the measurement & report of candidate access link quality
    - RS / BS measures MS signal quality (UL data burst, ranging, etc.) and report to MMR-BS
    - MS scans for the downlink channel, measures link quality and report to MMR-BS
- Target selection metrics
  - Quality of radio link (CINR,…), MS power level, Multi-hop bandwidth efficiency, QoS requirement, Traffic load, etc.

Intra MMR-BS HO
(Uniform-broadcast info. frame structures)

- Features
  - ➢ MS Synchronized to the same preamble before and after the handover
  - ➢ Target access station selection by BS
  - ➢ Handover process is invisible to MS

- Process
  1. Link quality monitoring and report to BS
  2. Handover target access station selection by BS
  3. Notification to MS and RS
     - – RNG-RSP for MS adjustment (power level, timing offset, etc.)
     - – BS notifies RS the handover target selection
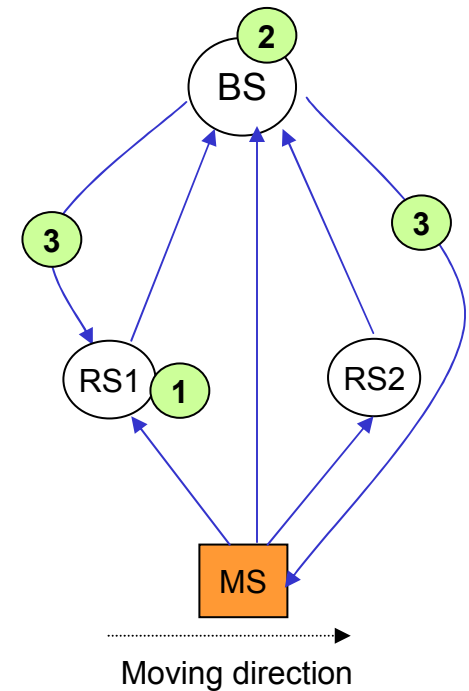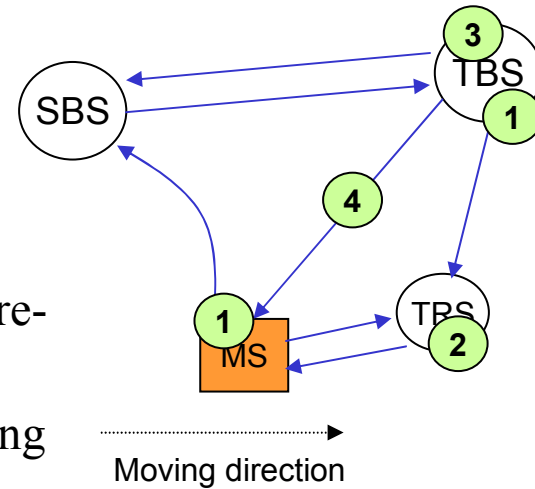
Inter MMR-BS HO

(Uniform-broadcast info. frame structures)

- Features
  - ➢ MS first performs legacy inter-BS handover procedures
  - ➢ Handover target access station selection at network re-entry
- Process
  1. Handover initialization
     - – MS or BS initialize a legacy handover procedure
  2. RS conducts link quality monitoring of MS ranging at re-entry, and reports to target serving station
  3. Handover target access station selection by target serving station
  4. Notification to MS and RS
  5. Complete legacy MS handover procedure

SBS

TBS **3** **1**

4

1 MS

TBS **2**

Moving direction

Intra MMR-BS HO
(Different-broadcast info. frame structures)

- Features
  - ➢ Subordinate RS has its own preamble different from BS
    - – MS regards RS as a BS
  - ➢ MS performs legacy handover procedures

- Process
  1. Link quality measurement by RS and report to BS
  2. Handover initialization by MS or BS
     - – MS scans for the downlink channel, measures link quality and report to BS
  3. Handover target access station selection by BS
  4. Complete the legacy handover process
     - – Synchronization to target
   - – Ranging
     - – Network re-entry
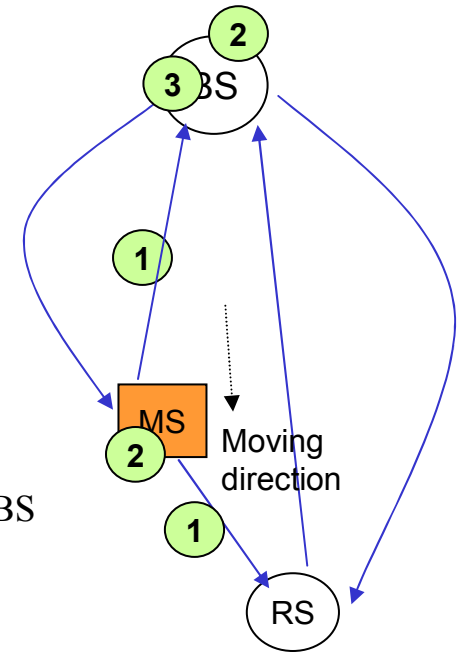
Inter MMR-BS HO

(Different-broadcast info. frame structures)

- **Features**
  - ➢ MS performs legacy handover procedures
  - ➢ Handover target access station selection in HO decision period.

- **Process**
  1. Handover procedure initialization by MS or BS
  2. Neighbor BS reports to serving station
     - Channel information of relay links in its coverage
  3. Handover target access station selection and decision
     - Considering neighbor BS reports, and also MS scanning results
  4. Complete the legacy handover process

SBS, TBS, RS, MS, Moving direction
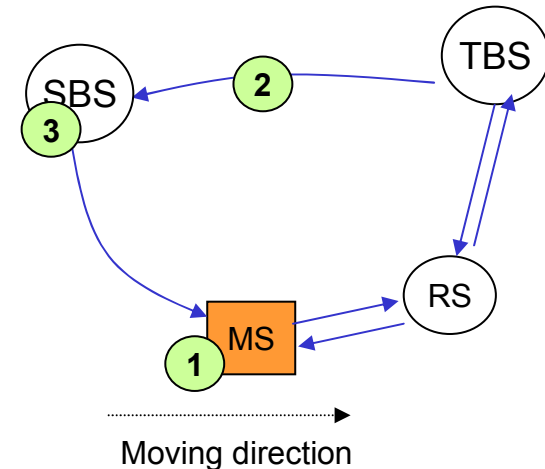
Summary

- Target access station selection
  - Based on the whole path evaluation instead of access link only
  - Require RS / MS to measure and report link qualities
- Different frame structure schemes introduce different handover procedures
  - MS performs a legacy 16e handover, if it is synchronized to the different preamble after handover
  - MS just adjusts parameters, if it is synchronized to the same preamble after handover