Handover Schemes in IEEE 802.16j

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. Propose handover schemes for IEEE802.16j

Handover Schemes in IEEE 802.16j

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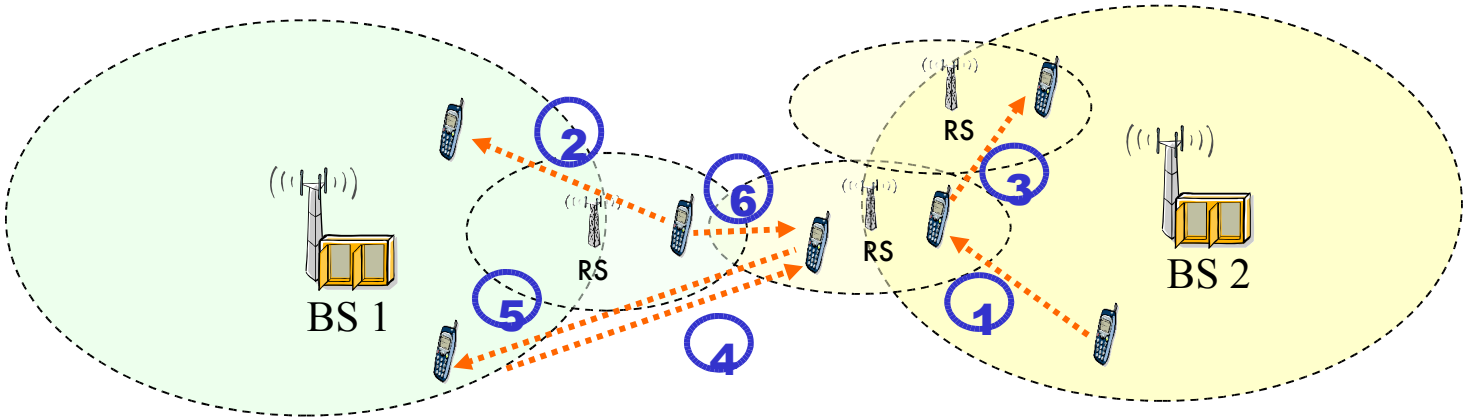
Outline

- Handover scenarios with RS involvement
- Classification of handover scenarios
- Handover target selection
- RS mobility
- Summary

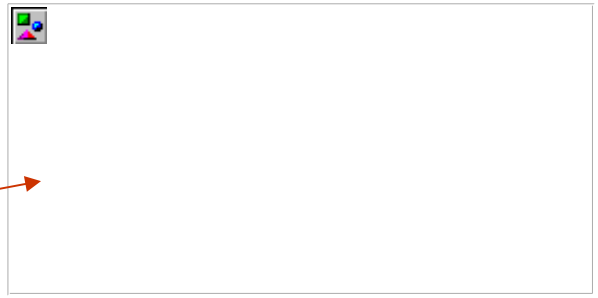
Handover Scenarios with RS involvement

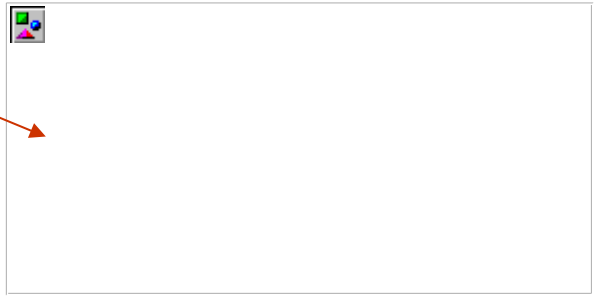


- Intra-BS handover with RS involvement within one BS coverage
  - ①BS→RS, ②RS→BS, ③RS→RS
- Inter-BS handover with RS involvement across BS
  - ④BS→RS, ⑤RS→BS, ⑥RS→RS
- Different relay frame structure definition may lead to different handover procedures

Possible Relay Frame Structure Definition

- Two strategies of relay frame structure
  - **Synchronous-broadcast frame structure**
    - **No broadcast info. relay**: RS does not need relay DL broadcast information
      - Refer to C80216mmr-05_023 in session #40
    - **Synchronized broadcast info. relay**: RS and BS sends the same broadcast information at the same time
  - **Asynchronous-broadcast frame structure**
    - RS and BS sends the broadcast information at the different time



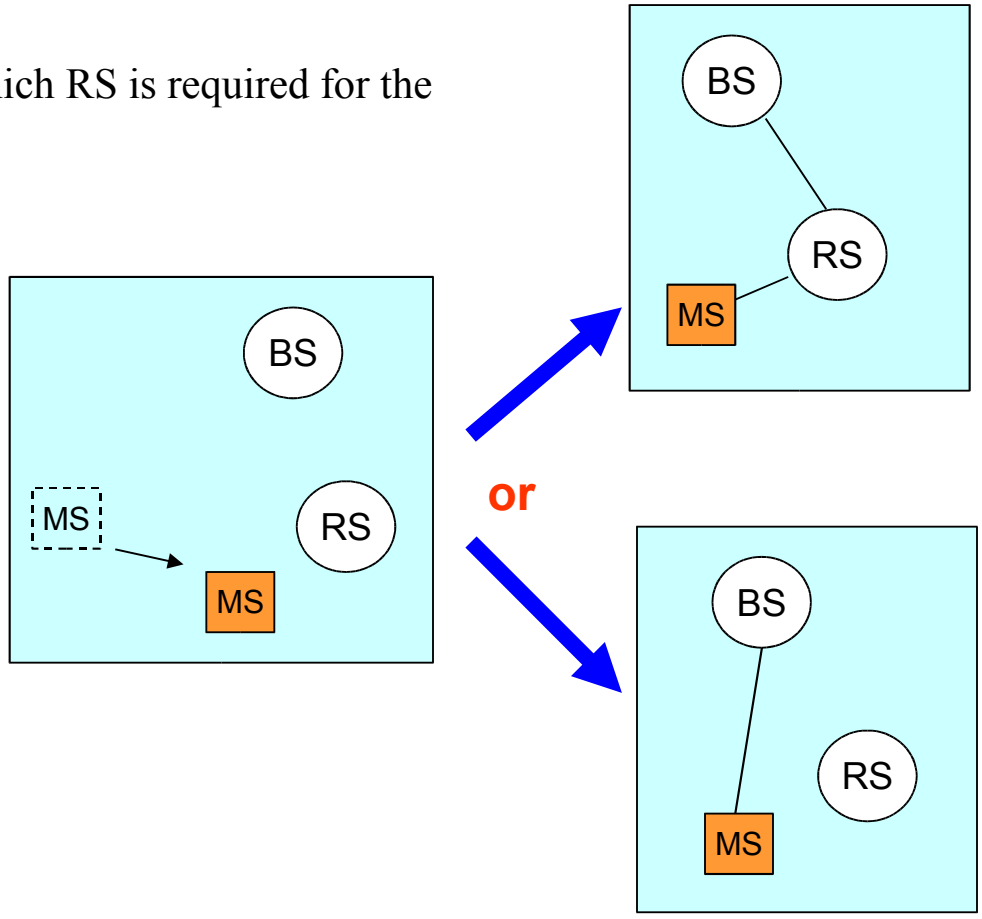


Classification of Handover Scenarios

- Synchronous-broadcast frame structure
  - Intra-BS handover
    - Serving and target cells have the same preambles
    - Handover is fully controlled by BS
    - MS is not involved in handover process
  - Inter-BS handover
    - Preamble of target cell is different from serving cell
    - MS performs legacy inter-BS handover procedures
- Asynchronous-broadcast frame structure
  - MS performs legacy procedures in both Intra-BS and Inter-BS handover

Handover Target Selection with RS Involvement

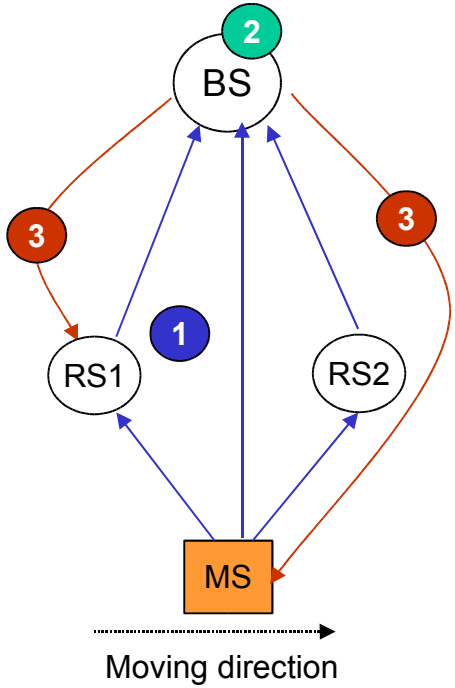
- **What is handover target selection**
  - BS decides whether RS or BS, or which RS is required for the specified MS
- **Target selection strategies**
  - Comparison between MS-BS and MS-RS is not sufficient to decide the target
  - Possible paths comparison must be performed
    (e..g. MS-RS-BS vs. MS-BS)
  - Make a handover decision based on comparison results
- **Target selection metrics**
  - Link quality (CINR,…)
  - MS power level
  - Multi-hop bandwidth efficiency
  - QoS requirement
  - Traffic load
  - etc.



Handover Target Selection

(Synchronous-broadcast relay frame structure, intra-BS)

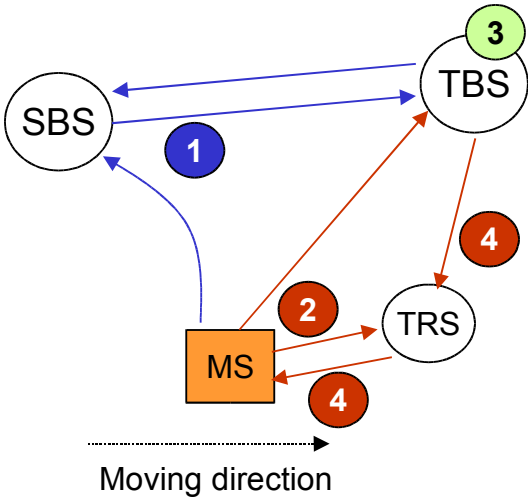
1. Link quality monitoring
   - MS signal quality monitored by RS, and also by BS if the signal can reach BS
     - UL data burst, ranging
   - RS selects MSs with high signal quality and reports related measurement results to BS
2. Handover target selection
   - BS makes the decision as to handover target selection based on the comparison of possible paths
     - E.g. MS<->BS, MS<->RS1<->BS, MS<->RS2<->BS
3. Notification to MS and RS
   - RNG-RSP for MS adjustment
     - Power level, timing offset, etc.
   - BS notifies RS the handover target selection



Handover Target Selection

(Synchronous-broadcast relay frame structure, inter-BS)

1. Legacy Inter-BS handover to TBS
   - MS perform ranging to TBS
2. Link quality monitoring
   - MS ranging signal quality monitored by TRS, and also by TBS if the signal can reach TBS
   - TRS forward MS handover ranging request and also report measurement results to TBS
3. Handover target selection decision
   - BS makes the decision as to handover target selection based on the comparison of possible paths
     - E.g. MS<->TBS, MS<->TRS<->TBS
4. Notification to MS and RS
   - RNG-RSP for MS adjustment
     - Power level, timing offset, etc.
   - BS notifies RS the handover target selection

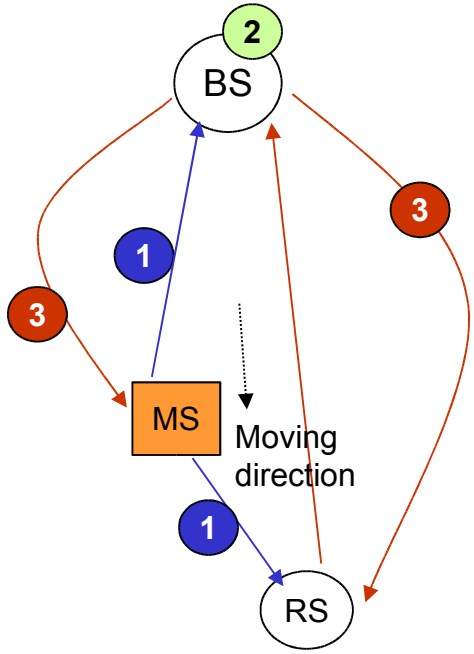


Target selection in HO re-entry phase

Handover Decision

(Asynchronous-broadcast relay frame structure, intra-BS)

1. Link quality monitoring
   - MS signal quality monitored by RS, and also by BS if the signal can reach BS
   - RS selects MSs with high signal quality and reports related measurement results to BS
2. Handover trigger and decision
   - BS considers RS measurement reports and possible paths in handover decision
3. Complete the legacy handover process
   - Synchronization to target
   - Ranging
   - Network re-entry

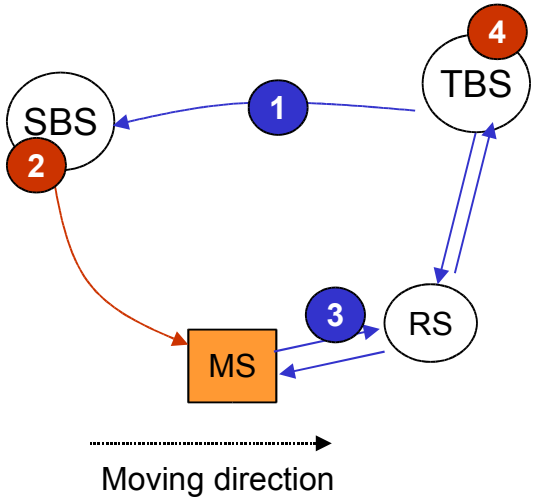


Target selection in HO decision phase

Handover Decision

(Asynchronous-broadcast relay frame structure, inter-BS)

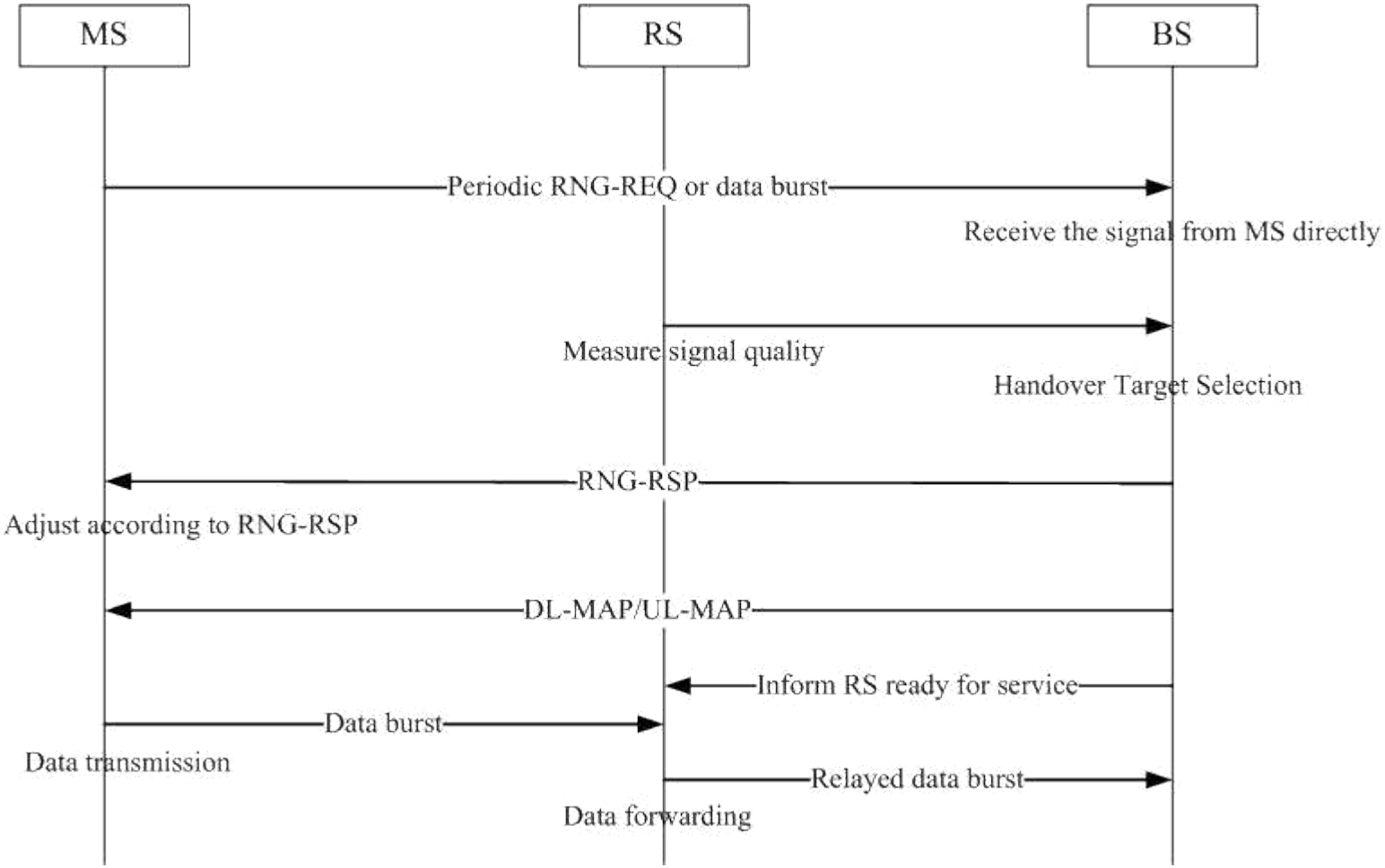
1. The serving BS obtains channel information for RSs in neighbor BS coverage through their host BS. It also obtains RS-BS link quality of its neighbor for later RS selection in handover decision
2. Handover trigger and decision
   - Consider RS-BS link quality, possible paths, multihop bandwidth efficiency, and etc. for RS selection in handover decision
3. Complete the legacy handover process
   - Synchronization to target
   - Ranging
   - Network re-entry



Target selection in HO decision phase

Example: Intra-BS handover (BS->RS)

(Synchronous-broadcast Frame Structure)



RS mobility

- RS handover among different BS as a legacy MS
- In roaming, RS exercise the same handover procedure as MS does except that target BS allocates a specific CID to RS for identification
- MS in RS coverage
  - Not move with RS
    - Exercise handover from RS to serving BS
  - Move with RS
    - Exercise across BS handover following RS handover

Summary

- Different frame structure schemes introduce different handover procedures
  - Handover target selection for synchronous-broadcast relay frame structure
    - Intra-BS handover: RS-BS, or RS-RS handover is transparent to MS
    - Inter-BS handover: MS performs a legacy inter-BS handover, and then a intra-BS handover for suitable RS selection occurs in re-entry phase
  - Handover target selection for asynchronous-broadcast relay frame structure
    - For any handover between RS-BS or RS-RS, MS has to perform a legacy inter-BS handover.
    - BS consider RS features for selection in handover decision.
- Strategies of handover decision
  - Comparison of possible relay paths is taken into account to decide the handover target