Macro Diversity Handover and Fast Access Station Switching for MMR Network

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Propose new MAC management messages for MDHO and FASS for a mobile multi-hop relay network

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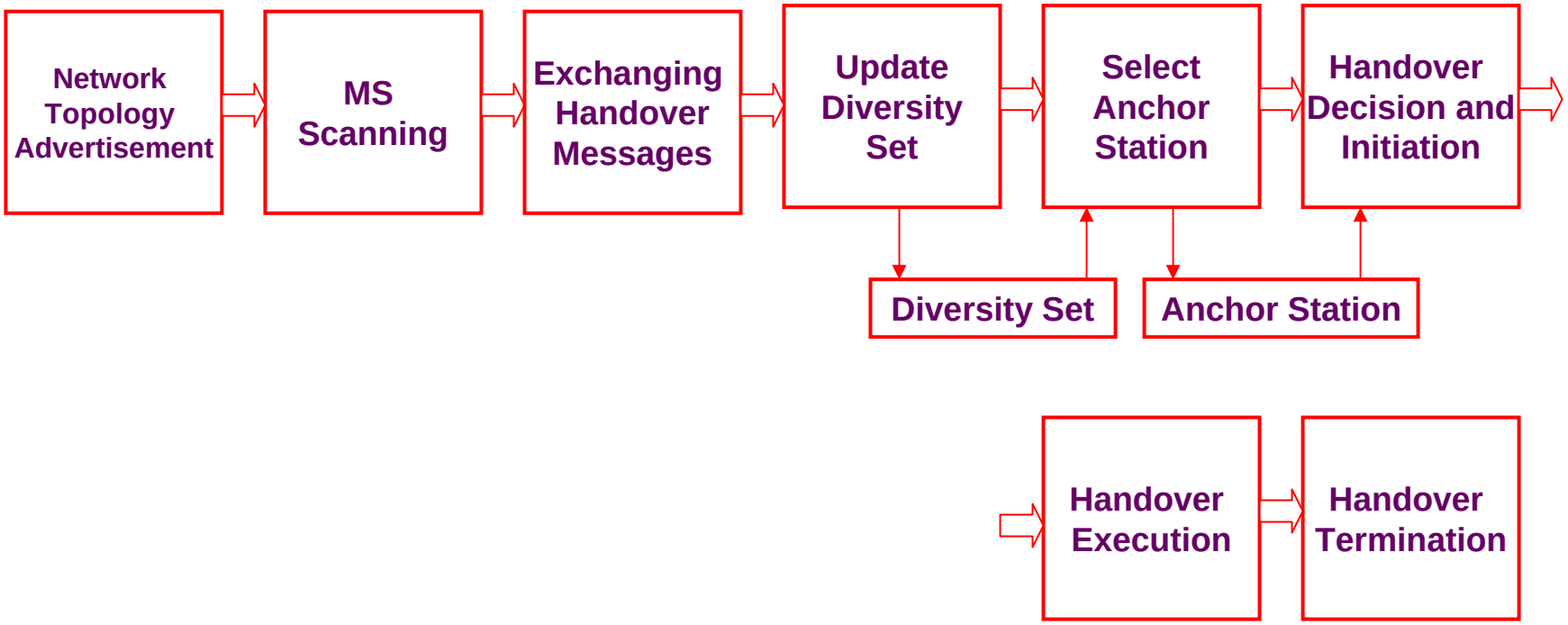
Introduction

- MDHO and FASS provides seamless and better handover performance for MS with higher speed mobility
- MDHO and FASS handover procedures are described for nine main classes of topology
- New MAC management messages over relay links are introduced
- Handover procedures are backward compatible to an IEEE802.16e compliant MS

- Note:
- MDHO (macro diversity handover): MS can communicate simultaneously with all active stations in diversity active set. In uplink (downlink), active stations (MS) are capable of diversity combining of received signals
- FASS (fast access station switching): The data are sent to all active stations in diversity active set but without diversity combining.

HO Procedures

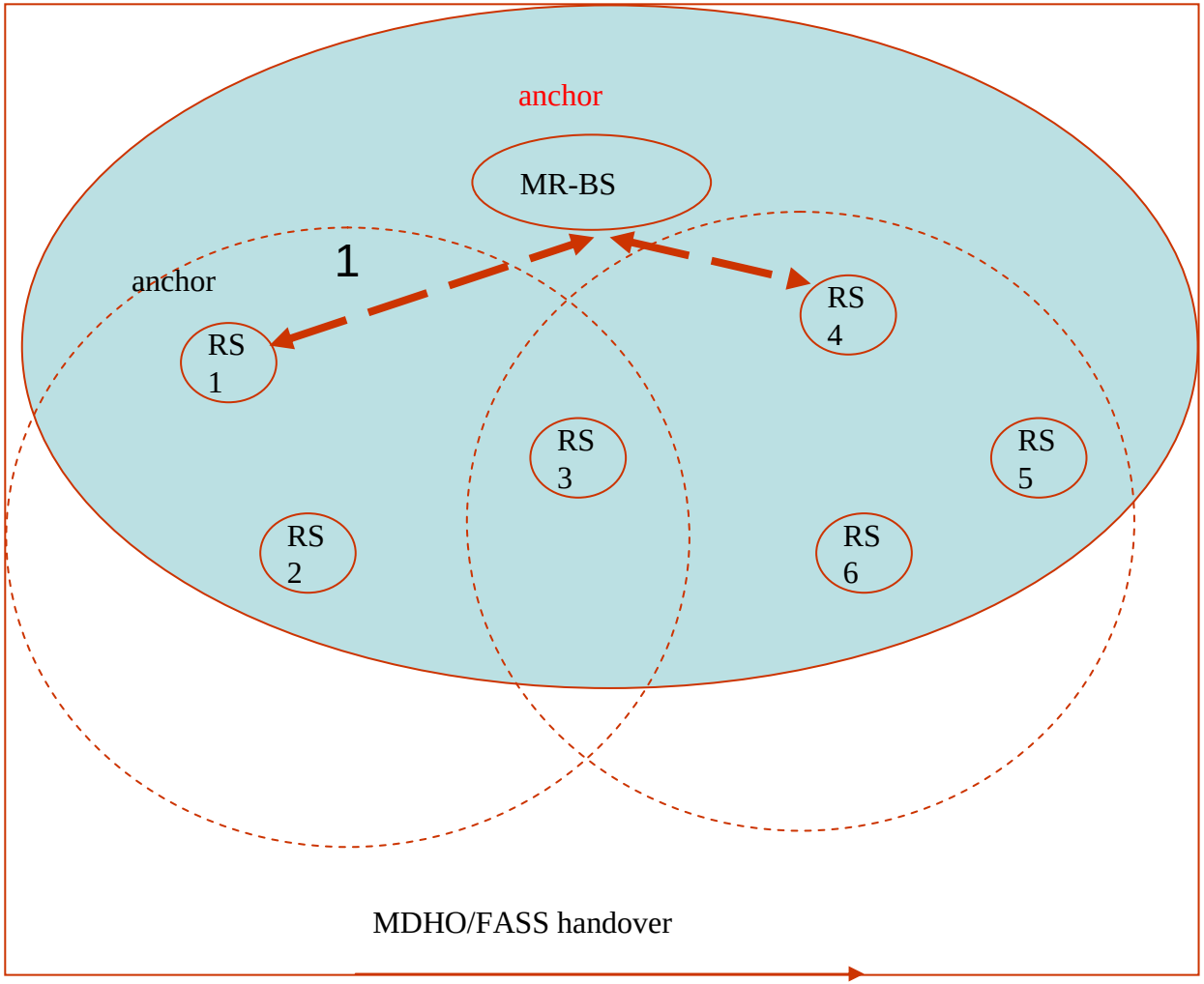


- Anchored station: provide DL and UL maps, FCH and DL broadcast messages. map may consists of burst allocation info for the non anchored active stations

- Diversity set: consists of a list of BSs and/or RSs that are involved in MDHO/FASS

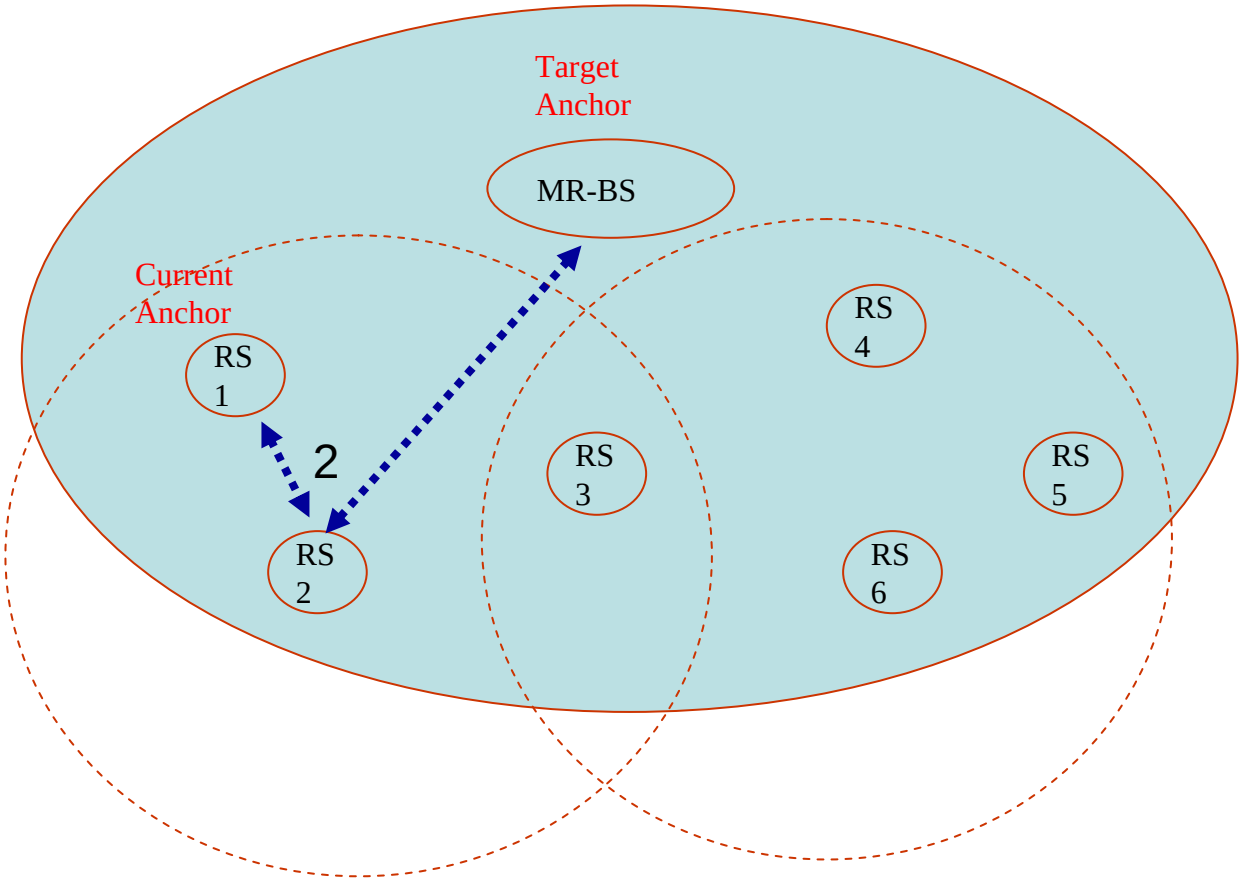
Intra MR-BS handover

Case 1: the current anchor station and target anchor station is MR-BS



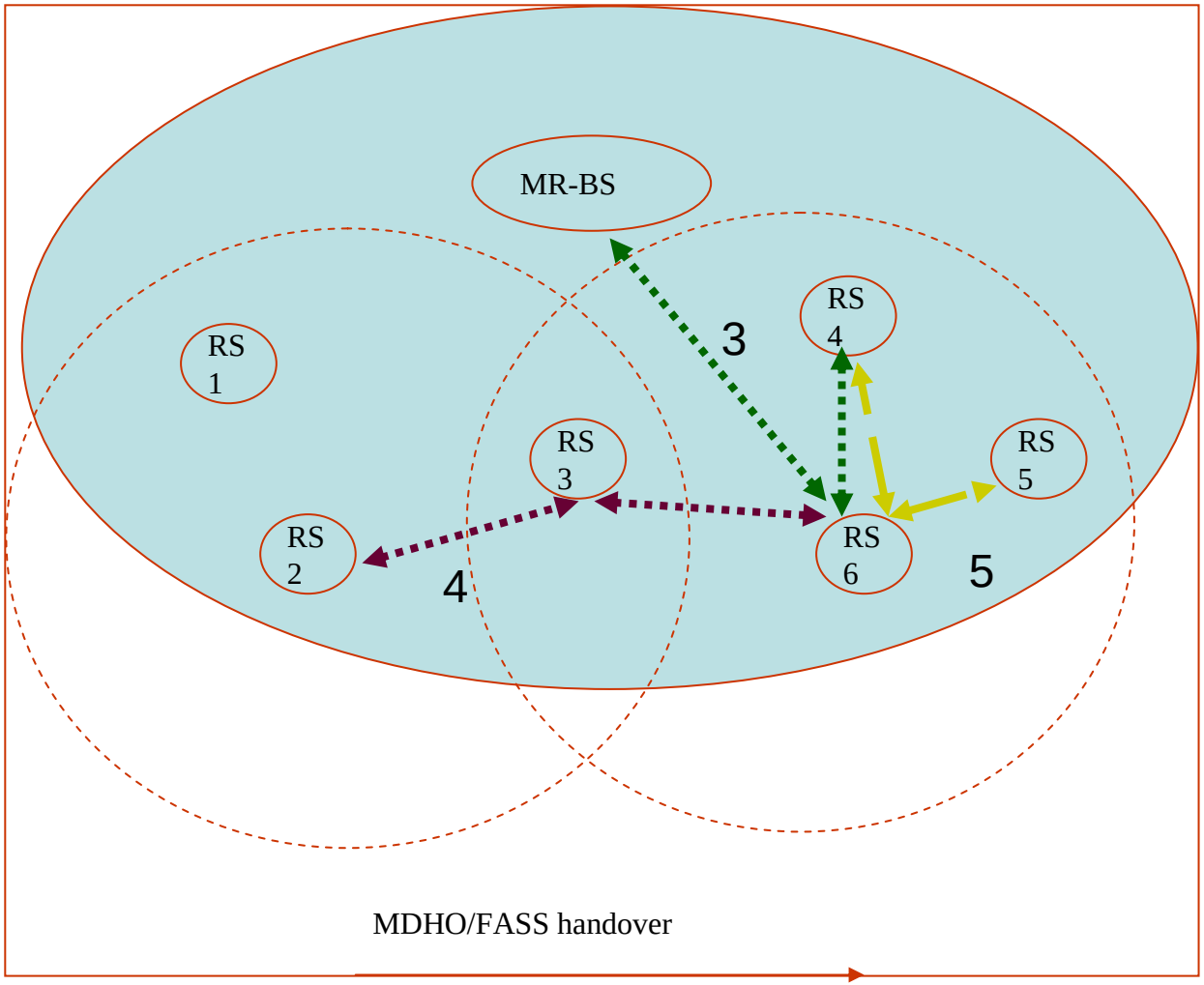
Intra MR-BS handover (case 2)

Case 2: the current anchor station is RS and target anchor station is MR-BS



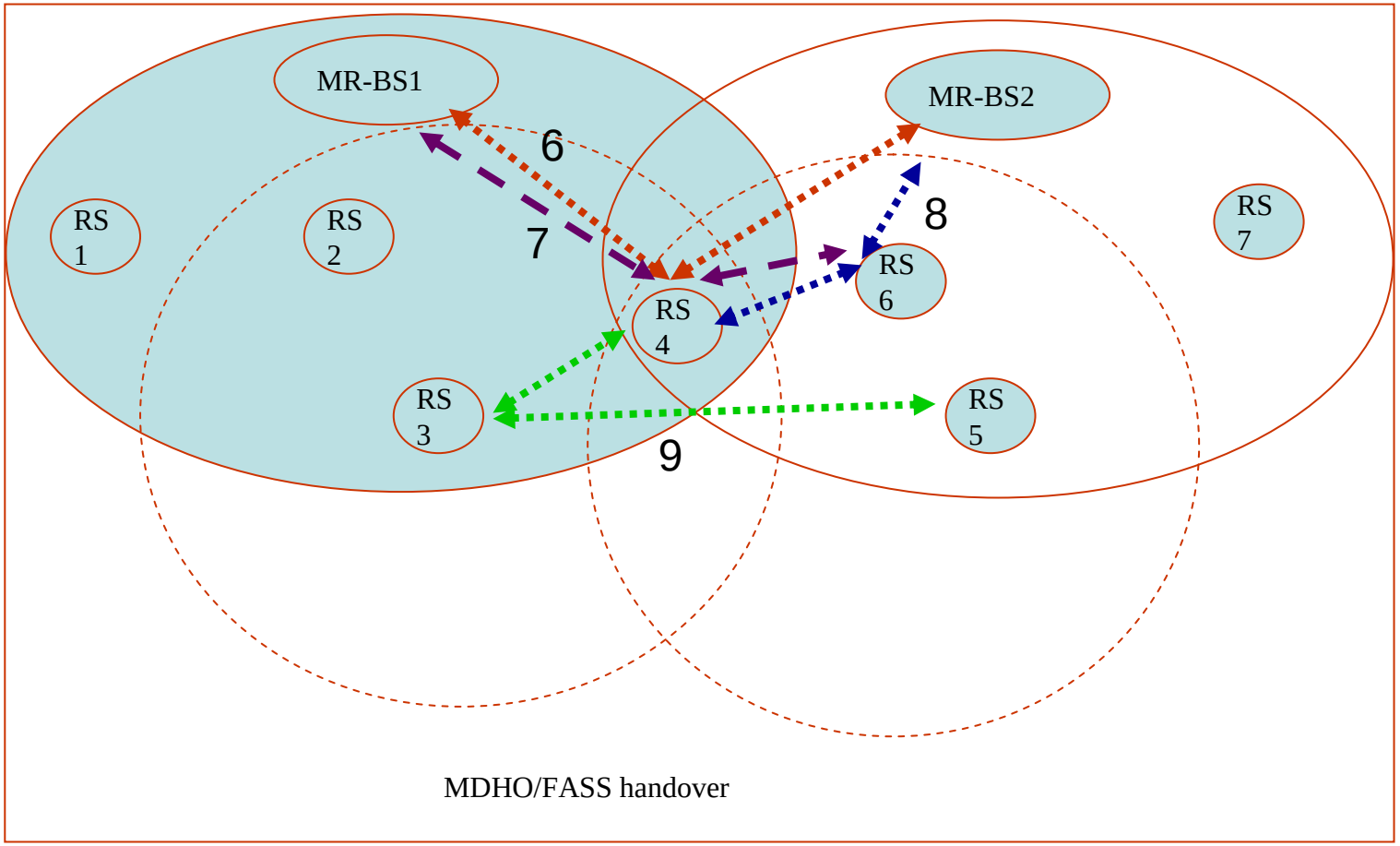
MDHO/FASS handover

Intra MR-BS handover



Case 3: the current anchor station is MR-BS and target anchor station is RS
Case 4: the current anchor station and target anchor station is the same RS
Case 5: the current anchor station and target anchor station is the different RSs

Inter MR-BS handover

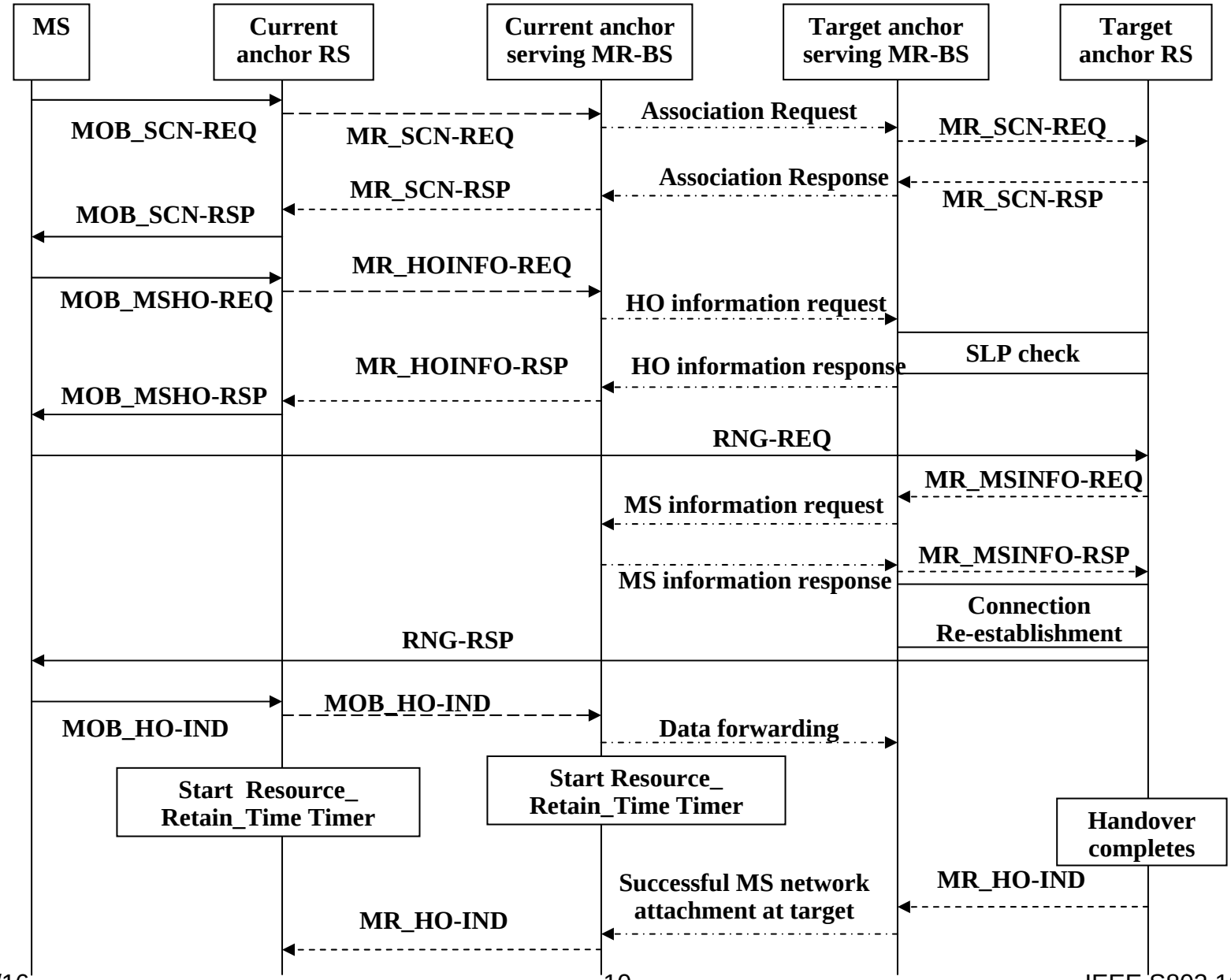


Case 6: the current anchor station and target anchor station is the different MR-BSs
Case 7: the current anchor station is MR-BS and target anchor station is RS controlled by the different MR-BS
Case 8: the current anchor station is RS and target anchor station is MR-BS in a different MR-cell
Case 9: the current anchor station and target anchor station are the different RSs and also they are located in different MR-cells

Summary

- Handover procedures for MDHO and FASS
- New MAC management messages to support MDHO/FASS for nine main classes of topology
- New MAC messages are used for handover messages over the relay link

Case 9 Handover Procedures and New MAC Messages



MAC management messages over relay links

New MAC messages	MS handover phase	Descriptions
MR_NBR-REQ MR_NBR-RSP	Network Topology Advertisement	The legacy MOB_NBR-ADV message is used to inform stations' access link channel information over relay links. A MR_NBR-REQ/RSP message is used by RSs to request access link channel information of other stations of interest
MR_SCN-REQ MR_SCN-RSP	MS scanning	These two messages are used to coordinate an association for an MS at target anchor station
MR_HOINFO-REQ MR_HOINFO-RSP	MDHO/FASS decision and initiation	These two messages are used to pass the handover related information of potential target anchor station to the current anchor station over relay links
MR_MSINFO-REQ MR_MSINFO-RSP	Handover execution	These messages are used to pass MS information to new anchor and target anchor station when actual handover is performed
MR_HO-IND	Handover termination	This message is used to notify successful handover to the current anchor station and to the target anchor station

Topology of MDHO and FASS

- Nine cases and classified into two categories:
  - (1) Intra MR-BS handover
    - Case 1: the current anchor station and target anchor station is MR-BS
    - Case 2: the current anchor station is RS and target anchor station is MR-BS
    - Case 3: the current anchor station is MR-BS and target anchor station is RS
    - Case 4: the current anchor station and target anchor station is the same RS
    - Case 5: the current anchor station and target anchor station is the different RSs
  - (2) Inter MR-BS handover
    - Case 6: the current anchor station and target anchor station is the different MR-BSs
    - Case 7: the current anchor station is MR-BS and target anchor station is RS controlled by the different MR-BS
    - Case 8: the current anchor station is RS and target anchor station is MR-BS in a different MR-cell
    - Case 9: the current anchor station and target anchor station are the different RSs and also they are located in different MR-cells

- Note:
- Intra MR-BS HO: handover among group of RSs or the MR-BS controlled by the same serving MR-BS
- Inter MR-BS HO: handover among group of RSs and two or more MR-BSs controlled by the two or more MR-BSs