Proposal for MS handover procedure in an MR network

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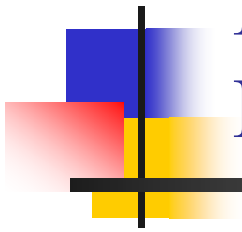
Proposal



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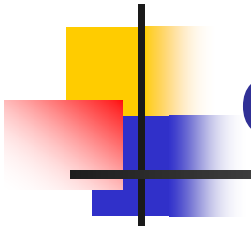
NTUST



Outline

- **Definition**
- **Handover scenarios**
- **Cell-based HO**

Definition

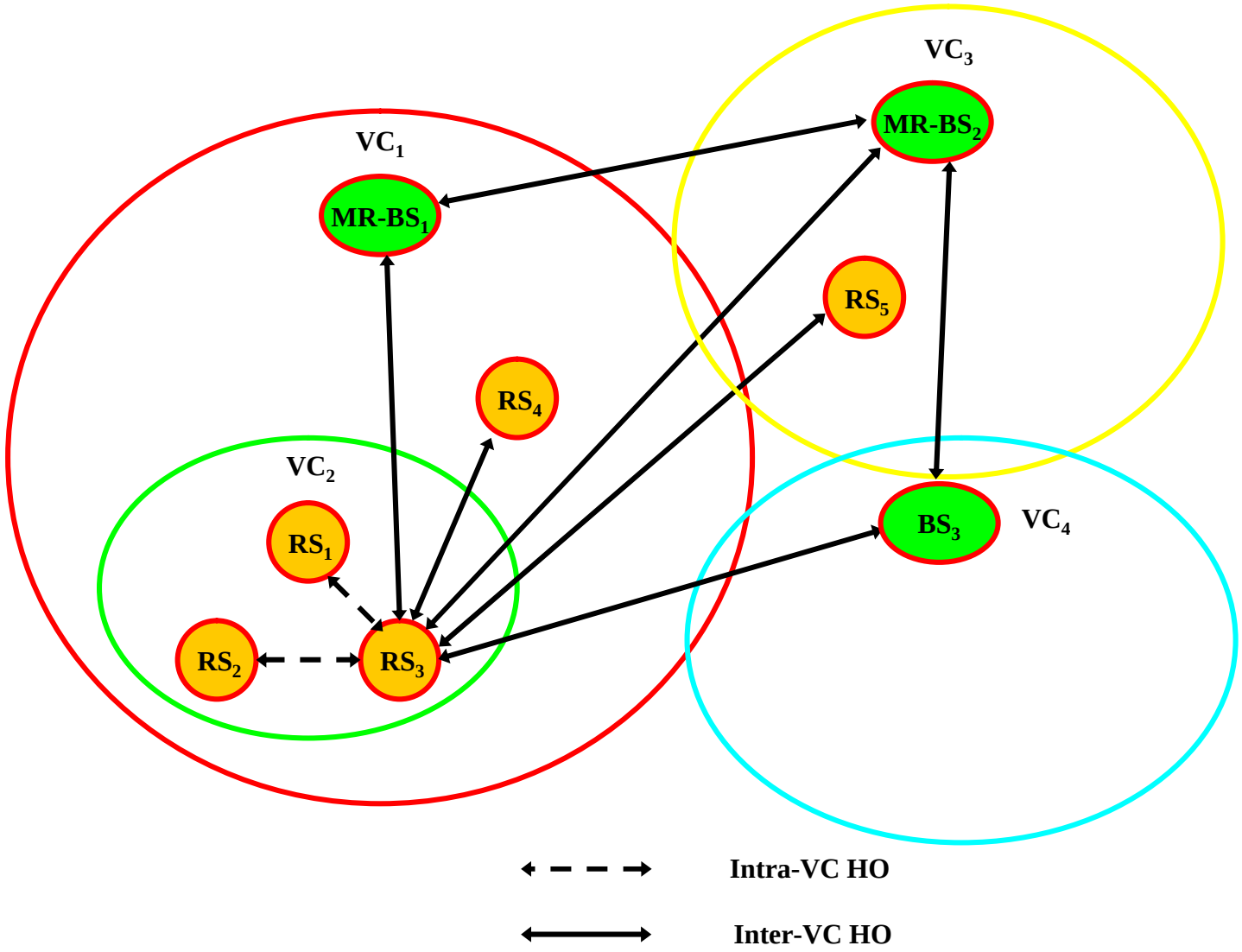
- **Transparent RS:**
  - An RS that does not transmit its own preamble, FCH and MAC management messages on a broadcast connection on the access DL.
- **Non-transparent RS:**
  - An RS that transmits its own preamble, FCH and MAC management messages on a broadcast connection on the access DL.

Ref: C80216j-06/290

Virtual Cell (VC) based HO

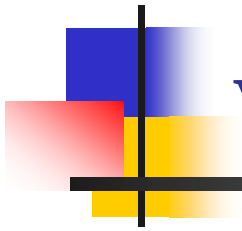
- **Definition**
  - virtual cell (VC): one or more stations that share the same frame header. A VC can consist of a MR-BS and its subordinate transparent RSs, or a number of non-transparent RSs, which transmit the same frame header, and their subordinate transparent RSs. Note that RSs belonging to the same VC may not have to transmit data bursts simultaneously.
  - VC head: the station that performs the resource allocation for a VC. A VC head is an MR-BS (or a non-transparent RS) if a centralized (or decentralized) resource allocation is adopted for the VC.
- **Each virtual cell comprise**
  - An MR-BS with zero or more subordinate transparent RSs or non-transparent RSs (with same header)
  - A non-transparent RS with zero or more subordinate transparent RSs or non-transparent RSs (with same header)

HO Scenarios



VC-based HO

- **Two cases of HO**
  - Intra-VC HO:
    - access and the target stations belong to the same VC
    - HO is occurred among the stations (MR-BS or RSs) with same frame header (preamble/FCH/ MAP)
  - Inter-VC HO:
    - access and the target stations belong to different VCs
    - HO is occurred among the stations (MR-BSs, BSs, or RSs) with different frame header (preamble/FCH/MAP)
- **Intra-VC HO and Inter-VC HO should work together**

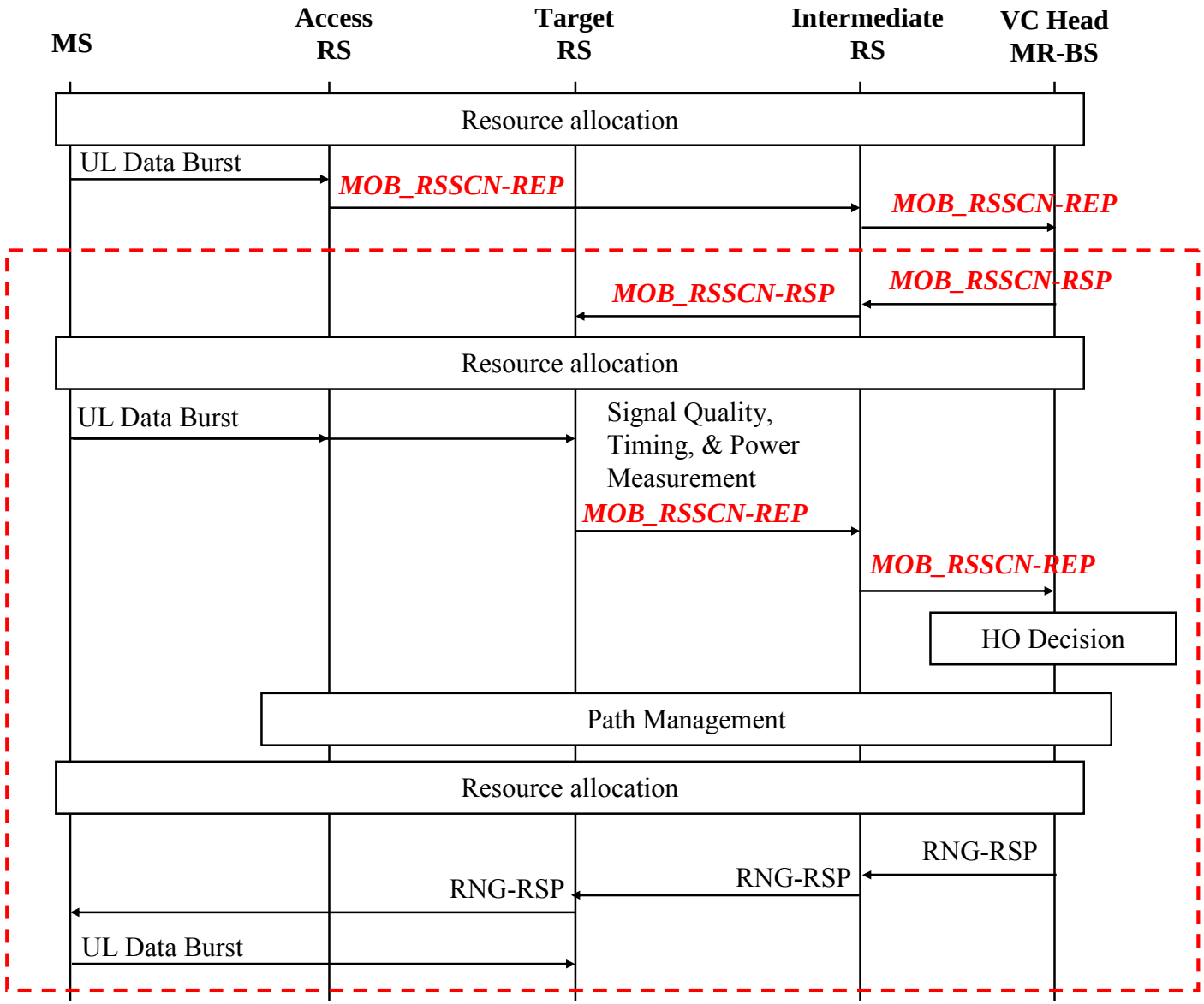


VC-based HO Procedures

Intra-VC HO

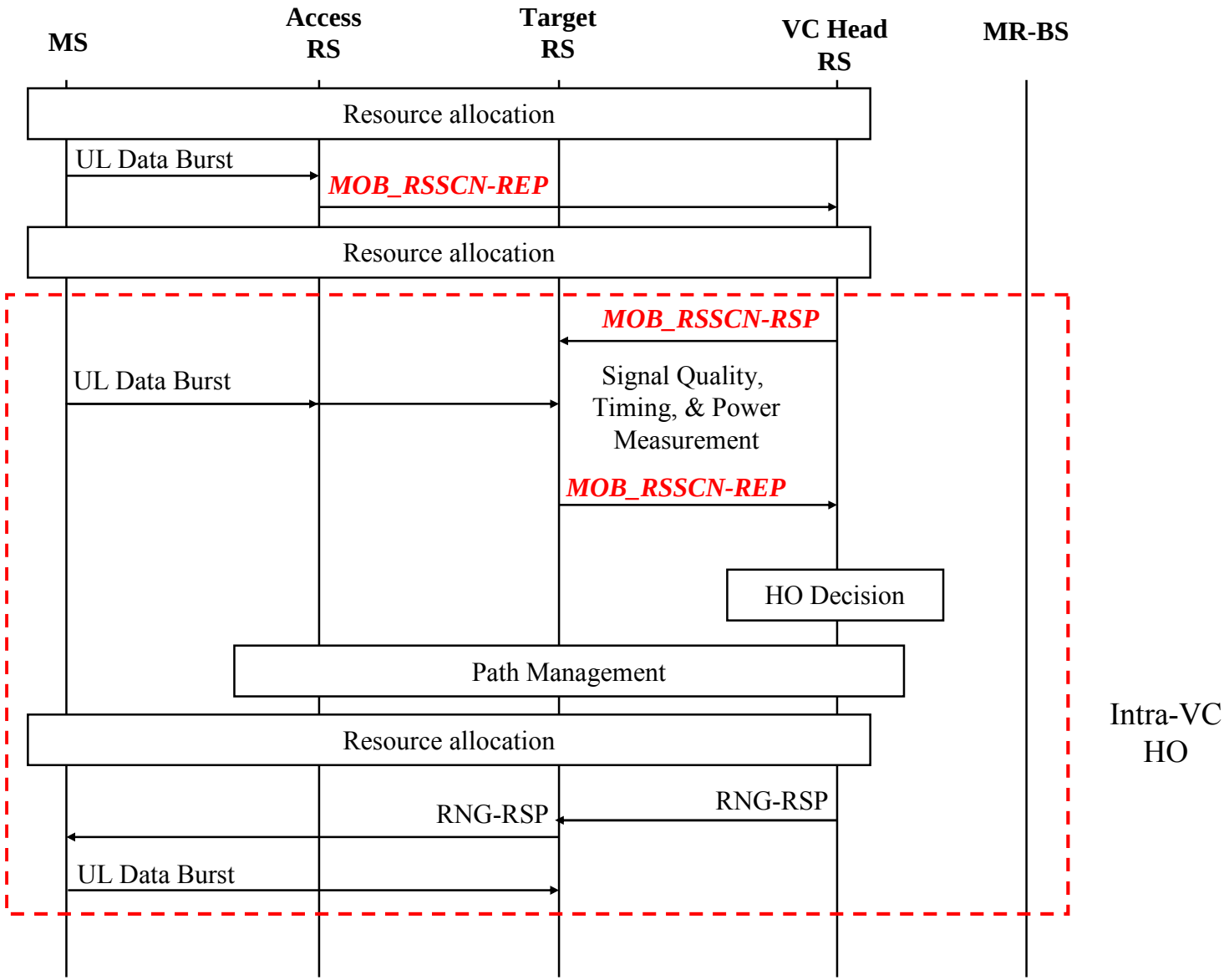
- **Intra-VC HO:**
  - MS is not aware of the HO and HO decision result can be directly achieved by resource allocation.
    - Centralized HO decision if MR-BS is the VC head
    - Decentralized HO decision if RS is the VC head
  - Intra-VC HO procedure shall be triggered by the VC head.
    - The VC head may receive access RS the measurement of the MS either by event-triggered or periodically.
  - Measurement
    - The VC Head requests the involved RSs to perform measurement
    - Measurement is performed by the involved RSs and is reported via assigned dedicated channels
    - Measurement is done for the data burst

Intra-VC HO (Centralized HO Decision)



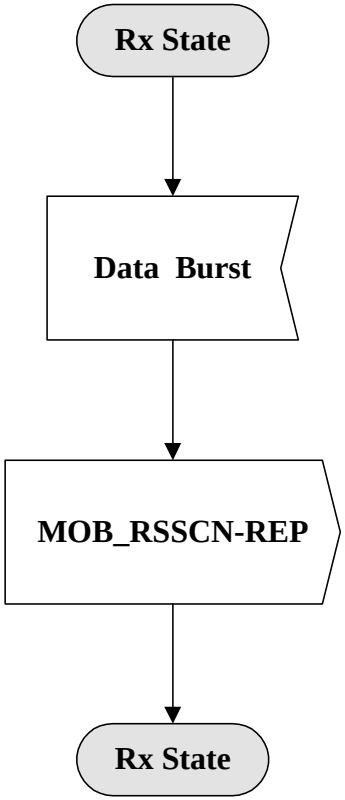
Intra-VC HO

Intra-VC HO (Decentralized HO Decision)

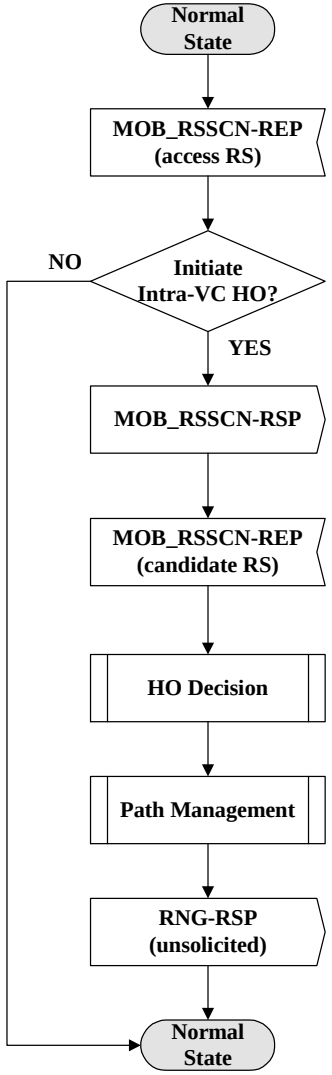


Intra-VC HO

- **Access RS state flow diagram**



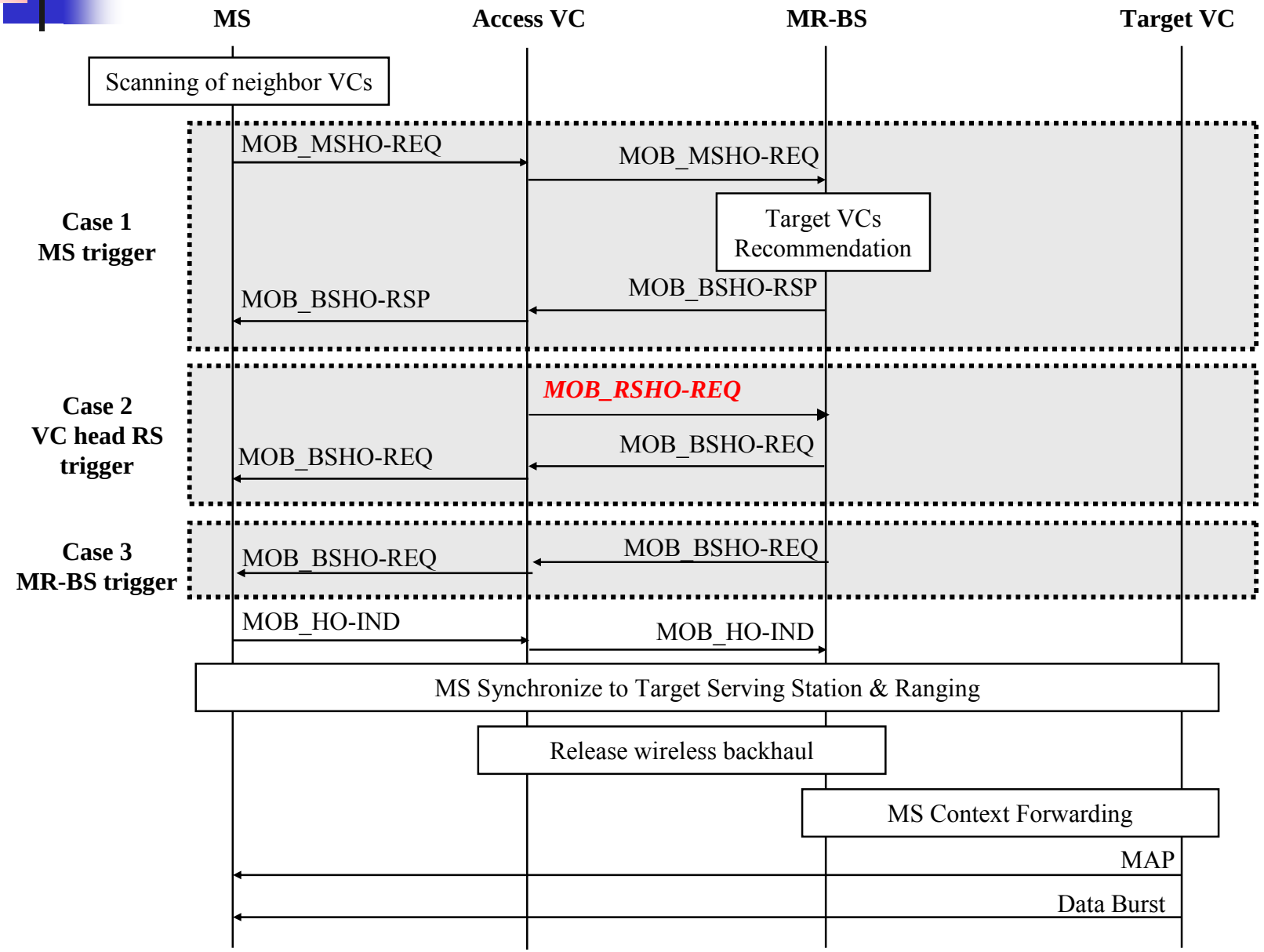
- **VC head state flow diagram**



Inter-VC HO

- **Inter-VC HO:**
  - Triggered by
    - the MS, or
    - The VC Head RS/MR-BS
  - MS is aware of the HO and legacy 802.16e HO procedure is reused.
  - Measurement
    - Measurement is performed by MS
    - Measurement is done for the preamble
  - The path selection and target access station decision algorithms may be required to establish wireless backhaul links

Inter-VC HO


MS
Access VC
MR-BS
Target VC
Scanning of neighbor VCs
Case 1
MS trigger
MOB_MSHO-REQ
MOB_MSHO-REQ
Target VCs
Recommendation
MOB_BSHO-RSP
MOB_BSHO-RSP
Case 2
VC head RS
trigger
MOB_RSHO-REQ
MOB_BSHO-REQ
MOB_BSHO-REQ
Case 3
MR-BS trigger
MOB_BSHO-REQ
MOB_BSHO-REQ
MOB_HO-IND
MOB_HO-IND
MS Synchronize to Target Serving Station & Ranging
Release wireless backhaul
MS Context Forwarding
MAP
Data Burst

Summary

- **Intra-VC HO**
  - Centralized
    - Resource is centralized controlled by MR-BS.
    - RS scanning is requested by MR-BS.
    - HO decision (or, channel switching) is made by MR-BS
  - Decentralized
    - Resource is governed by VC Head RS.
    - RS scanning is requested by VC Head RS.
    - HO decision (or, channel switching) is made by VC Head RS.
- **Inter-VC HO**
  - Inter-VC HO may be initiated either at MS, VC head RS, or MR-BS.
  - Inter-VC communication can only be supported through MR-BS so that legacy Centralized
    - All RSs are transparent for the HO procedure, i.e., RSs only perform message forwarding.
  - Decentralized
    - VC Head RS should be able to decode the MOB_MSHO-REQ sent by MS
    - The HO decision may need to be approved by MR-BS.
      - The complexity and overhead are almost the same as centralized control HO.

Proposal

- **Proposed HO solution for 802.16j**
  - Intra-VC HO decision shall be executed at VC head.
    - VC head may be an RS or MR-BS dependent on resource allocation manner.
  - Inter-VC HO procedure can reuse the legacy dot16e HO procedure.
    - In some instances, the VC head RS can initiate inter-VC HO.
- **New message to be defined**
  - MOB_RSSCN-REP/MOB_RSSCN-RSP
  - MOB_RSHO-REQ

MOB_RSSCN-REP

MOB_RSSCN-REP_Message_format(){	--	--
Management Message Type=69	8 bits	--
N_CID	8 bits	Number of CID to be reported
For (j=0; j<N_CID; j++){	--	--
Basic CID	16 bits	Basic CID of MS
RSSI info	16 bits	The value shall be interpreted as an unsigned byte with units of 0.25 dB, such that 0x00 is interpreted as –103.75 dBm, an RS shall be able to report values in the range –103.75 dBm to –40 dBm.
}	--	--
}	--	--

MOB_RSSCN-RSP

MOB_RSSCN-RSP_Message_format(){	--	--
Management Message Type=70	8 bits	--
N_CID	8 bits	Number of CID to be scanned
For (j=0; j<N_CID; j++){	--	--
Basic CID	16 bits	Basic CID of MS
}		
Scan Frame	4 bits	The data burst of the MS is scanned from the frame in which this message was received at the RS that performing scanning. A value of zero means that scanning is performed in the next frame.
Report Frame	4 bits	The scanning result is reported from the frame in which the scanning is performed by the RS. A value of zero means that MOB_RSSCN-REP is sent by the RS in the frame next to the scanning frame.
}	--	--

MOB_RSHO-REQ

MOB_RSHO-REQ_Message_format(){	--	--
Management Message Type=71	8 bits	--
N_CID	8 bits	Number of CID to be triggered inter-VC HO
For (j=0; j<N_CID; j++){	--	--
Basic CID	16 bits	Basic CID of MS
}	--	--
}	--	--