

## Proposal for MS handover procedure in an MR network

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# Proposal for MS handover procedure in an MR network

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**NTUST**



# Outline

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



# Definition

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- **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

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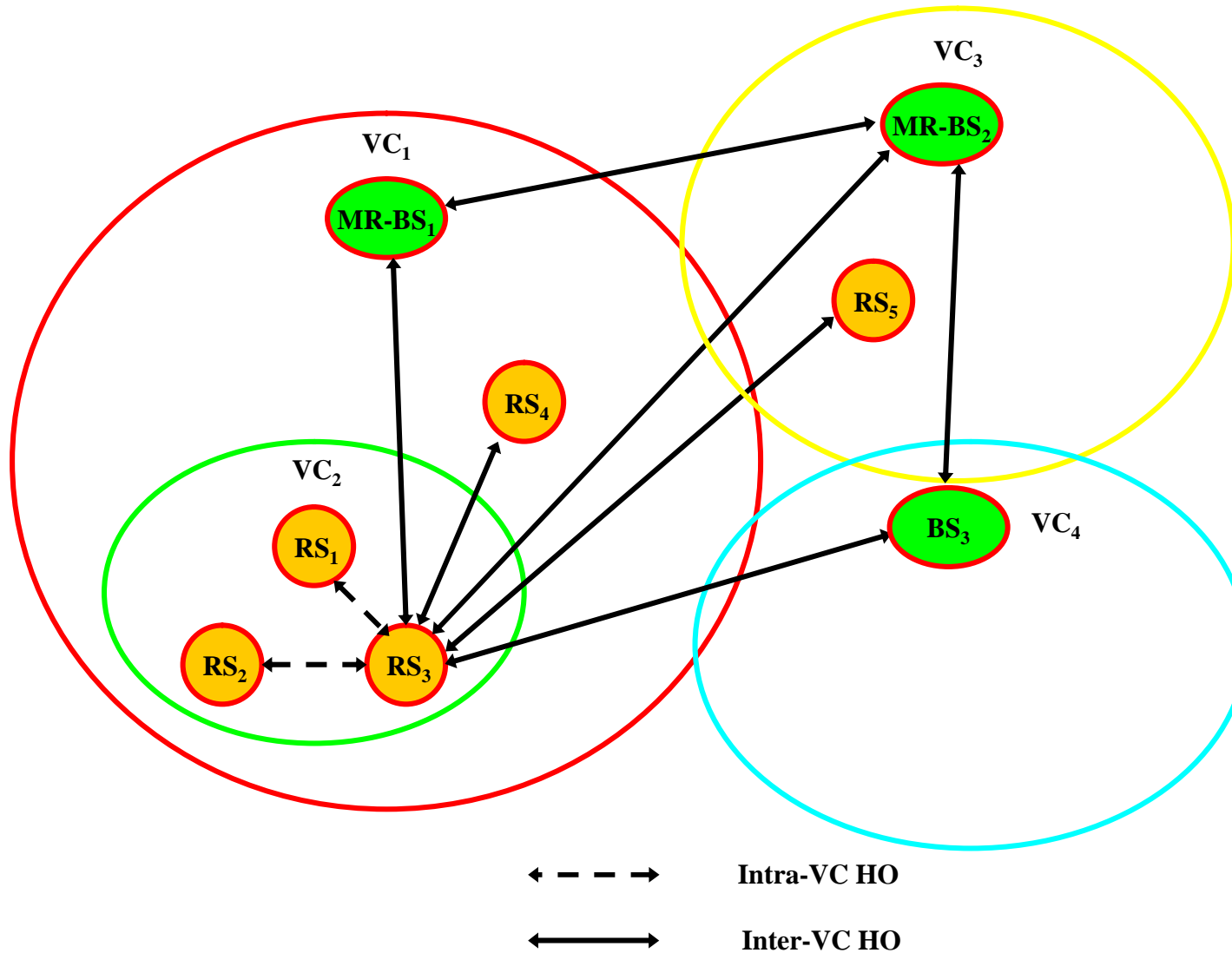
## ■ Definition

- **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

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- **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

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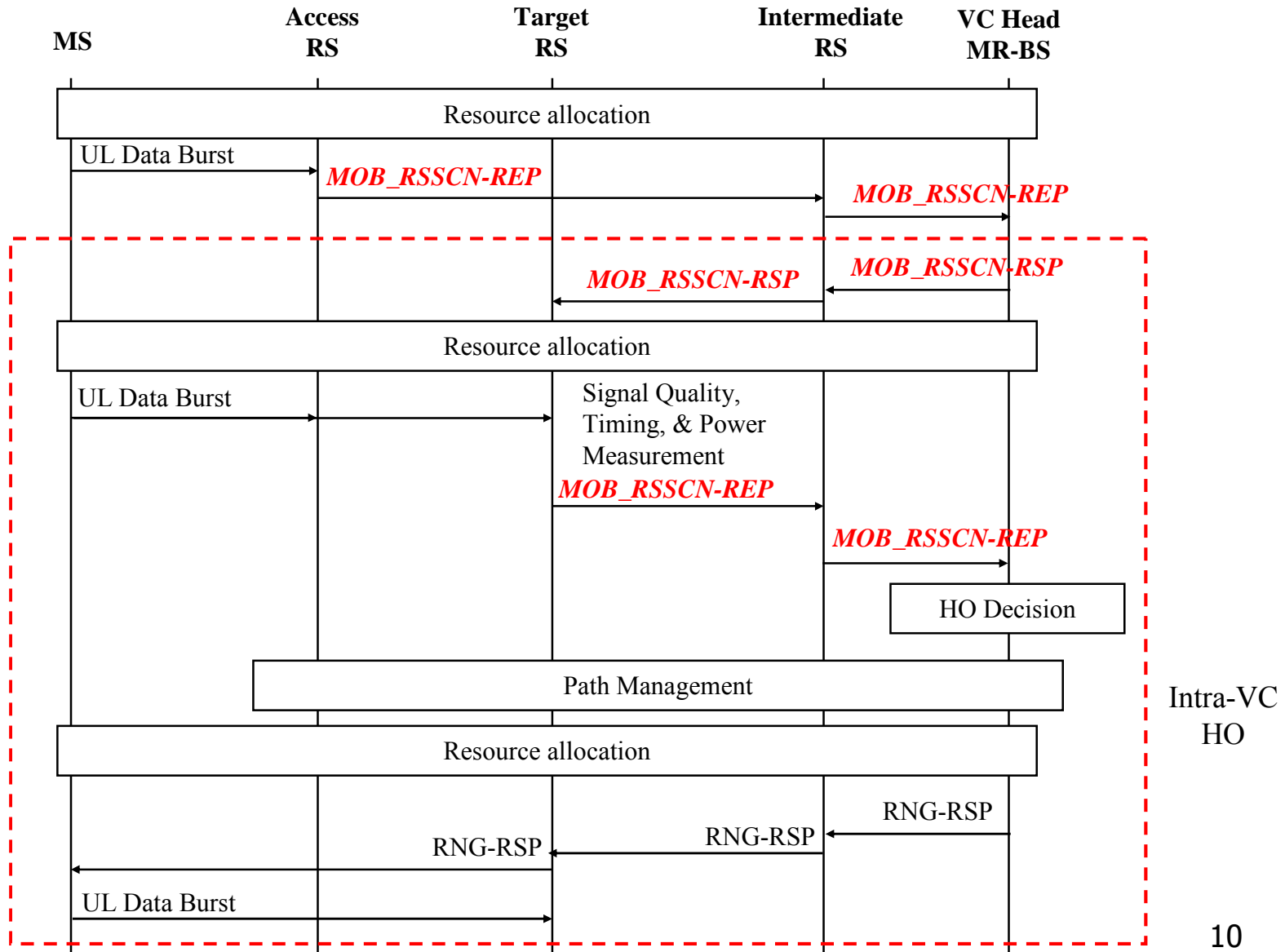


# Intra-VC HO

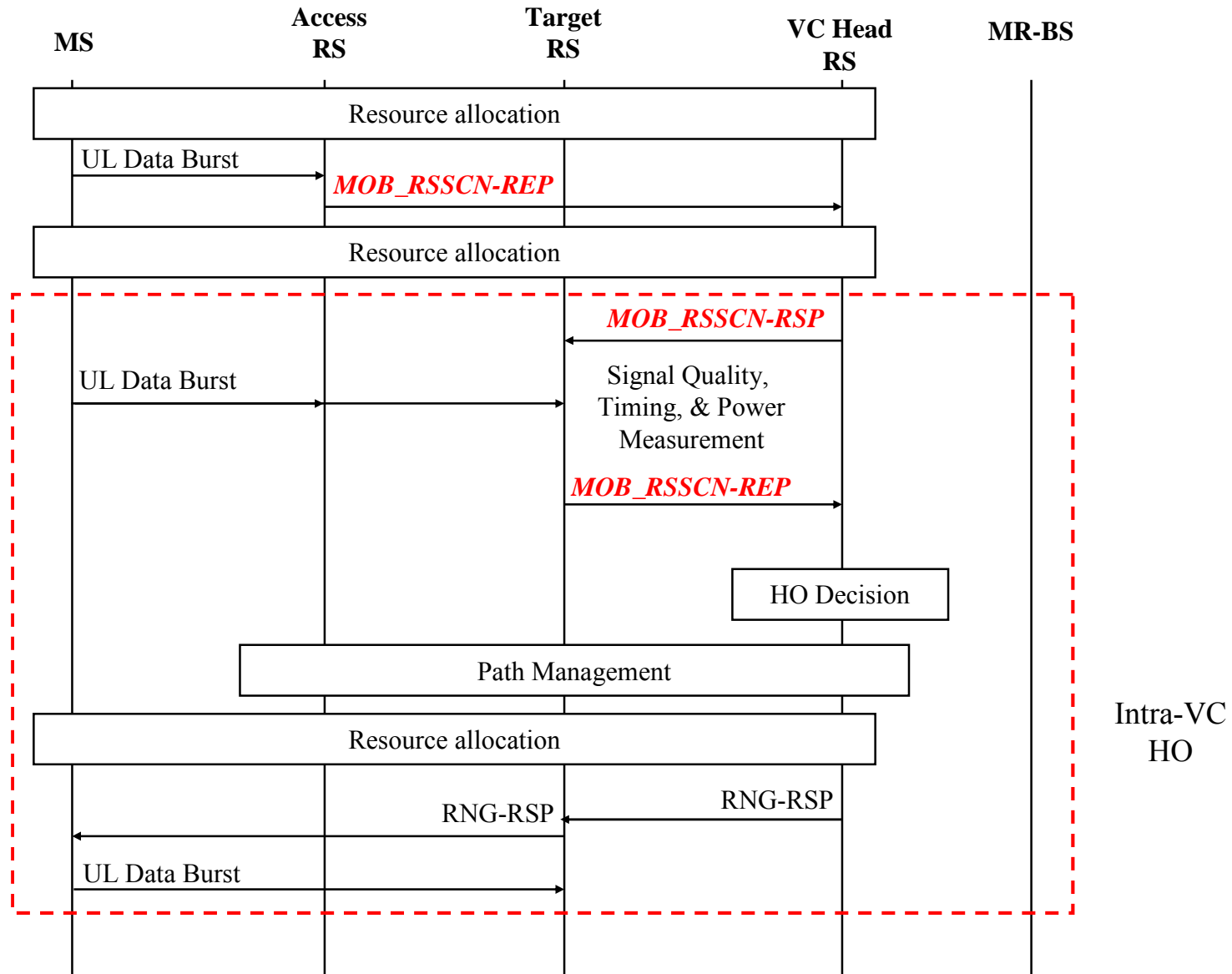
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- **Intra-VC HO:**
  - MS is not aware of the HO and HO decision result can be directly achieved by resource allocation.
    - Centralized HO decision if MR-BS is the VC head
    - Decentralized HO decision if RS is the VC head
  - Intra-VC HO procedure 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)

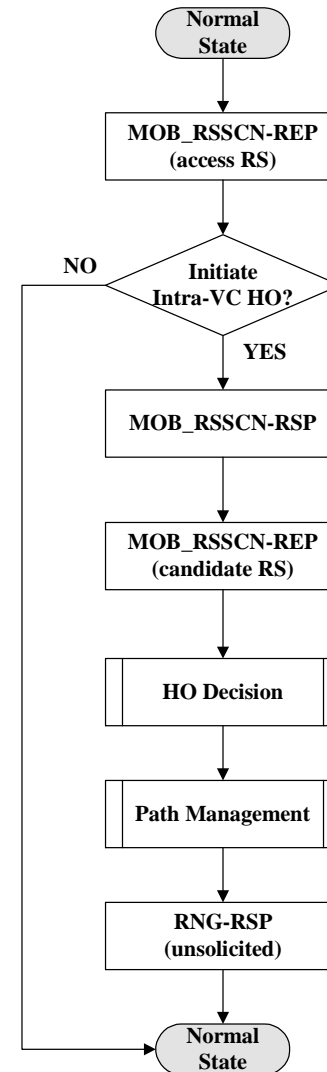
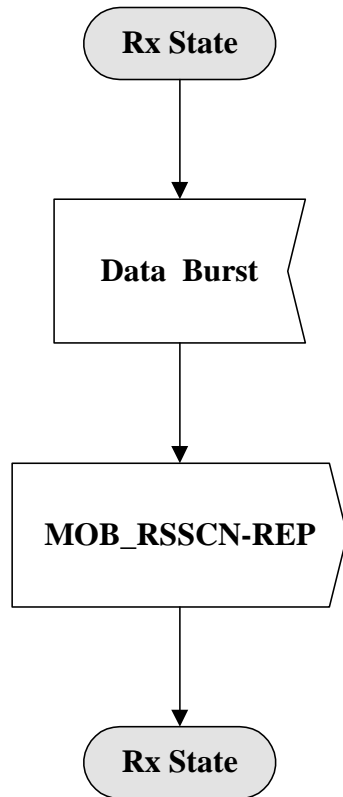


# Intra-VC HO (Decentralized HO Decision)



# Intra-VC HO

- Access RS state flow diagram
- VC head state flow diagram





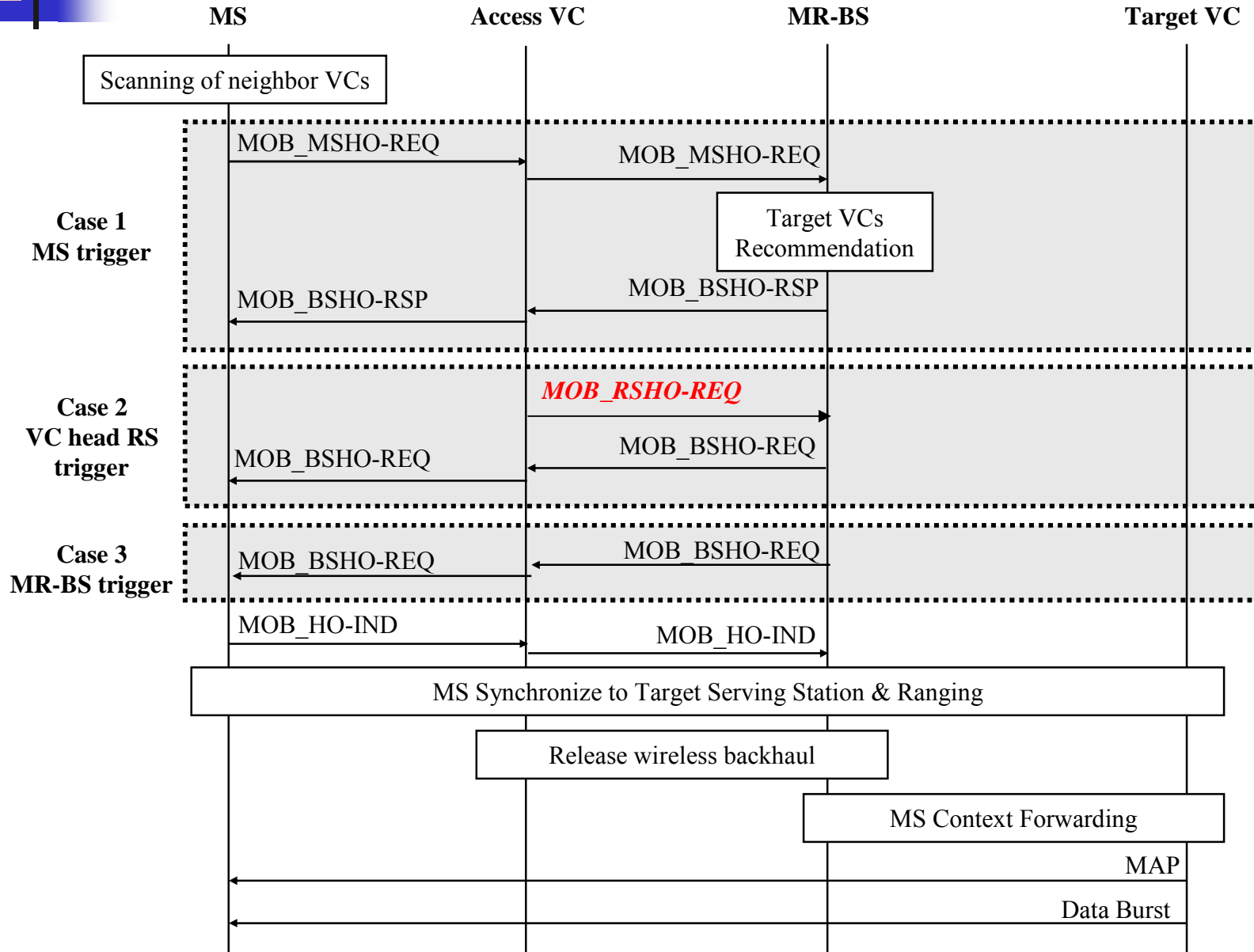
# Inter-VC HO

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- **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





# Summary

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- **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

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- **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

<u>MOB_RSSCN-REP_Message_format()</u> {	--	--
<u>Management Message Type=69</u>	8 bits	--
<u>N_CID</u>	8 bits	<u>Number of CID to be reported</u>
<u>For (j=0; j&lt;N_CID; j++)</u> {	--	--
<u>Basic CID</u>	16 bits	<u>Basic CID of MS</u>
<u>RSSI info</u>	16 bits	<u>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.</u>
<u>}</u>	--	--
<u>}</u>	--	--

# MOB\_RSSCN-RSP

<u>MOB_RSSCN-RSP_Message_format(){</u>	<u>--</u>	<u>--</u>
<u>Management Message Type=70</u>	<u>8 bits</u>	<u>--</u>
<u>N_CID</u>	<u>8 bits</u>	<u>Number of CID to be scanned</u>
<u>For (j=0; j&lt;N_CID; j++){</u>	<u>--</u>	<u>--</u>
<u>    Basic CID</u>	<u>16 bits</u>	<u>Basic CID of MS</u>
<u>    }</u>		
<u>Scan Frame</u>	<u>4 bits</u>	<u>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.</u>
<u>Report Frame</u>	<u>4 bits</u>	<u>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.</u>
<u>}</u>	<u>--</u>	<u>--</u>



# MOB\_RSHO-REQ

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