

Prague, March 2007

IETF 68th – netImm WG

PMIPv6-MIPv6 Interactions

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Motivation and objective

- **Motivations**

- long discussion in the mailing list
- interest in others SDOs

- **Objective**

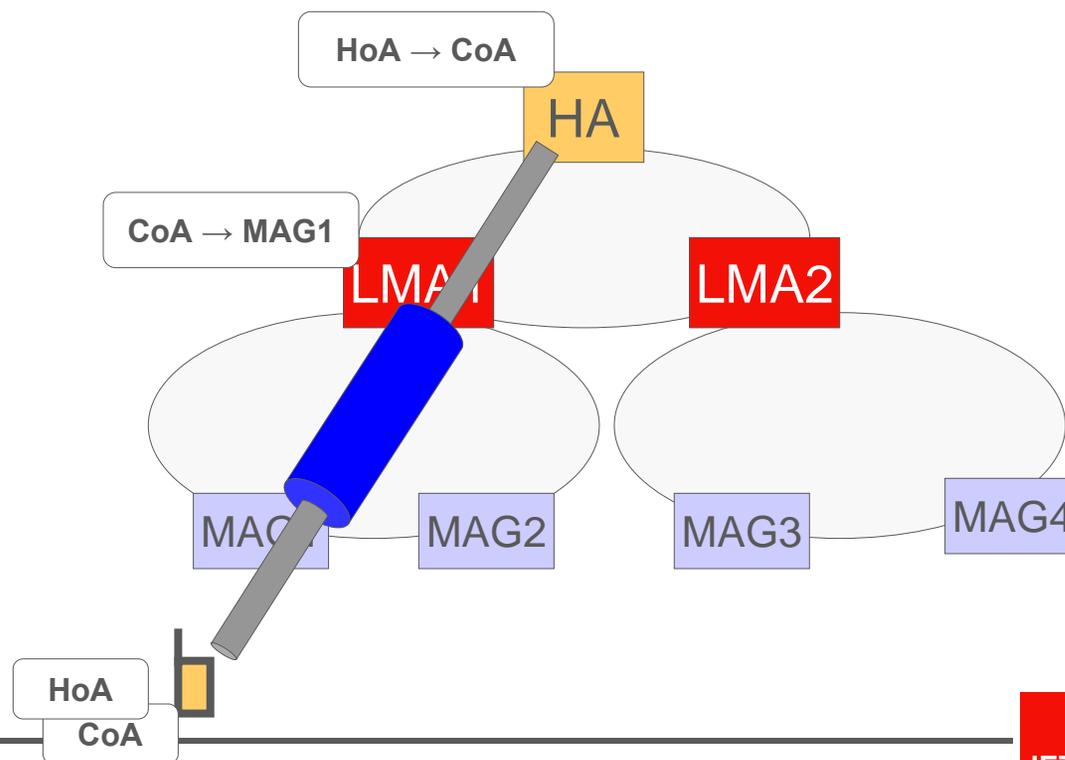
- identify the main scenarios
- identify the open issues for each scenario
- identify the requirements on the PMIPv6 side and MIPv6 side to support the scenarios
- understand if the scenarios can be supported in the base spec or further work is needed

Scenarios

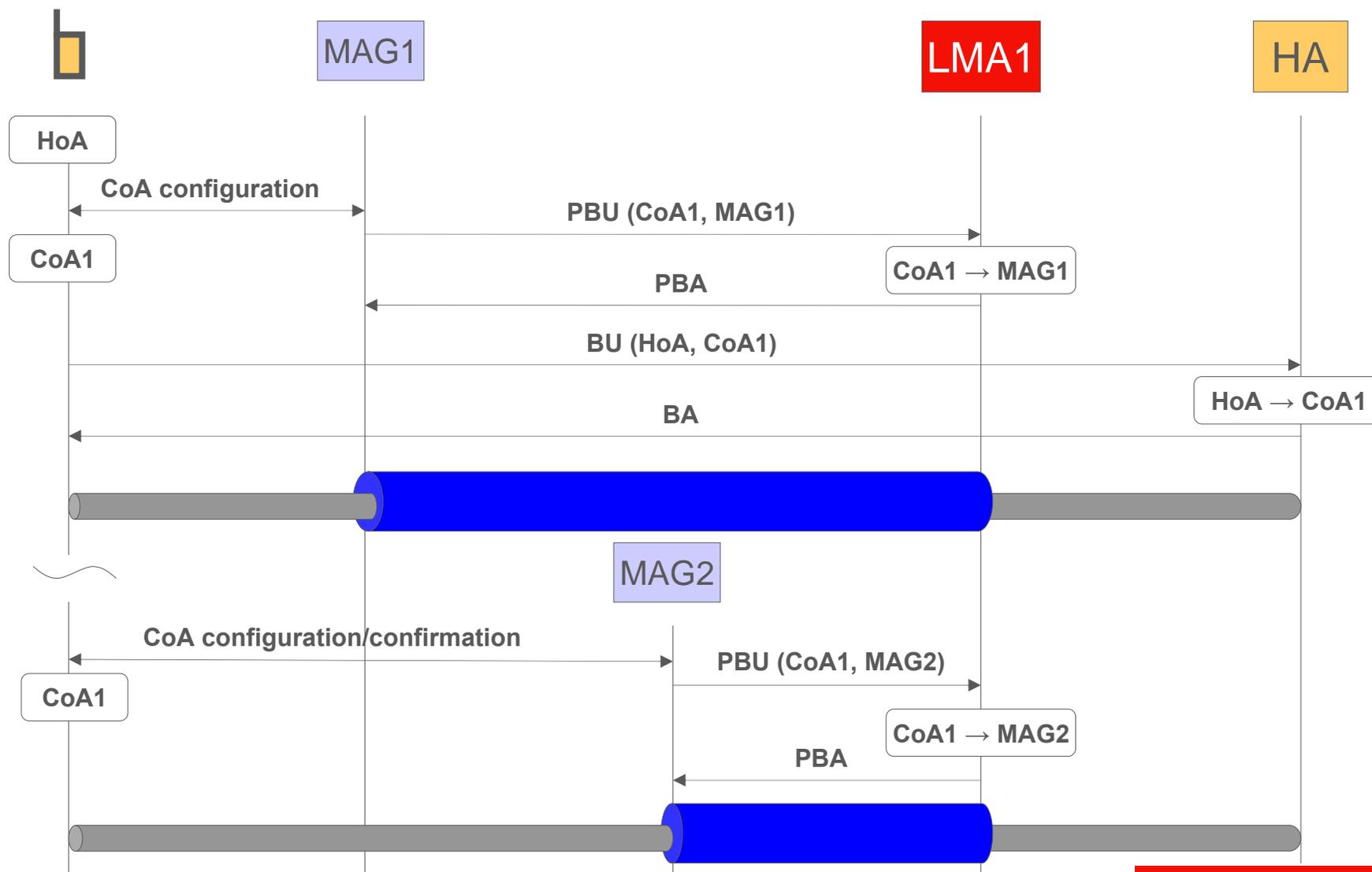
- **PMIPv6 as the local mobility management protocol and MIPv6 as the global mobility management protocol**
- **MIPv6 terminals and “PMIPv6 terminals” in the same network**
- **Movements between PMIPv6-enabled areas and PMIPv6 non-enabled area**

PMIPv6 as local and MIPv6 as global

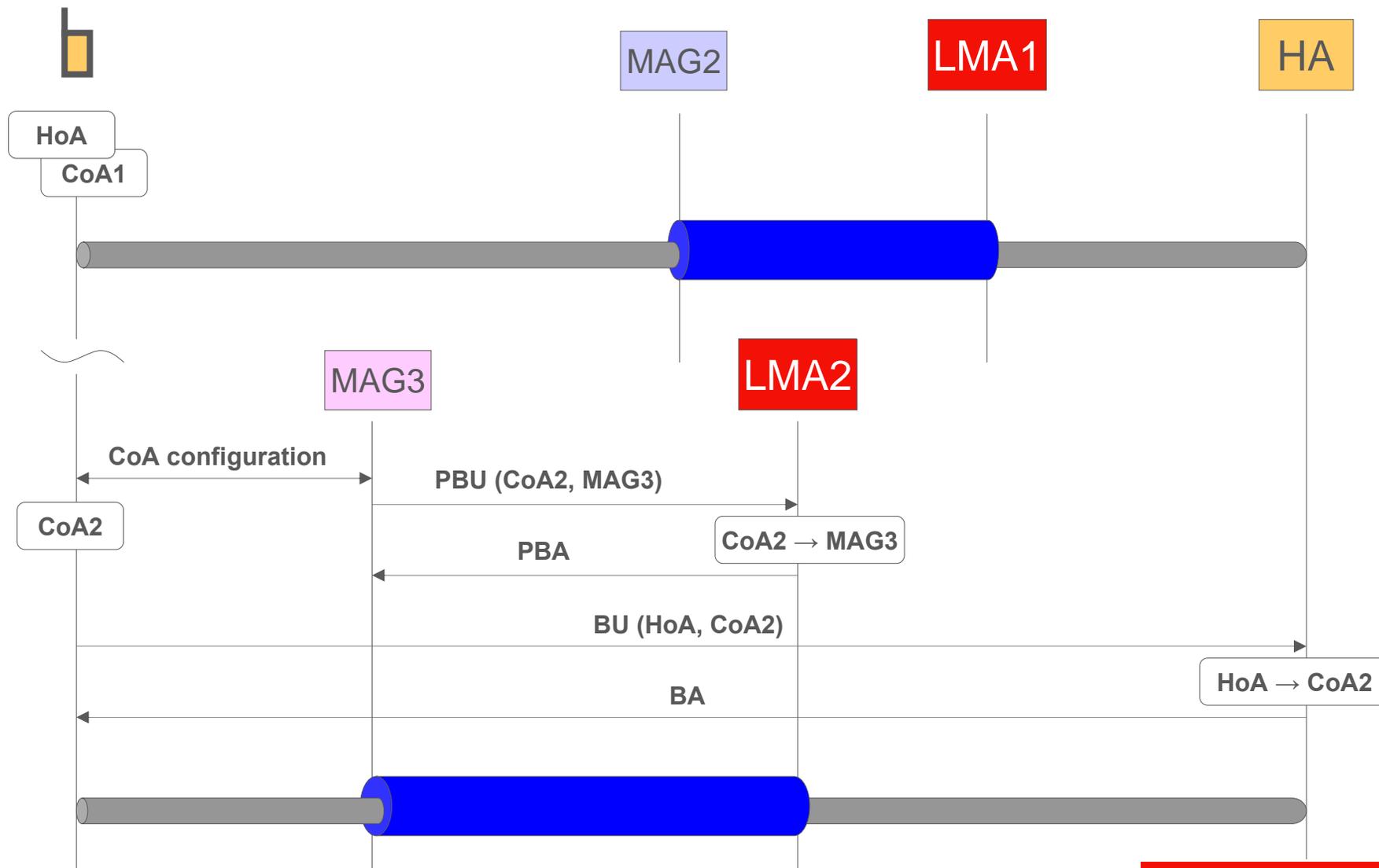
- **Similar to a MIPv6-HMIPv6 scenario**
- **The address assigned from the PMIP LMA is used as the CoA for MIPv6 BU**



Local Mobility Management



Global Mobility Management



PMIPv6 as local and MIPv6 as global

- **No issues from the above analysis**
- **Minor issue: possible race condition between PMIP registration and MIP registration**
 - if the state at the HA is created before the state at the LMA
 - this is because the PBU and the BU are sent by different entities (MAG and MN)
 - this is different from the HMIPv6/MIPv6 scenario since in the latter case the MN is responsible of sending both registration messages
 - unrealistic

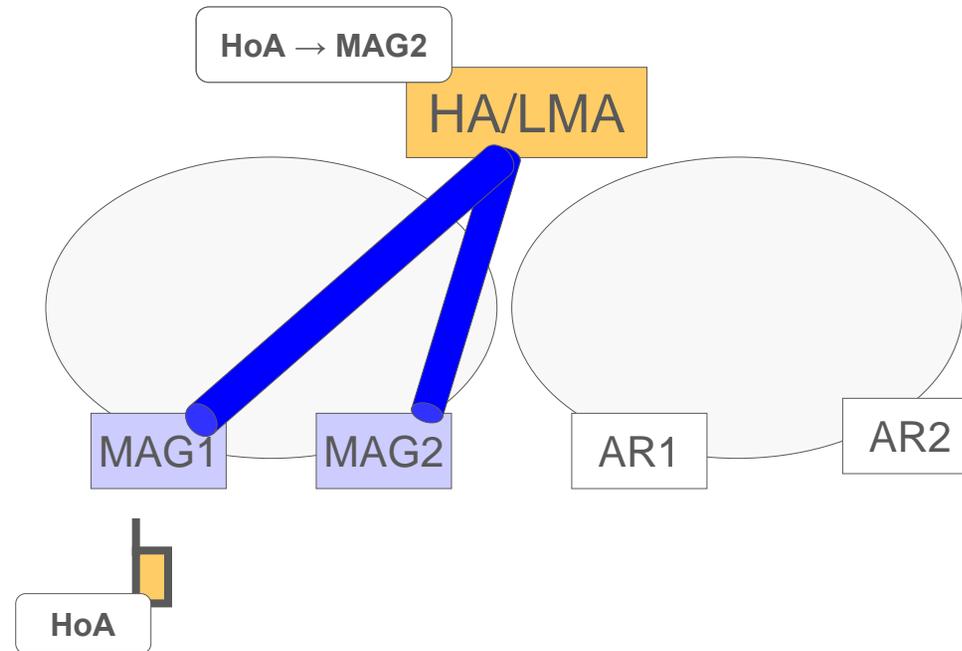
MIPv6 terminals and “PMIPv6 terminals” in the same network

- **Two kinds of terminals in the network**
 - MNs do not implement MIPv6 and the mobility is handled by PMIPv6
 - MNs implement MIPv6 and want to manage the mobility on their own
- **Based on PMIPv6 configuration the network would advertise the home prefix of the MN**
 - if so, how the MIPv6 terminals can use MIPv6 if the home network prefix is advertised?
- **The issue seems to be solvable at system-level**
 - AAA, user’s profiles, out-of-band signaling
 - out of scope of this WG

Movement between PMIPv6 and MIPv6

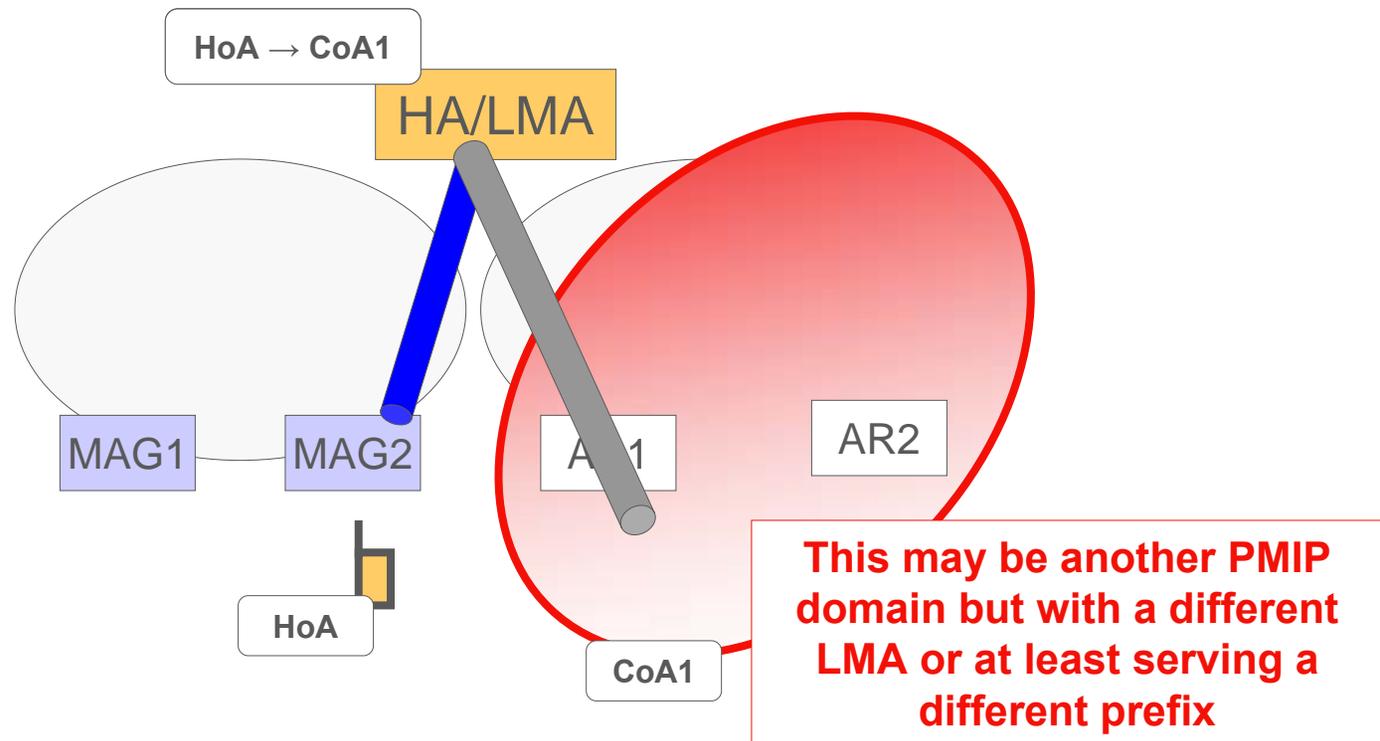
- **The MN uses PMIPv6 and switches to MIPv6 when it moves to an access network that does not have any MAG functionality**
- **This means the address assigned by the LMA in the PMIPv6 domain becomes the home address while using MIPv6**
 - MIPv6-HoA == PMIPv6-HoA

Movement between PMIPv6 and MIPv6



- **MN is in a network where PMIPv6 is used**
 - network based mobility
 - MN is at home in a MIPv6 term
 - HoA is the only address used by the MN

Movement between PMIPv6 and MIPv6



- **MN moves towards a network that does not support PMIPv6**
 - CoA configuration
 - MIPv6 BU
 - MIPv6 HoA is the address used by the MN in the PMIPv6 network

Issues

- **Security**

- assumption in rfc3775: strong binding between HoA and SA used to update the Binding Cache Entry
- in PMIPv6 different Security Associations are used to update the entry of a HoA (per-MAG Security Association)
- in this PMIPv6-MIPv6 scenario both host-based and network-based Security Associations are used to update a single HoA/HNP BCE
- a compromised MAG can send a bogus PBU to the HA/LMA even when the MN is not in the PMIP domain, since the MAG is in the MIP6 "home" domain
 - **a possible solution is that the PBU is accepted only if there is no host-based BC entry**
 - **unfortunately this solution may lengthen the handover latency when the MN returns to the PMIP domain (e.g. due to retransmission of the PBU from the MAG)**

Issues (cont'd)

- **HoA management and lookup key in BC**

- in MIPv6 (rfc3775) the HoA is the lookup key in the BC
 - **MN does not include any MN-ID in the BU based on standard rfc3775**
- in PMIPv6 the HoA may not even be present (based on the prefix-per-MN model) and either MN-ID or the network prefix is the lookup key
- HoA may not even be known by the HA/LMA when PMIP is used
 - **the MN may autoconfigure RFC3041 addresses that are not known by the network**
- when the MN sends a standard BU the HA/LMA may create a new entry and treat it as a new registration and not as an update of the network-based registration
 - **this may imply having two different entries for the same MN/HoA/HNP and may also imply wrong routing paths**

Issues (cont'd)

- **Race condition in the registration from MAG and deregistration of the MN**

- when the MN returns to the home network (i.e. PMIP network) the MAG will send a PBU to the HA/LMA and the MN may send a deregistration message
- depending on which message is received earlier by the LMA/HA the routing path may be correct or not
- note that the deregistration BU is optional in rfc3775
 - The mobile node SHOULD then send a Binding Update to its home agent, to instruct its home agent to no longer intercept or tunnel packets for it
- *seems solvable*

Issues (cont'd)

- **Sequence Numbers**

- MN will use SN in the BUs
- PMIP may use timestamps
- we need to understand how the LMA/HA avoids race conditions and duplicated messages
- *seems solvable*

- **Multihoming**

- an interface in the PMIPv6 network and another interface handled with MIPv6
- what happens if Multiple CoAs extension is used?
- similar to the case of returning home of one interface
 - **but here the home network is the whole PMIP domain**

Conclusions

- **PMIPv6 for local mobility and MIPv6 for global mobility management**
 - no issue
- **MIPv6 terminals and “PMIPv6 terminals” in the same network**
 - out of scope since it requires some system-level solutions
- **Movement between PMIPv6 and MIPv6**
 - several issues identified
 - may be solvable
 - should we consider this scenario as an input for PMIPv6 base specification?
 - or should we leave how to handle this scenario for future work after the base spec is ready?