Cross-over Mobility Anchor Point based Hierarchical Mobility Management Protocol for Mobile IPv6 Network

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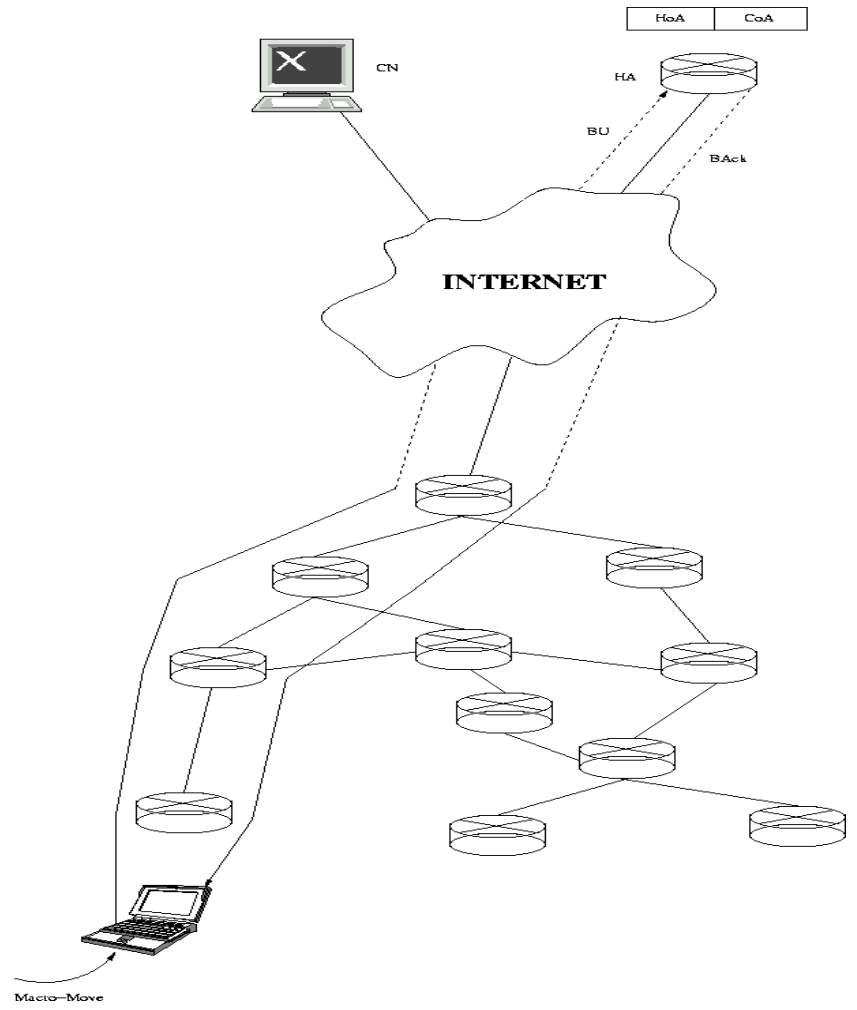
Mobile IPv6 Overview

- Mobile IPv6 means a node's IP can be mobile
- "IP routing" characteristics forces each node to change its IP address whenever it moves from one subnet to another
- Mobile IPv6 requires that there will be one unique IP address (Home Address) by which the node will be identified

Mobile IPv6 Working



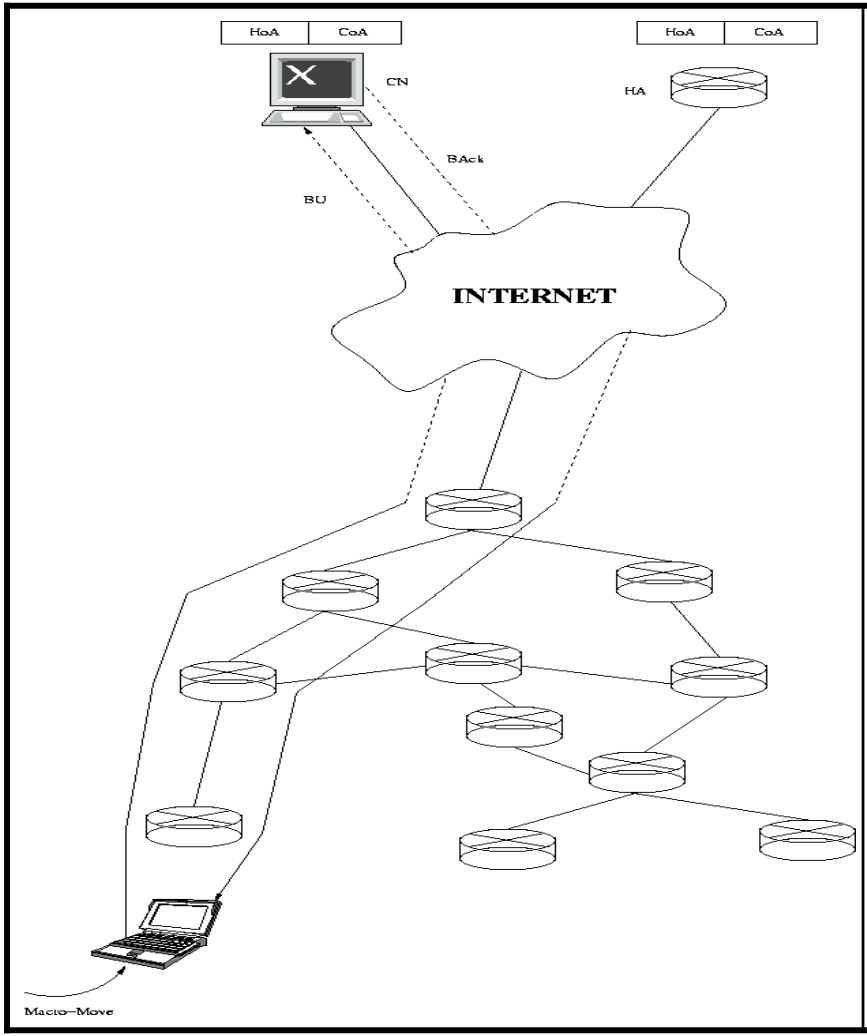
- Whenever the MN's POA changes, it informs its HA & CNs about its new IP address (CoA)

•As a result, the HA refreshes its Binding Cache Entry for the MN,

Home Address	Care-of Address

•After that, the MN finishes the "return routability procedure" with all the CNs

Mobile IPv6 Working



•Now, the MN starts the "return routability procedure" with all the CNs

•After that key-exchange protocol, the MN updates its binding at all the CNs

Home Address	Care-of Address

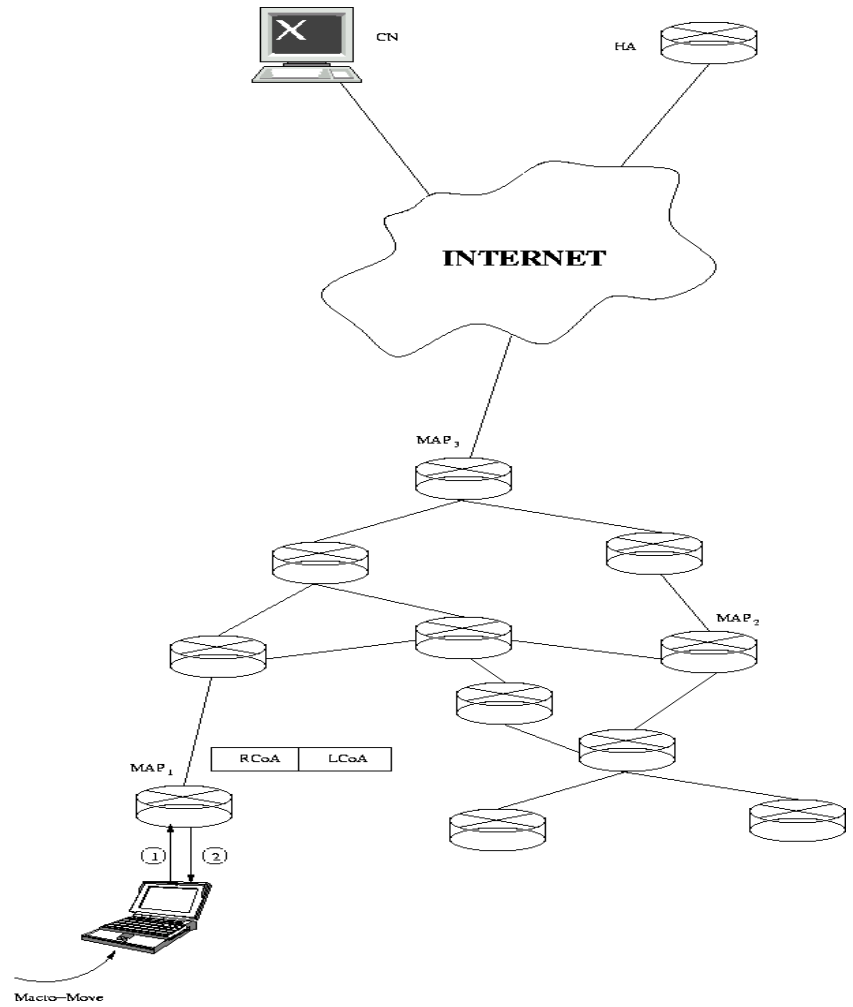
Handover Problem for MIPv6

- For every movement (i.e. IP changes for MN), the MN has to update its binding with HA and all the CNs which comprises of the time-consuming “return routability” procedure also. As a result, Handover delay is quite high

- Signaling load generated for every movement (i.e. control messages required for Mobile IPv6) is also large

- All these will result in
  - Loss of in-transit packets destined to the old POA for the MN
  - Additional delay for the packets
  - Wastage of bandwidth

Remedy



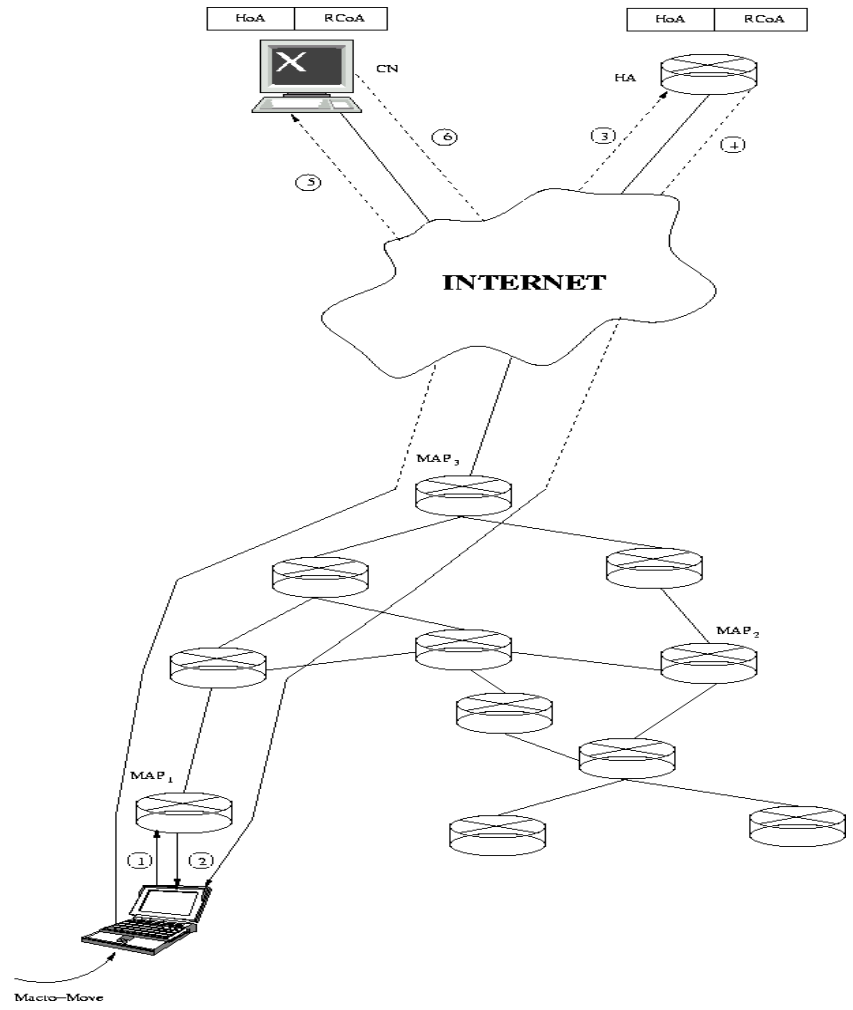
- ***Goal***: To reduce the handover delay & also the signaling load

•Many extensions have been proposed. One of them is Hierarchical Mobile IPv6(HMIPv6)

•Separates movement inside a domain from movement across domains

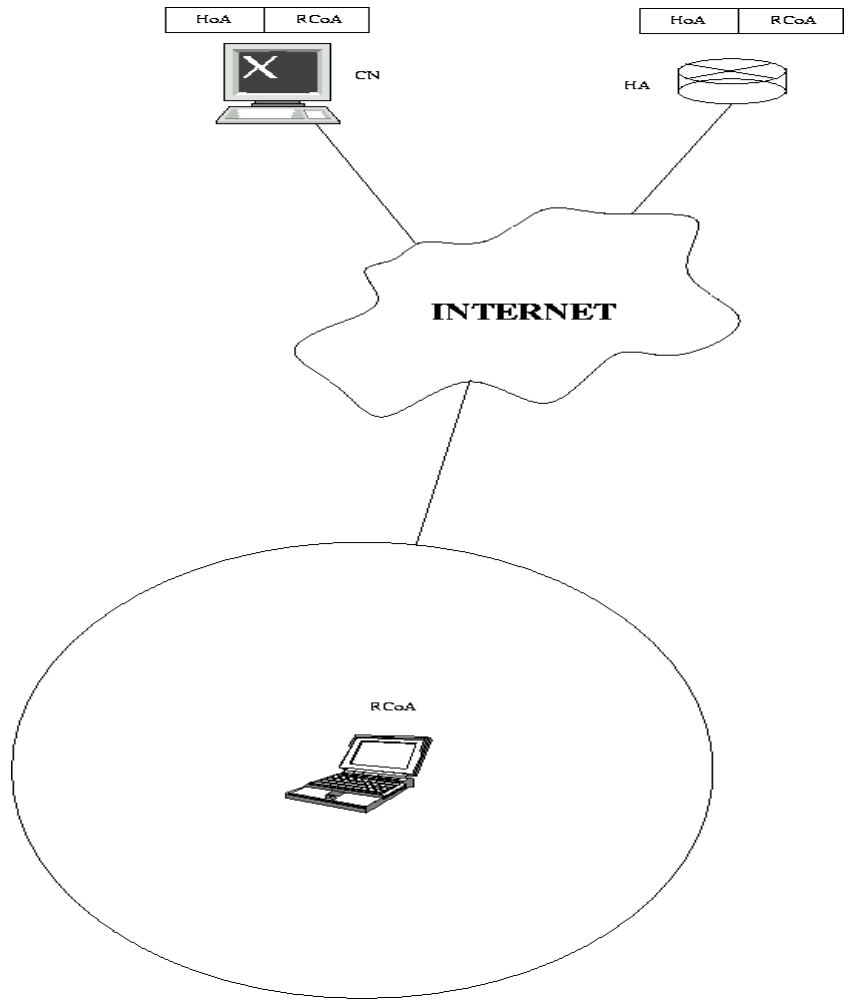
•In each domain, MAP (mobility anchor point) will serve as a local Home Agent

Hierarchical MIPv6



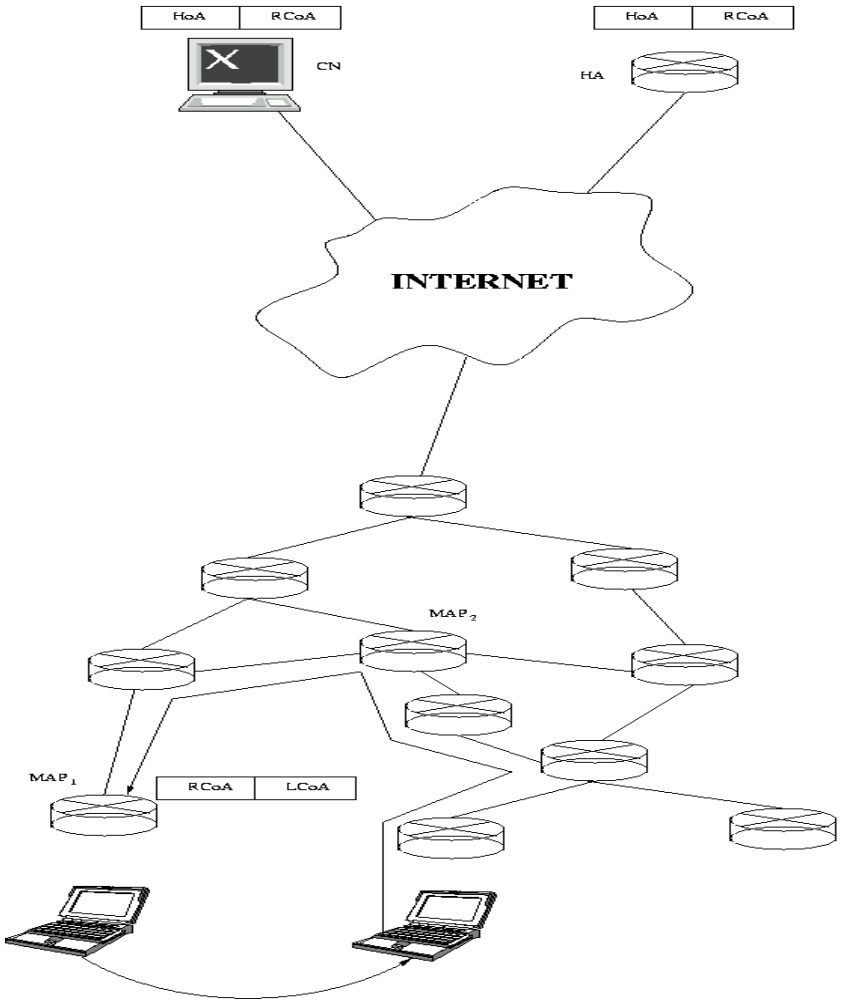
- Separates movement inside a domain from movement across domains
- In each domain, MAP (mobility anchor point) will serve as a local Home Agent
- MN will have two addresses – one is on Link CoA and the other one is RCoA at the MAP's link
- Nodes outside the domain will identify the MN with its RCoA

Hierarchical MIPv6



- Nodes outside the domain will identify the MN with its RCoA
- So, the movement inside a domain is transparent to the outside world
- ***Result***: smaller handover delay and signaling load for movements inside a domain than MIPv6

Problems of HMIPv6



- No definite MAP selection criteria
- Sometimes results in greater handover delay because of the selection of the MAPs
- Sometimes packets suffer additional delay and also causes bandwidth wastage

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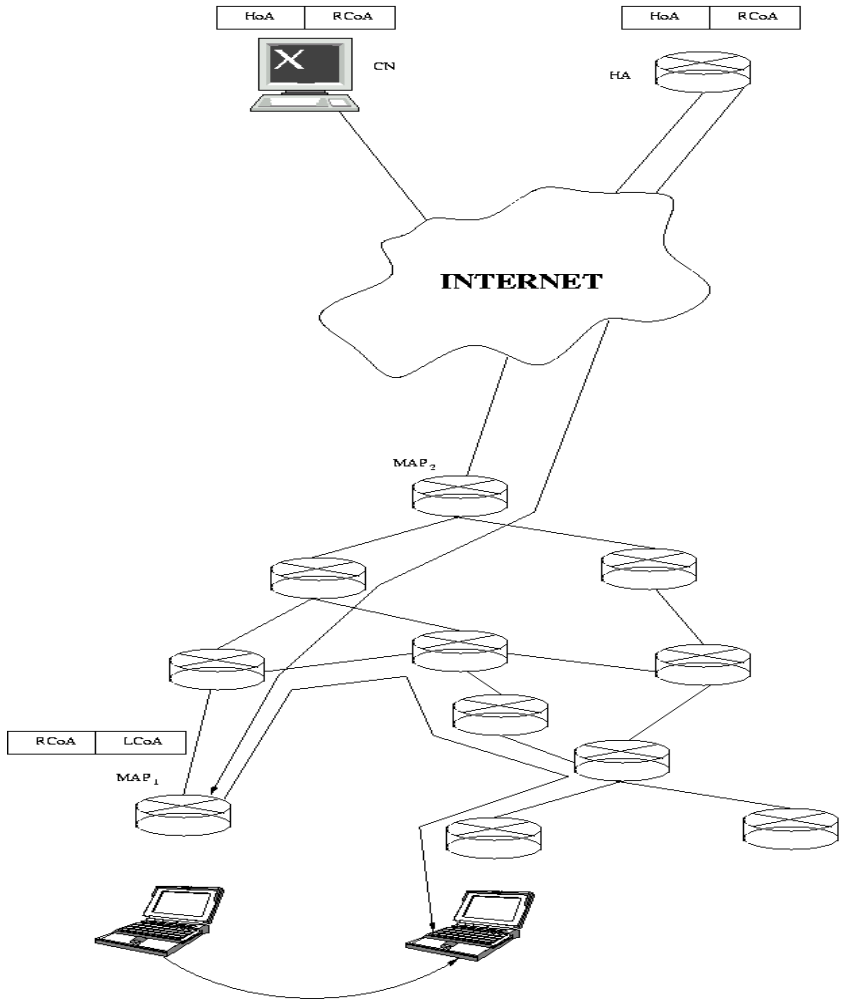

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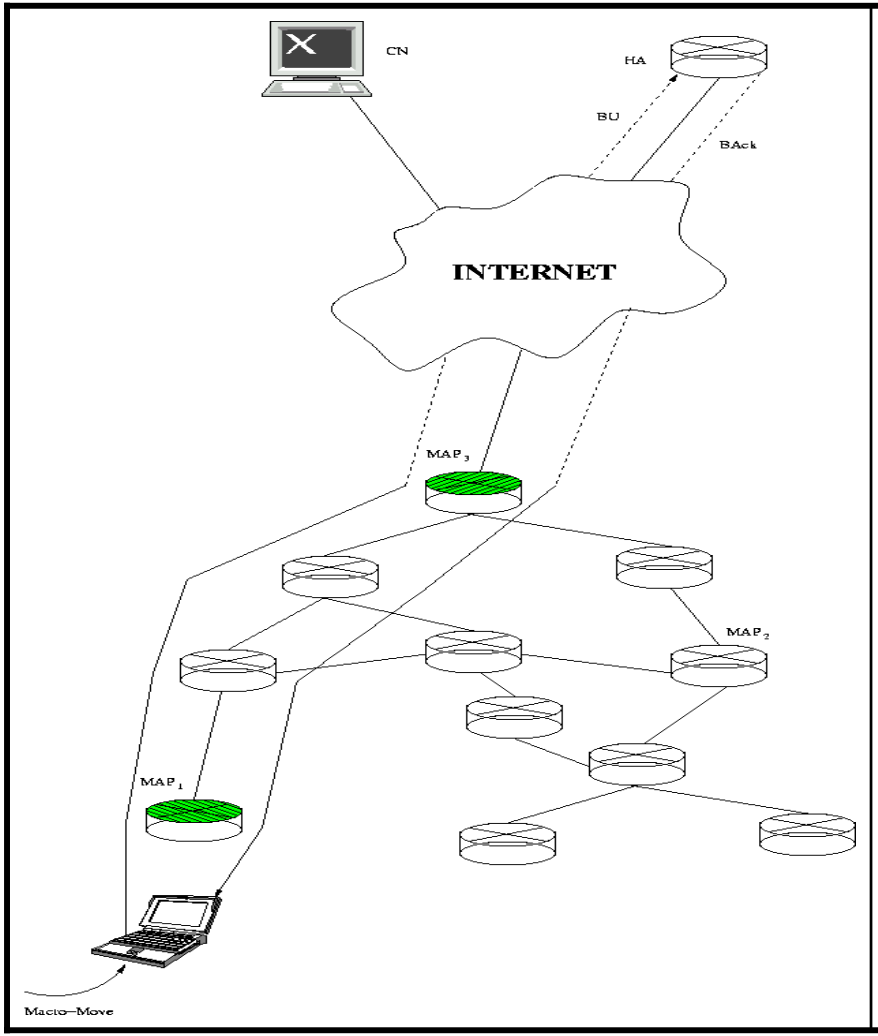
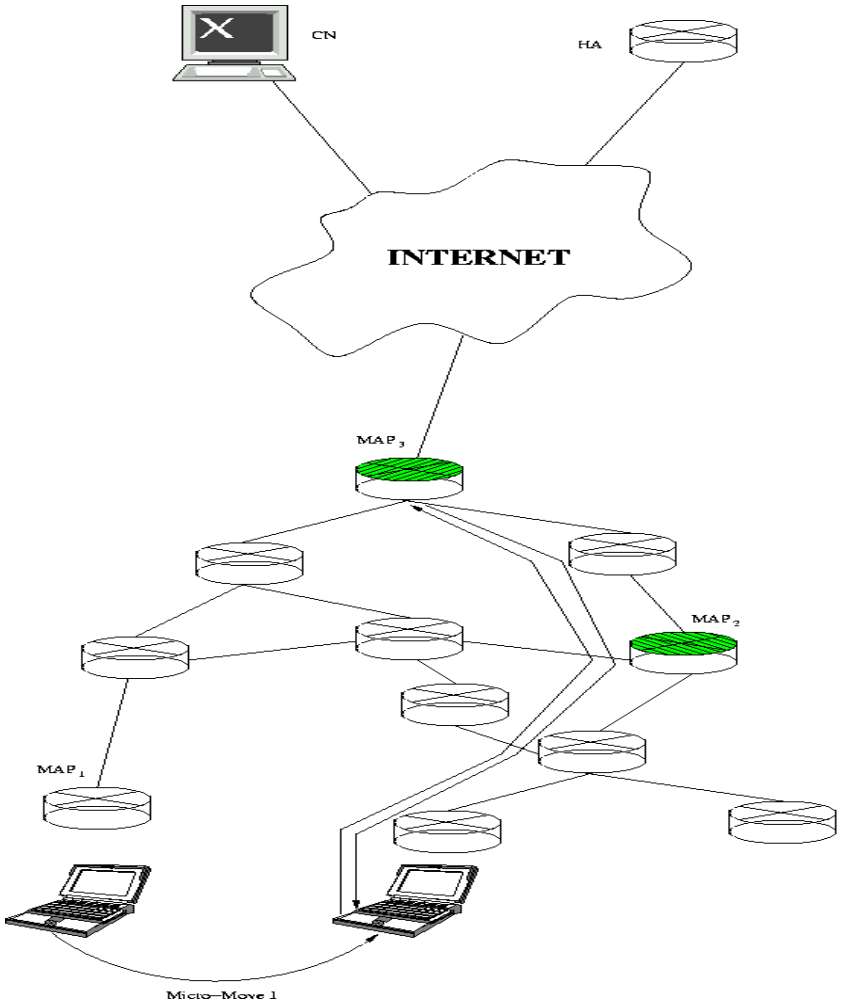
XMAP-HMIPv6



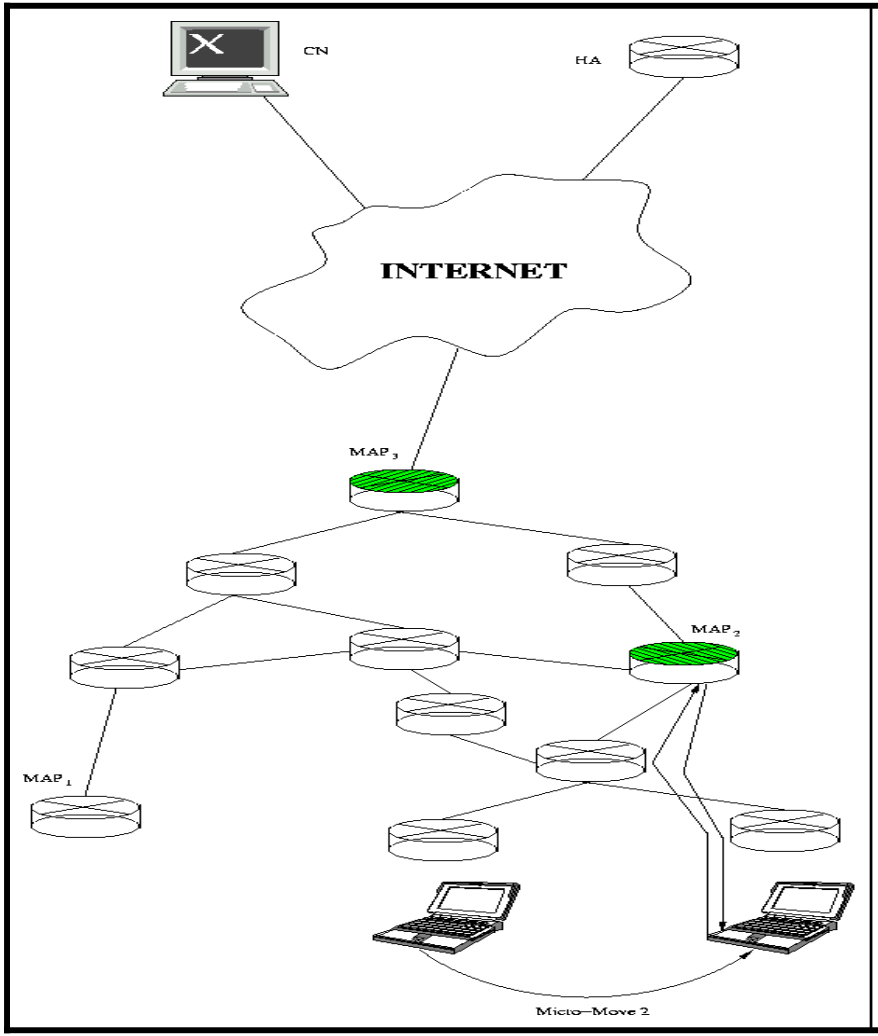
- Our strategy will select all the MAPs in a domain along the path from MN to HA when the MN first moves into a domain
- MN will be identified by a different RCoA in each of the MAP's link along the path
- HA and all the CNs will only see the top-level RCoA of the MN

XMAP-HMIPv6



- Then for each movement inside, the binding procedure ends at the cross-over MAP
- All the higher level binding cache entries above the cross-over MAP remains intact
- ***Result***: Similar reduced signaling load like HMIPv6 but lower handover latency than it.

XMAP-HMIPv6



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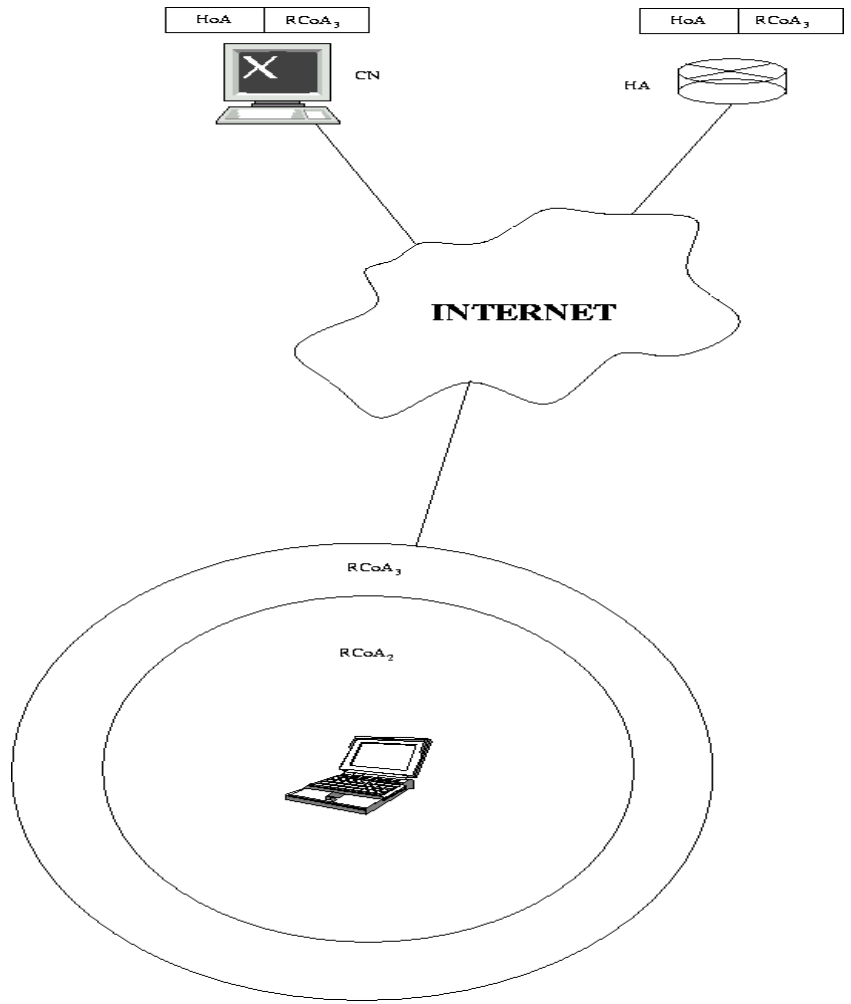


- Smaller circle is the MAP_2 domain and big circle is the MAP_3 domain

- The binding cache entry at HA and all the CNs for the MN,

HoA	$RCoA_3$

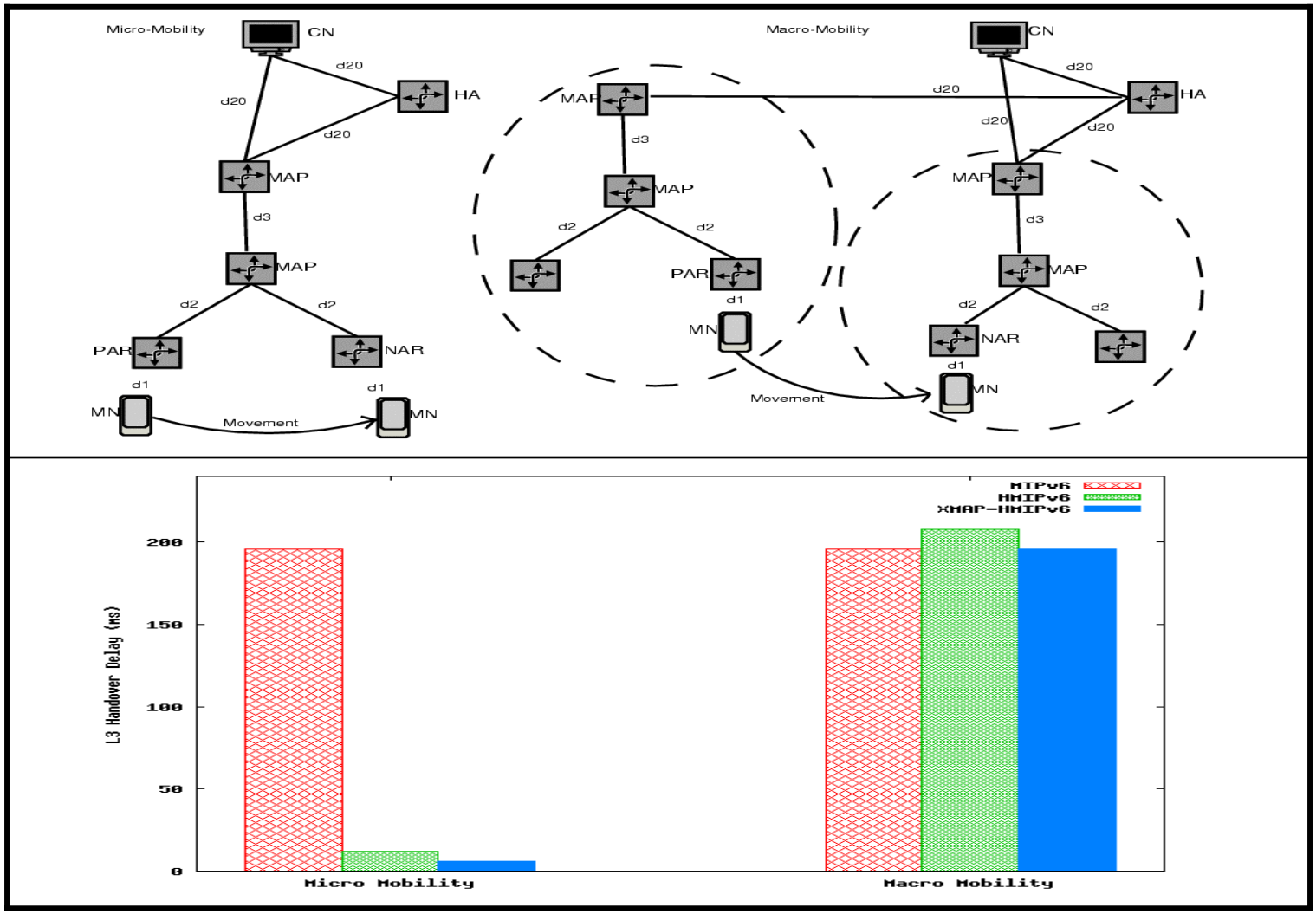
- The binding cache entry at MAP_3 for the MN,

$RCoA_3$	$RCoA_2$

- The binding cache entry at MAP_2 for the MN,

$RCoA_2$	LCoA

Analytical Results



Future Work & Conclusion

- We are currently doing in-depth analysis to come up with the complete protocol specification
- Signaling load analysis for our proposal
- Analyze our proposal with other protocols based on an analytical mobility model (i.e. Random Walk)
- NS-2 simulation to test higher-level protocol's performance (e.g. TCP, UDP) with our proposal

Thank You for your patience.
Any Questions??