



# MoAR: Mobile Access Router. Providing Security and Localised Mobility support for Mobile Networks

Workshop on *Research and Deployment Possibilities based on MIPv6*  
16th IST Mobile and Wireless Communications Summit



<http://www.ist-daidalos.org>

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# Outline

1. Introduction
  1. Network Mobility (NEMO)
  2. Network-based Localised Mobility Management (NetLMM)
  3. Protocol for Carrying Authentication for Network Access (PANA)
2. Use Cases Scenarios and Motivation
3. MoAR: Mobile Access Router
  1. Overview
  2. Detailed protocol operation
4. Conclusions and Future work



# Network Mobility

## What is a mobile network?

AR = Access Router

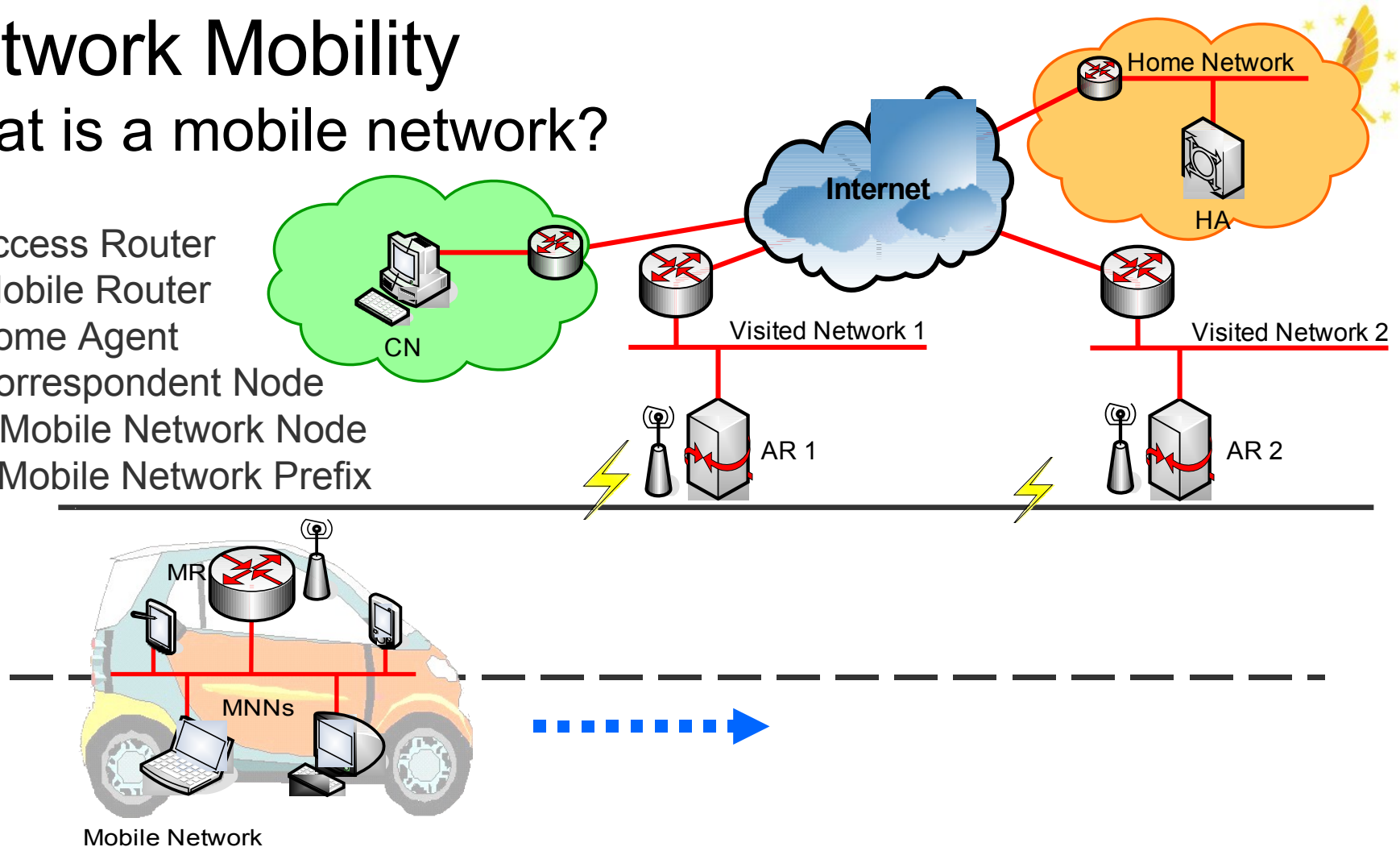
MR = Mobile Router

HA = Home Agent

CN = Correspondent Node

MNN = Mobile Network Node

MNP = Mobile Network Prefix

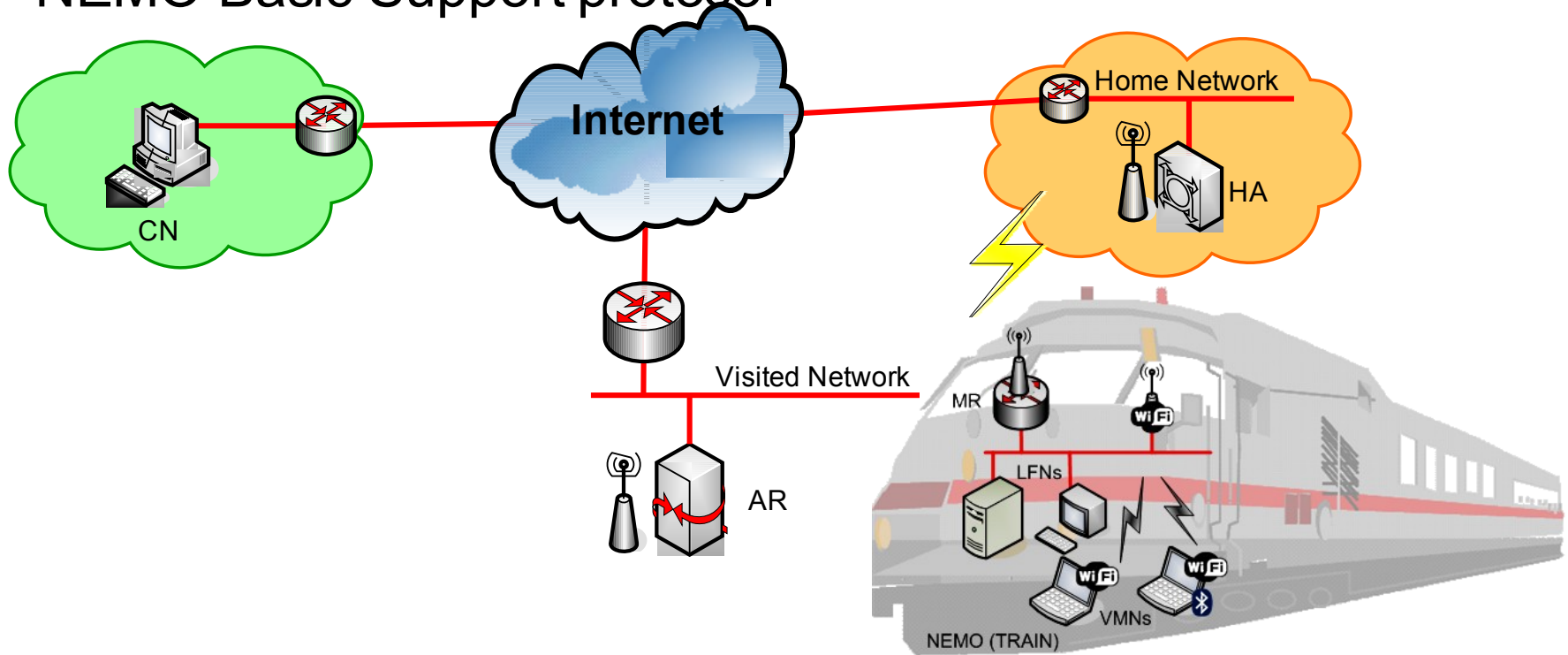


- ▶ Demand for ubiquitous Internet access in mobile platforms (like trains, planes, buses, boats, cars) is increasing



# Network Mobility (NEMO)

## NEMO Basic Support protocol





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# Network-based Localised Mobility Management

- ▶ Historical background
    - Some host-based solutions already standardised at the IETF to improve the performance of MIPv6 by managing the local mobility closer to the MN
      - e.g., HMIPv6
  - ▶ Motivation
    - New IETF work on global mobility management protocols that are not MIPv6, such as HIP
      - future wireless IP nodes may support a more diverse set of global mobility protocols
    - The success in the WLAN infrastructure market of WLAN switches, which perform localised management without any host stack involvement
- 👉 This triggered a new interest at the IETF to take a fresh 👉 look at localised mobility management
- NetLMM Working Group, created in January 2006



# Network-based Localised Mobility Management



## ▶ Basic idea

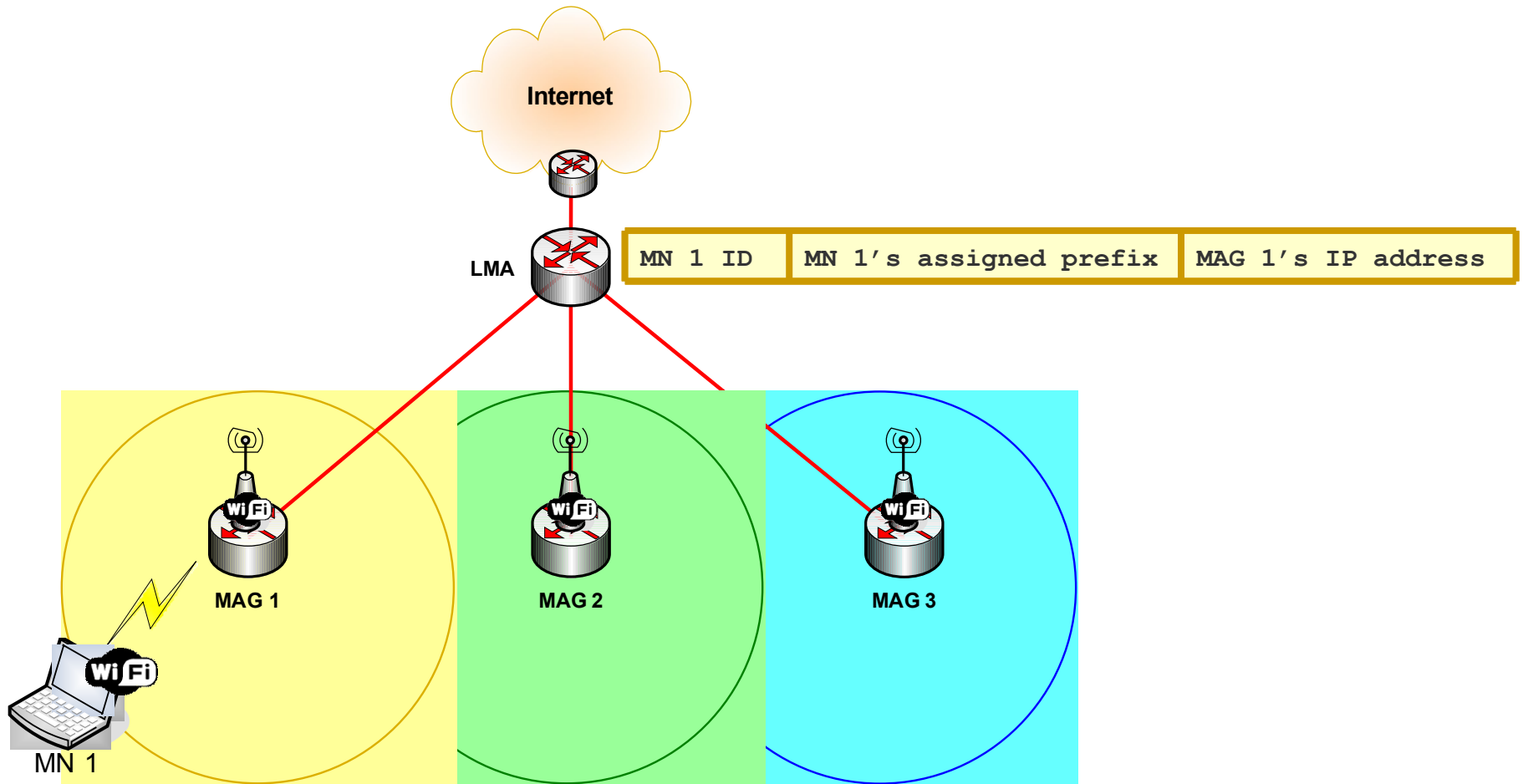
- To provide IP mobility management for mobile nodes within an access network (a geographical area)
  - Localised Mobility Domain (LMD): area (set of fixed and mobile network components) where a Localised Mobility Protocol (LMP) is run. An MN attached to an LMD does not change its IP address while roaming within the same LMD
  - MNs are not involved in the localised mobility management (it is network based)
    - ▶ No specific support required on the MN
  - The solution does not impose any particular L2 technology to work





# Network-based Localised Mobility Management

## Daidalos solution







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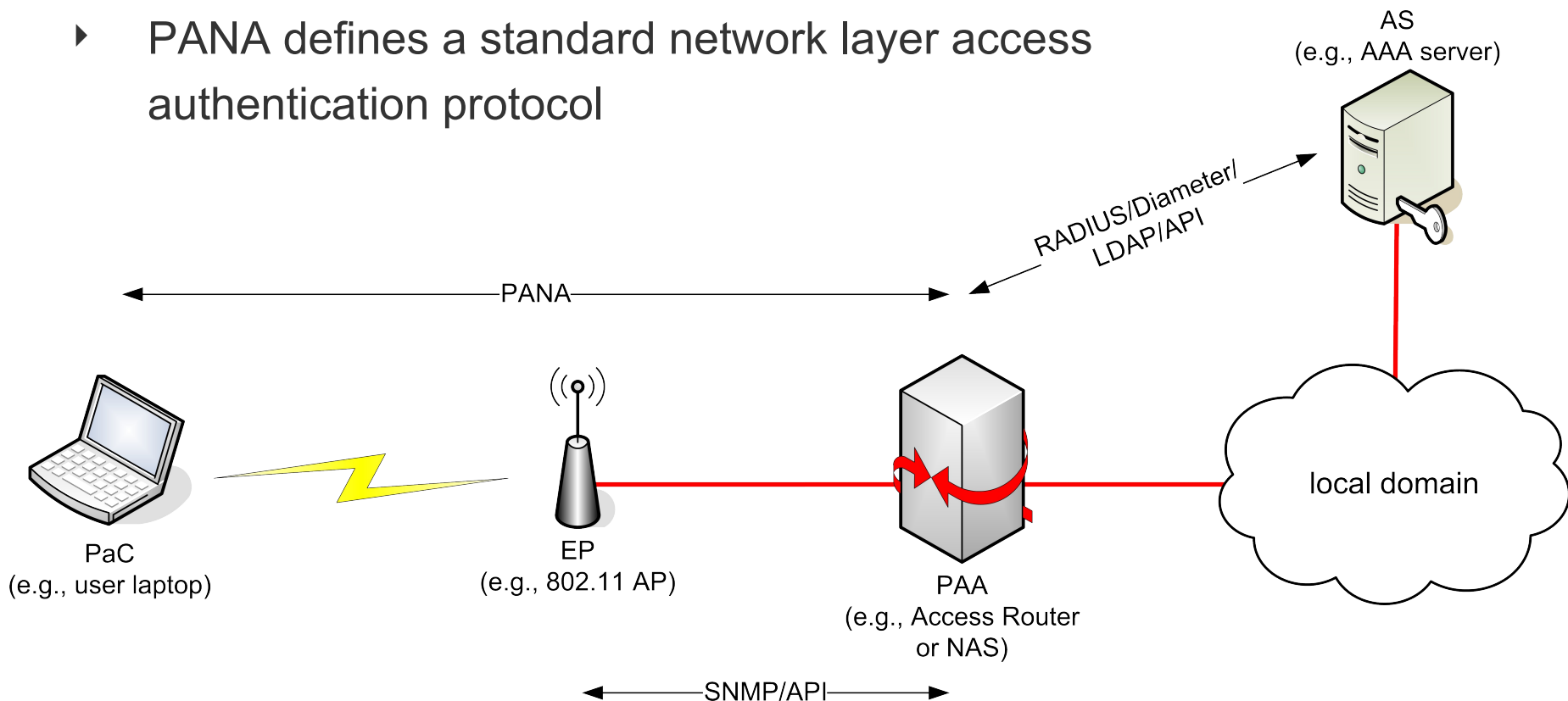
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# Protocol for carrying Authentication for Network Access (PANA)



- ▶ Access networks in most cases require some form of authentication in order to prevent unauthorised usage
- ▶ PANA defines a standard network layer access authentication protocol





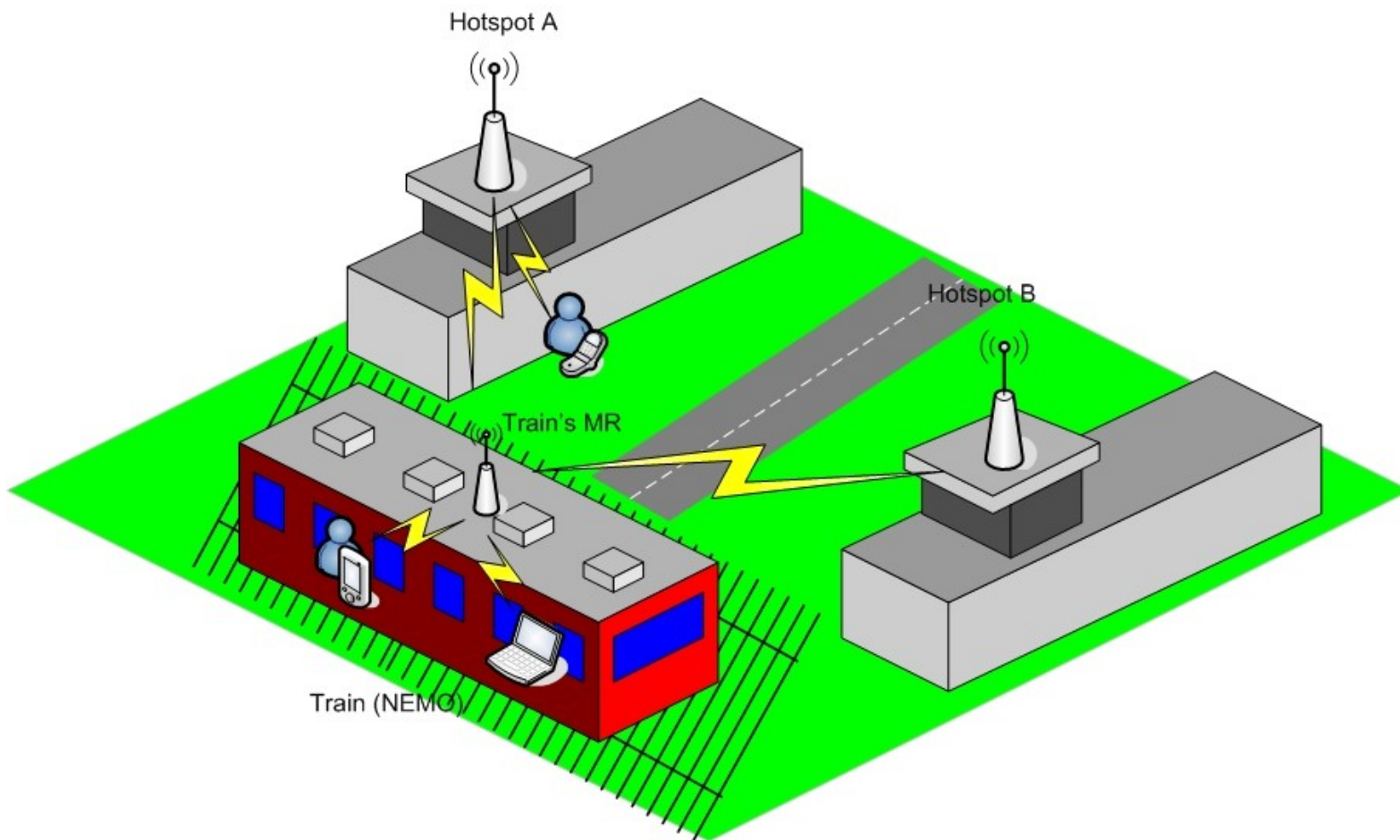
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# Use Cases Scenarios and Motivation

## Airport scenario



# Use Cases Scenarios and Motivation



## Motivation

- ▶ The integration of NEMO and NetLMM brings several interesting advantages
  - A reduction in the required signalling (which in NEMO can be significant when a Route Optimisation solution is used)
  - An overall gain in the performance
- ▶ This integration might be hard, depending on the type of nodes that connects to the NEMO
  - Local Fixed Nodes (LFNs): not really a problem
  - Visiting Mobile Nodes (VMNs) and nested NEMOs: handovers between NEMO and the infrastructure are challenging





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# MoAR: Mobile Access Router

## Overview (I)

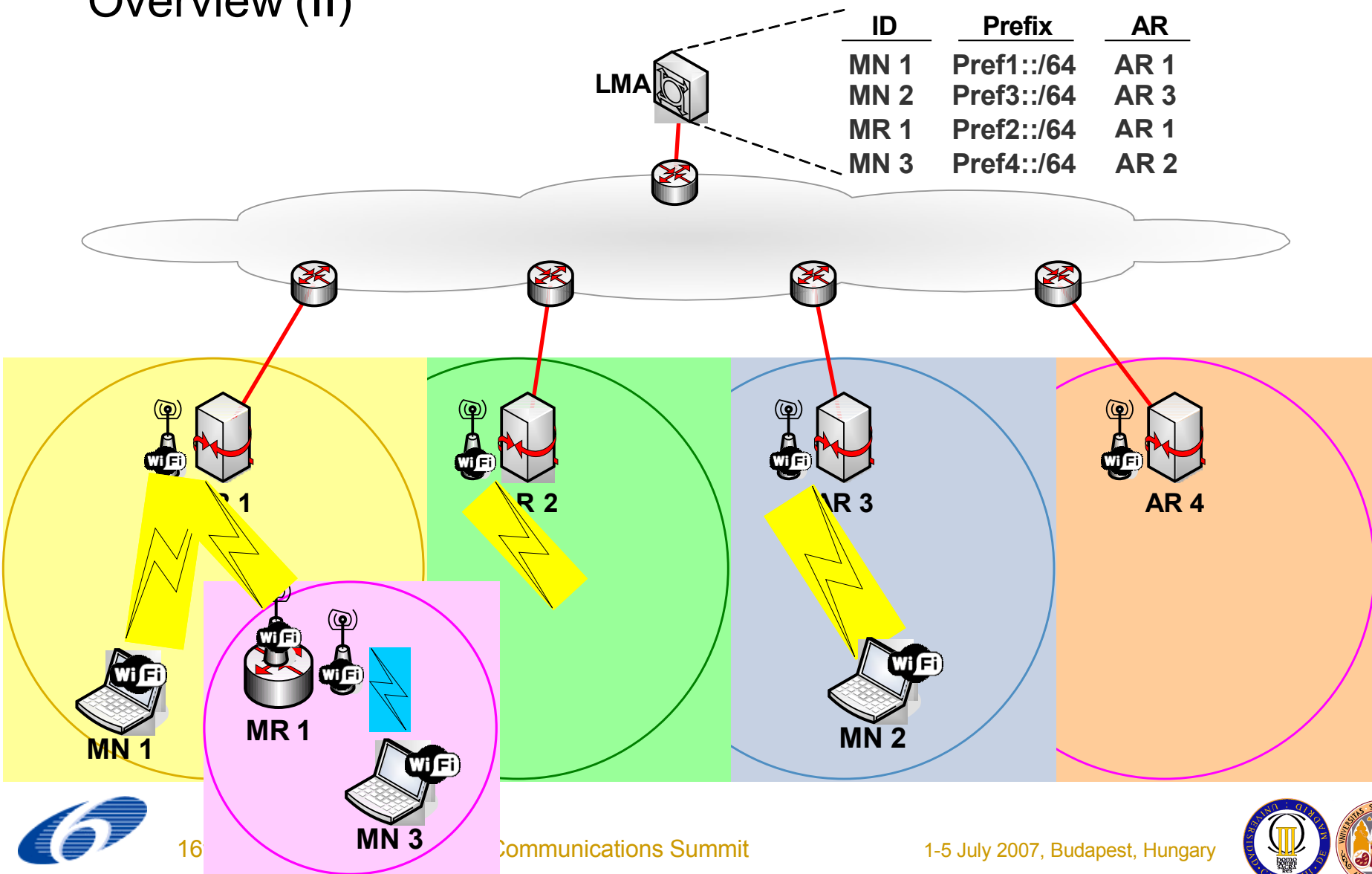
- ▶ We extend LMDs with attached MRs
  - To do so, the role of the MR is two-folded:
    - the MR behaves as a normal MN on its egress interface
    - the MR behaves as a MAG/AR of the attached LMD on its ingress interface
  - ▶ **That's why we called it Mobile Access Router (MoAR)**
- ▶ A MoAR can be considered as a MAG/AR that is able to move within the LMD to which it belongs
  - Therefore, Mobile Nodes do not change their IP addresses, even when moving between a MoAR and a fixed MAG/AR





# MoAR: Mobile Access Router

## Overview (II)







# Outline

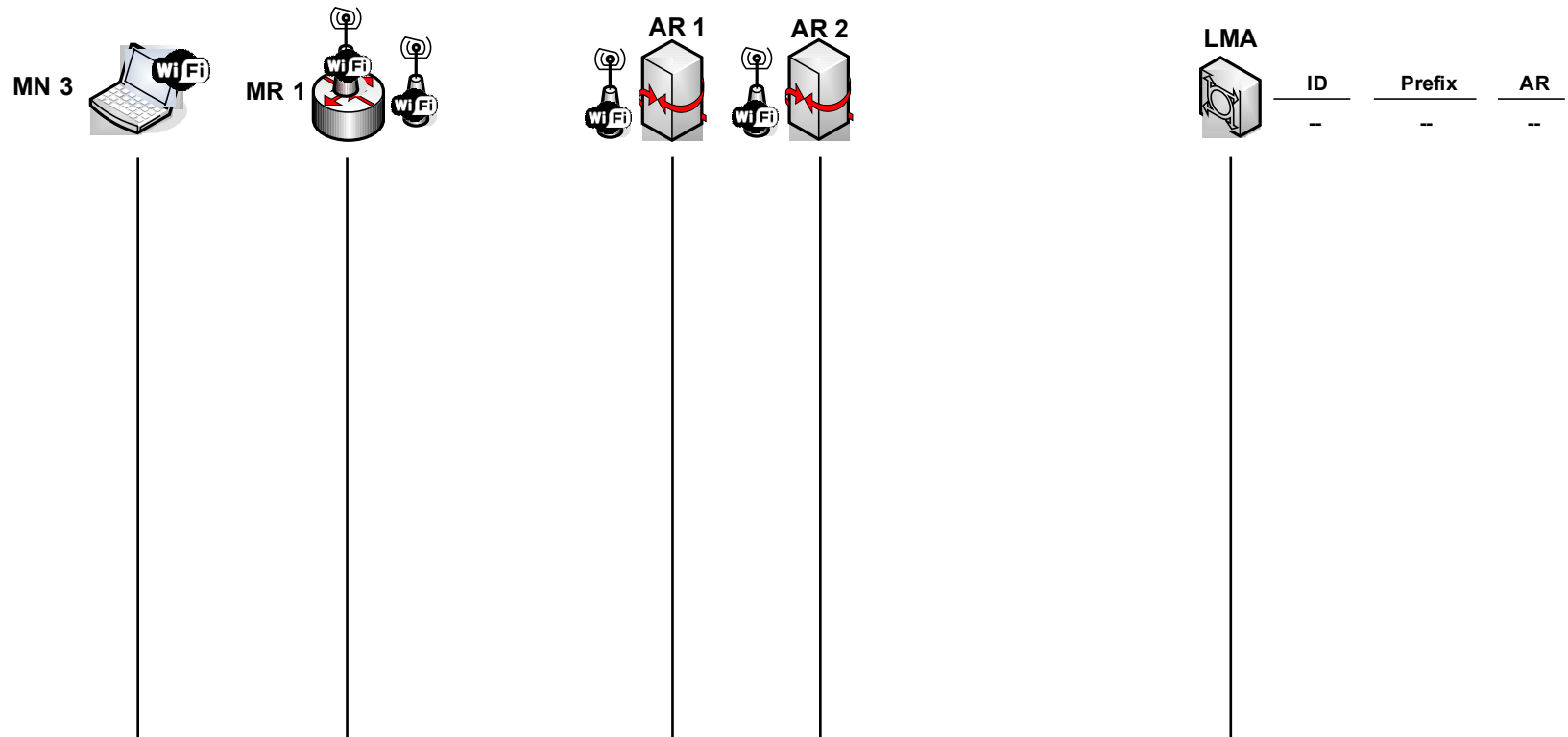
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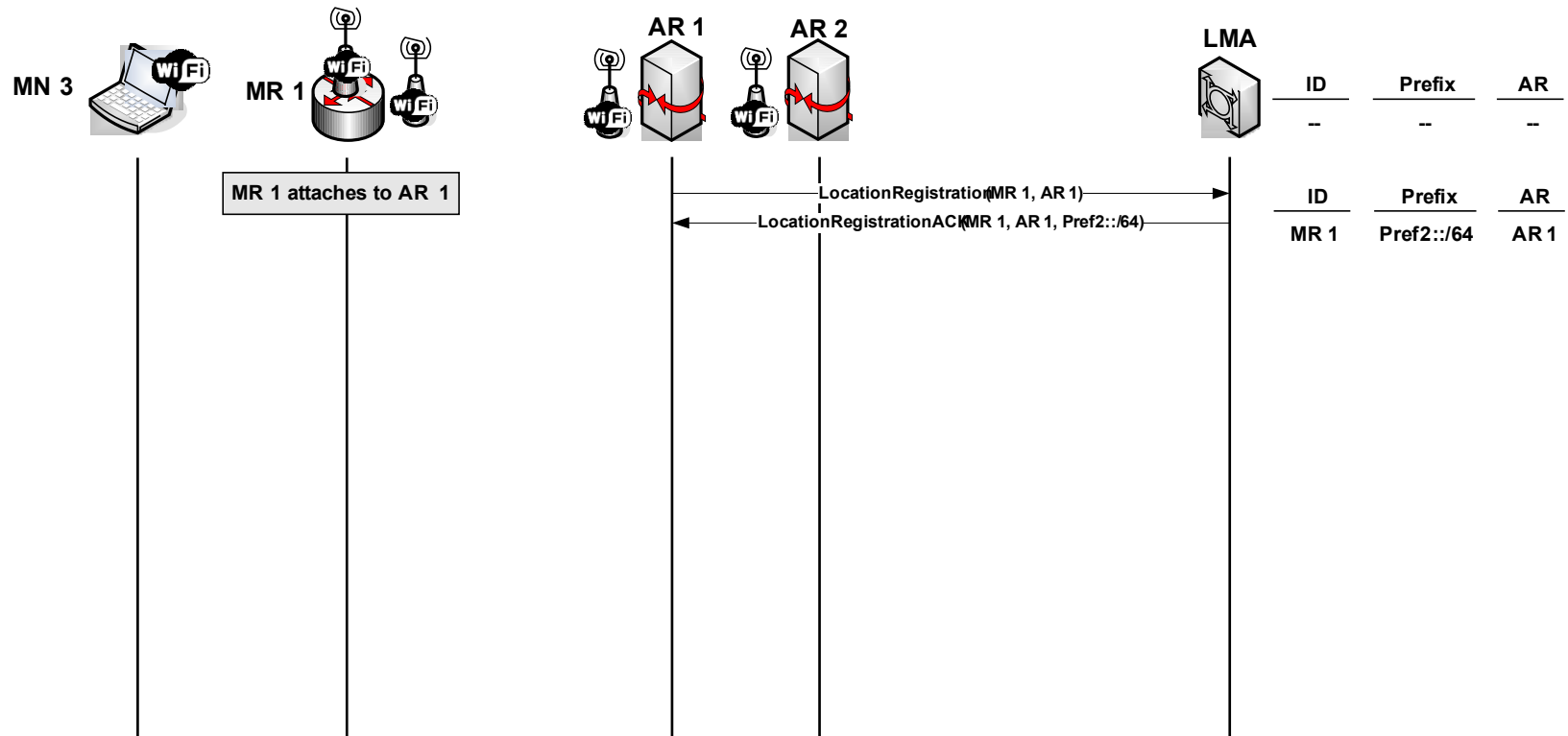
## Detailed protocol operation (I)





# MoAR: Mobile Access Router

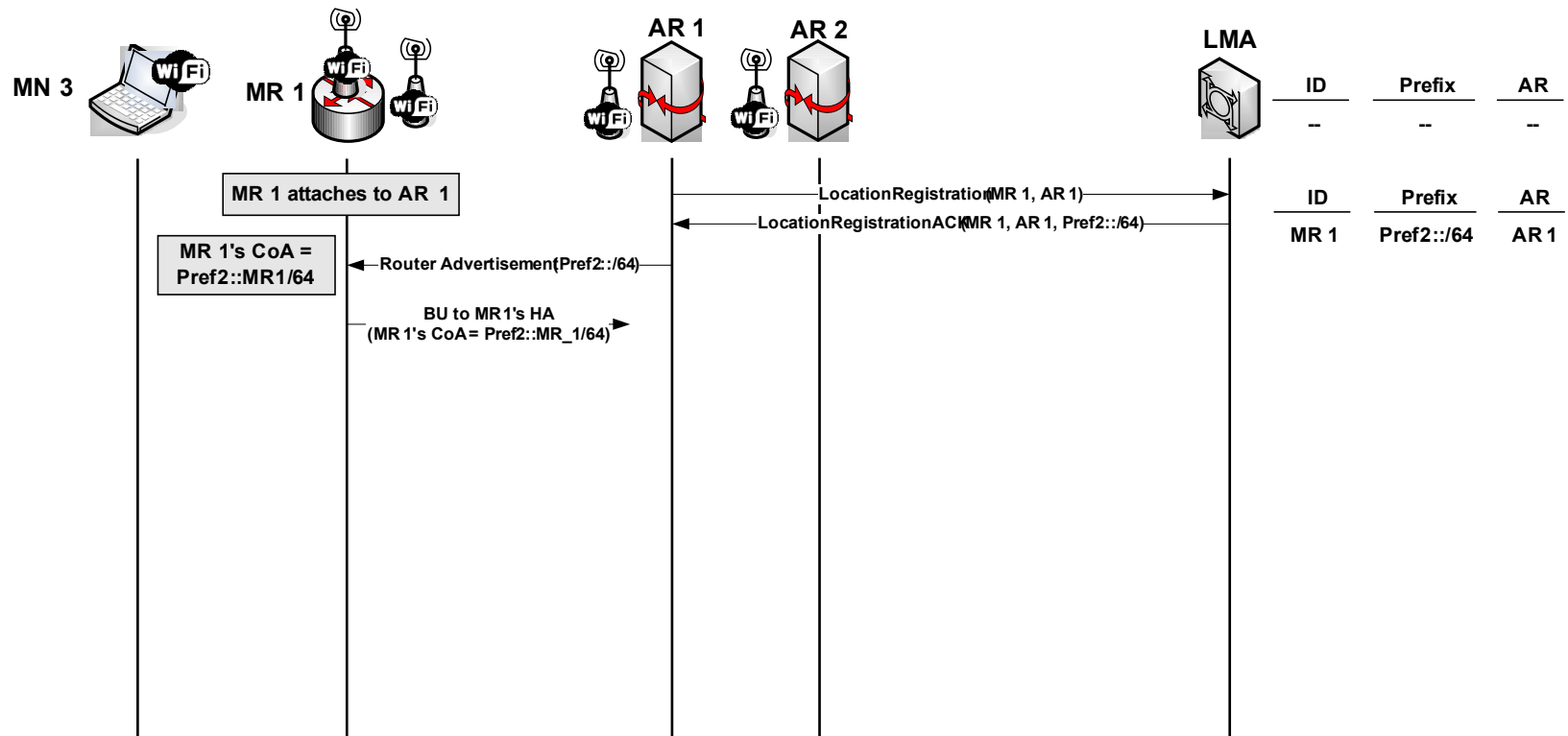
## Detailed protocol operation (I)





# MoAR: Mobile Access Router

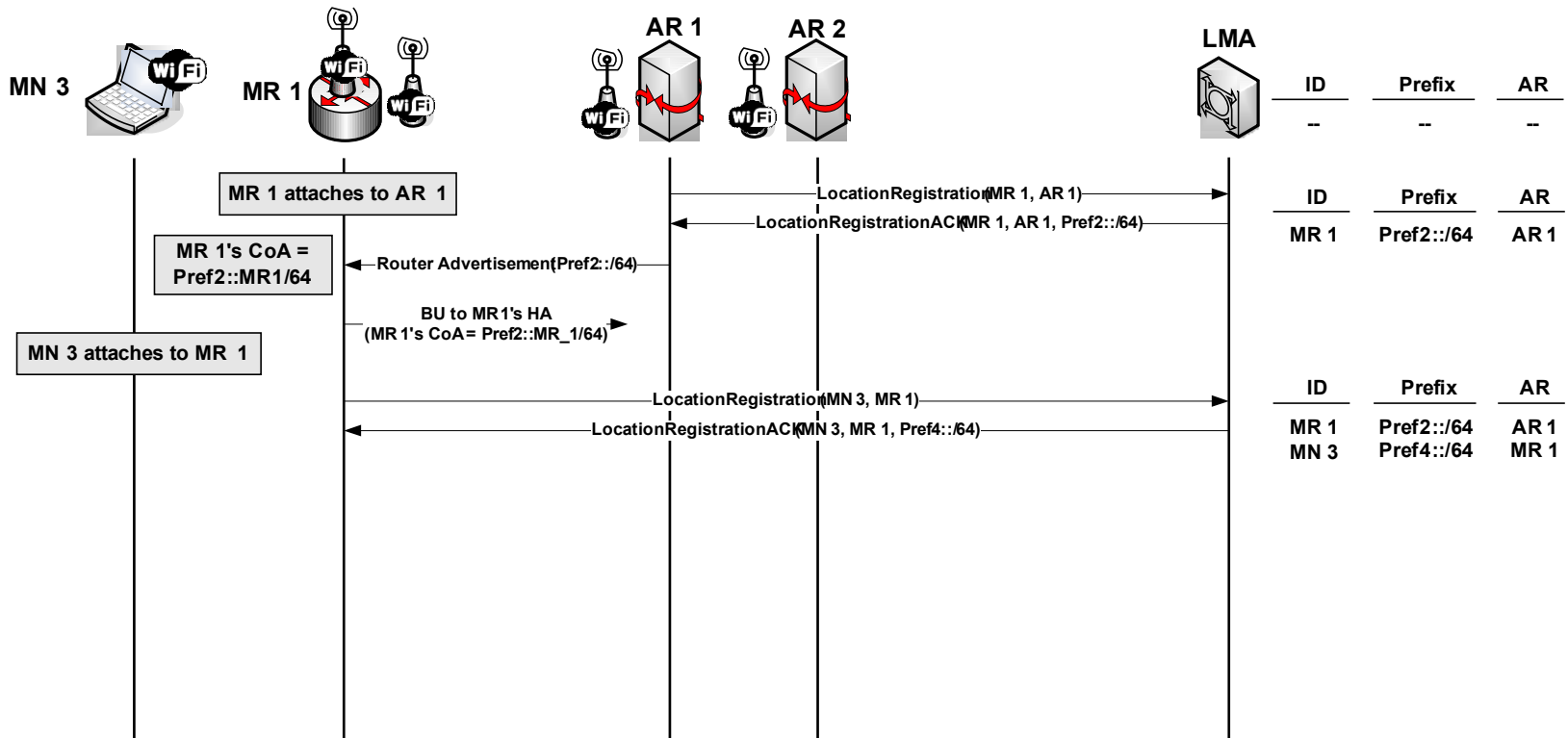
## Detailed protocol operation (I)





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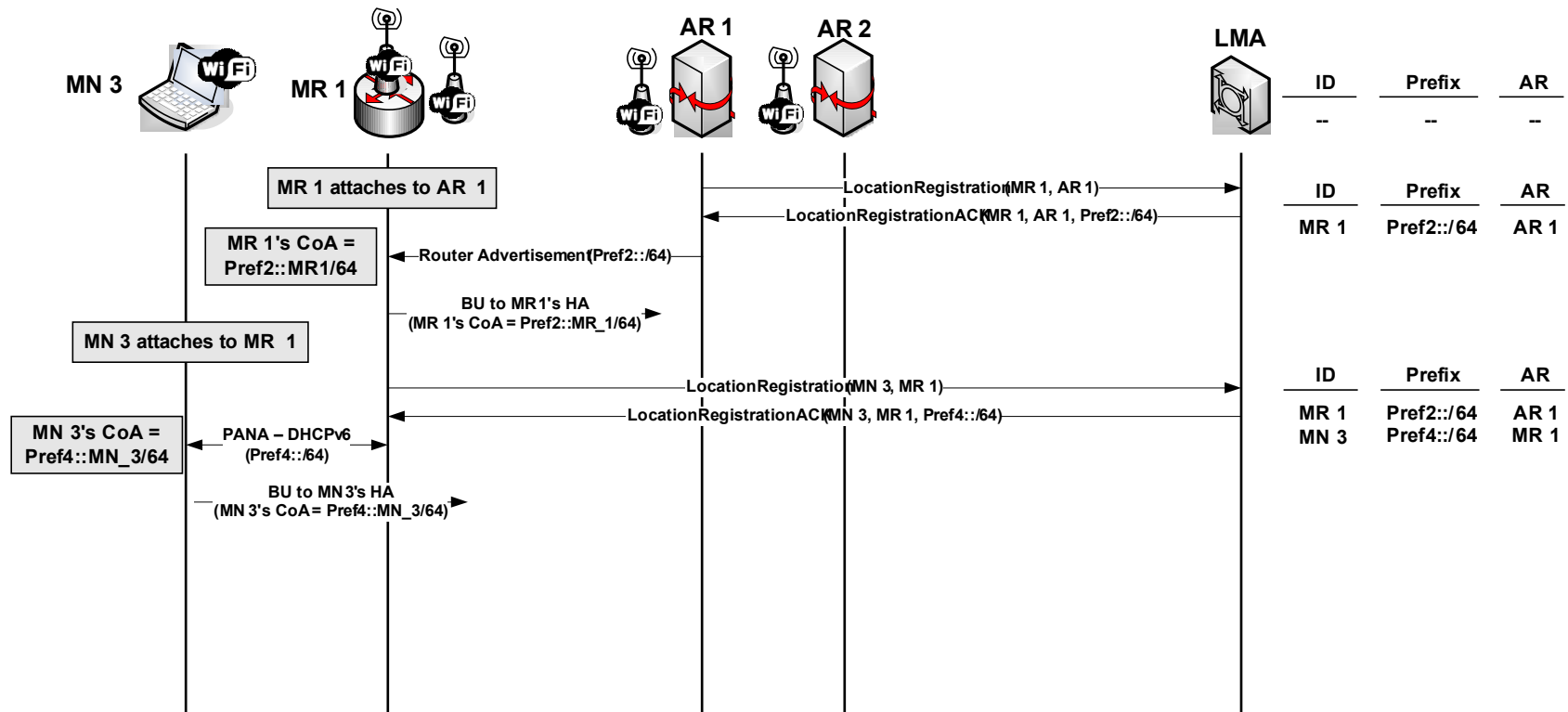
## Detailed protocol operation (I)





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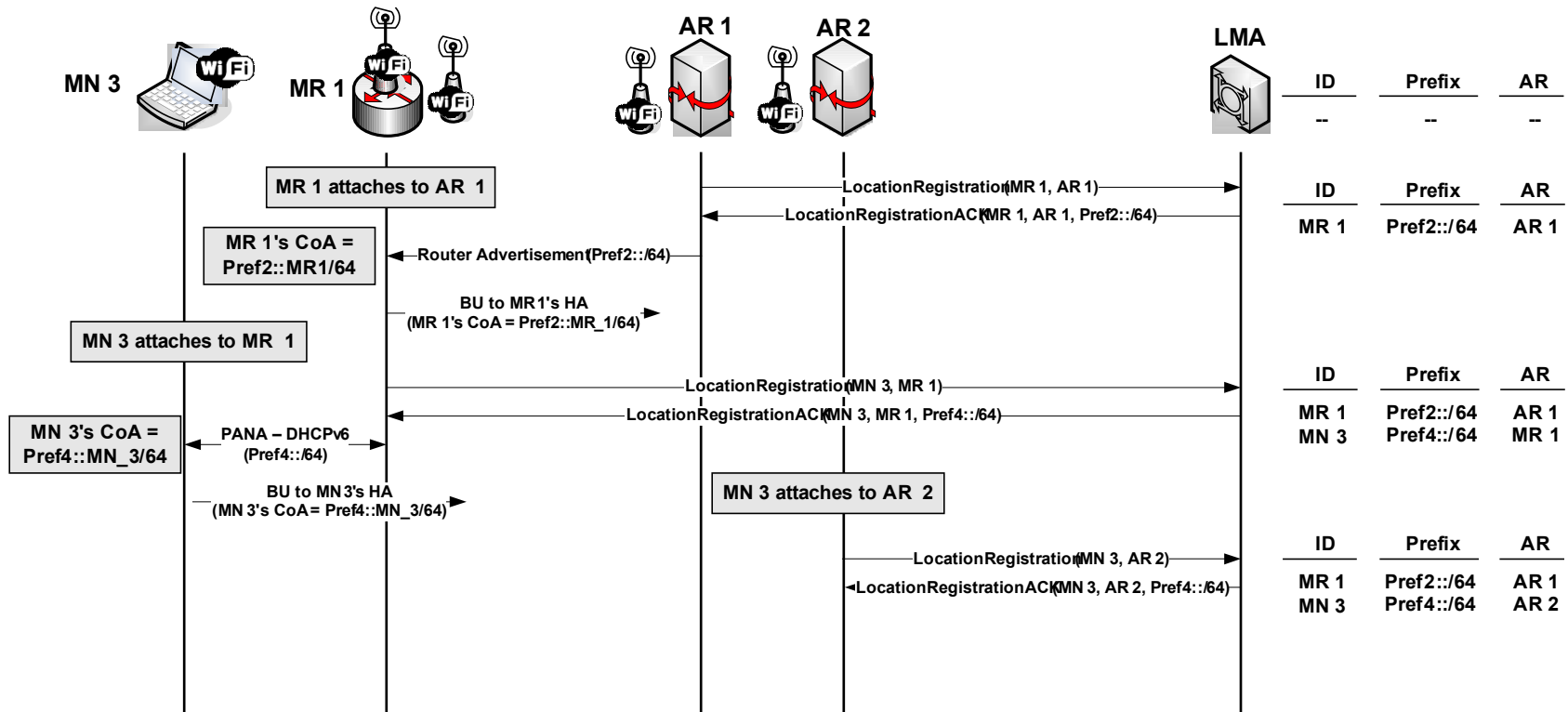
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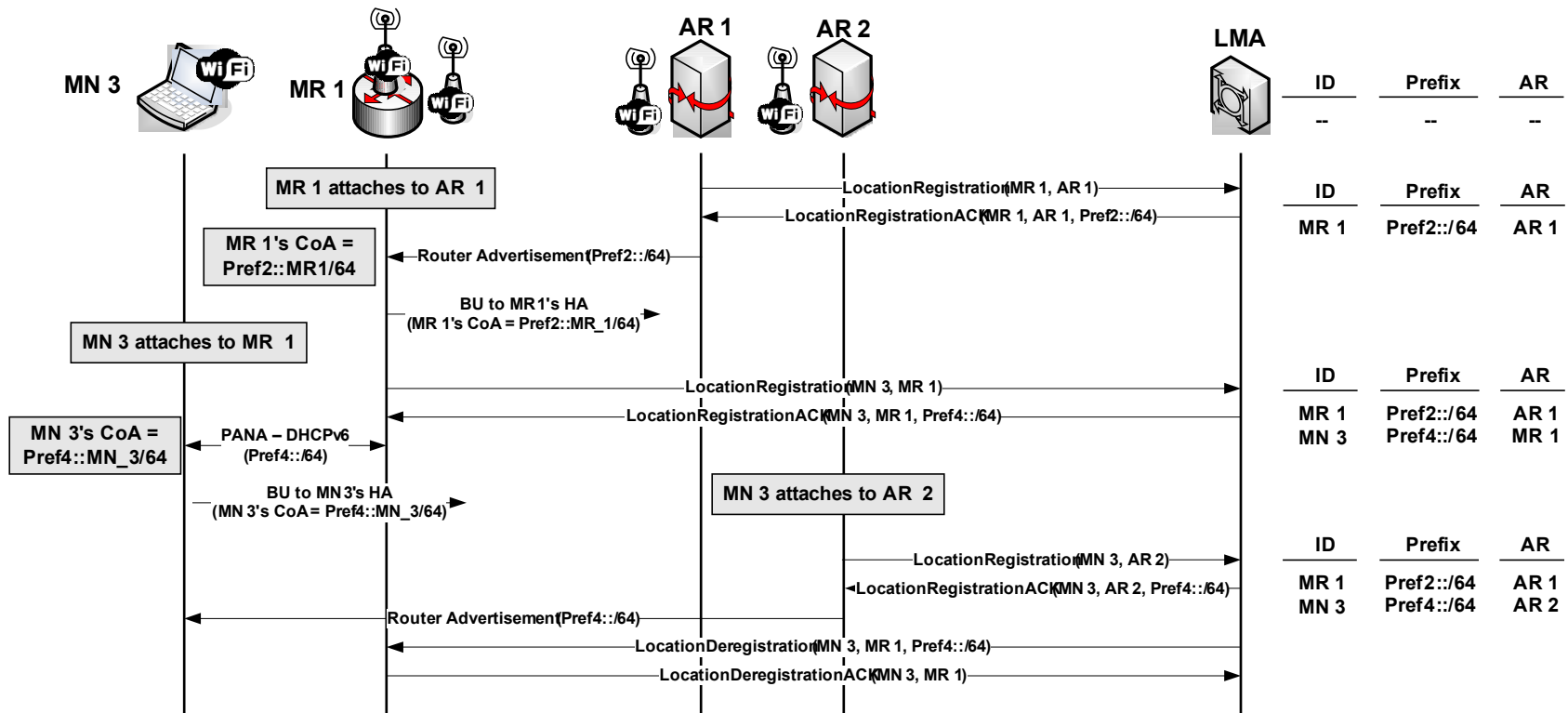
## Detailed protocol operation (I)





# MoAR: Mobile Access Router

## Detailed protocol operation (I)

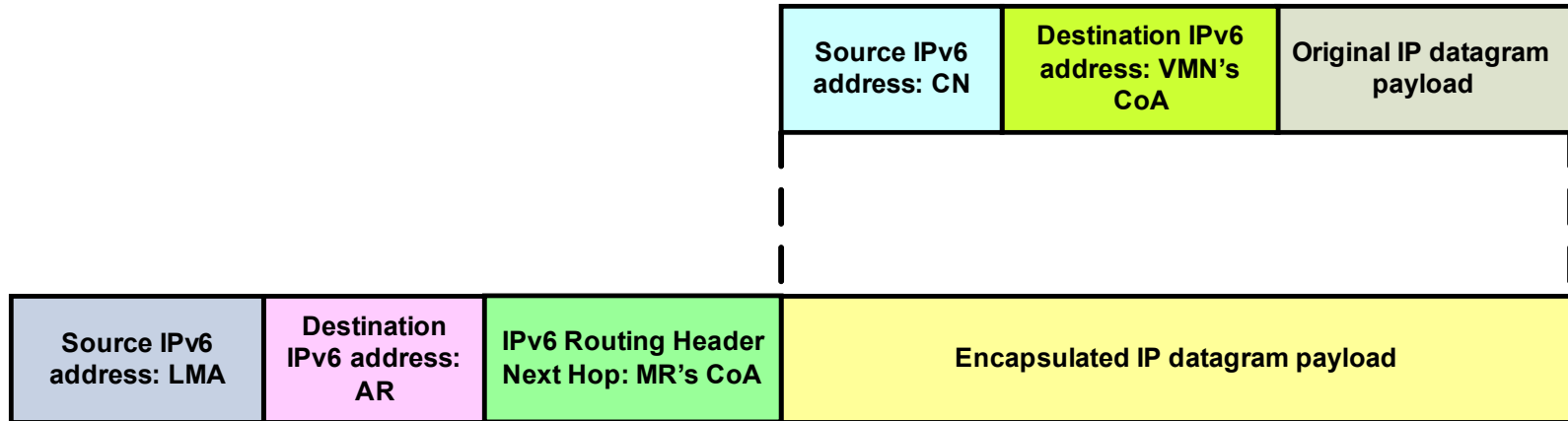




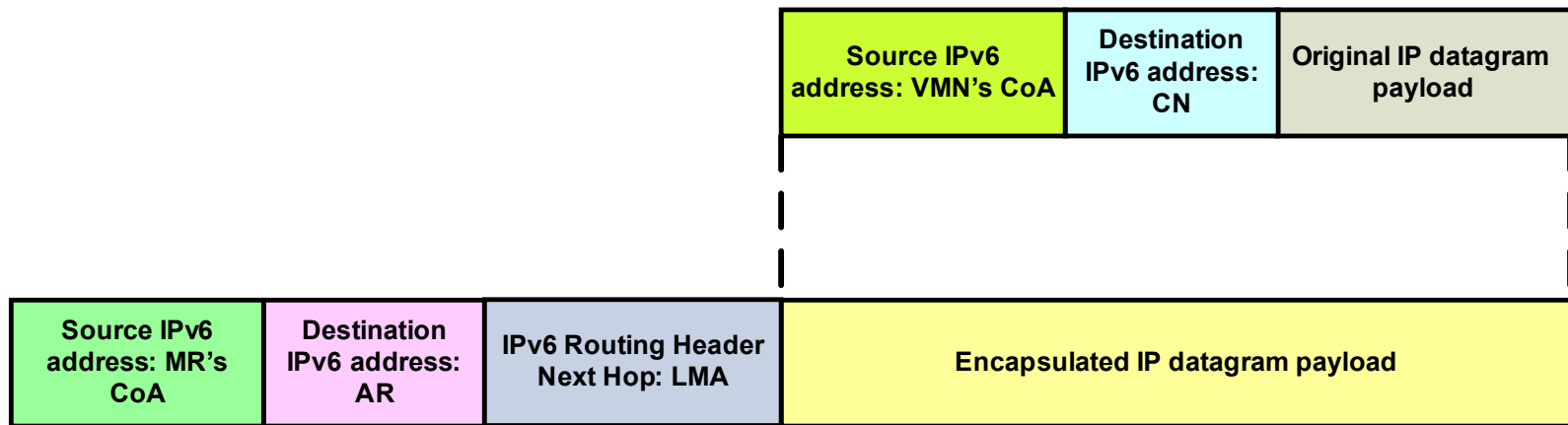


# MoAR: Mobile Access Router

## Detailed protocol operation (II)



Packet encapsulation (traffic from CN to VMN)



Packet encapsulation (traffic from VNN to CN)





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# Conclusions and Future work

- ▶ MoAR architecture enables extending Localised Mobility Domains with attached Mobile Networks
  - This integration has been proved to be useful in real use cases scenarios
  - It improves the overall performance and reduces signalling load
- ▶ Future work
  - Simulation and evaluation of the proposed architecture in several real deployment scenarios
  - Integration of NEMO and Proxy Mobile IPv6 (PMIPv6)

