

# Network-based Mobility Management

Internet Computing Laboratory @ KUT  
(<http://icl.kut.ac.kr>)

Youn-Hee Han

# Motivation

- ◆ Host-based MIP has been not yet deployed that much.
- ◆ WLAN switch device starts to provide link specific and proprietary solution for IP handover.
- ◆ Existing LMM protocol (e.g., HMIP) has interoperability problem
  - HMIP and MIP? OK.
  - But, HMIP and GMM protocols (HIP and MOBIKE) also OK?
- ◆ Operator's favoritism
  - Network-based XXX managed by operator itself.
- ◆ However, network based scheme does not scale well
- ◆ So, NetLMM (Network-based Localized Mobility Management)

# Solution Approach

## ◆ Solution Approach

- New LMM protocol that is scalable to topologically large networks, but requires no host stack involvement for LMM

## ◆ Mobility anchor points within the backbone access network

- The routes point to the ARs on which MNs currently are located.
- When an MN moves from one AR to another, the ARs send a route update to the mobility anchor point.

## ◆ However, the followings are needed at MN

- Generic mobility function (such as movement detection)
- to inform the AR about MN movement
  - ◆ It is needless if WLAN AP notifies it.

# Advantages of NetLMM

## ◆ Advantages

- No host stack change for LMM support
- NetLMM is independent of a GMM protocol (HIP and MOBIKE)
  - ◆ It can be a more modular mobility management protocol that better accommodates changing technology and market requirements.
- an IP level network-based LMM solution works for any link protocols

# Current Solution Candidate

## ◆ IETF NetLMM Design Team (DT)

- G. Giaretta - Telecom Italia
- K. Leung - Cisco
- M. Liebsch - NEC
- P. Roberts - Motorola
- K. Nishida - NTT DoCoMo Inc.
- H. Yokota - KDDI Labs
- M. Parthasarathy - Nokia
- H. Levkowitz – Ericsson

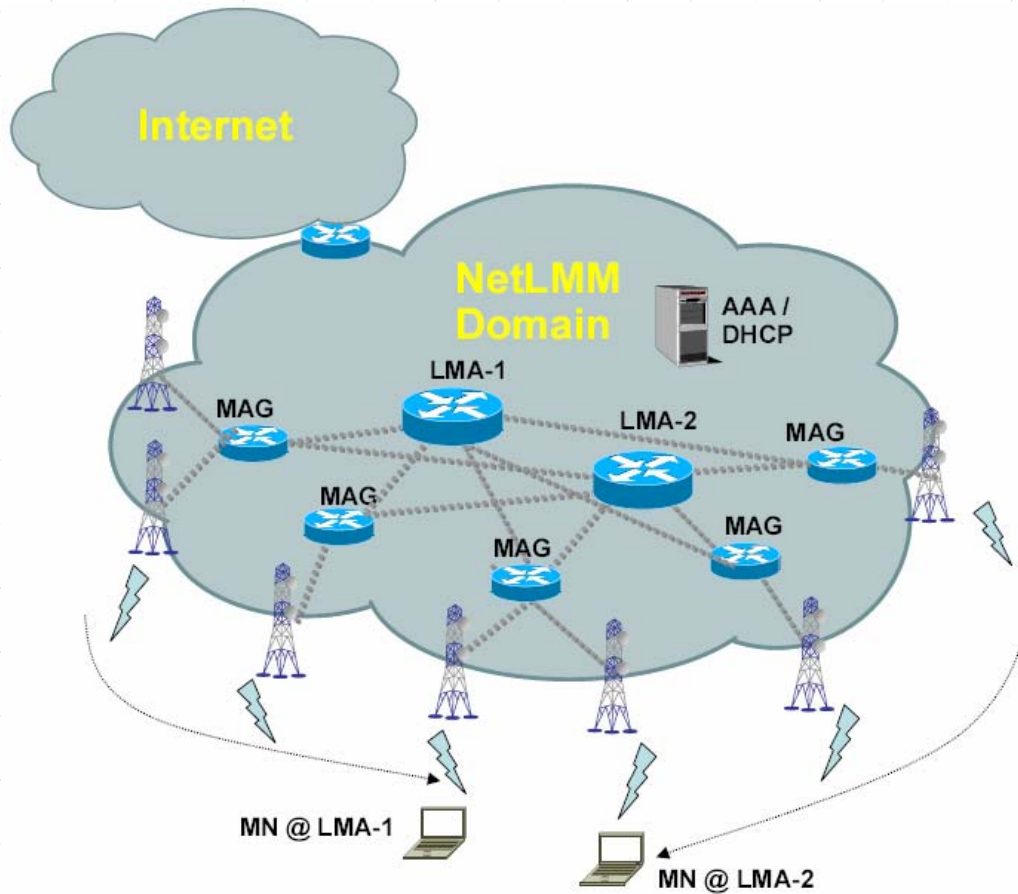
## ◆ **DT NetLMM Protocol** - draft-giaretta-netlmm-dt-protocol-00.txt

- It will be updated soon after NetLMM interim meeting (26-27 Sept.)

# Terminology

- ◆ **NetLMM Domain**
  - a set of multiple MAGs and a set of one or more LMAs interconnected within an access network
- ◆ **NetLMM Address**
  - The invariant IP address on the MN inside the NetLMM domain
- ◆ **NetLMM Network Prefix (NNP)**
  - the IPv6 link prefix of the NetLMM address.
- ◆ **Routing Tag (or Tunnel ID)**
  - An ID that is exchanged between MAGs and LMAs
  - It is used to distinguish traffic per MN
- ◆ **Mobile Access Gateway (MAG)**
  - a router that an MN is attached to as the first hop router.
- ◆ **Local Mobility Anchor (LMA)**
  - It is responsible to maintain packet forwarding information for the MNs
  - It terminates connections to multiple MAGs

# NetLMM Domain



- ◆ It is not assumed that a MAG can be associated with **multiple LMA**
- ◆ MN has NetLMM address anchored at LMA, which advertises the **NNP** via routing protocol.
- ◆ MN can move between MAGs **using the same NetLMM address** for data communications

# Data Structures in MAG and LMA

## ◆ Mobile Access Gateway (MAG)

- Data Structures
  - ◆ NetLMM Routing Cache
    - MN ID, MN NetLMM address, Routing Tag, LMA ID
  - ◆ LMA List
    - LMA ID, LMA IP Address, Forwarding Method, LMA Capabilities

## ◆ Local Mobility Anchor (LMA)

- Data Structures
  - ◆ NetLMM Routing Cache
    - MN ID, MN NetLMM address, Routing Tag, MAG ID
  - ◆ MAG List
    - MAG ID, MAG IP Address, Forwarding Method, MAG Capabilities



# Protocol Phase and Messages

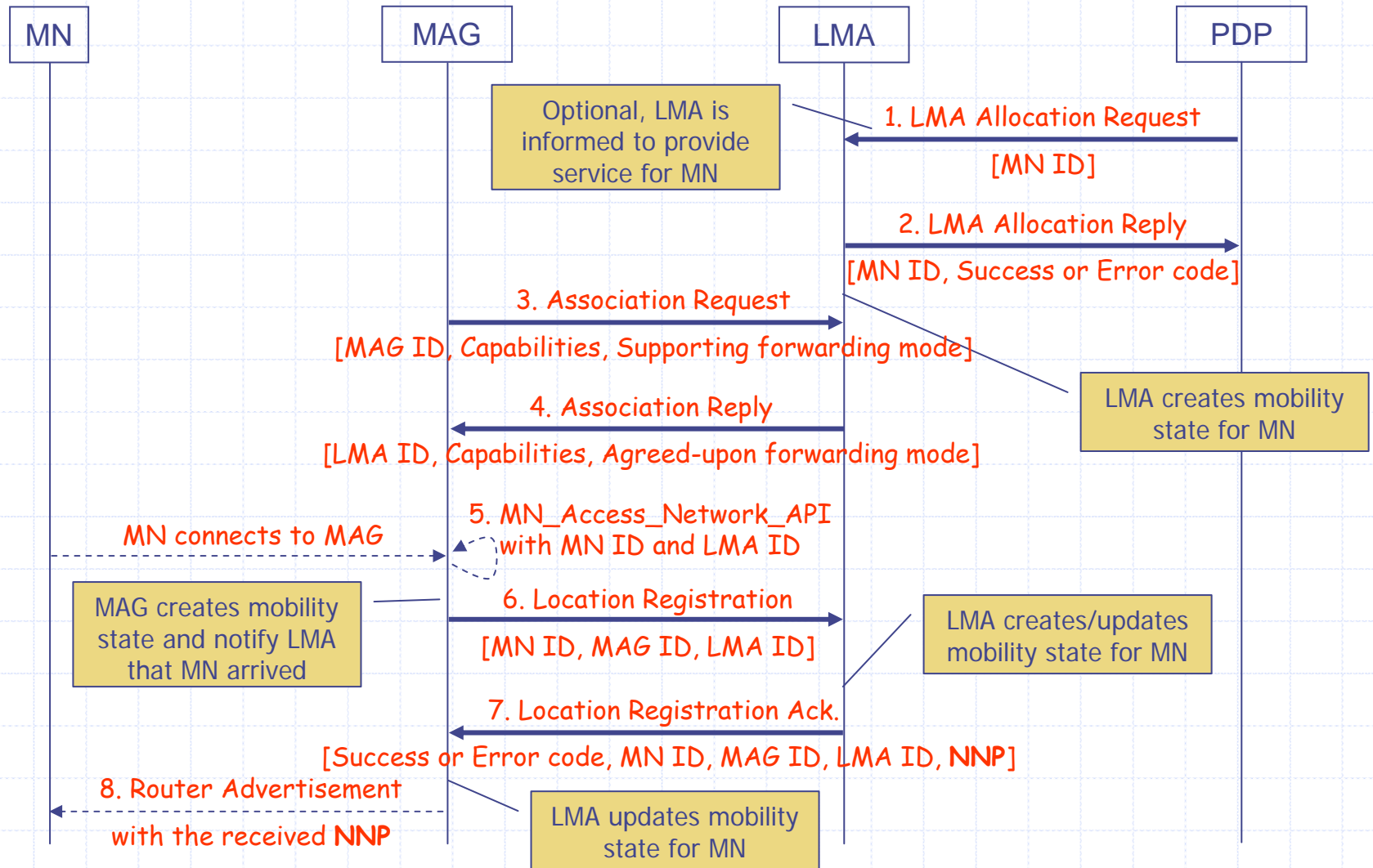
## ◆ Two major phases

- **Initiation phase**
  - ◆ Association Request/Reply
  - ◆ Disassociation Request/Reply
  - ◆ Heartbeat/Ack
- **Operational phase**
  - ◆ LMA Allocation Request/Reply
  - ◆ Location Registration/Ack
  - ◆ Location Deregistration/Ack
  - ◆ Routing Setup/Ack
  - ◆ Routing Removal/Ack
  - ◆ MN Address Setup/Ack
  - ◆ MN Address Removal/Ack

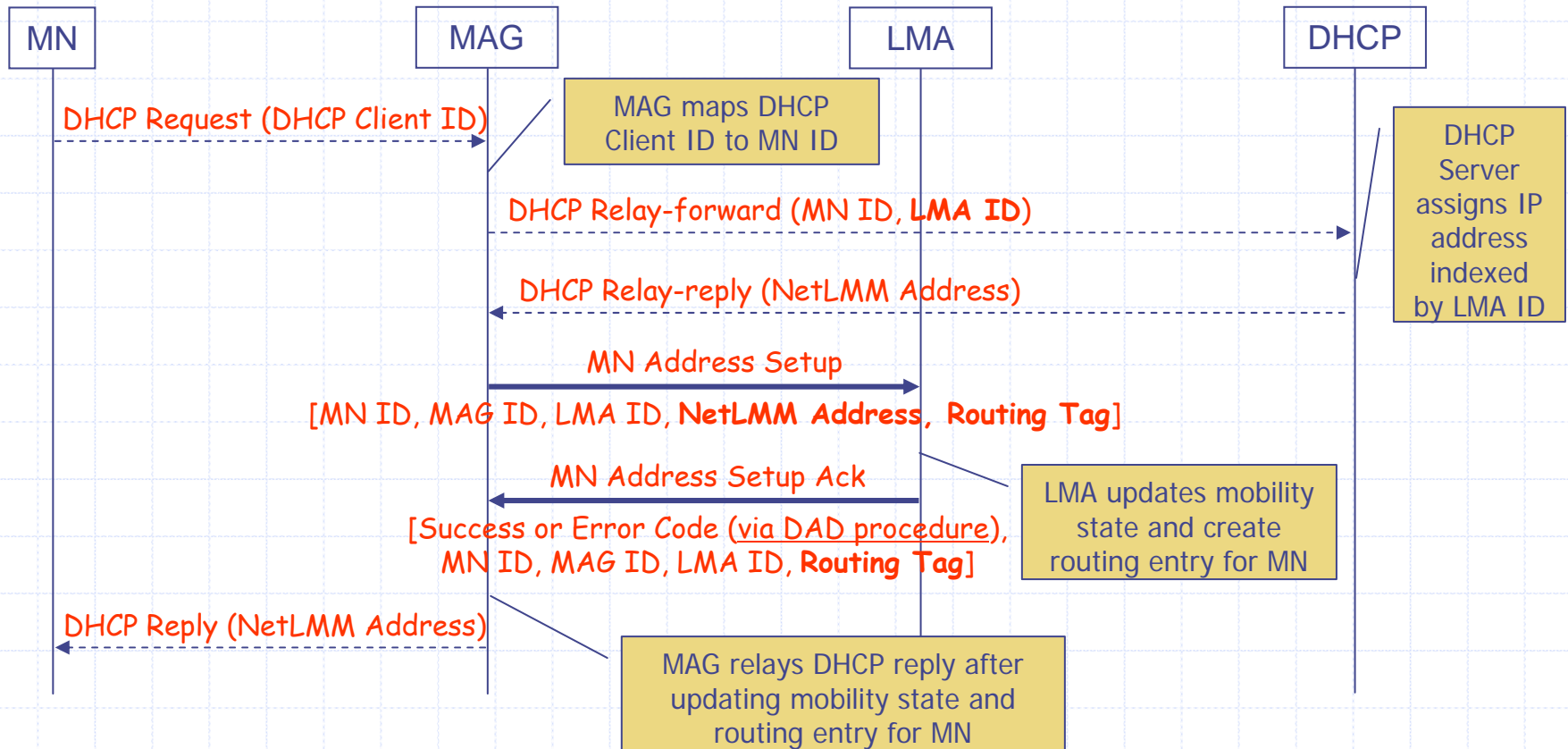
## ◆ Message Transport

- UDP with well known port number
  - ◆ It includes some reliability mechanism (e.g., retransmission and timers)

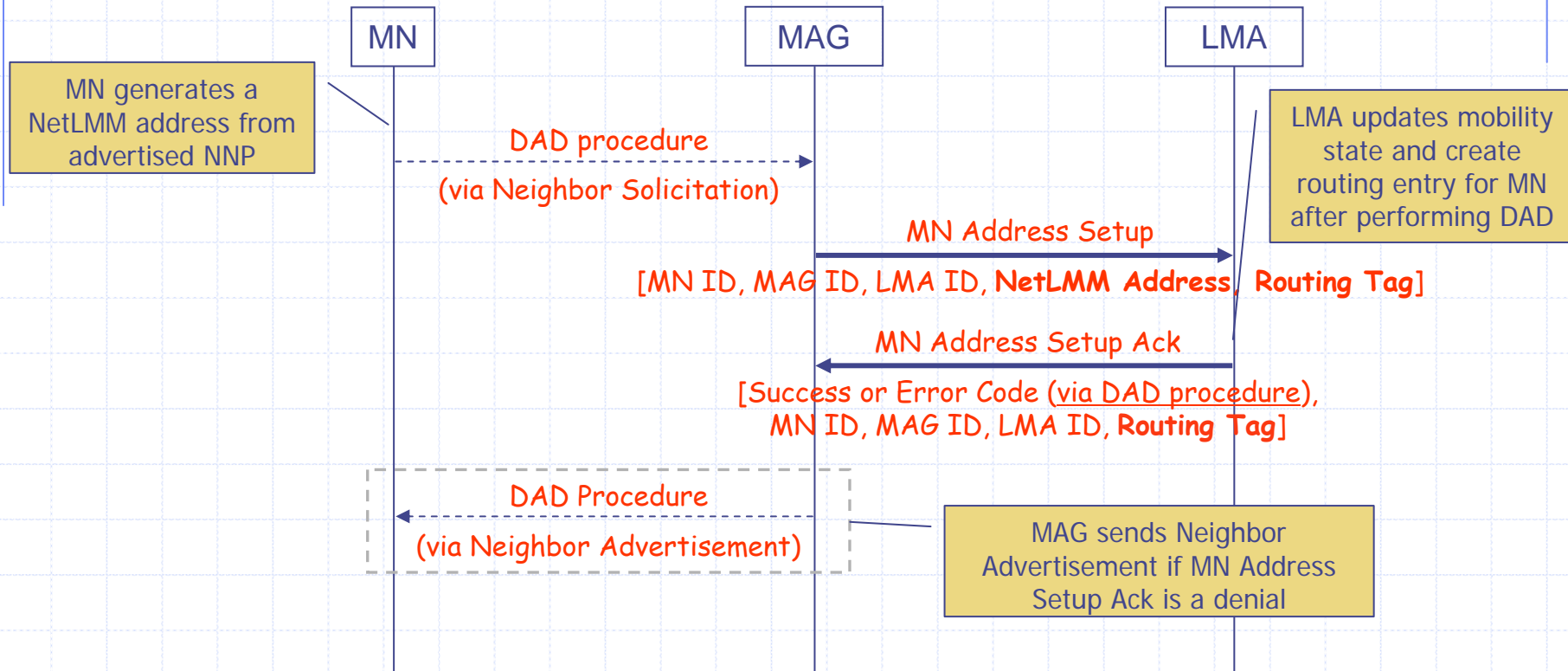
# Initial Network Access Procedure



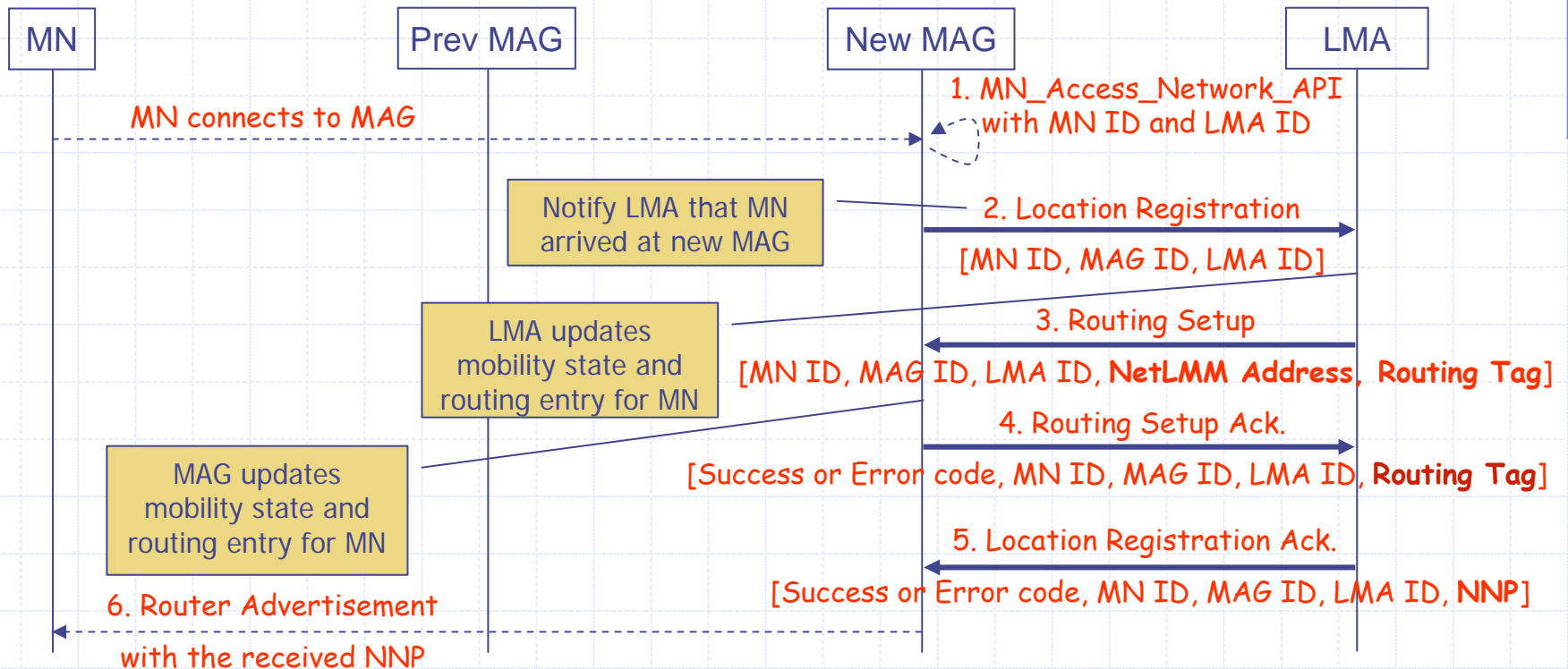
# MN Address Setup with Stateful Manner



# MN Address Setup with Stateless Manner

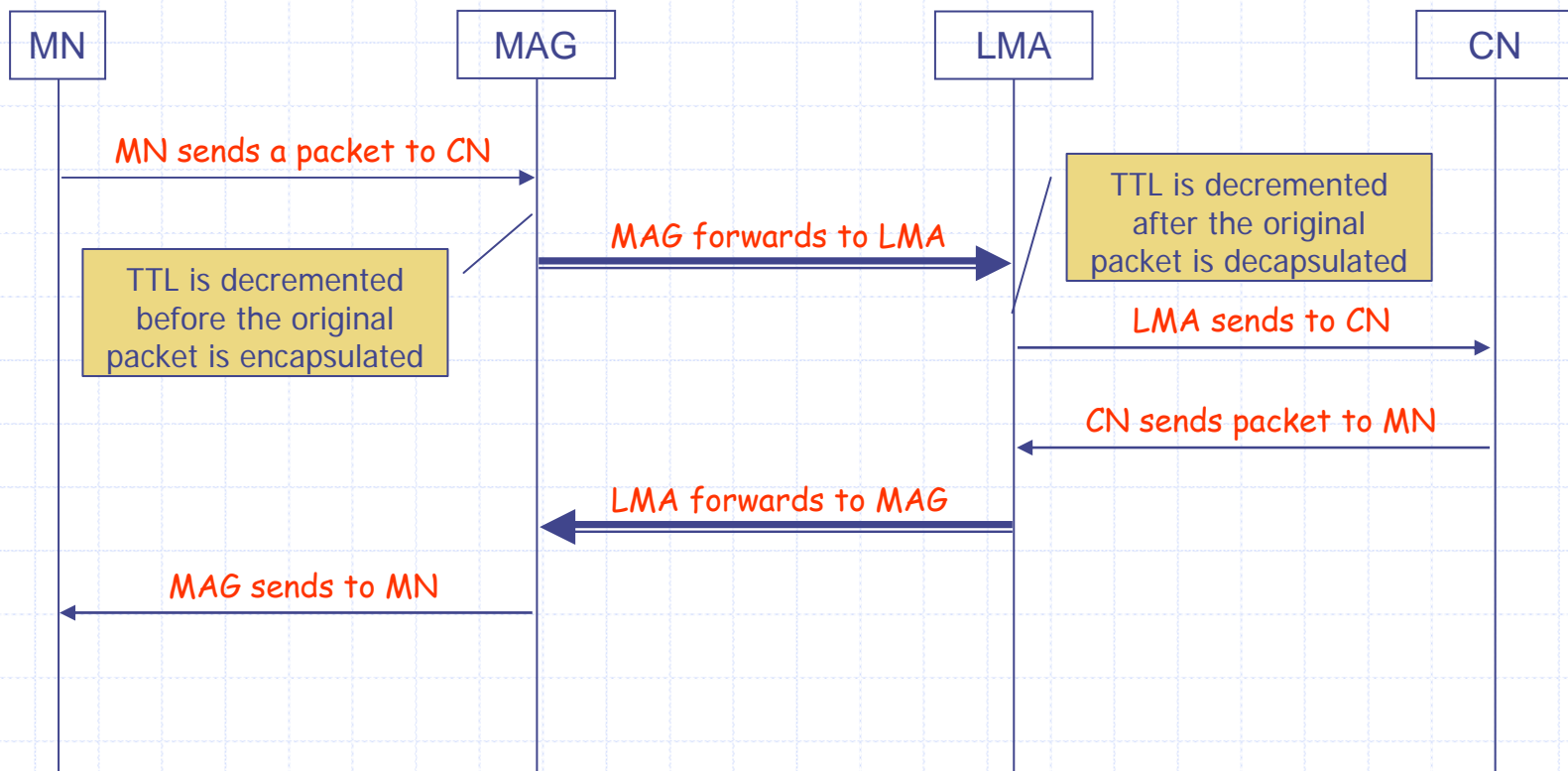


# Routing Setup



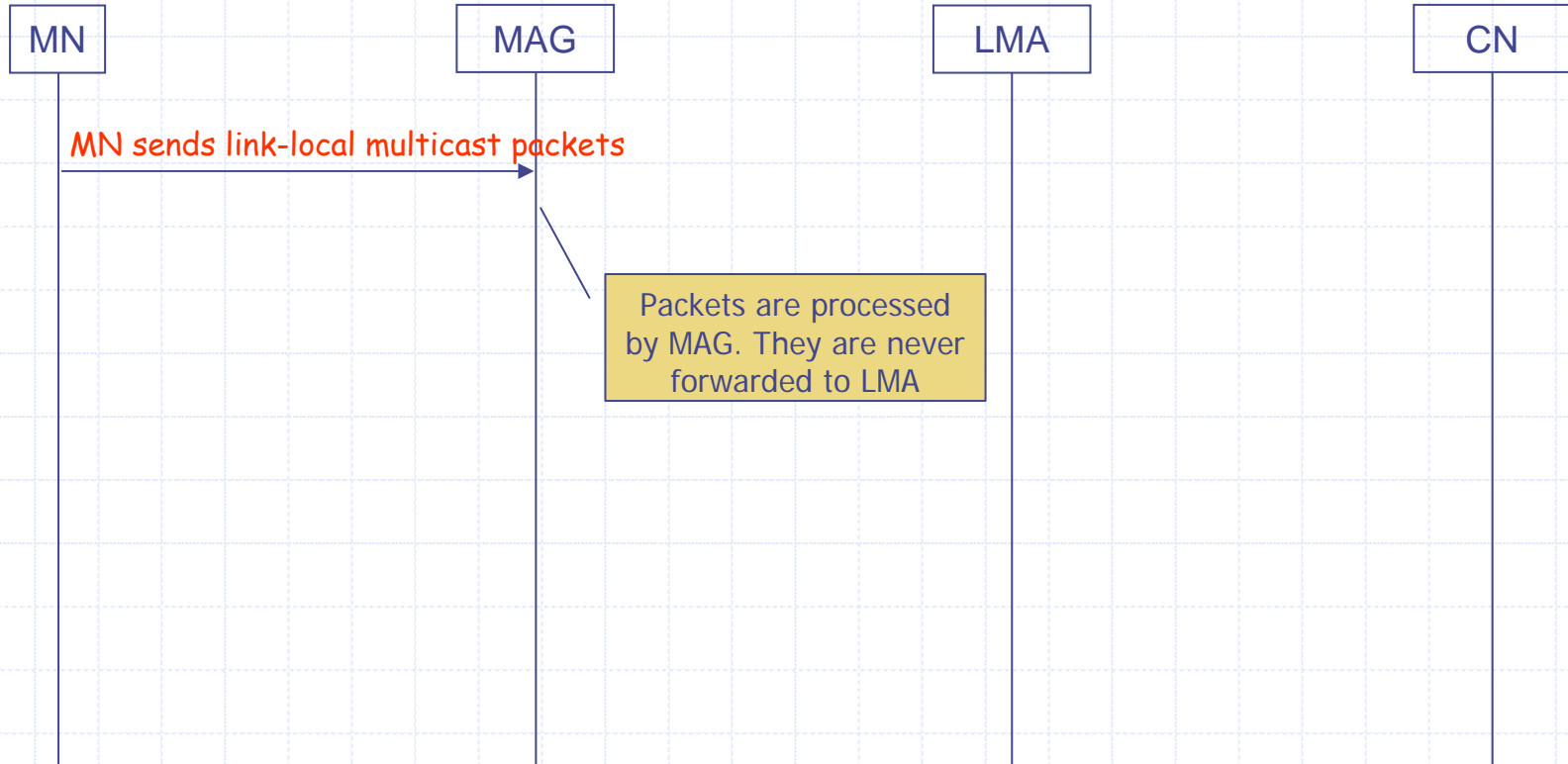
# Data Transport

- ◆ LMA's and MAG's routing cache
  - It maintains the associated location and forwarding information for each MN.
- ◆ IPv6-in-IPv6 MUST be supported



# Link-local Multicast Traffic

- ◆ The scope of link local multicast packets is confined to the link between MNs and the associated MAG node.
- ◆ MAG does not forward link local multicast packets.



## ◆ 과연 우리나라 Operator들은 얼마나 관심이 있는가?

### ■ 매력 포인트

- ◆ 단말기는 Plain IPv6 Stack만 가져도 된다는 점  
→ NetLMM 도입하기에 용이
- ◆ Operator들이 100% Mobility 를 지원한다는 점  
→ Management 하기에 용이

## ◆ NetLMM over WiBro ?

- 전국을 하나의 NetLMM Domain 으로 볼 수 있는가?
- 그렇지 않다면, 어느 정도의 범위가 NetLMM Domain으로 적당한가?
- WiBro 장비들 (RAS, ACR)에게 접목하기에 좋은가?

## ◆ How about NetGMM ?