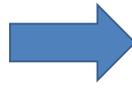


# NETWORK-BASED DMM DEMO



## DEMO KEY CONCEPTS

- The number of mobile users and their traffic demand are expected to be ever-increasing in future years
- This growth can represent a limitation for deploying current mobility management schemes that are intrinsically centralized, e.g., Mobile IPv6 and Proxy Mobile IPv6



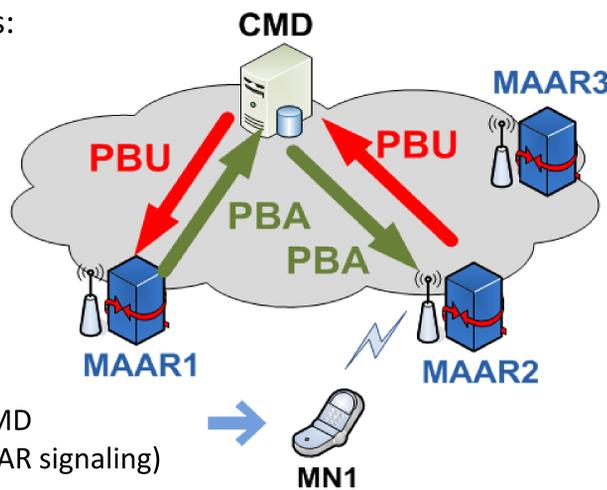
### DISTRIBUTED MOBILITY MANAGEMENT (DMM):

- Flat architecture for mobile networks
- “Anchors to the edge”: deployed in the default gateway of the MN
- Unified management for both 3GPP and non-3GPP accesses

## FULL FUNCTIONAL REAL-LIFE PROTOTYPE OF A NET-BASED DMM SOLUTION EMPLOYING:

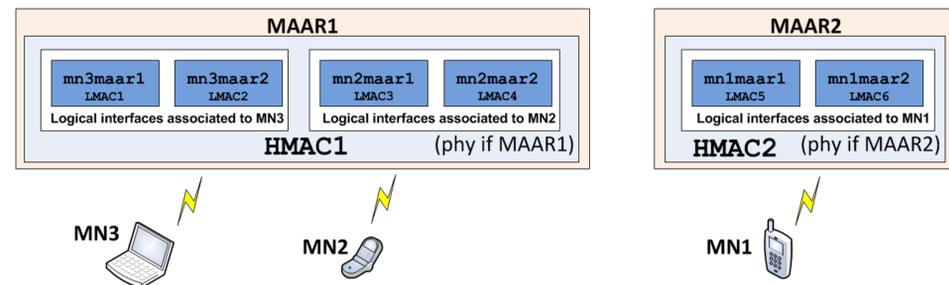
### A PMIPv6-BASED SOLUTION FOR DMM [1]

- Partially distributed approach for network-based DMM
  - Only data forwarding is distributed
- Entities
  - MAAR: Mobility Anchor and Access Router
    - First IP hop seen by the MNs connected on its access links.
    - It runs LMA and MAG functionalities
  - CMD: Central Mobility Database
    - It stores the mobility sessions for the MNs in the domain
- 3 different signaling modes:
  - CMD as PBU/PBA relay
  - CMD as MAAR locator
  - CMD as PBU/PBA proxy
    - CMD maintains the mobility sessions
    - CMD instructs MAAR on how to set up the packet forwarding
    - PBU/PBA signaling between MAARs and CMD (no direct MAAR-to-MAAR signaling)



### THE DISTRIBUTED LOGICAL INTERFACE CONCEPT [2]

- The Distributed Logical Interface (DLIF) is a software construct allowing to hide the change of anchor from the MN
- Each serving MAAR exposes itself towards a given MN as multiple routers, one per active anchoring MAAR associated to the MN
  - This is achieved by the serving MAAR configuring different logical interfaces
  - From the point of view of the MN, the anchoring MAARs are portrayed as different routers, although the MN is physically attached to a single physical interface of the serving MAAR



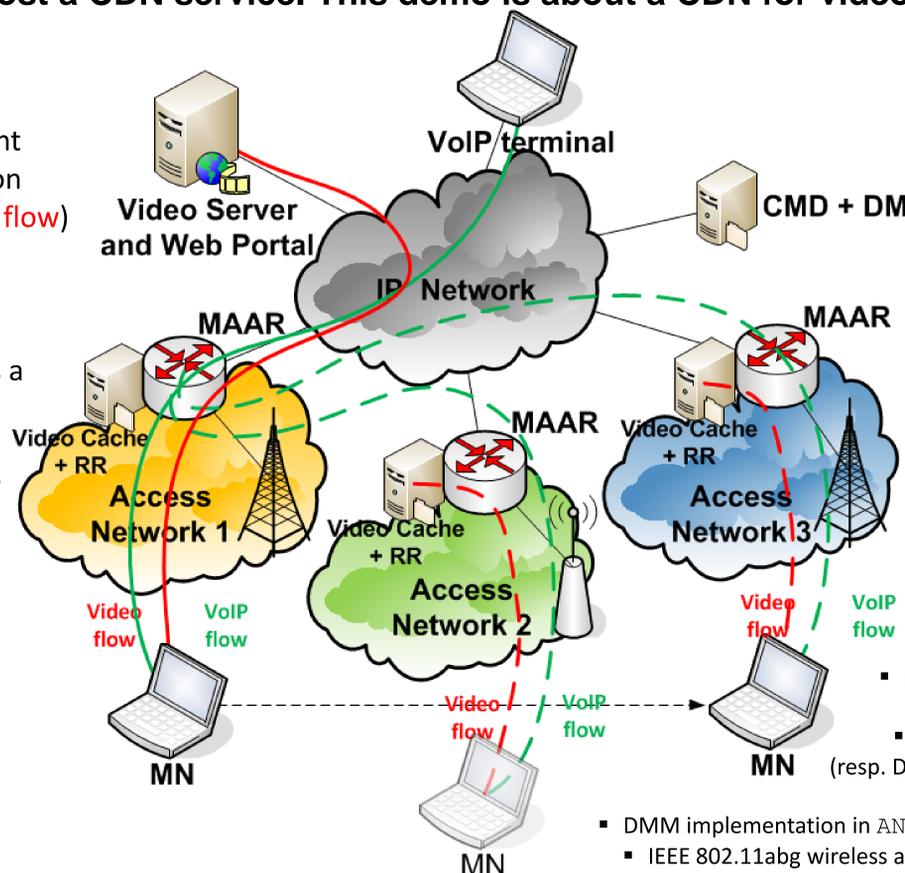
## DEMO USE CASE: CDN NODES CO-LOCATED WITH MAARs

Since users' IP sessions are no longer bound to the core network's anchor, the DMM flat and distributed architecture comes in handy to host a CDN service. This demo is about a CDN for video on-demand streaming.

### DEMO DESCRIPTION

- MN1 moves between the three different MAARs while having a VoIP conversation (green flow) and watching a video (red flow)
- A different (locally anchored) prefix is delegated by each MAAR

1. MN attaches to MAAR1 and starts/gets a VoIP flow
2. MN starts video application and gets it from cache@MAAR1 or Video Server
3. MN moves to MAAR2:
  - A. VoIP flow stays anchored to MAAR1 (the traffic is tunneled between the MAAR anchoring the flow and the MAAR serving the MN)
  - B. Video flow comes now from cache@MAAR2
4. MN moves to MAAR3
  - A. VoIP is still anchored to MAAR1
  - B. The video flow comes from cache@MAAR3



### VIDEO CHARACTERISTICS

- Dynamic Adaptive Streaming over HTTP (DASH)
- The file is truncated in multiple segments (chunks) downloaded using HTTP

### VIDEO SOURCE SELECTION

- The Request Routing (RR) function within a MAAR intercepts the HTTP requests and checks content availability
- If the content is present locally, the MAAR sends it directly to the MN
- If the requested chunk is not in cache, the RR negotiates with the Decision Manager (DM) the best source (either a remote server or another MAAR)

### TECHNICAL SPECS

- MAARs and CMD are Soekris net4826 routers, running Linux (Debian Squeeze) kernel 2.6.39 mobility support
- CN and MN are Asus EEE netbooks, running standard Linux (resp. Debian Squeeze and Ubuntu 12.04) with NO mobility support
  - DLIF concept implemented using macvlan support
- DMM implementation in ANSI C (partially developed within the MEDIEVAL EU project)
  - IEEE 802.11abg wireless access, with or without layer-2 handoff specific optimizations
- The CDN system is written in Perl. HTTP traffic interception is made with squid-cache
- Source-based IPv6 routing and tunneling by Linux Advanced Routing and Traffic Control features

## REFERENCES

[1] “A PMIPv6-based solution for Distributed Mobility Management”, Carlos J. Bernardos, A. de la Oliva, Fabio Giust, draft-bernardos-dmm-pmip-02, July 2013, <http://tools.ietf.org/html/draft-bernardos-dmm-pmip-02>

[2] “PMIPv6-based distributed anchoring”, Carlos J. Bernardos, Juan Carlos Zúñiga, draft-bernardos-dmm-distributed-anchoring-02, April 2013, <http://tools.ietf.org/html/draft-bernardos-dmm-distributed-anchoring-02>