Network-based and Client-based DMM solutions using Mobile IP mechanisms

draft-bernardos-dmm-cmip-07
draft-bernardos-dmm-pmip-08
draft-bernardos-dmm-distributed-anchoring-09

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Outline

• Motivation

• Client-based DMM

• Network-based DMM
  • Distributed Logical Interface

• Demos & Open Source

• Next Steps
Motivation

• 4 main DMM WG documents (fpc-cpdp, anchoring, deployment models and ondemand) close to be completed
  • But no solution specification yet

• There exist MIP-based (both client and network) solutions that could be adopted
  • With implementations available
Extending existing protocols…

- **Client Mobile IP (host) based**
  - draft-bernardos-dmm-cmip-07

- **Proxy Mobile IP (network) based**
  - draft-bernardos-dmm-pmip-08
Client-based DMM. Overview

- Re-uses existing approaches
  - Mobile IPv6 : RFC 6275
  - Authorizing MIPv6 BU with CGAs
    - draft-laganier-mext-cga
- Mobility management pushed to the edge of the network
  - The HA is deployed at the access router level
Client-based DMM. Entities

• Distributed Anchor Router (DAR)
  • Deployed in the MN’s default gateway
    • First hop router
  • It assigns a topologically valid address to MNs
  • An on-link MN can send/receive traffic using the address from the DAR
    • DAR forwards such packets as a plain router
  • A DAR anchors the address it assigned when the MN is not on-link (HA role)
    • The MN’s address is reachable through a bi-directional IP tunnel
Client-based DMM. Operations (i)

- When the MN moves to a new DAR, it can keep the old address reachability by notifying the corresponding DAR with a BU.
Client-based DMM. Operations (ii)

- The address configured at the new DAR is used for new sessions
- Old sessions are redirected through the IP tunnel
Net-based DMM. Overview

• Network based DMM approach
  • Based on Proxy Mobile IPv6 (RFC 5213)
• Mobility management pushed to the edge
  • Access router level
• Partially distributed solution
  • Centralized control plane kind-of LMA
    • A central node stores the mobility sessions of MNs
  • Distributed data plane
    • Only the edge routers handle the data forwarding
Net-based DMM. Entities

• **Mobility Anchor and Access Router (MAAR)**
  • One IP hop distance from the MN
  • Concentrates AR, LMA and MAG functionalities on a per-MN, per-prefix basis
  • Delegates and anchors an IP prefix to each MN attached
    • Serving MAAR (S-MAAR): MAAR which the MN is currently attached to
    • Anchor MAAR (A-MAAR): previously visited MAAR anchoring a prefix used by an active flow of the MN
  • Forwards data packets to/from IP networks

• **Central Mobility Database (CMD)**
  • Central node storing the BCEs of all the MNs in the domain
  • It plays the role of the LMA for the control plane
  • Not traversed by data packets
Net-based DMM
Operations: initial registration

- The S-MAAR registers the MN at the CMD through a PBU/PBA handshake.
Net-based DMM
Operations: handover

• 3 operational modes:
  • CMD as PBU/PBA relay
  • CMD as MAAR locator
  • CMD as PBU/PBA proxy

• Conceptually they are similar
  • The difference mainly consists on the message order

• We focus on the “proxy” mode
  • Already implemented
Net-based DMM
CMD as PBU/PBA proxy

• The CMD receives a PBU from the new S-MAAR announcing the MN attachment

• The CMD sends instructions to the S-MAAR and A-MAAR(s) on how to establish the proper routing configuration
Distributed Logical Interface

- Distributed Logical Interface (DLIF) concept
  - The DLIF is a software construct allowing to hide the change of anchor from the MN
  - Each serving D-GW exposes itself towards a given MN as multiple routers, one per active anchoring D-GW associated to the MN
    - This is achieved is by the serving D-GW configuring different logical interfaces
    - From the point of view of the MN, anchoring D-GWs are portrayed as different routers, although the MN is physically attached to only to the serving D-GW
  - The DLIF concept is also applicable to other network-based solutions
DLIF. Solution overview

Operator’s core

IP stack
mn1dgw1
phy interface
D-GW1

IP stack
mn1dgw1
mn1dgw2
phy interface
D-GW2

PrefA::/64
(AdvPrefLft=0)
PrefB::/64

PrefA::MN1/64 (deprecated)
PrefB::MN1/64

MN1

PrefA::/64

(DLIFs)
DLIF. Solution overview
Demos & Open Source

- Network-based DMM demonstrations

83rd IETF, Paris (March 2012)

87th IETF, Berlin (July 2013)
Demos & Open Source

- **ODMM**: Open platform for DMM solutions
  - [https://www.odmm.net](https://www.odmm.net)
  - GitHub repo [http://github.com/ODMM](http://github.com/ODMM)

- Platform hosting Open Source DMM implementations
  - Mobility Anchors Distribution for PMIPv6 (MAD-PMIPv6)
    - [https://odmm.net/node/12](https://odmm.net/node/12)
    - draft-bernardos-dmm-pmip & draft-bernardos-dmm-distributed-anchoring
  - Client DMM over MIPv6 (C-DMM)
    - [https://odmm.net/node/11](https://odmm.net/node/11)
    - draft-bernardos-dmm-cmip

- OpenFlow-DMM
  - Software-Defined Networking (SDN) implementation
Next steps

- Is the WG interested in standardizing (Proxy) Mobile-IPv6 based solutions?

- These 3 drafts can be taken as starting point
  - Been discussed several times
  - Published as academic papers
  - Open source implementations available
    - Used in EU-funded projects