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Outline

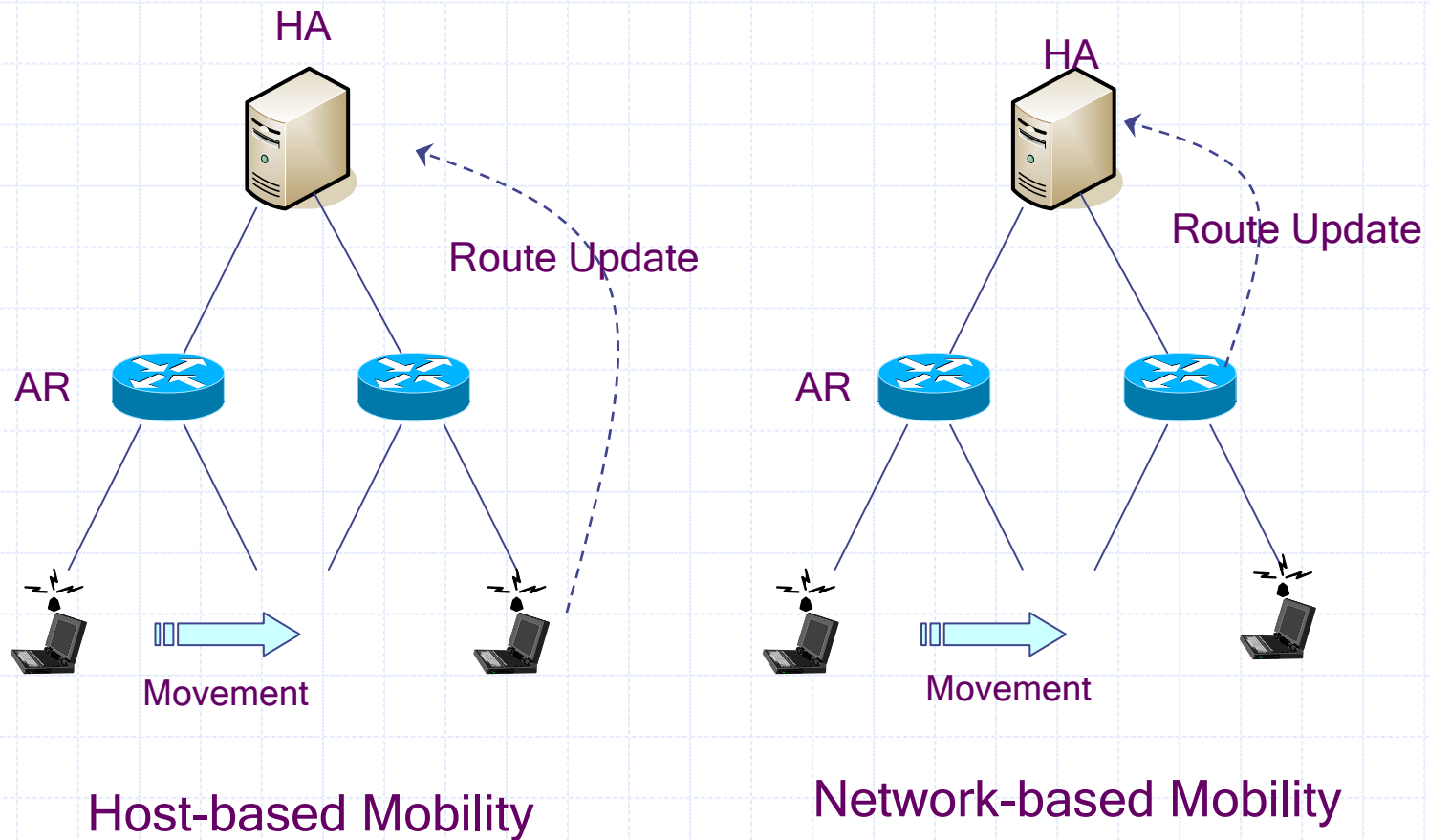
- ◆ **Background**
- ◆ **67th IETF Activities**
- ◆ **PMIPv6 vs. NetLMM DT (Design Team) Solution**
 - **PMIPv6 - Proxy Mobile IPv6**
 - **NetLMM - Network-based Localized Mobility Management**
- ◆ **PMIPv6 Features**
- ◆ **PMIPv6 Procedures and Operations**
- ◆ **Conclusions**

Background

- ◆ Host-based Mobile IPv4/v6 (RFC 3344/3775) has not been yet deployed that much.
- ◆ WLAN switch device starts to provide link specific and proprietary solution for IP handover.
- ◆ 3GPP2 and WiMAX operators are now deploying their non-standardized network-based Mobile IPv4 (not Mobile IPv4!).
- ◆ Operator's favoritism
 - Network-based XXX managed by operator itself.
- ◆ IETF NetLMM WG started to standardize a network-based mobility management protocol.

Background

◆ Host-based vs. Network-based Mobility



67th IETF Activities

◆ Before 67th IETF Meeting (Nov. 5~10, 2006)

■ IETF MIPv6 WG

◆ Proxy Mobile IPv6

- draft-sgundave-mipv6-proxymipv6
- draft-chowdhury-netmip6-01

■ IETF NetLMM WG

◆ DT (Design Team) Solution

- draft-giaretta-netlmm-dt-protocol
 - draft-akiyoshi-netlmm-protocol
 - draft-giaretta-netlmm-protocol
 - draft-gundavelli-netlmm-mipv6-proxy
 - draft-raman-netlmm-protocol
 - draft-templin-autoconf-netlmm-dhcp
 - draft-vidya-netlmm-netmob
 - draft-wanghui-netlmm-protocol

◆ DHCP-based solution

- draft-templin-autoconf-netlmm-dhcp

■ In MIPv6/NetLMM WG mailing list, so much mailing discussion!!!

67th IETF Activities

◆ During 67th IETF Meeting

■ IETF NetLMM WG

◆ Proxy Mobile IPv6

- [draft-sgundave-mipv6-proxymipv6](#) (First Author – Cisco) [1]
- [draft-chowdhury-netmip6-01](#) (First Author – Starent Networks) [2]

◆ DT (Design Team) Solution

- [draft-giaretta-netlmm-dt-protocol](#) (First Author – Ericsson) [3]

◆ DHCP-based solution

- [draft-templin-autoconf-netlmm-dhcp](#) (First Author – Boeing) [4]

■ Before voting, there are already many input from other SDOs

◆ 3GPP2 Correspondence to IETF on NetLMM WG

- *"3GPP2 has made a decision to use the Proxy Mobile IP concept as a network based mobility management solution."*

◆ Voice of a person from WiMAX

- *"WiMAX adopted PMIP. PLEASE make it standardized in IETF."*

67th IETF Activities

◆ Voting Results

- Vote 1: NETLMM WG should adopt more than one draft.
 - ◆ Overwhelming support against → Just one solution!

- Vote 2: Which one is our solution?
 - ◆ A Proxy MIPv6, [1] or [2]: 45 peoples → So, PMIP is selected!
 - ◆ DT Solution, [3]: 30 peoples
 - ◆ DHCP-based Solution, [4]: 10 peoples

- Vote 3: Then, which PMIP is adopted as a starting point?
 - ◆ [1]: 18 peoples
 - ◆ [2]: 7 peoples
 - ◆ Abstain and wait: 28 peoples → Harmonize!

PMIPv6 vs. NetLMM

◆ PMIPv6 vs. NetLMM DT Solution

- Global Mobility vs. Local Mobility
- RFC 3775 MIPv6 Re-use vs. new design
- Signaling messages
 - ◆ Mobility Header vs. UDP messages
- IP Protocol dependency
 - ◆ PMIP
 - PMIPv4
 - No standardized specification. But it is already deployed by CISCO
 - PMIPv6
 - ◆ NetLMM makes its protocol general so that both IPv4 and IPv6 are supported
- Other SDO's favoritism
 - ◆ Advocate PMIP and be hostile to NetLMM DT Solution

Goal and Advantages of PMIPv6

- ◆ S. Gundavelli (CISCO), K. Leung (CISCO), and V. Devarapalli (Azaire Networks), "Proxy Mobile IPv6," draft-sgundave-mipv6-proxymipv6-00, October 16, 2006

- ◆ GOAL
 - This protocol is for enabling any IPv6 host to achieve protocol mobility without requiring the host to participate in any mobility related signaling.

- ◆ Advantages
 - No host stack change for IP mobility
 - Avoiding tunneling overhead over the air

Re-use of Mobile IPv6

- ◆ PMIPv6 is based on Mobile IPv6 [RFC3775].
 - Mobile IPv6 is a very mature mobility protocol for IPv6.
 - Numerous Mobile IPv6 enhancement can be re-used.
 - PMIPv6 allows the same Home Agent to provide mobility to hosts that do not use any mobility management protocol as well as hosts that use Mobile IPv6.

- ◆ PMIPv6 provides solution to a real deployment problem.

Home in Any Place

◆ Important Features

- MN will always obtain its “home-address”, any where in the network.
- The access router will emulate the home link on its access link.
 - ◆ It will ensure that MN believes it is at its home.
- A new function, **Proxy Mobile Agent**, that runs on the access router is required for this scheme to work.

Procedure Overview

Proxy Mobile IPv6 Overview

Mobile IP Tunnel

A IPinIP tunnel HA and PMA.

Home Network

MN's Home Network (Topological Anchor Point)

Prefix
CAFÉ::/64



PMA2

Home Agent

PMA1

LMM Network

Access Router

Proxy Binding Update (PBU)

Control message sent out by PMA to HA to register its correct location

Prefix
BABA::/64



Care of Address (CoA)

The address of the Proxy Mobile Agent. That will be the tunnel end-point.

Procedure Overview

◆ Network Entry Procedure

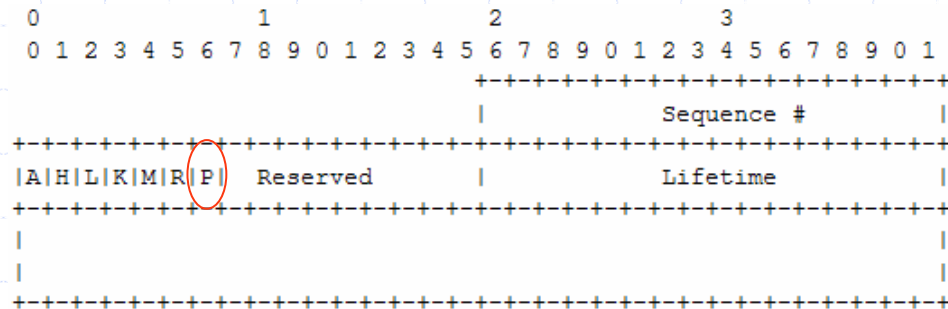
1. MN moves and attaches to an access router
2. After access authentication, access router (Proxy Mobile Agent, PMA) identifies MN
3. PMA obtains MN's profile containing the Home Address ..etc
4. PMA sends the **Proxy Binding Update** on behalf of MN
5. PMA sends **Router Advertisements containing MN's home network prefix**
 - ◆ Stateless Case
 - MN will still configure (or maintain) the same as its home address.
 - ◆ Stateful Case:
 - the network will ensure that it always gets its home address.

Operation Overview

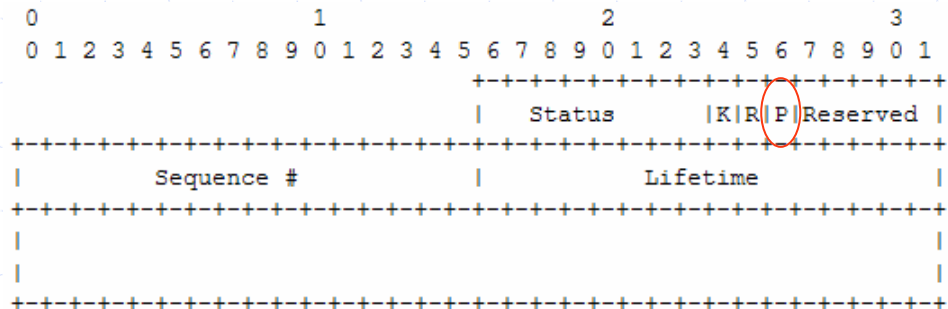
◆ Home Agent Operation

- The home agent needs to understand the Proxy Registration.
 - ◆ It needs to accept Proxy registrations from certain trusted network entities.
 - ◆ It has to modify the typical 3775 trust model to support Proxy Model.

Proxy Binding Update



Proxy Binding Acknowledgement



Operation Overview

◆ Home Agent Operation

- HA-MN tunnel is a shared tunnel among many MNs.
 - ◆ 1:1 relation → m:1 relation
 - ◆ One tunnel is associated to multiple BCE.
 - ◆ Life-time of a tunnel should not be dependent on the life time of any single BCE.

- Home Agent will add host/prefix routes to the mobile home address/prefix over the tunnel.

Operation Overview

◆ Proxy Mobile Agent Operation

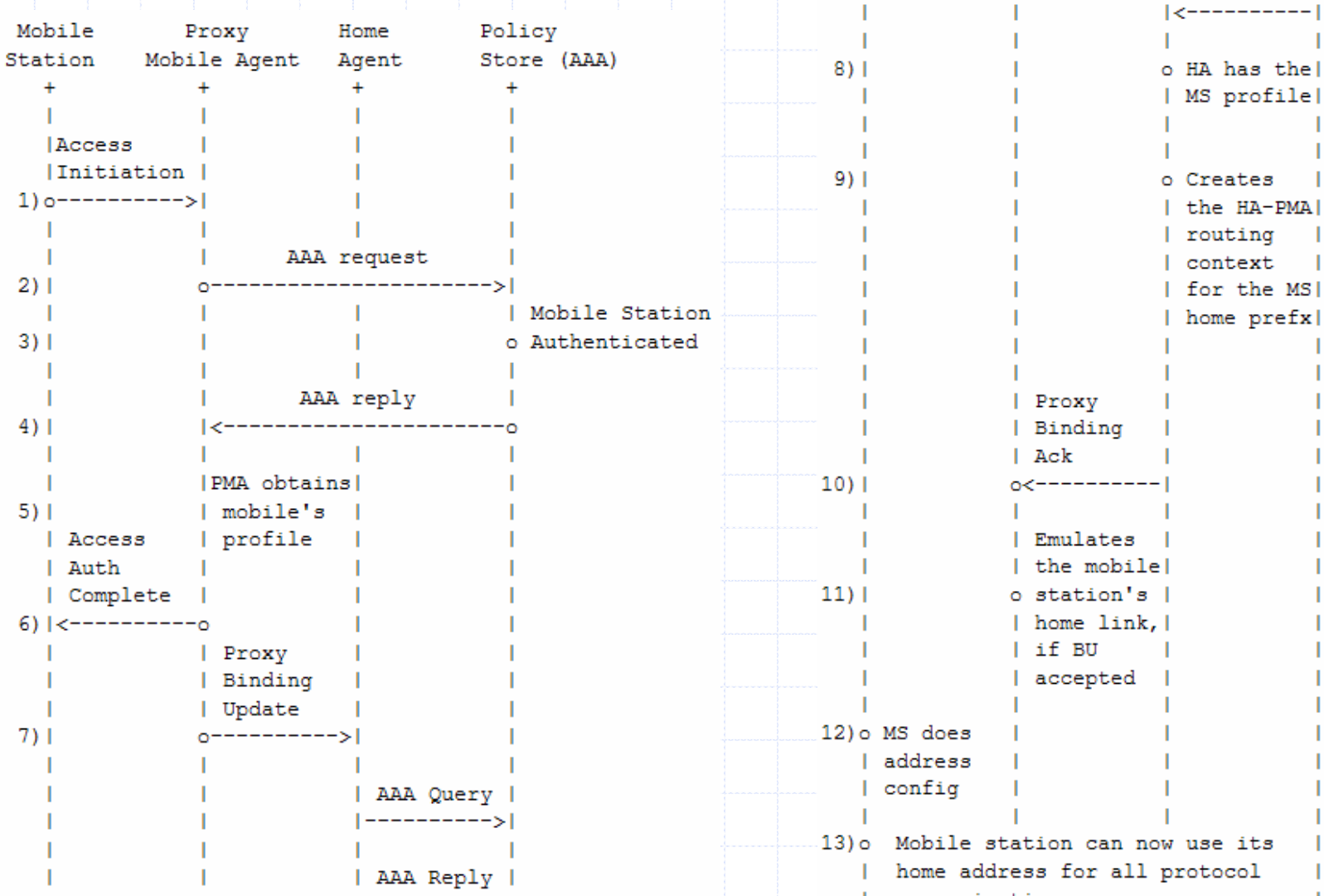
- It emulates the home link for each MN.
- After the access authentication, PMA will obtain MN's profile which contains:
 - ◆ MN's home address
 - ◆ home network prefix
 - ◆ home agent address ..etc.
- PMA sends a **Proxy Binding Update** to MN's home agent.
- It establishes a **IPv6/IPv6 tunnel** with its home agent.
 - ◆ All the packets from MN are reverse tunneled to its home agent
 - ◆ All the packets from the tunnel are routed to MN.

Operation Overview

◆ Mobile Node Operation

- Any MN is **just a IPv6 host** with its protocol operation consistent with the base IPv6 specification.
 - ◆ All aspects of Neighbor Discovery Protocol will not change.
- When MN attaches to a new AR, it receives a Router Advertisement message from the AR **with its home prefix**.
- Throughout the PMIP domain, MN using DHCP procedure or in stateless address configuration mode, will obtain **the same home address**.

PMIPv6 Call Flow



Another PMIP Specification

- ◆ K. Chowdhury (Starent Networks) and A. Singh (Motorola), "Network Based Layer 3 Connectivity and Mobility Management for IPv6," draft-chowdhury-netmip6-01

- ◆ Covers both:
 - DHCP case
 - PPP/IPCP case

- ◆ Features
 - Supports both IPv6 and IPv4 addressing
 - No new MH and MO introduced
 - Addresses Inter Access Router (AR) handoffs
 - ◆ Inter AR signaling with ICMPv6 extensions
 - Includes HMIP6 consideration
 - ◆ Proxy HMIP6 within the MAP footprint

Conclusions

- ◆ We expect the harmonized version of PMIP
 - draft-sgundave-mip6-proxymip6-00
 - draft-chowdhury-netmip6-01

- ◆ PMIP is New Idea?
 - Absolutely No!

- ◆ Not new idea, but **new trend!**. It's a turn for the better!
 - Why host-based MIP is not deployed yet?
 - ◆ Waste of air resource
 - ◆ Too heavy specification to be implemented at a small terminal
 - ◆ Battery problem
 - Until now, long confrontation
 - ◆ Telecommunication Operators ↔ Internet Developers and Users

- ◆ PMIP is a good example of technical settlement
 - It is still RFC 3775 MIP-based one.
 - But, it follows telco's favoritism!