

Future Network - Mobility

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Outline

- Overview of ISO/IEC WD 29181-4
 - Future Network: Problem Statements and Requirement - Mobility
- Introduction to MOFI
 - Architecture of Future Internet for Mobile Environment
 - Project sponsored by Korean government

ISO/IEC 29181-4: Status

- ISO/IEC JTC1/SC6/WG7
- Title:
 - Future Network:
Problem Statements
and Requirements -
Mobility
- Status
 - Technical Report (TR)
 - WD 29181-4 (as of 2011)

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TELECOMMUNICATION AND INFORMATION	
EXCHANGE BETWEEN SYSTEMS	
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Information Technology — Future Network: Problem Statement and Requirements — Part 4: Mobility

Warning

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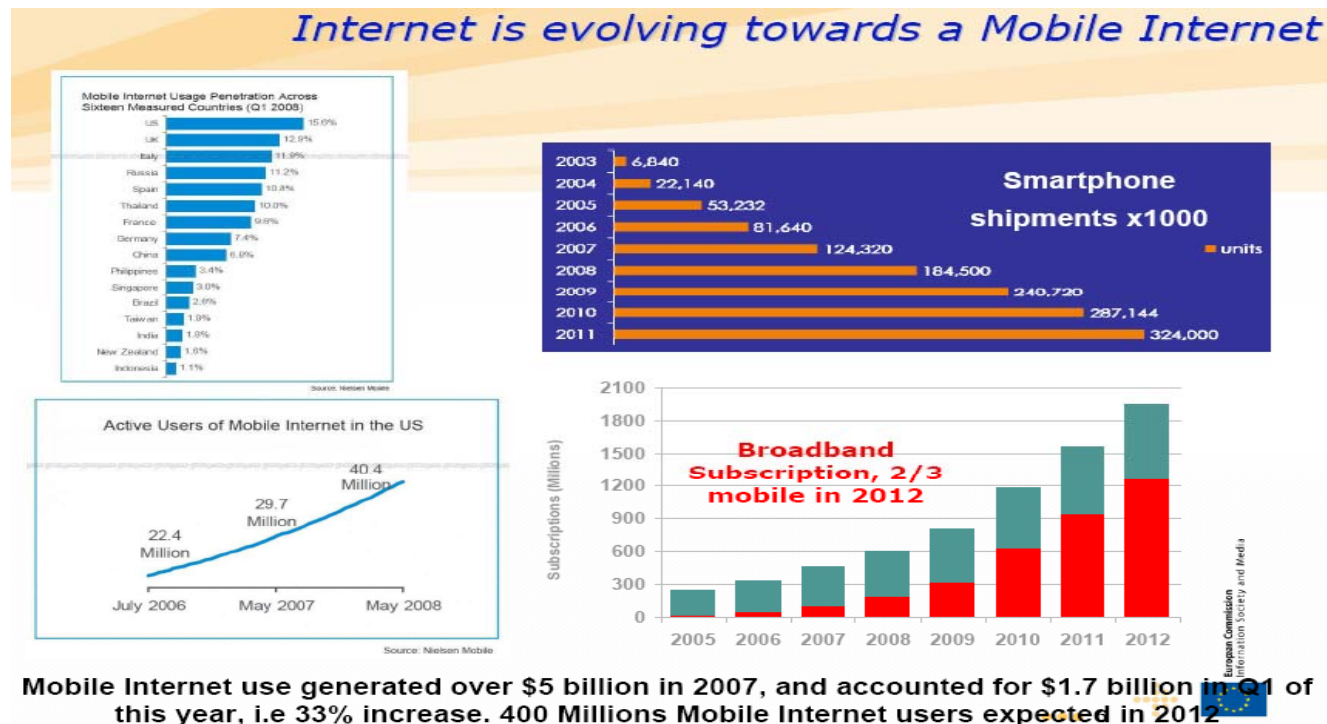
Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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Motivations

- Paradigm Shift: from Fixed to Mobile
 - “Mobility” is a key factor in the design of FN



Problems of Current Internet

- Overloaded semantics of IP address
 - Identifier and Locator as well
- Single protocol for heterogeneous networks
 - No consideration of heterogeneous networks
- Integration of data delivery and control function
 - No distinction between data plane and control plane
- Centralized mobility control
 - Home Agent (central anchor) of Mobile IP
 - Traffic overhead, failure by DoS attack, non-optimal routes

Architectural Requirements for FN

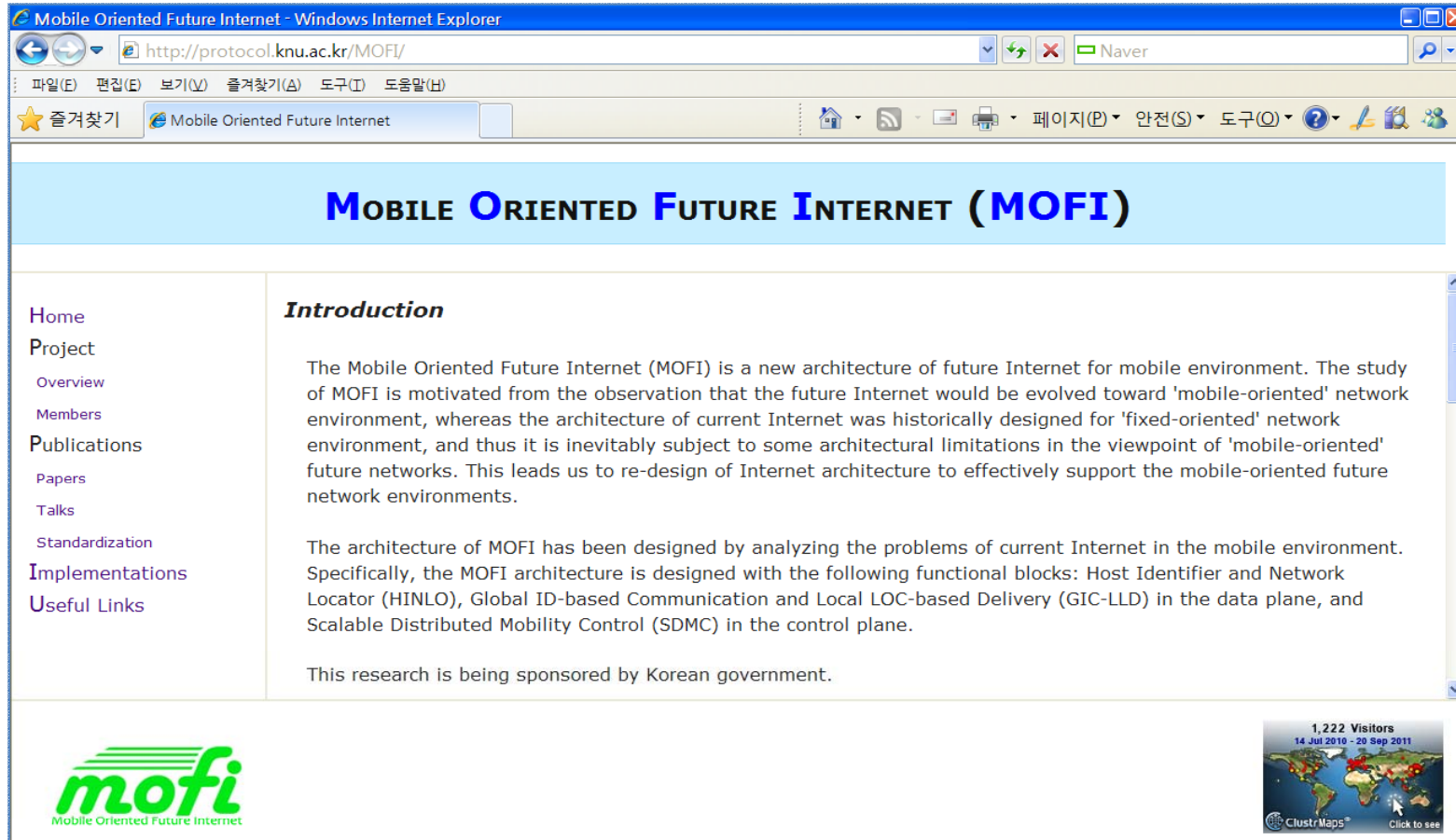
- Separation of identifier (ID) and locator (LOC)
 - Permanent ID and Temporary LOC (Mobility, Multi-homing)
- Separation of access/backbone networks
 - Support of Heterogeneous access networks
- Separation of control plane from data plane
 - Control (mobility) information: mission-critical
 - User data packets: best-effort
- Distributed mobility control
 - Built-in mobility control (cf. MIP: patch-on)
 - Use of Optimized Route (Query-based signaling)
 - Scalable management of ID-LOC mappings

Functional Requirements for FN

- Location management
 - ID-LOC mapping management for mobile hosts
 - ID-LOC Binding and Query Operations
- Route optimization
 - Direct (Optimized) path between two communicating hosts
- Handover control
 - Seamless handover for on-going sessions
 - Route Update

MOFI Overview

(<http://www.mofi.re.kr>)



The screenshot shows a Windows Internet Explorer browser window displaying the MOFI website. The address bar shows the URL <http://protocol.knu.ac.kr/MOFI/>. The page title is "Mobile Oriented Future Internet - Windows Internet Explorer". The main content area features a blue header with the text "MOBILE ORIENTED FUTURE INTERNET (MOFI)". Below the header, there is a navigation menu on the left with links: Home, Project, Overview, Members, Publications, Papers, Talks, Standardization, Implementations, and Useful Links. The main content area is titled "Introduction" and contains the following text:

The Mobile Oriented Future Internet (MOFI) is a new architecture of future Internet for mobile environment. The study of MOFI is motivated from the observation that the future Internet would be evolved toward 'mobile-oriented' network environment, whereas the architecture of current Internet was historically designed for 'fixed-oriented' network environment, and thus it is inevitably subject to some architectural limitations in the viewpoint of 'mobile-oriented' future networks. This leads us to re-design of Internet architecture to effectively support the mobile-oriented future network environments.

The architecture of MOFI has been designed by analyzing the problems of current Internet in the mobile environment. Specifically, the MOFI architecture is designed with the following functional blocks: Host Identifier and Network Locator (HINLO), Global ID-based Communication and Local LOC-based Delivery (GIC-LLD) in the data plane, and Scalable Distributed Mobility Control (SDMC) in the control plane.

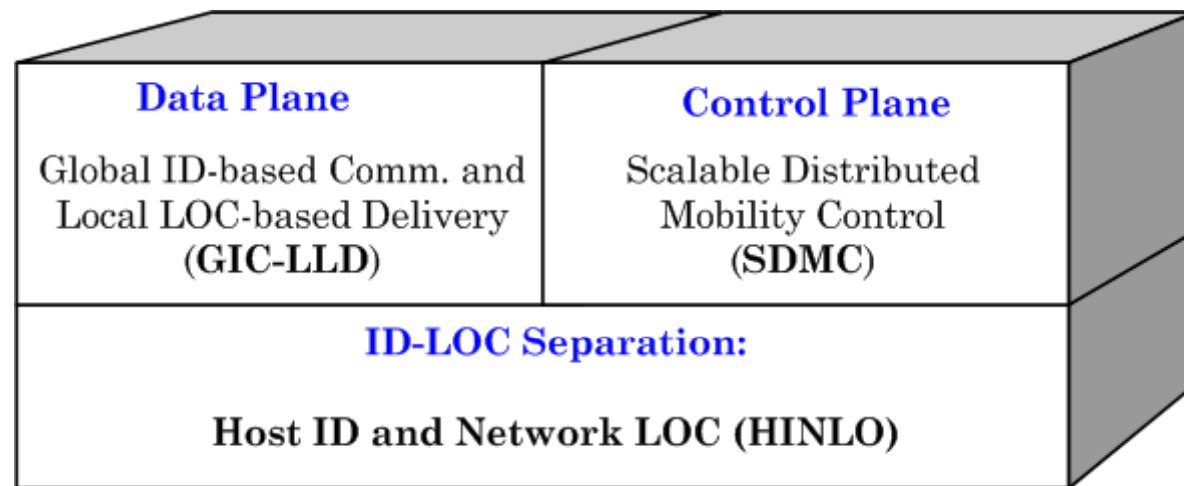
This research is being sponsored by Korean government.

At the bottom of the page, there is a logo for "mofi Mobile Oriented Future Internet" on the left and a ClustrMaps visitor counter on the right showing "1,222 Visitors" for the period "14 Jul 2010 - 20 Sep 2011".

MOFI: Design Principles

Problems of Current Internet	MOFI	
	Design Principles	Functional Blocks
Overloaded semantics of IP address (ID and LOC)	Separation of ID and LOC	Host ID and Network LOC (HINLO)
Static allocation of ID and LOC to a host interface	Static ID to host and dynamic LOC to network	
IP address-based end-to-end communication and delivery	ID-based end-to-end communication and LOC-based local delivery	Global ID-based Communication and Local LOC-based Delivery (GIC-LLD)
No consideration of heterogeneous network characteristics	Local delivery mechanism within a network	
Integration of data delivery and control function	Separation of control plane from data plane	Scalable Distributed Mobility Control (SDMC)
Patch-on and centralized mobility control	Built-in and distributed mobility control	

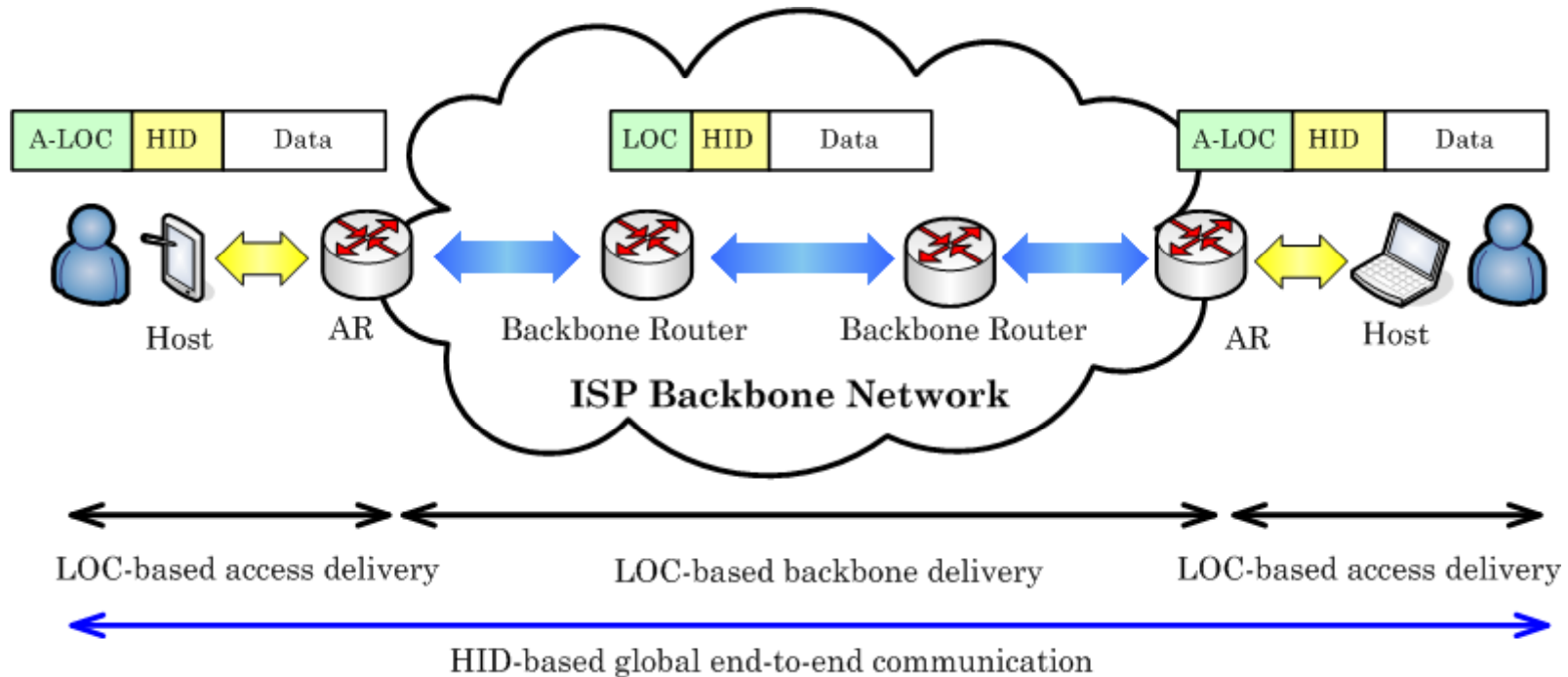
MOFI: Building Block



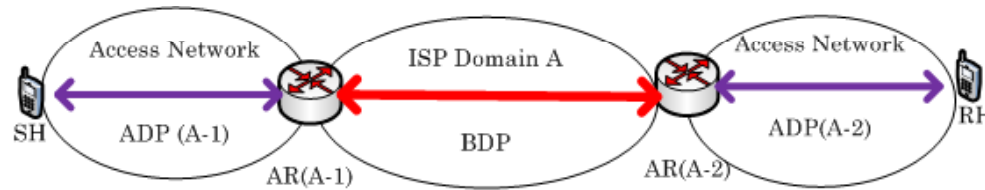
Host ID and Network LOC (HINLO)

- Host ID (HID)
 - “Globally” unique ID (permanent)
 - Allocated to a host (not interface) by ISP
 - Used for end-to-end socket communication
- Locator (LOC)
 - IP address of network (host interface, routers)
 - Used for data delivery in the network
 - “Local” (only unique in the local network)

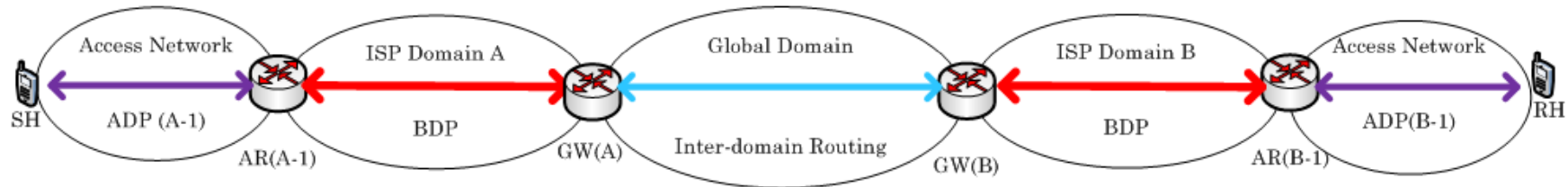
Data Delivery Model (ID-based Comm. & LOC-based Delivery)



Data Delivery Models

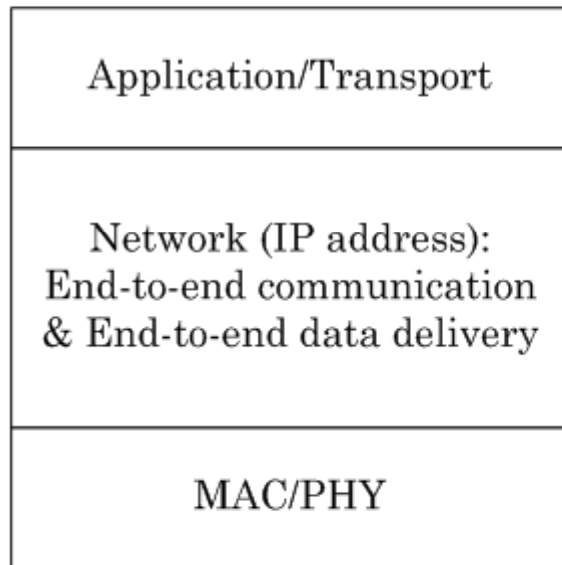


(a) Between different access networks in the same ISP domain (intra-domain)

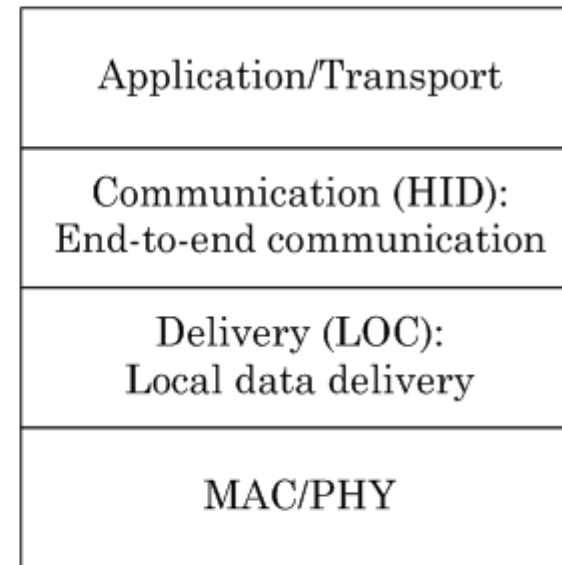


(b) Between different ISP domains (inter-domain)

Protocol stacks for Data Delivery

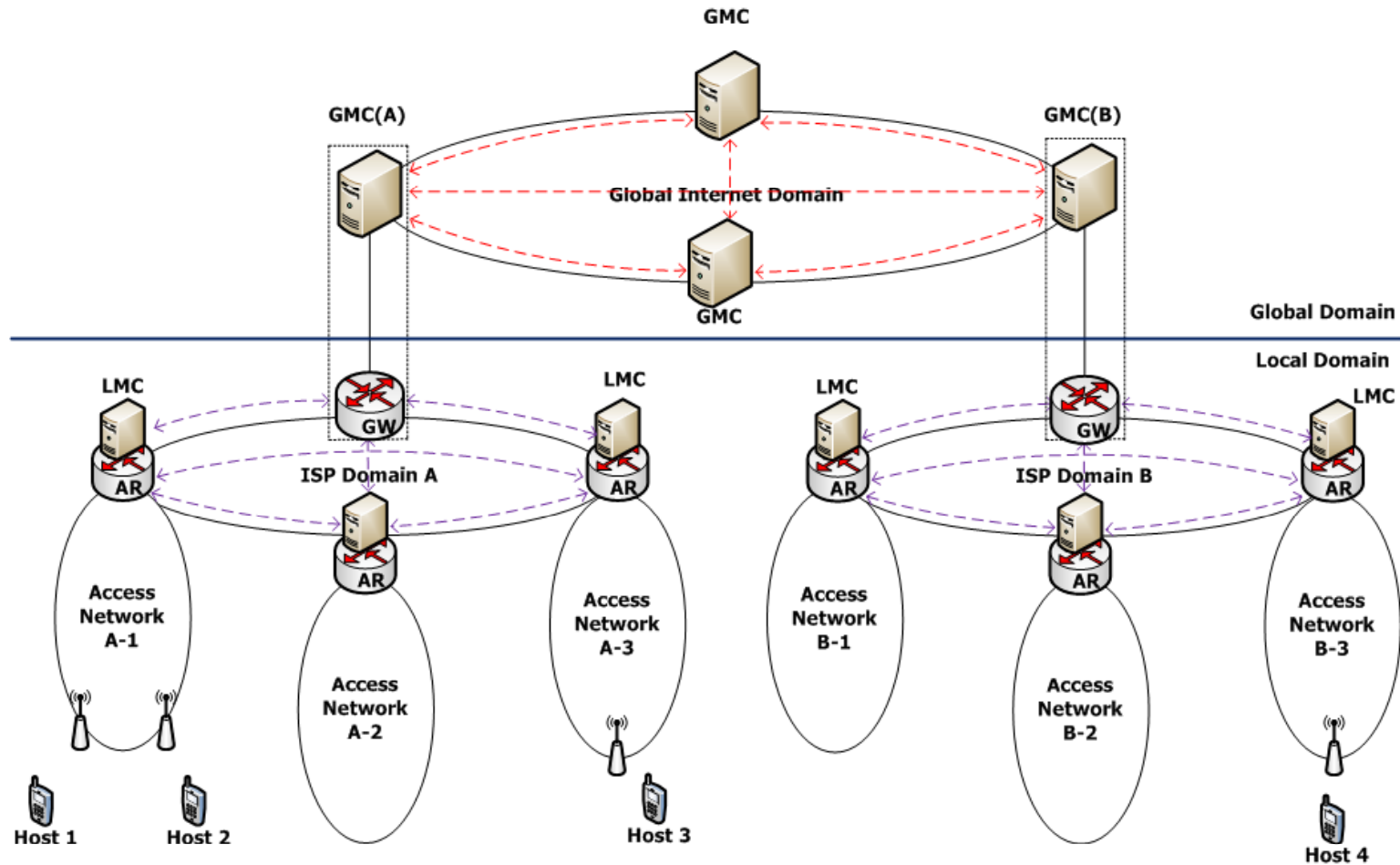


(a) Current TCP/IP

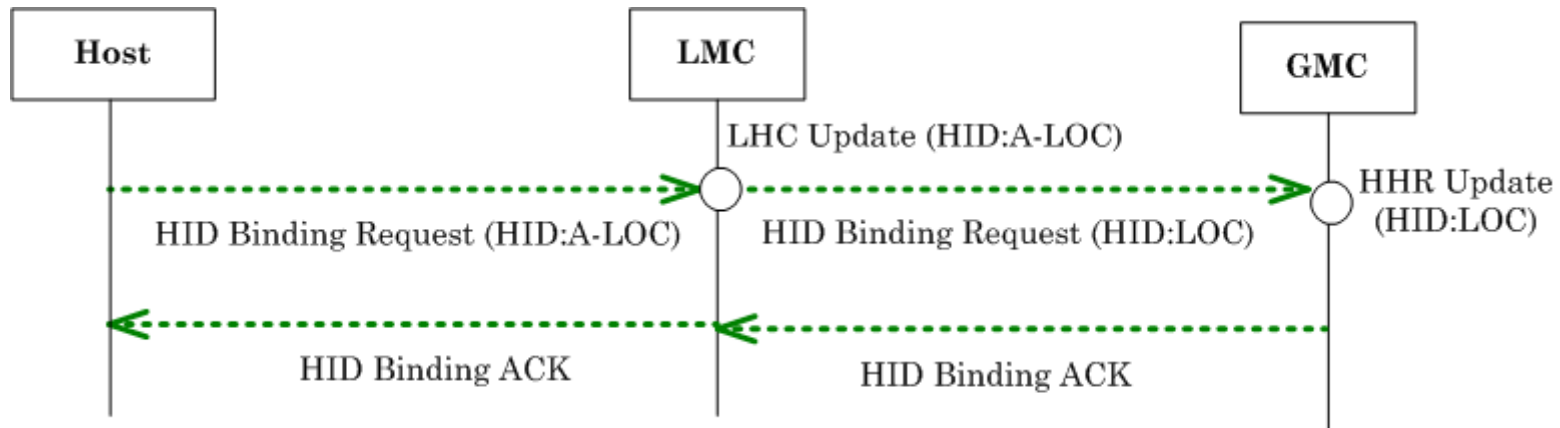


(b) MOFI

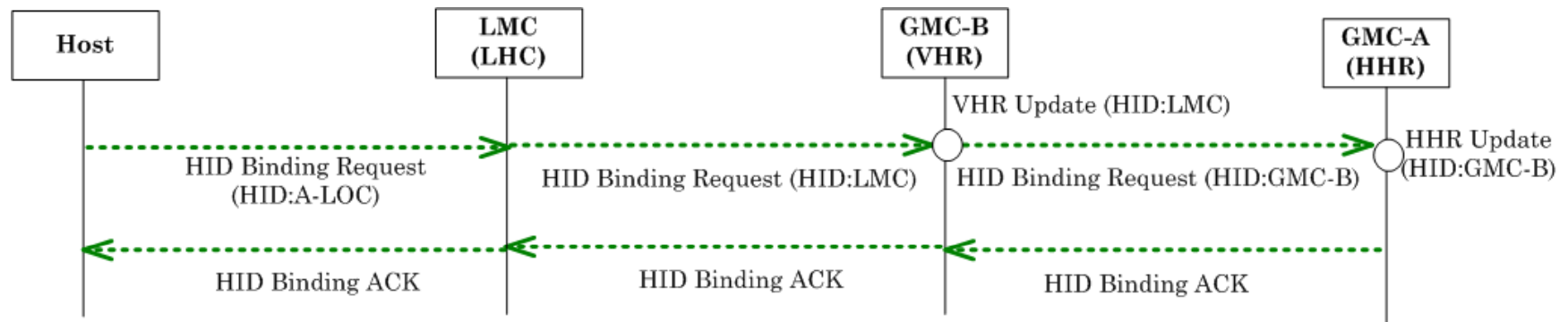
Scalable Distributed Mobility Control (SDMC): LMC, GMC



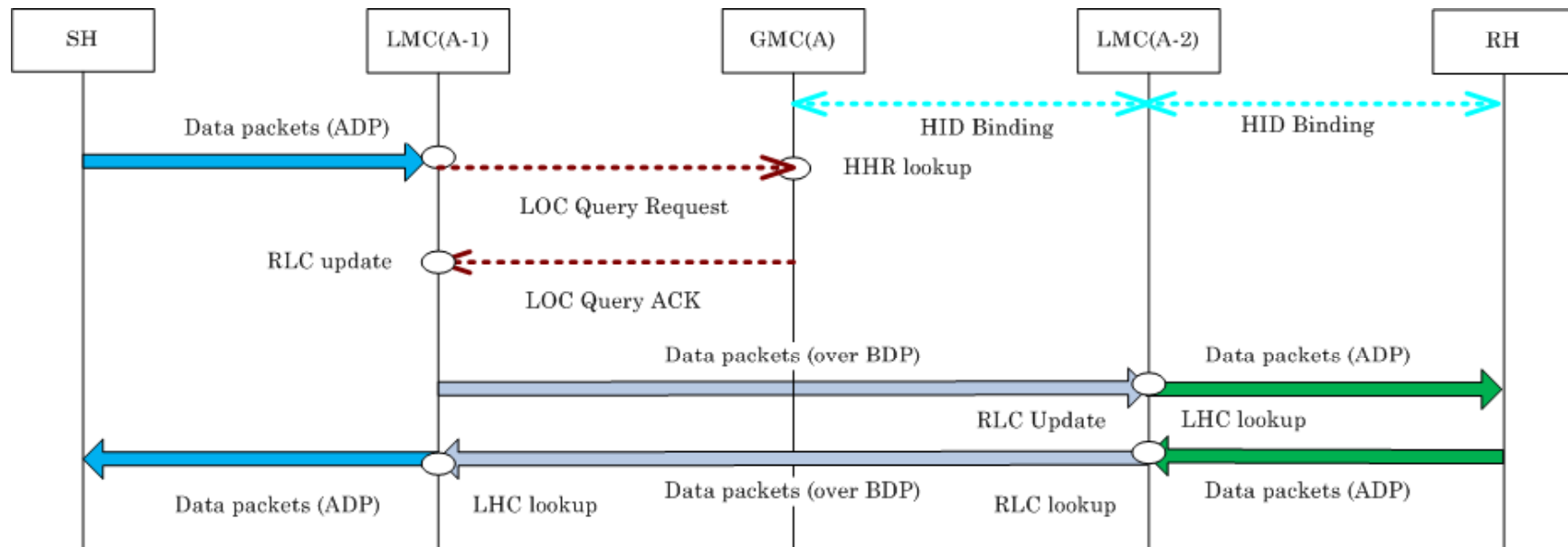
HID Binding: Non-roaming



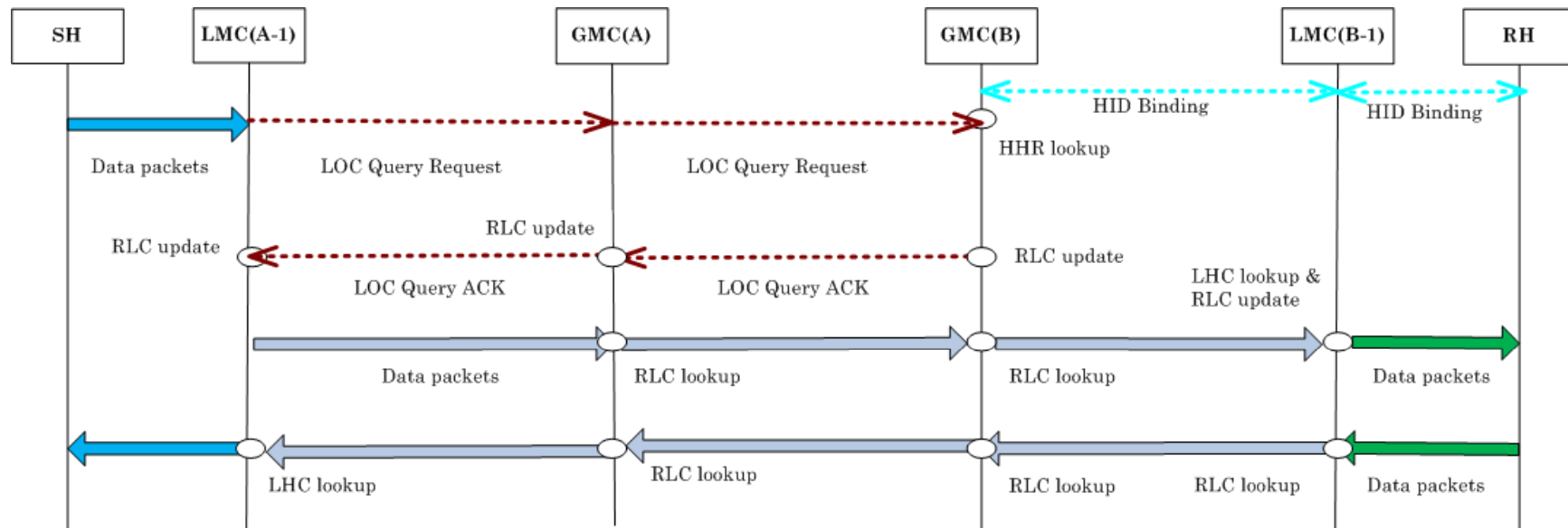
HID Binding: Roaming



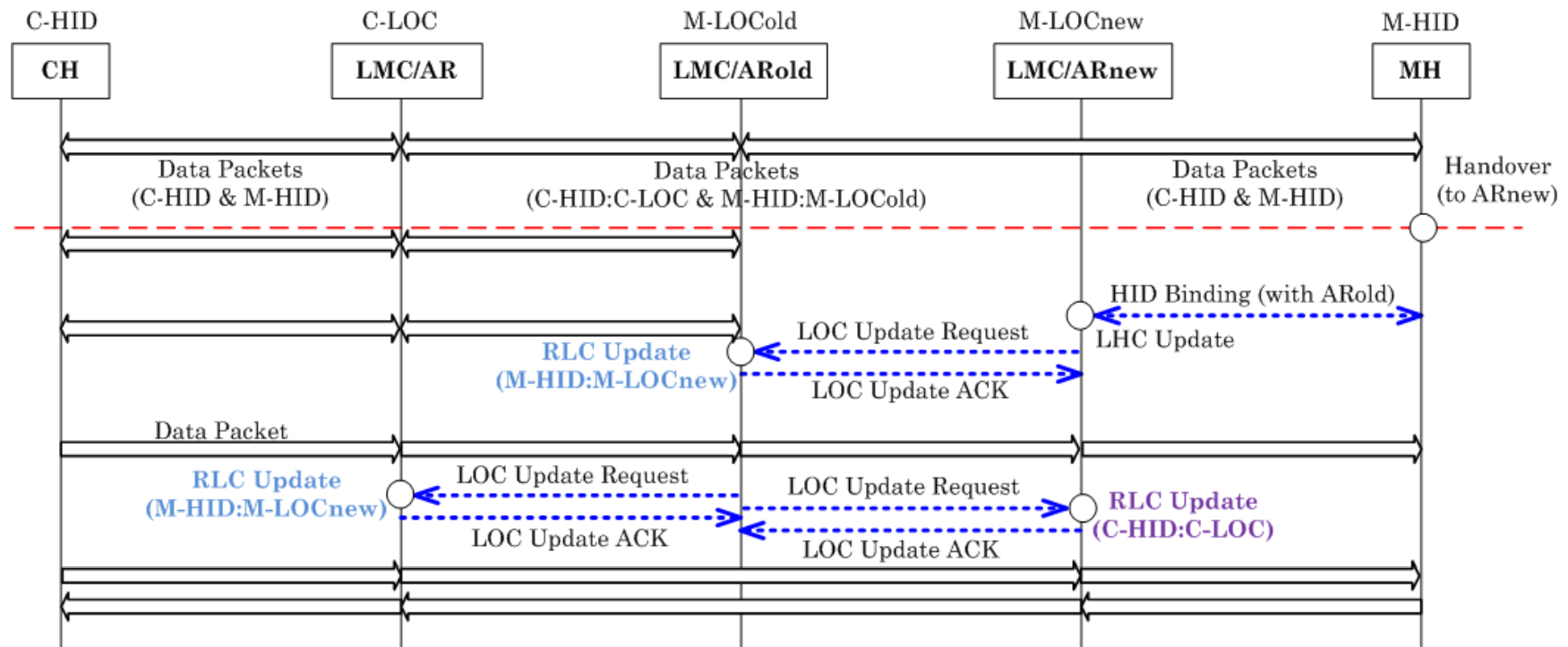
LOC Query and Data Delivery: Intra-domain



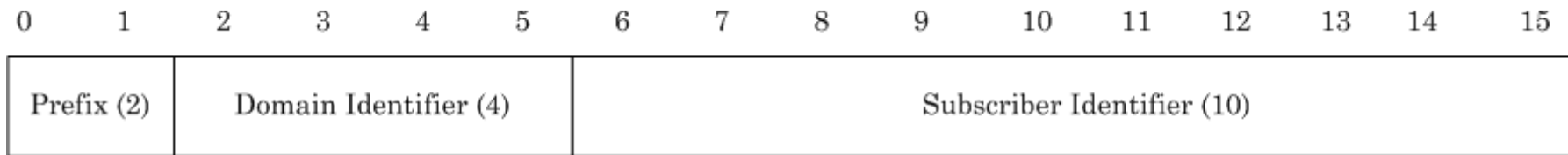
LOC Query and Data Delivery: Inter-domain



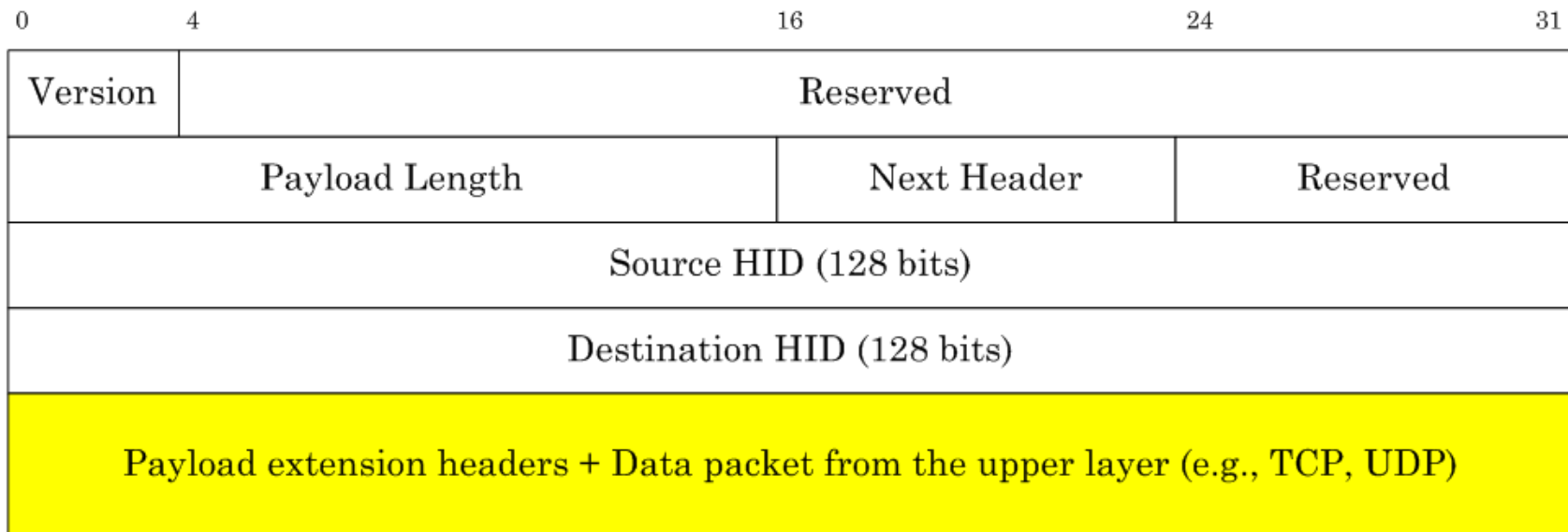
LOC Update for Handover



HID Format



HID Header



SDMC Control Messages

Table 6 – SDMC Control Messages

Packet	Full Name	Encoding	From	To
HBR	HID Binding Request	0000 0000	Host or LMC	LMC or GMC
HBA	HID Binding ACK	0000 0001	LMC or GMC	Host or LMC
LQR	LOC Query Request	0000 0010	LMC or GMC	LMC or GMC
LQA	LOC Query ACK	0000 0011	LMC or GMC	LMC or GMC
LUR	LOC Update Request	0000 0100	LMC	LMC or GMC
LUA	LOC Update ACK	0000 0101	LMC or GMC	LMC

MOFI Proxy Agent (MPA)

