Media Independent Pre-Authentication Framework Update

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http://www.ietf.org/internet-drafts/draft-irtf-mobopts-mpa-framework-04.txt

Update on A Framework of Media-Independent Pre-Authentication (MPA) for Inter- domain Handover Optimization

- Comments from 72nd IETF
  1) Add some results into Appendix to show the results
  2) Add a handover guideline subsection in the appendix
  3) Make some reference to 802.11r roaming scenarion

- All the comments have been addressed in the recent draft
  - http://www.ietf.org/internet-drafts/draft-irtf-mobopts-mpa-framework-04.txt

Following are the changes:

- C.5. Systems evaluation and performance results
  - C.5.1. Intra-technology, Intra-domain
  - C.5.2. Inter-technology, Inter-domain
  - C.5.3. MPA-assisted Layer 2 pre-authentication
- C.6. Guidelines for handover preparation

Realization of IEEE 802.21 Services and Pre-authentication Framework

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Outline

- Integration of MPA and 802.21
  - MPA and MIHF Stack
- Mobile Initiated Handover
- Network Initiated Handover
- Testbed and Implementation
  - WiFi and CDMA Handover

MPA Primer

1. Pre-authentication: EAP pre-authentication to CTN (Candidate Target Network)
2. Pre-configuration: Proactive IP address acquisition from CTN
3. Secured Proactive Handover
   - MN-nAR tunnel establishment
   - L3 HO execution over MN-nAR tunnel
   - L2 handover
   - Tunnel deletion (can be done earlier also)

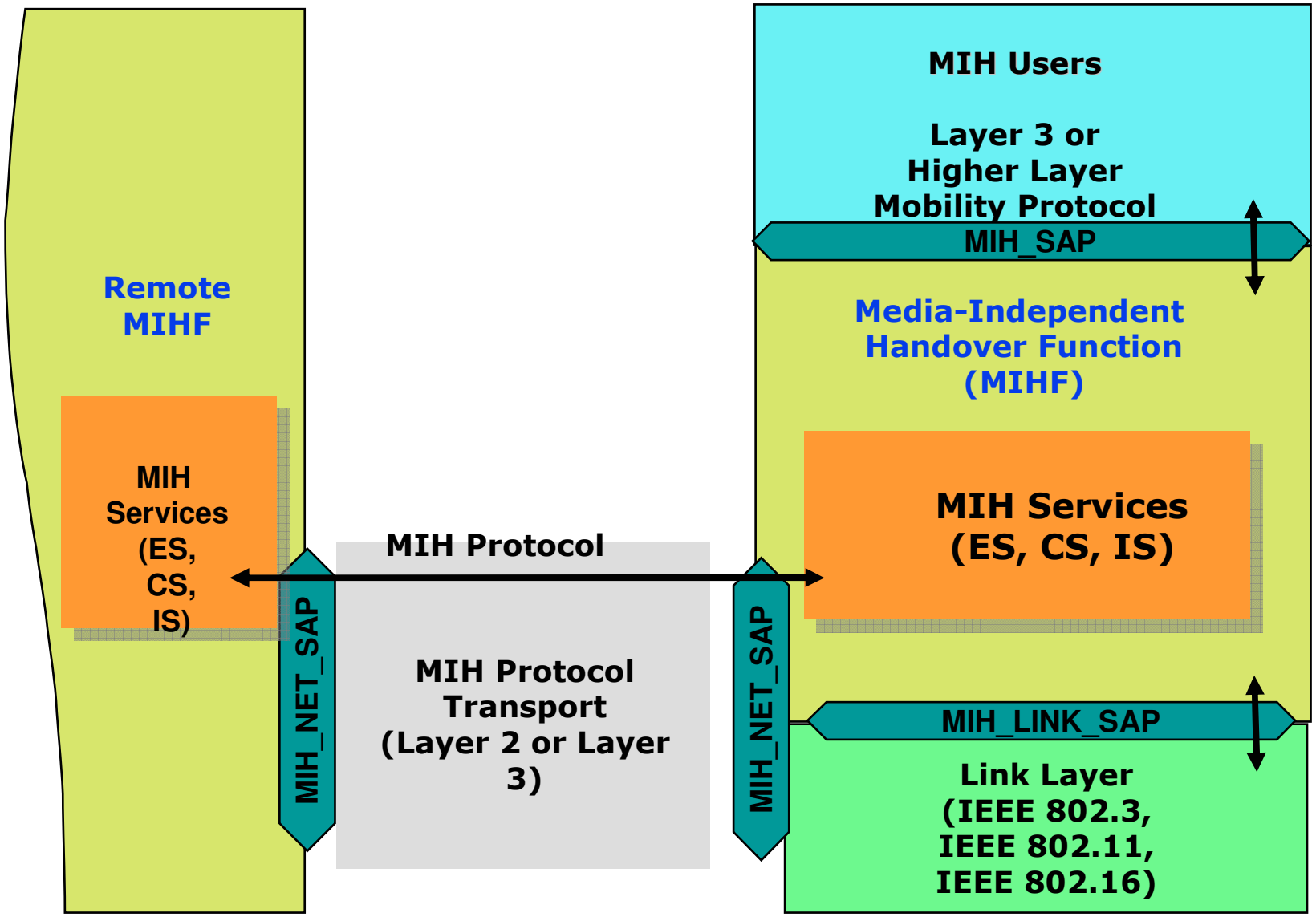
Not all MPA phases have to be executed and can thus be replaced with other mechanisms

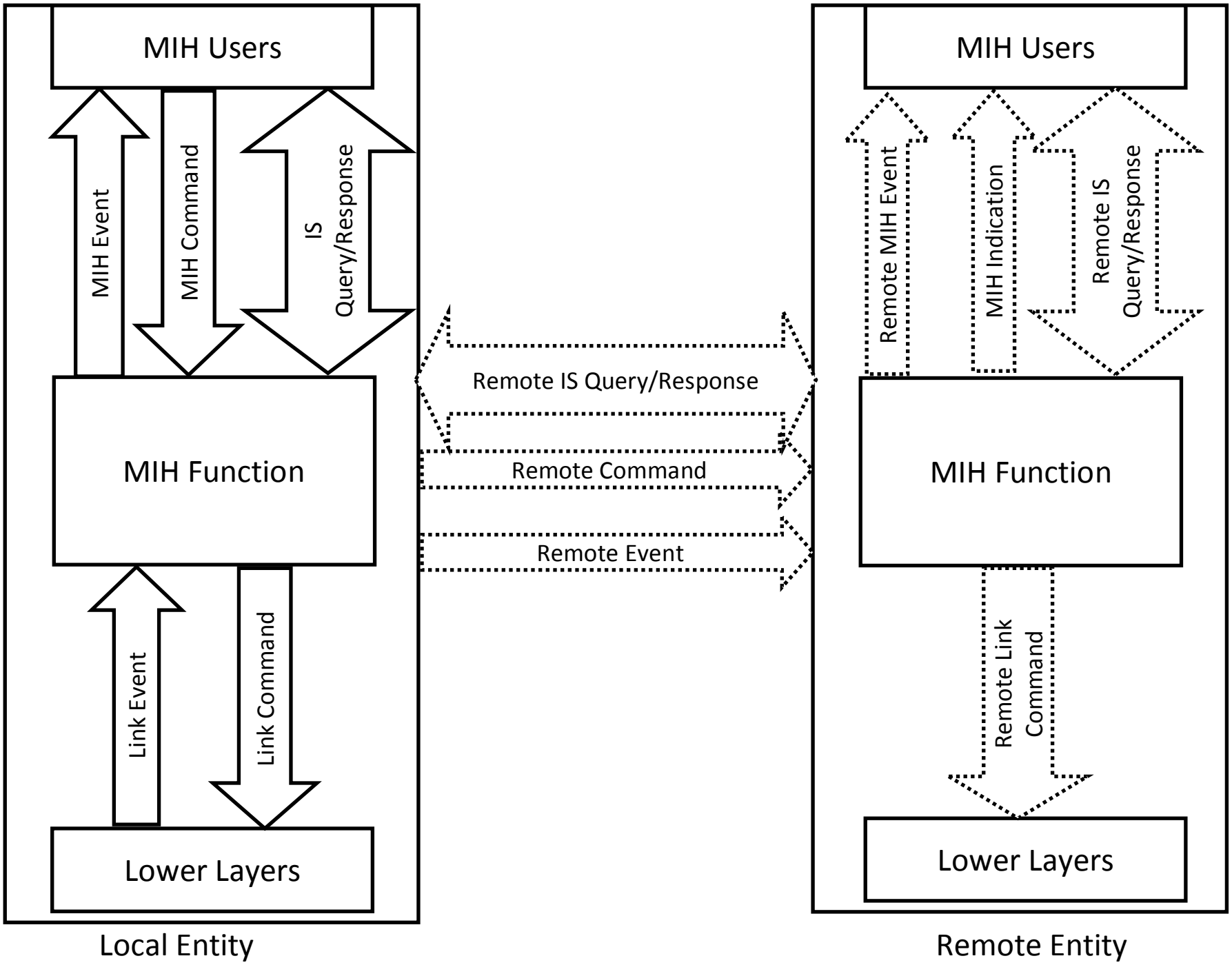
MPA Operation can stop at phase 1 (pre-auth only) or at phase 2 (pre-auth + pre-authorization),

MIHF Descriptions

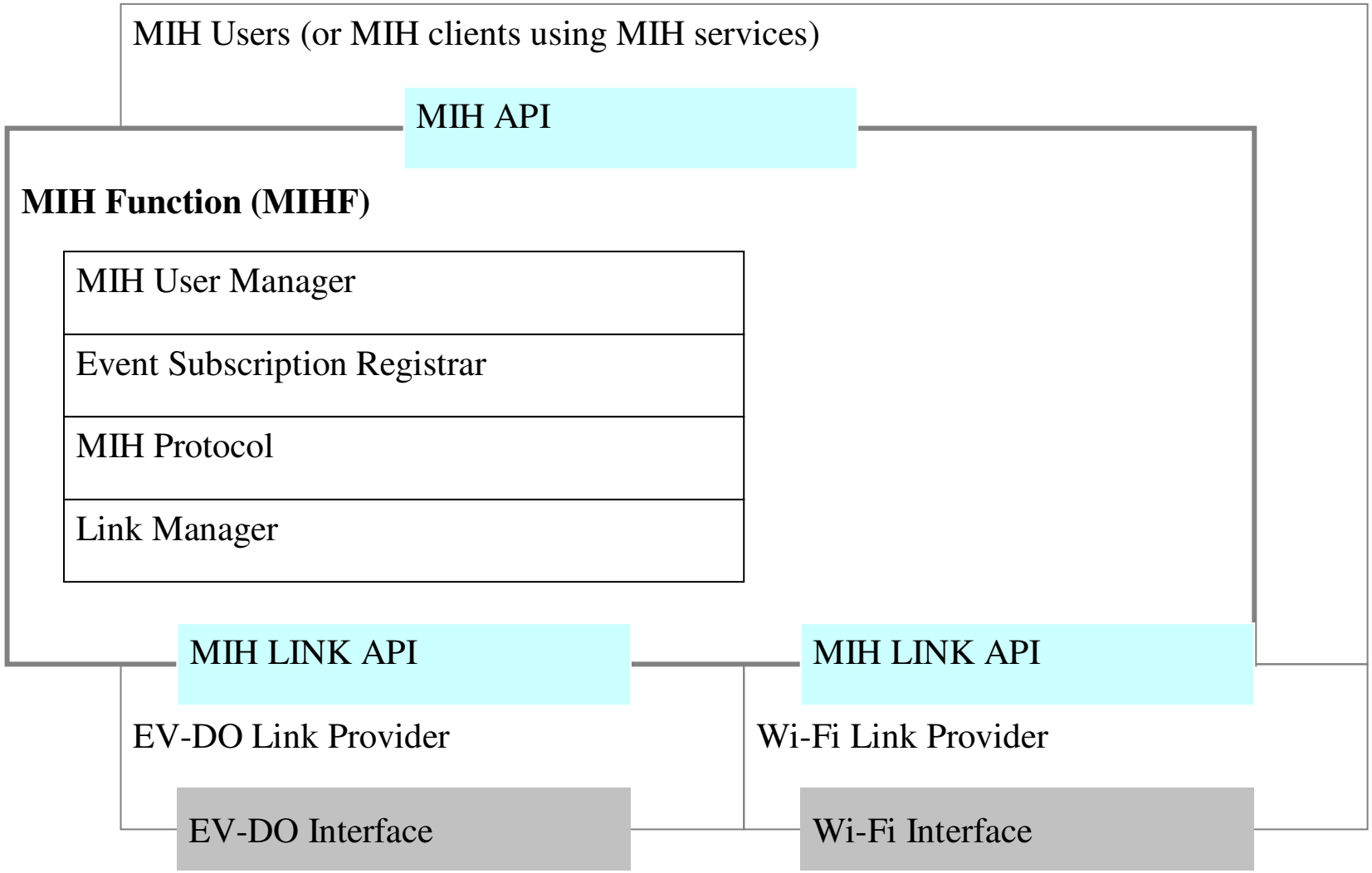
- The Media Independent Event Service (MIES) detects changes in link layer properties and reports appropriate events from both local and remote interfaces,
- The Media Independent Command Service (MICS) provides a set of commands for both local and remote MIH Users to control link state
- The Media Independent Information Service (MIIS) provides information about neighboring networks including their location, properties and related services.

MIHF interfaces and communication with a remote MIHF

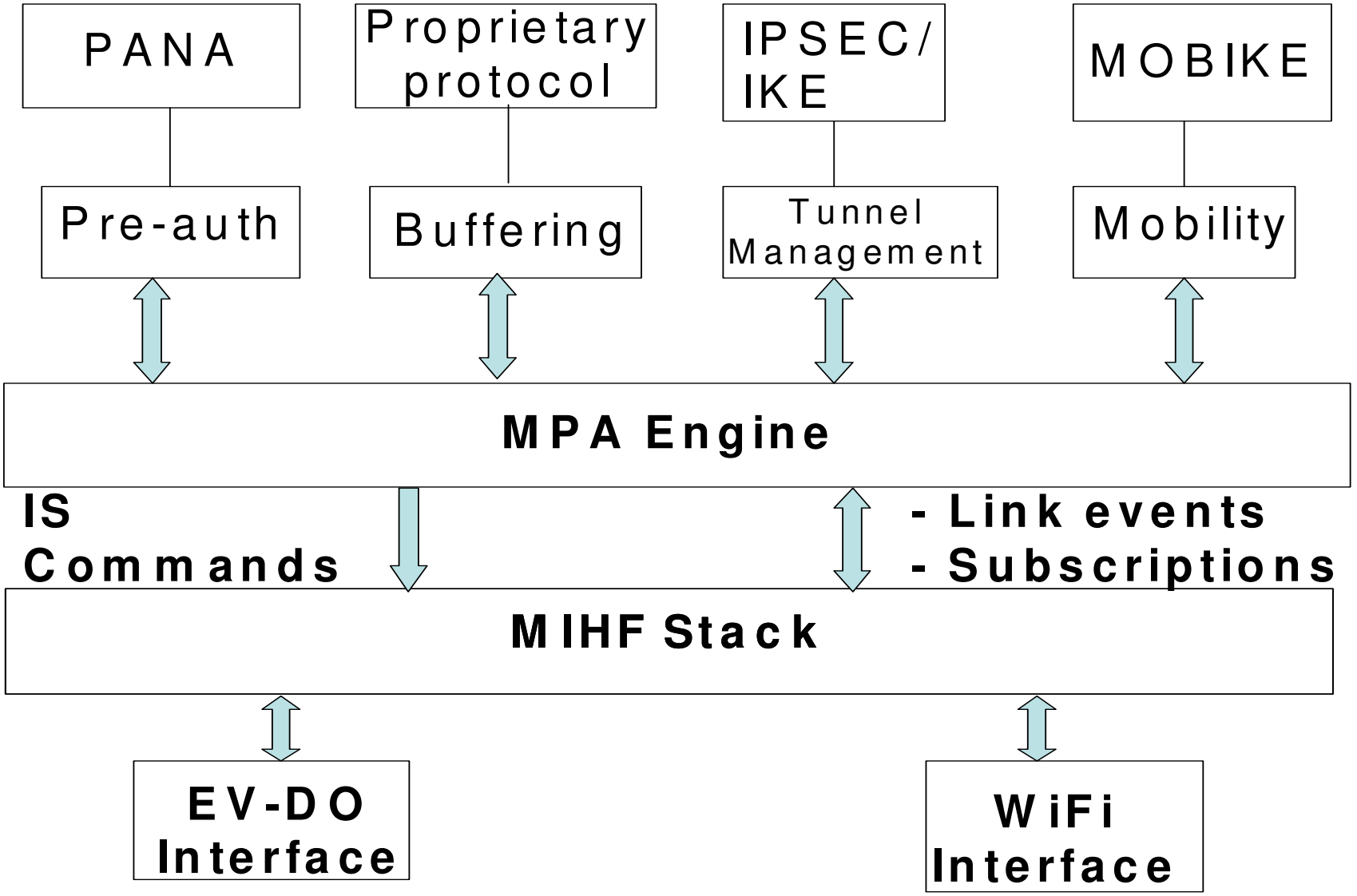



MIH Users
MIH Event
MIH Command
IS
Query/Response
MIH Function
Link Event
Link Command
Lower Layers
Local Entity
Remote IS Query/Response
Remote Command
Remote Event
MIH Users
Remote MIH Event
MIH Indication
Remote IS
Query/Response
MIH Function
Remote Link
Command
Lower Layers
Remote Entity

MIHF software components and its interfaces



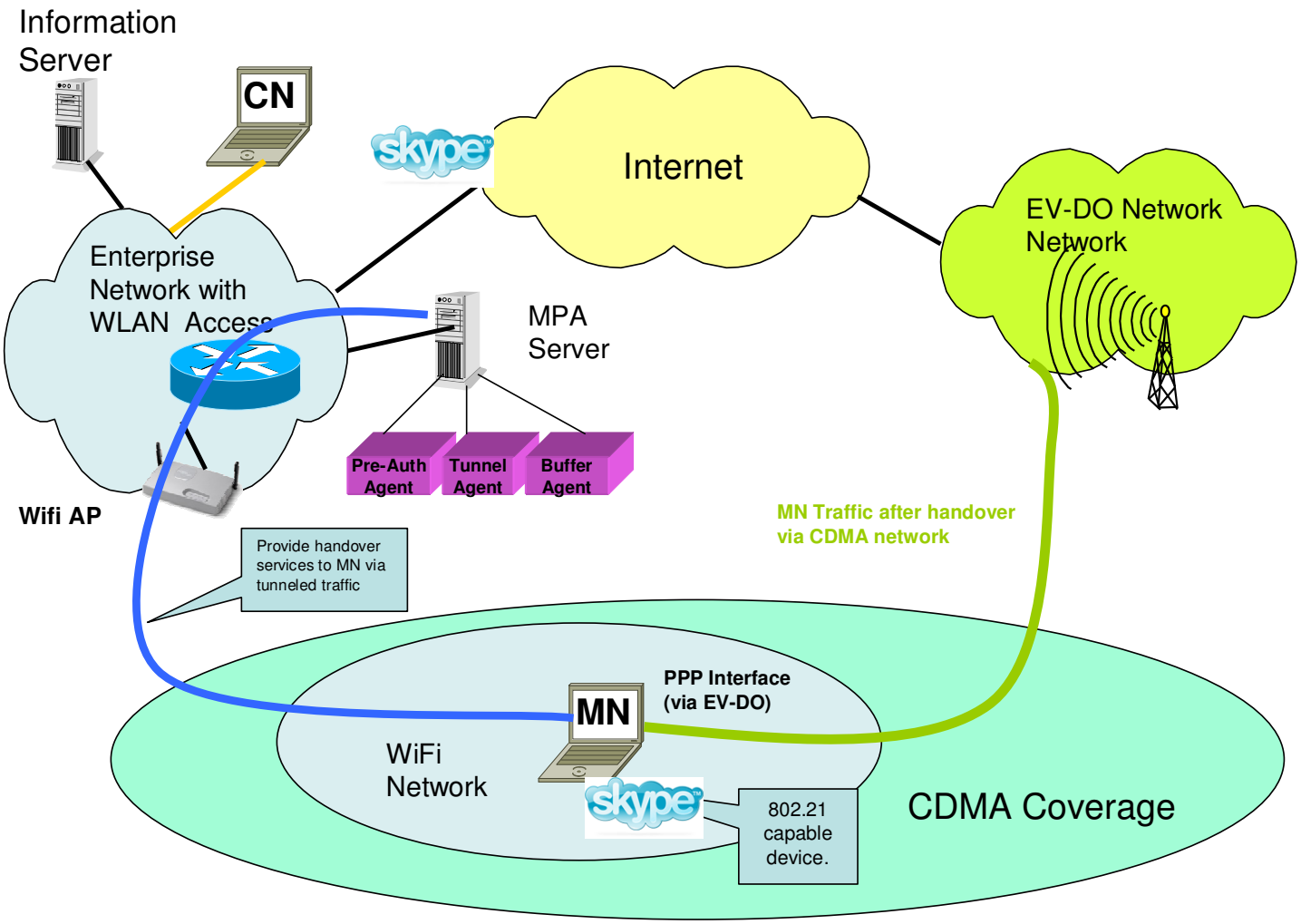
MIH-MPA integration protocol stack



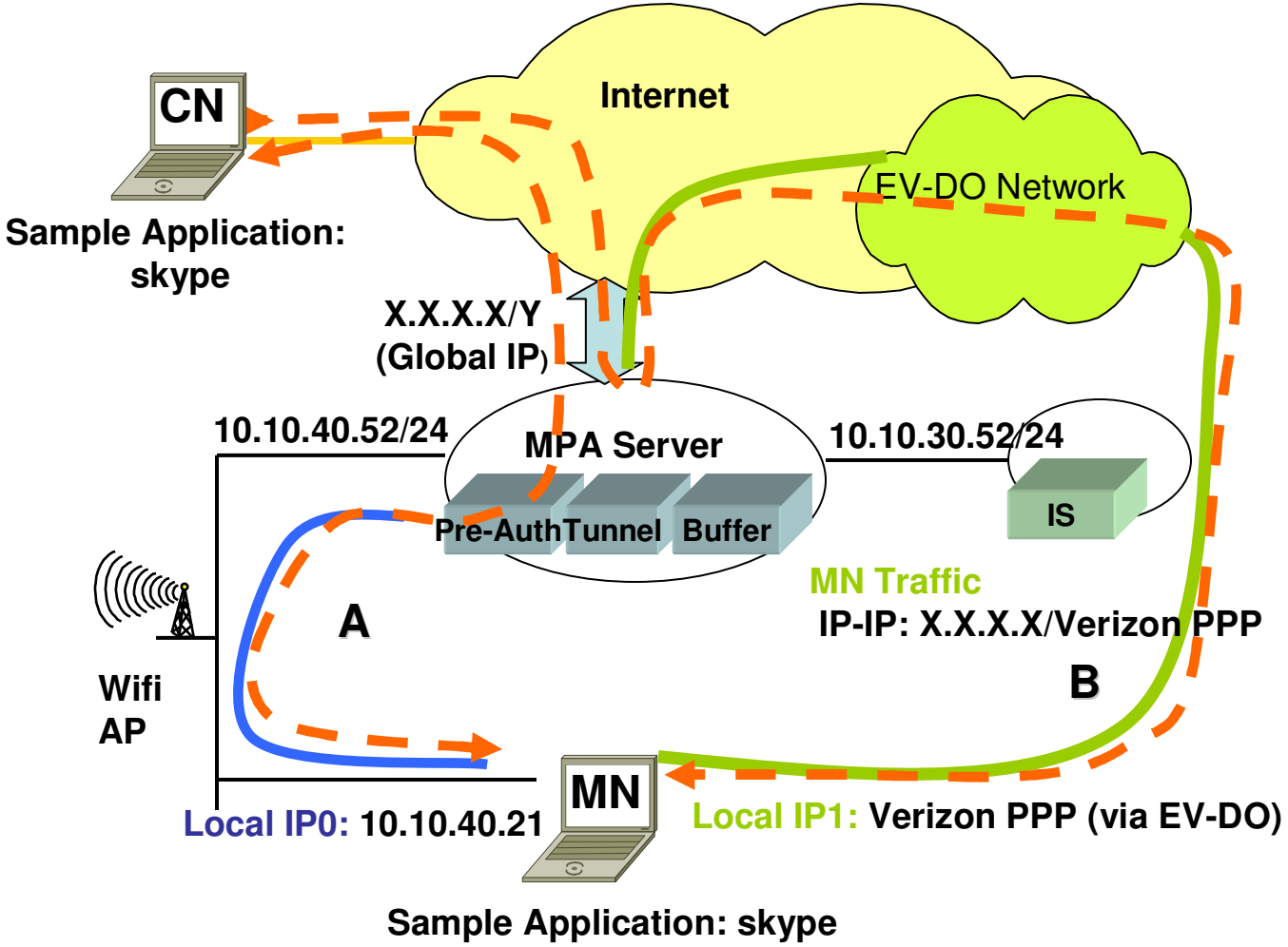
How MIHF helps MPA

- Identify when to prepare for handover based on signal thresholds of the active interface.
  - This is done by event subscription to ‘Parameter Reports’
- Identify candidate networks, and their related parameters, to handover to by querying the Information Service
- Using the ‘MIH_Link_Actions’, Power Up MIH command to power up, connect and configure the EV-DO interface and set up a PHT once pre-authentication procedure is over.
- Using MIH command ‘MIH_Link_Actions’, Power Down to turn off the old link once handover is complete.

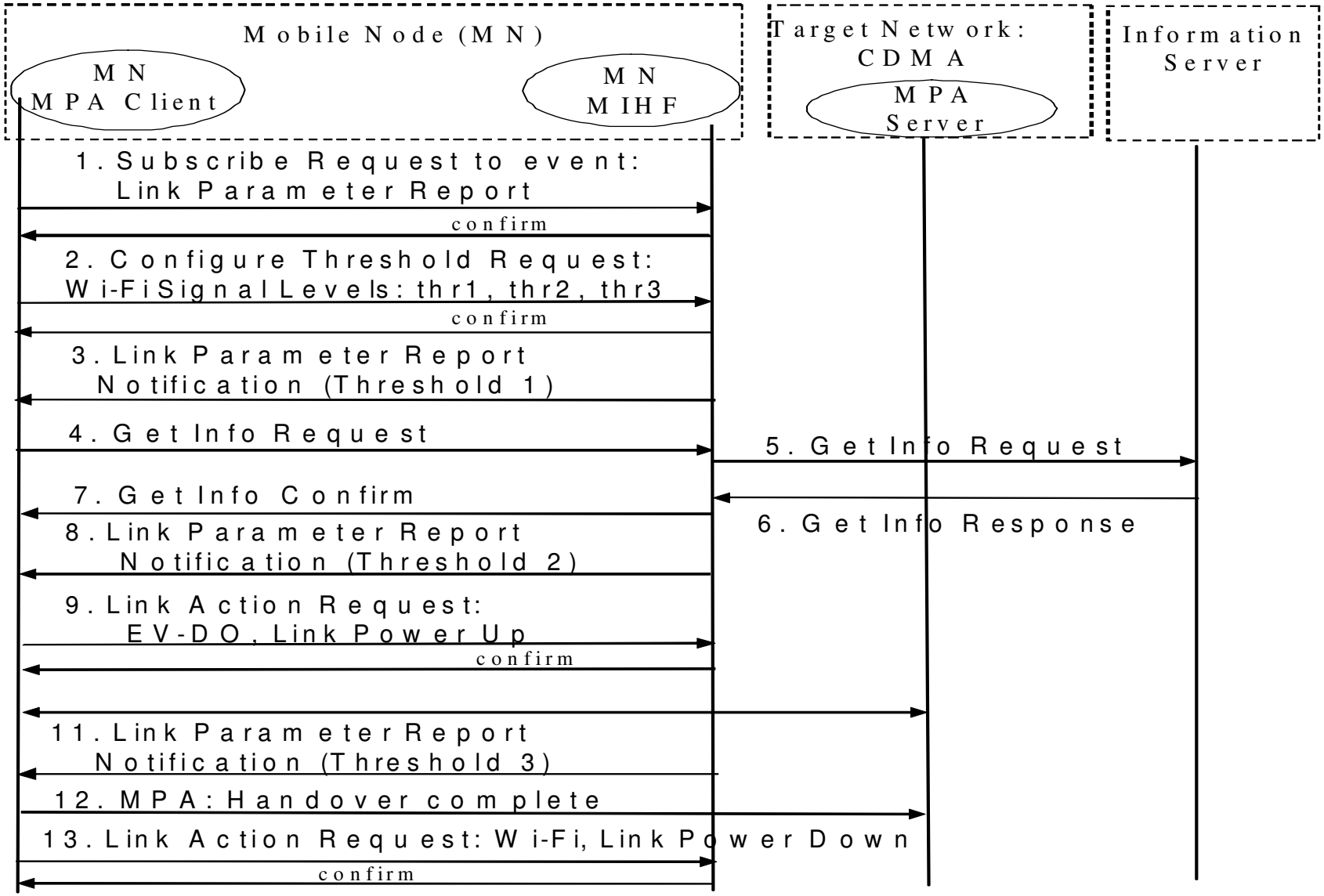
MIHF-MPA Testbed



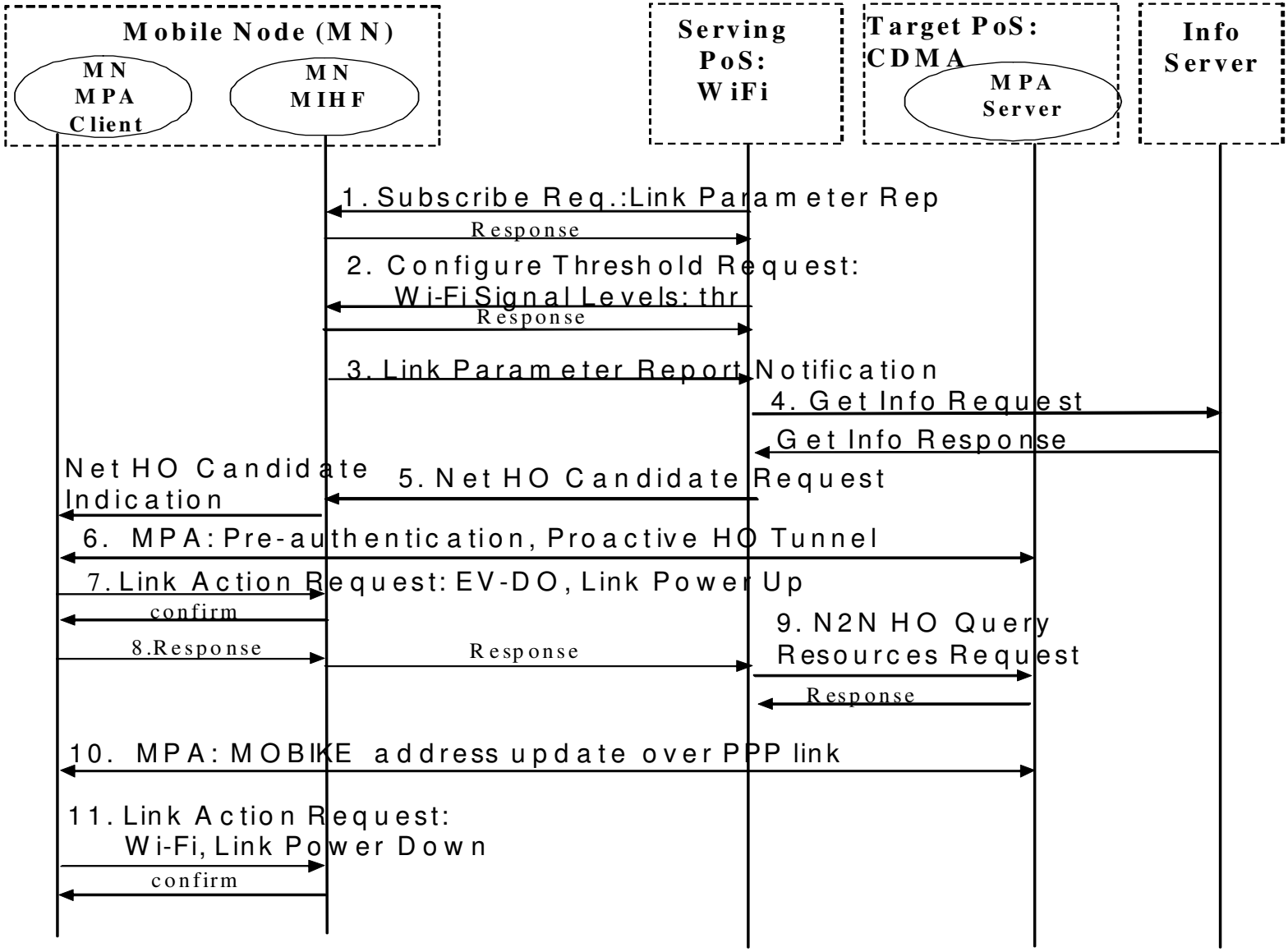
Integrated MIH and MPA Testbed Topology
Multi-Interface Scenario



Mobile Initiated Handover



Network Initiated Handover



Comparison between Mobile Initiated and Network Initiated

- MPA client being local receives the signal level change much faster than the remote serving PoS in case of network initiated handover
- Network initiated handover provides an accurate way to find out the resources in the target network before the handover takes place
- Mobile initiated handover uses fewer messages
- Network-initiated scenario provides more information to better time the handover that saves time and resources
- Network initiated handover provides better control on business and policy decisions

Associated MIH-MPA Delays

- (i) Propagation of the Link events from the link layer to the MIH user
  - i.e., local MIH user, in case of MN initiated handover and remote MIH user in Network-initiated handover)
- (ii) Querying the IS database
- (iii) MPA related handover delays

MIH Message Composing

Measured Time (ms)	Message type
5	Registration Request
5	Subscription Response
5	MIH Get Information
8	Threshold configuration Response

MIH message decomposing time

Measured Time (ms)	Message type
32	Register Response
19	Link Event Subscription
18	Configure threshold Request
8	MIH_Get_Information response
12	Network HO Candidate Query Request

MPA related delays

- Pre-authentication delay
  - 2,175 ms
  - i) Four round trip signaling associated with EAP-GPSK (Extensible Authentication Protocol-Generalized Pre Shared Key)
  - ii) generation of keys at the authentication server
  - iii) message processing delays at the end hosts
- Proactive handover tunnel set up delay
  - 4,730 ms
  - Time for IKE handshake over PPP link
  - Mobike exchange
- Binding update delay – 400 ms
  - Mobike binding update delay over PPP network

Implementation Challenges

- Layer 2 set up delay, that is intrinsic to layer 2 access characteristics (e.g., PPP/CDMA)
- Java provided platform independence but added performance challenges
- Some of the devices drivers do not actively support link events
  - Polling was unavoidable adding to the delay
- EVDO does not have the primitive to support Link_parameter_event notification
  - Thus, handover in other direction is not possible
- Since we did not have control in the target CDMA network, we had to emulate the MPA server on the enterprise network