CI-PMIPv6: An Approach for Inter-domain Network-based Mobility Management

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ICN 2017

Agenda

IP mobility
and Problem Statement

CI-PMIPv6

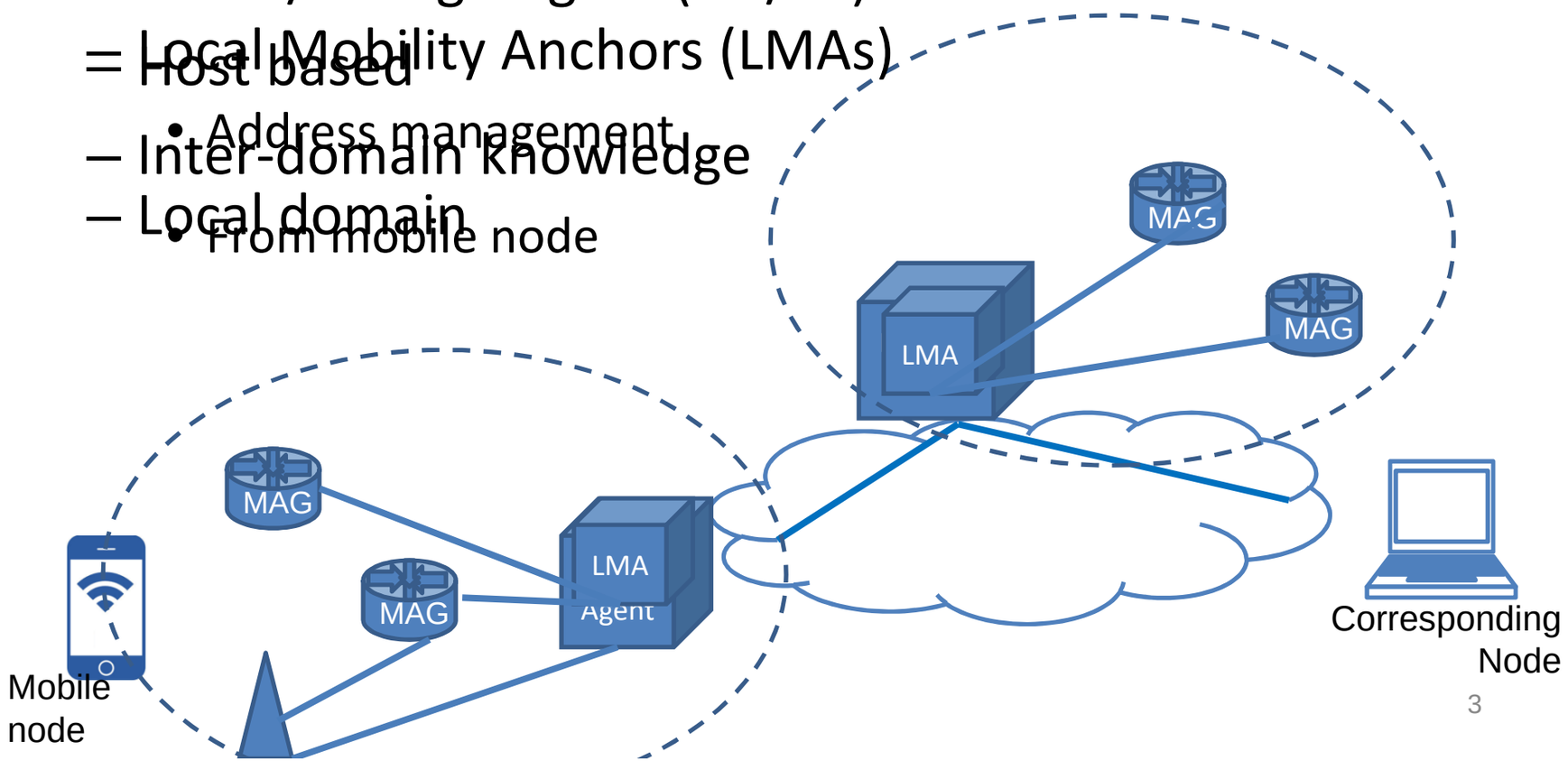
Modeling

Performance
Results

Conclusions
and
Future Work

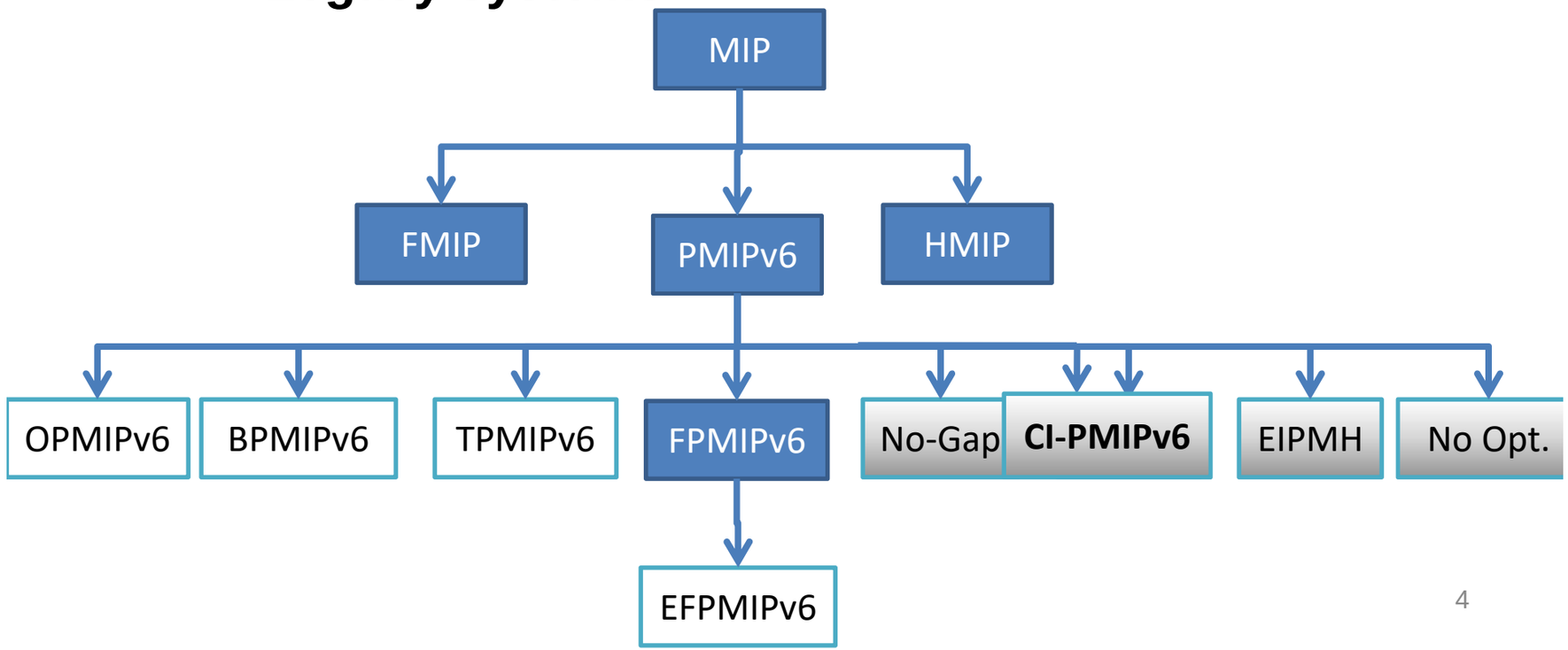
IP Mobility

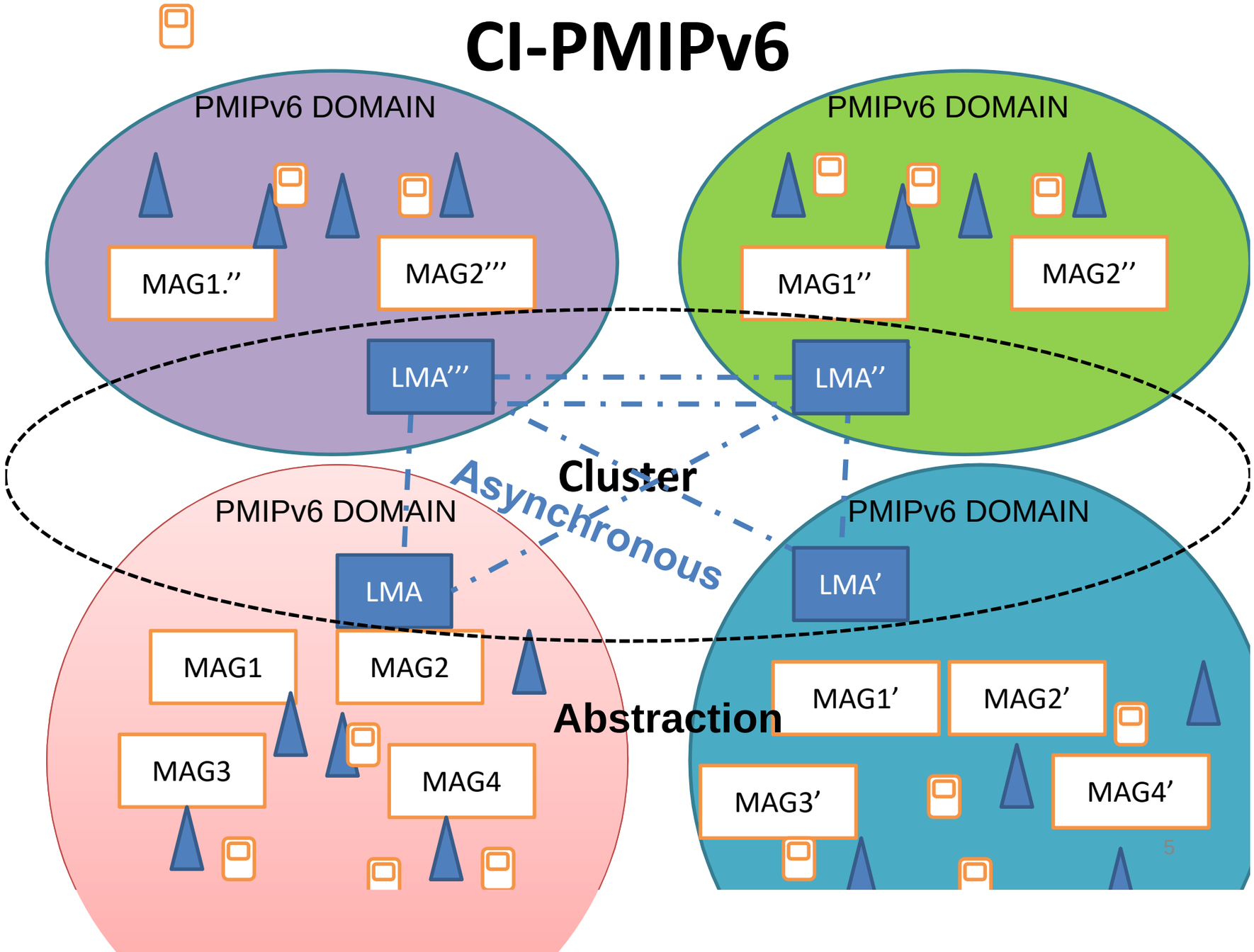
- Mobile IP (RFC 3344, 5944)
  - Keeps original IP address
  - Home/Foreign Agent (HA/FA)
  - Host based
  - Inter-domain knowledge
  - Local domain
- PMIPv6 (RFC 5213)
  - Mobility Access Gateways (MAGs)
    - Movement detection
  - Local Mobility Anchors (LMAs)
    - Address management
    - From mobile node



Problem Statement

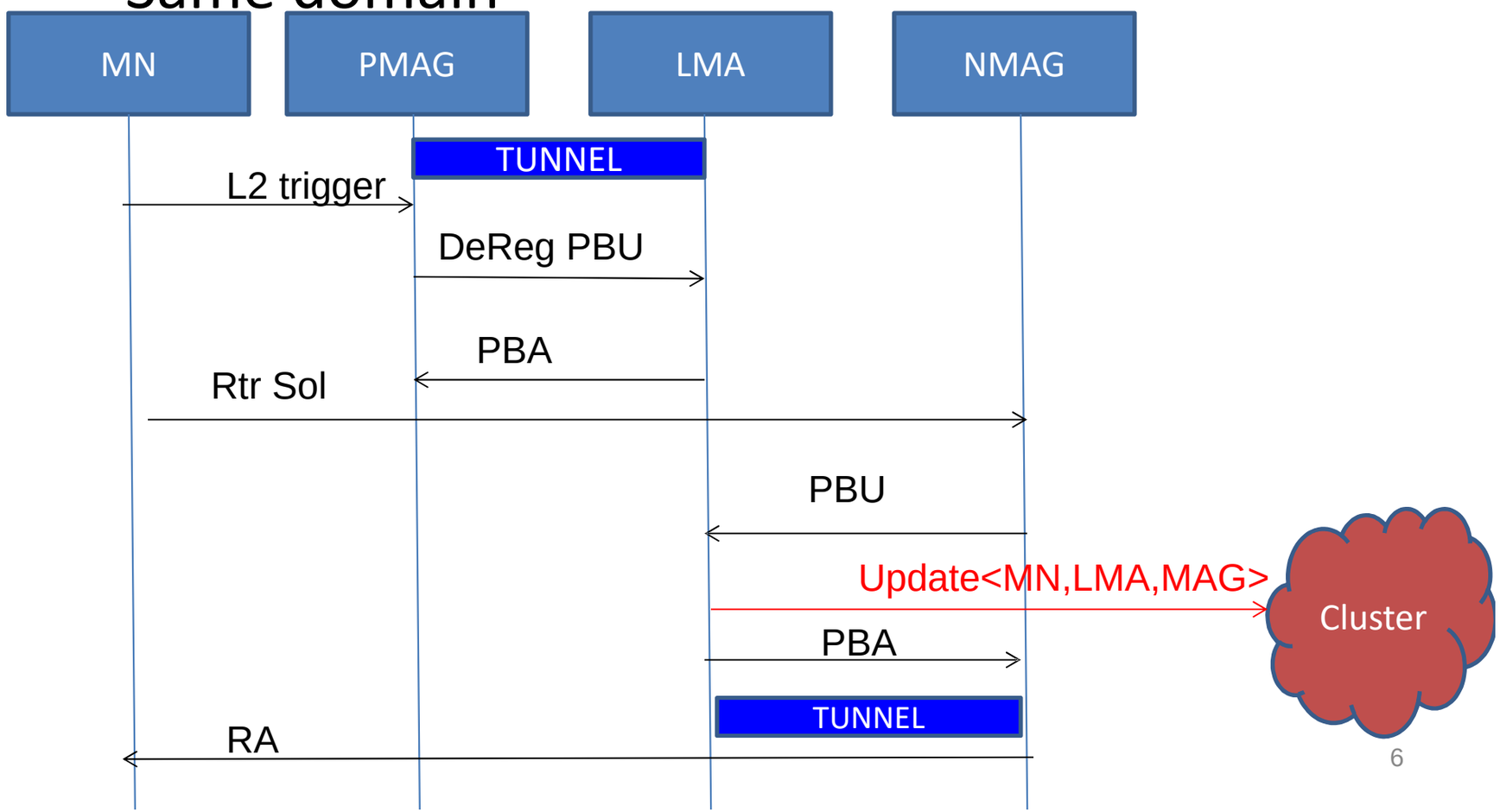
- **Centralized entities**
- **Synchronous signaling**
  - Impact in latency
- **Extra tunnels**
- **Legacy systems**



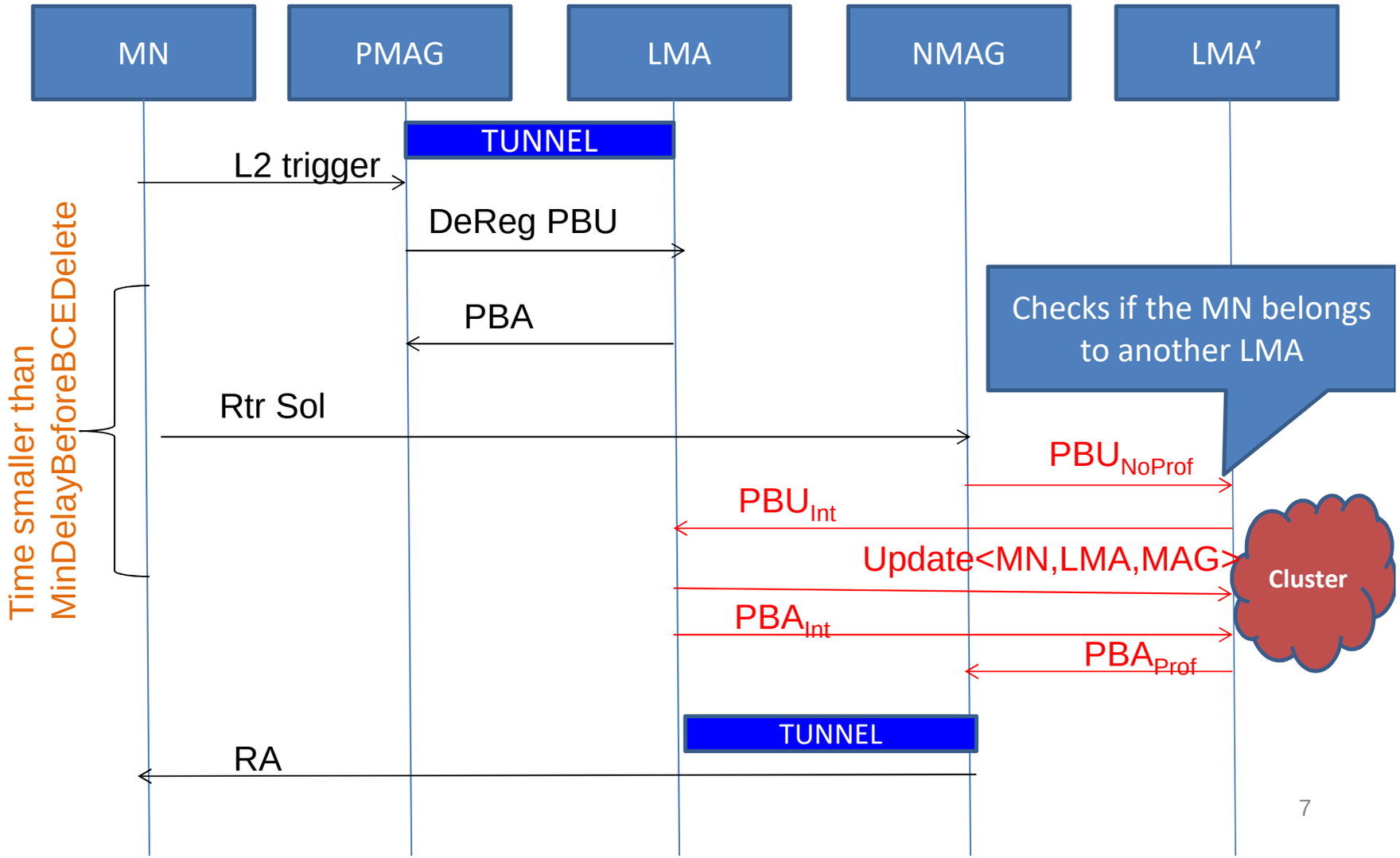

CI-PMIPv6
PMIPv6 DOMAIN
MAG1.''
MAG2'''
LMA'''
PMIPv6 DOMAIN
MAG1''
MAG2''
LMA''
Cluster
Asynchronous
PMIPv6 DOMAIN
LMA
MAG1
MAG2
MAG3
MAG4
Abstraction
PMIPv6 DOMAIN
LMA'
MAG1'
MAG2'
MAG3'
MAG4'

CI-PMIPv6 – Intra-domain Handover

- Same domain



CI-PMIPv6 – Inter-domain Handover



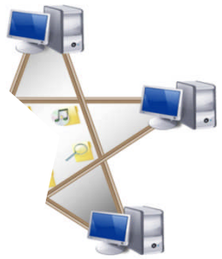
Modeling

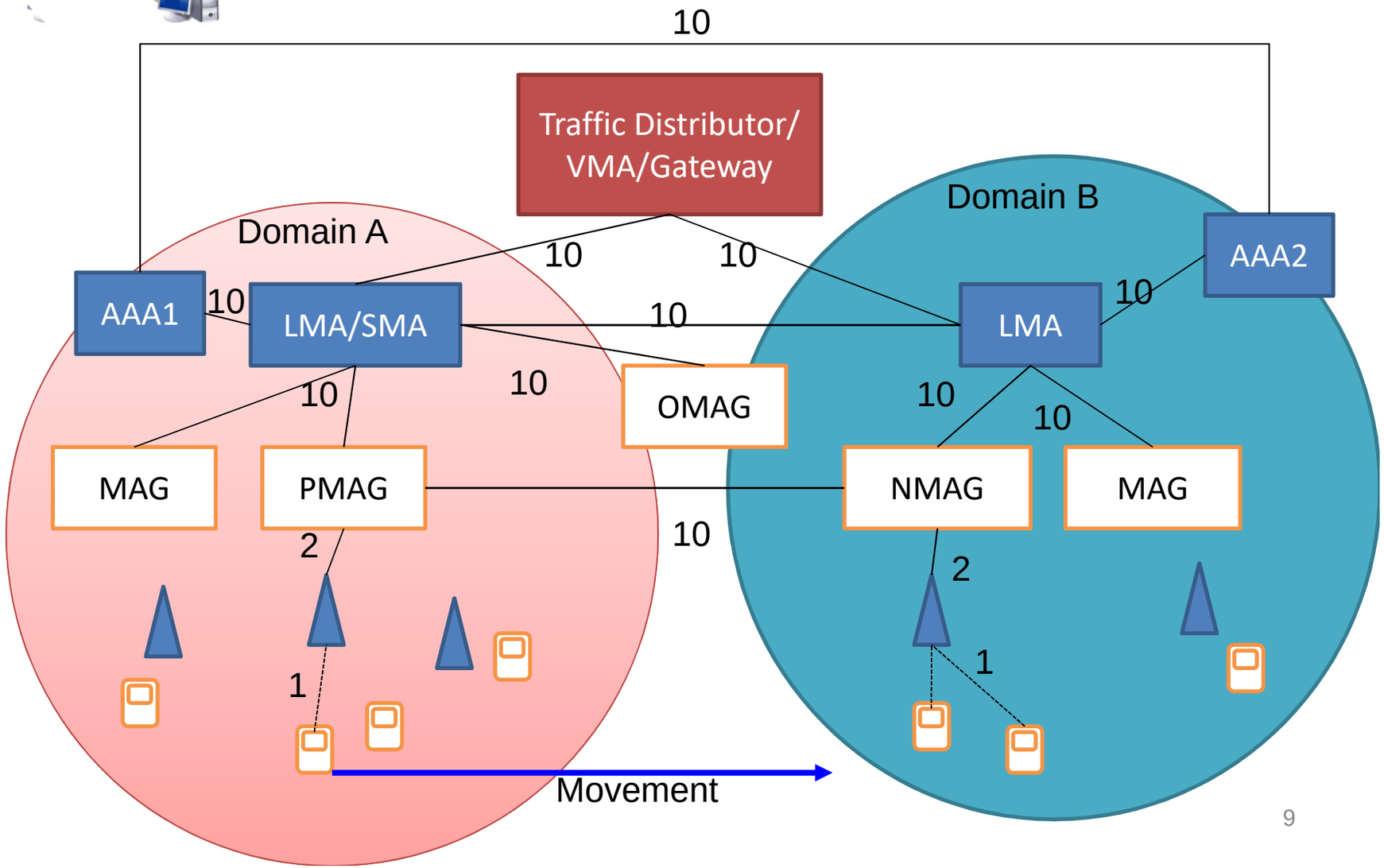
- Based on frameworks found in[TAGHIZADEH et al., 2012], [MCNAIR; AKYILDIZ; BENDER, 2001], and [MAKAYA; PIERRE, 2008].
- Mobility model
  - Fluid flow
  - Inter-domain handover rate $Ng = \mu_D = \frac{vL_D}{\pi A_D}$
  - Intra-domain handover rate $Nl = \mu_M - \mu_D$ where

$$\mu_M = \frac{vL_M}{\pi A_M}$$

  - Session-to-Mobility Ratio (SMR) $SMR = \frac{\lambda_S}{\mu_M}$

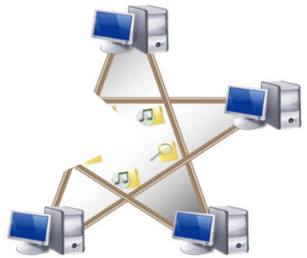
Modeling




10
Traffic Distributor/
VMA/Gateway
Domain A
Domain B
AAA1
AAA2
LMA/SMA
LMA
OMAG
MAG
PMAG
NMAG
MAG
10
10
10
10
10
10
10
10
10
10
2
2
1
1
Movement

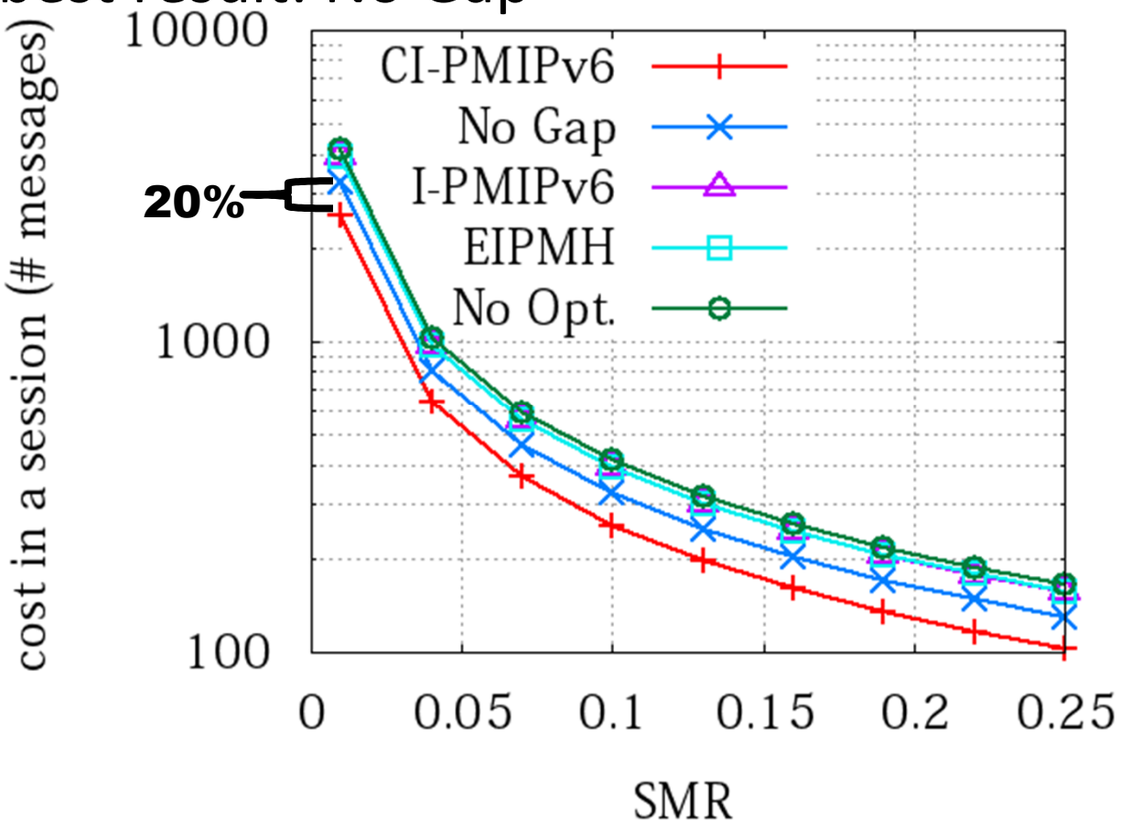
Modeling

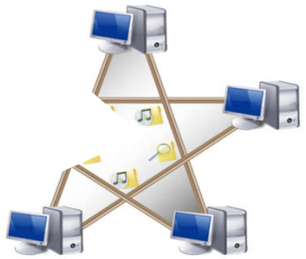
- Metrics
  - Signaling cost in a session x SMR
  - Latency x wireless fail prob.
  - Packet loss x wireless fail prob.
  - Goodput in a session x SMR



Performance Results

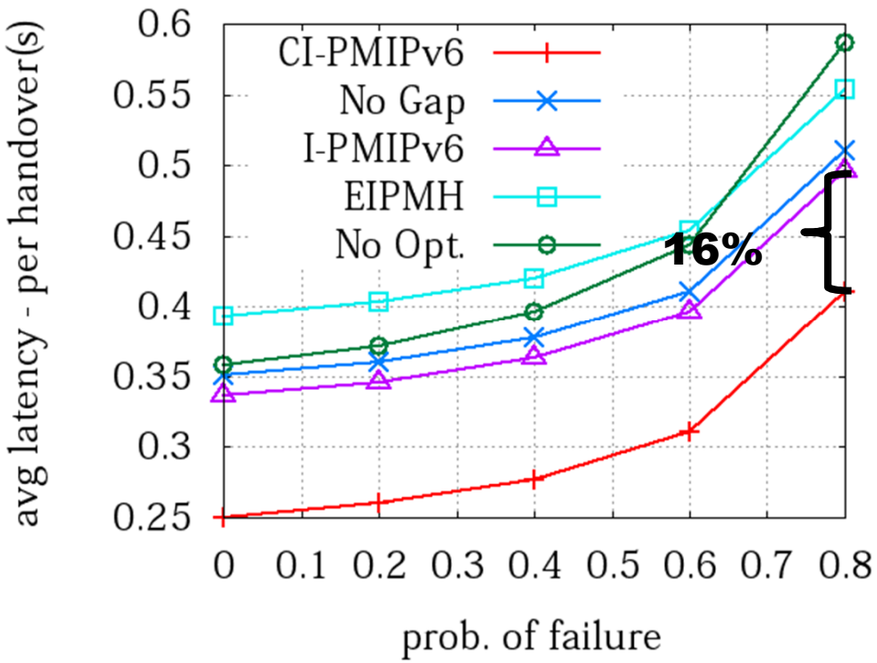
- Signaling cost in a session x SMR
- 2nd best result: No Gap

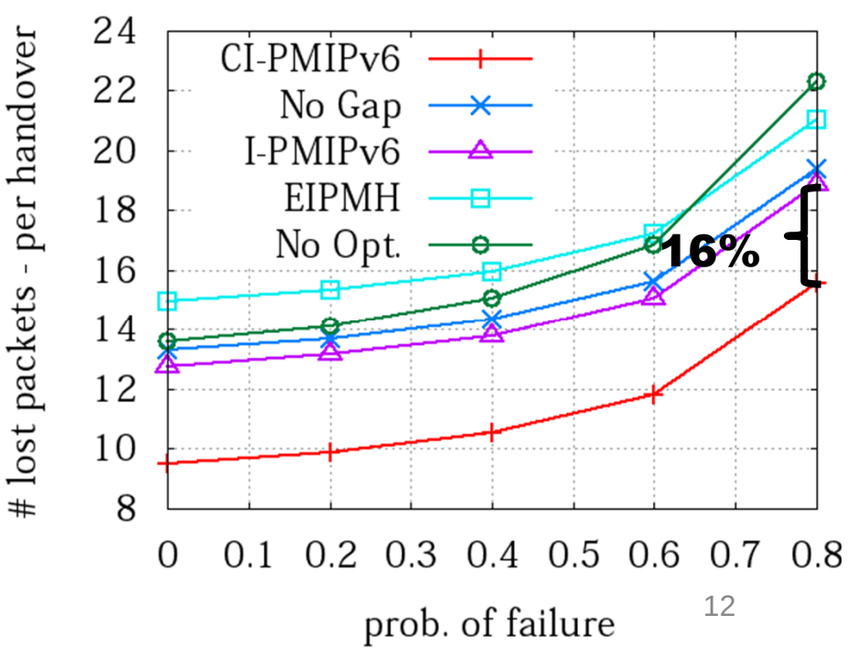


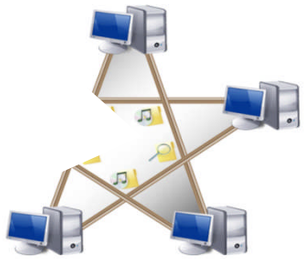


Performance Results

- Latency x wireless fail prob
- Packet loss x wireless fail prob
- 2nd best result: I-PMIP

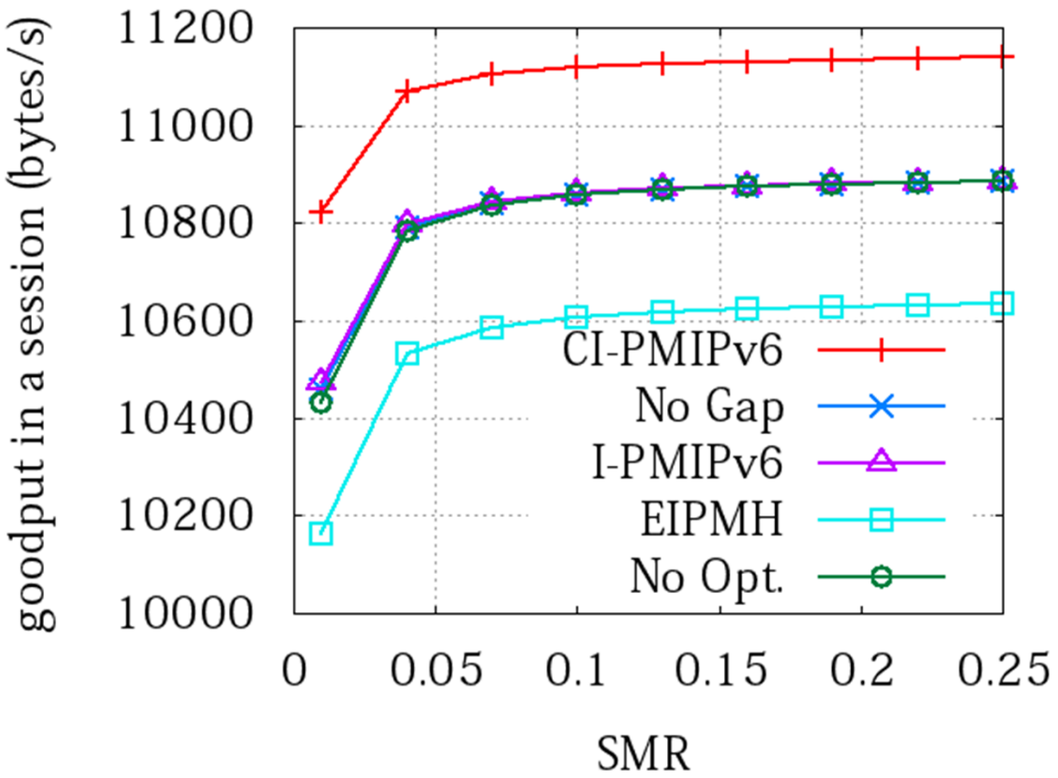






Performance Results

- Goodput in a session x SMR
- 2nd best result: No-Gap, I-PMIP, and non optimized



Conclusions and Future Work

- CI-PMIPv6
  - Inter-domain Handover
  - Distributed mobility management
  - Network-based handover
  - Reuse of existing PMIPv6 entities
  - Anticipation of MN information for future handovers
  - Low handover cost and latency in scenarios studied
- The Future
  - Approach with FPMIPv6
  - Localized routing
  - Scalability tests

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