

A Decoupling Approach for Distributed Mobility Management

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Agenda



- Motivation
- Our Proposal
- Splitting mobility management control and data planes
- Performance Evaluation and Results
- Conclusions and Future Work

Motivation

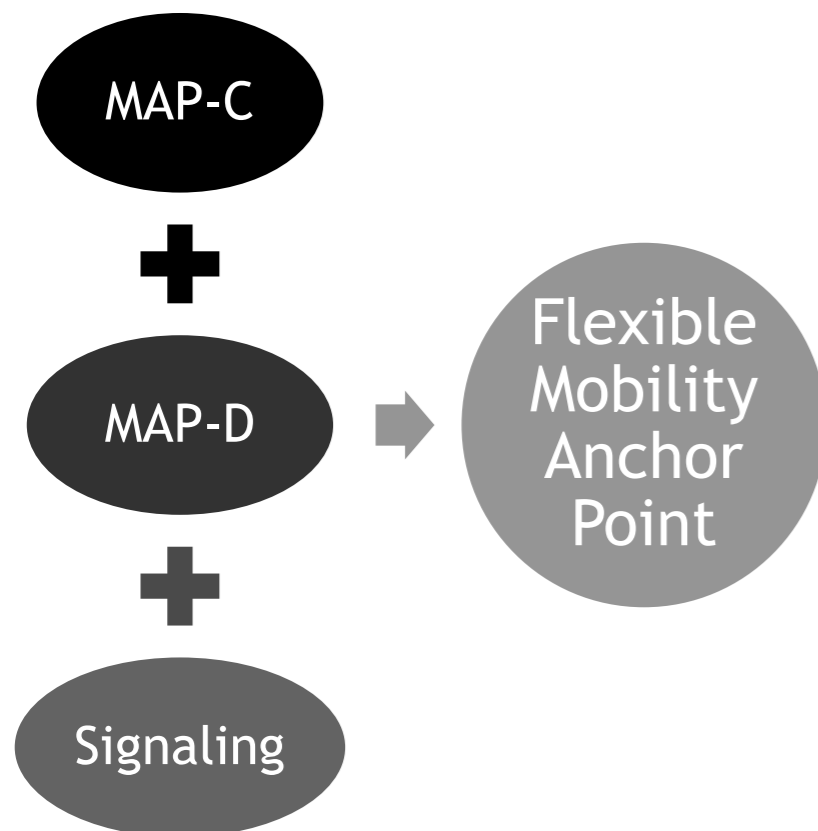


- Our scenarios: user-centric, wireless environments*
 - End-user devices as networking devices
 - Spontaneous deployment
 - **Mobility anchor points may reside on devices controlled by the user**
 - **Mobility Management solutions as of today**
 - Centralized model: MIPv6, SIP, HIP
 - Anchor point is static and trustable
 - **Self-organizing nature of user-centric networking requires...**
 - More flexibility in terms of placement of mobility management functionality
- *Refer to the following projects: ULOOP (<http://uloop.eu>) for User-centric environments; UMM (<http://siti.ulusofona.pt/~umm>) for the problematic of mobility management in user-centric environments.*

Our Proposal...



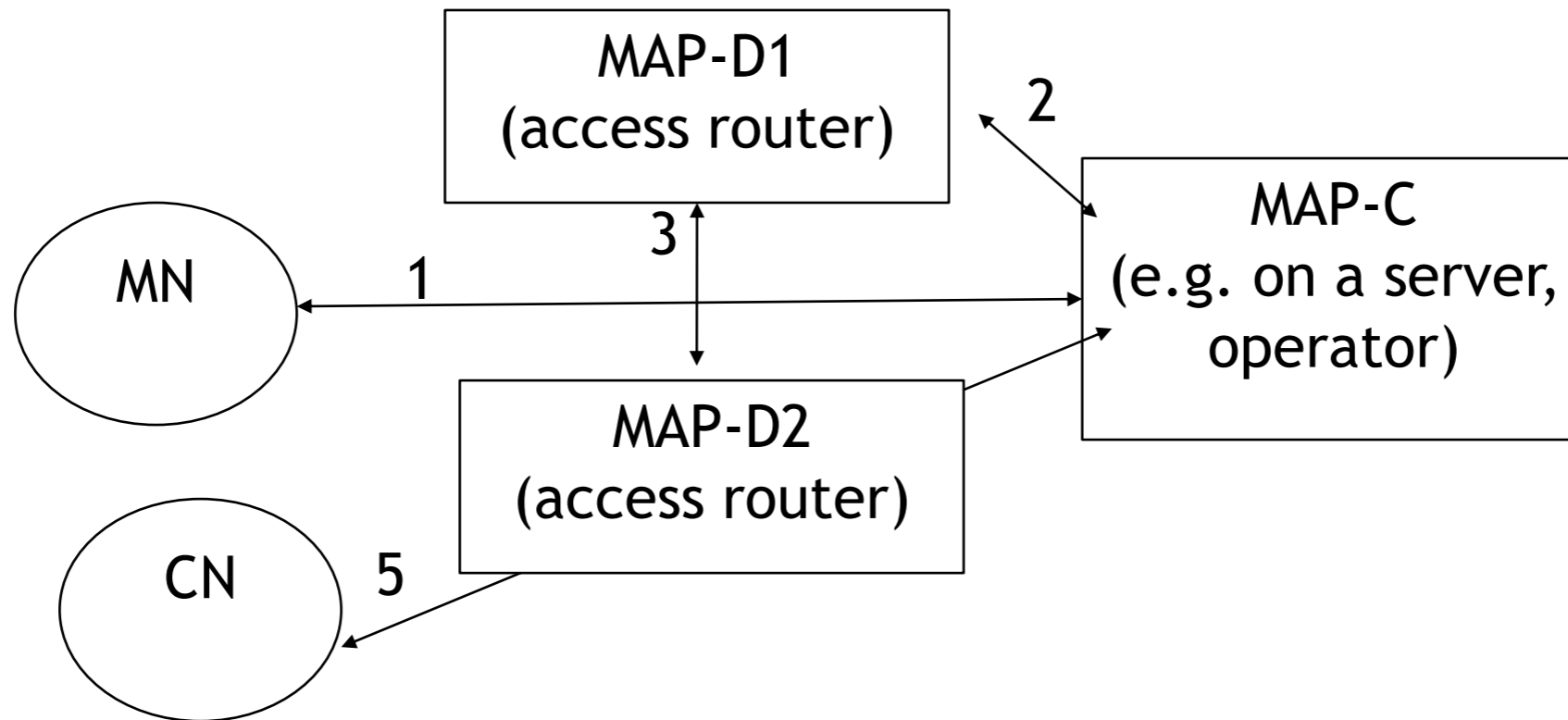
- Consider splitting of mobility management - MIPv6 as example
 - In previous work: analysed potential decoupling techniques available
- **Our choice: separation of control and data plane***
 - What is the mobility management functionality that belongs to the control plane and the data plane?
 - How to separate the control and data planes? And what are the implications ?



- **MAP-C:** Identification database, binding, handover negotiation
- **MAP-D:** device identification, encapsulation/tunneling
- Introduced signaling:
 - TER: Tunnel Establishment Request message
 - TEA: Tunnel Establishment Acknowledgment messages
 - NOTIF: Notification message

Splitting Mobility Management

Control and Data Plane Approach

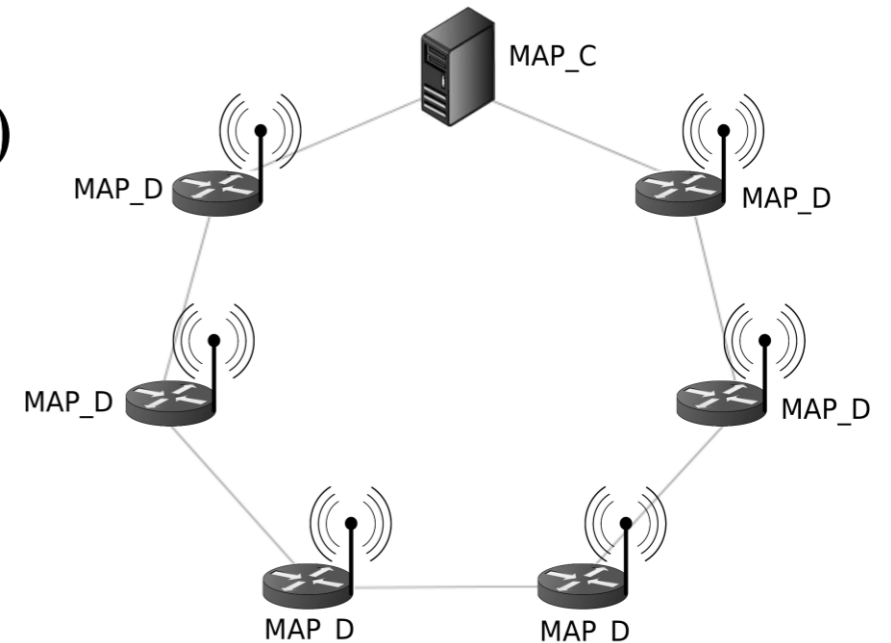
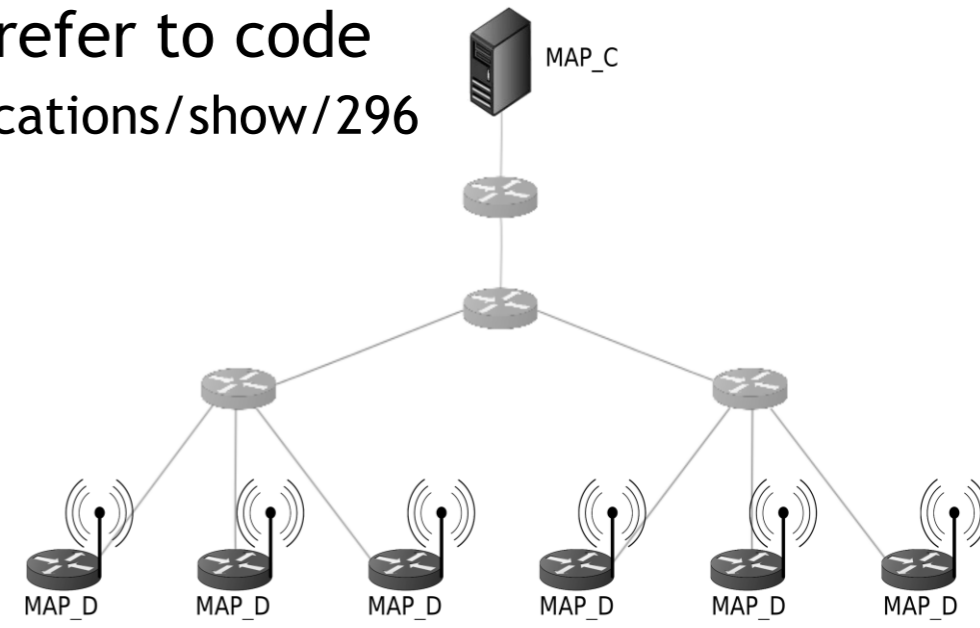


- MN performs binding to MAP-C (1)
- MAP-C sends TER to MAP-D1 (2)
- MAP-D1 establishes tunnel to MN's new location (3)
- MAP-D1 sends TEA message back to MAP-C (4)
- CN sends message to the MN's Home Address
- MAP-C answers with a NOTIF message (5)

Proposal Evaluation



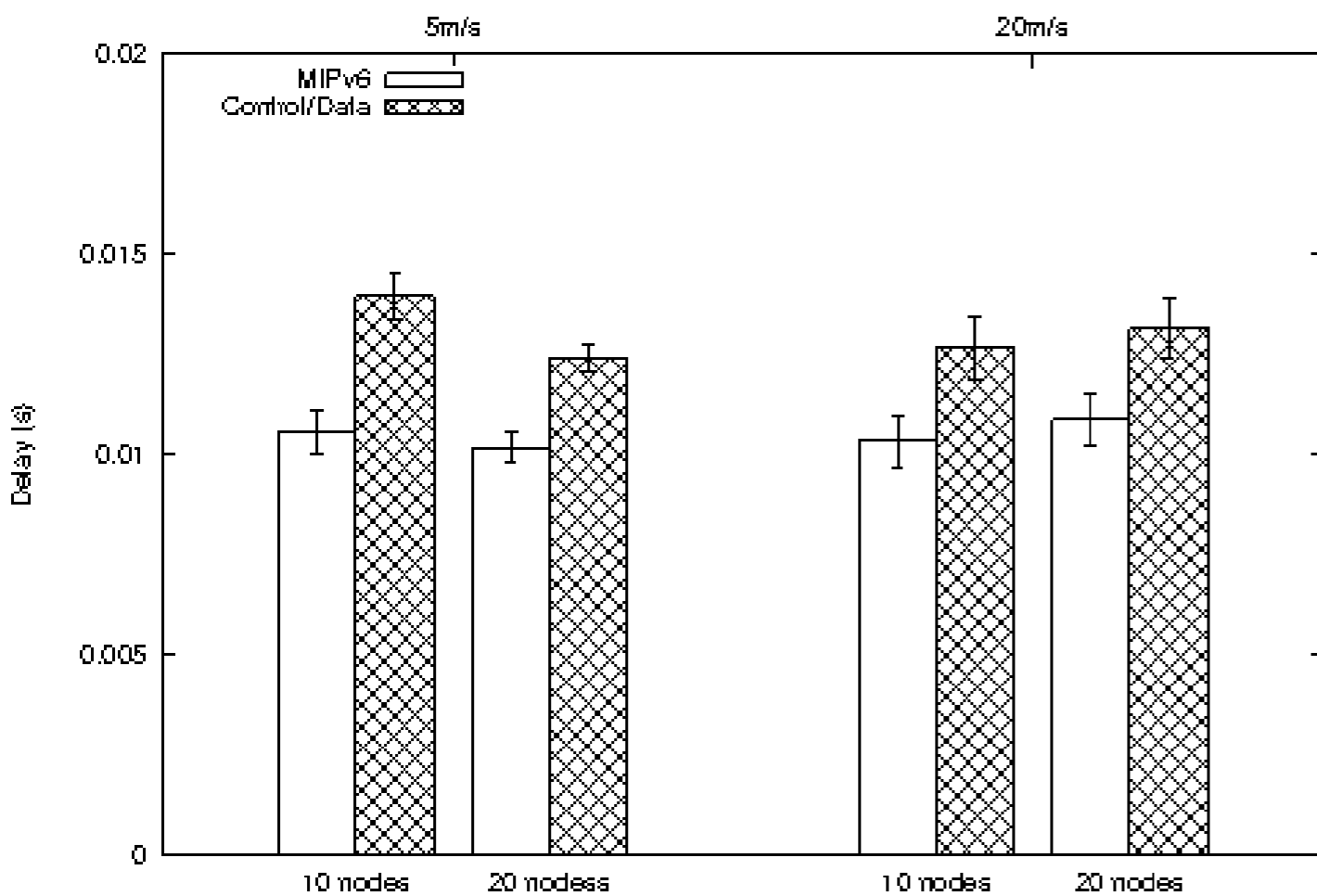
- Simulations carried out with ns2.33, results extracted within a 95% Confidence Interval
 - Mobiwan module extended with our proposal , refer to code here: <http://siti.ulusofona.pt/aigaion/index.php/publications/show/296>
- 2 specific topologies (proof of concept)
- Varying number of nodes: 10, 20
- Node movement
 - BonnMotion, Random Waypoint
 - Speeds uniformly distributed [0,5] m/s and [0.20] m/s
- Traffic Model
 - Voice over IP modelled as a Poisson (call arrival)
- Performance evaluation parameters
 - End-to-end delay
 - Packet Loss
 - MN reachability time



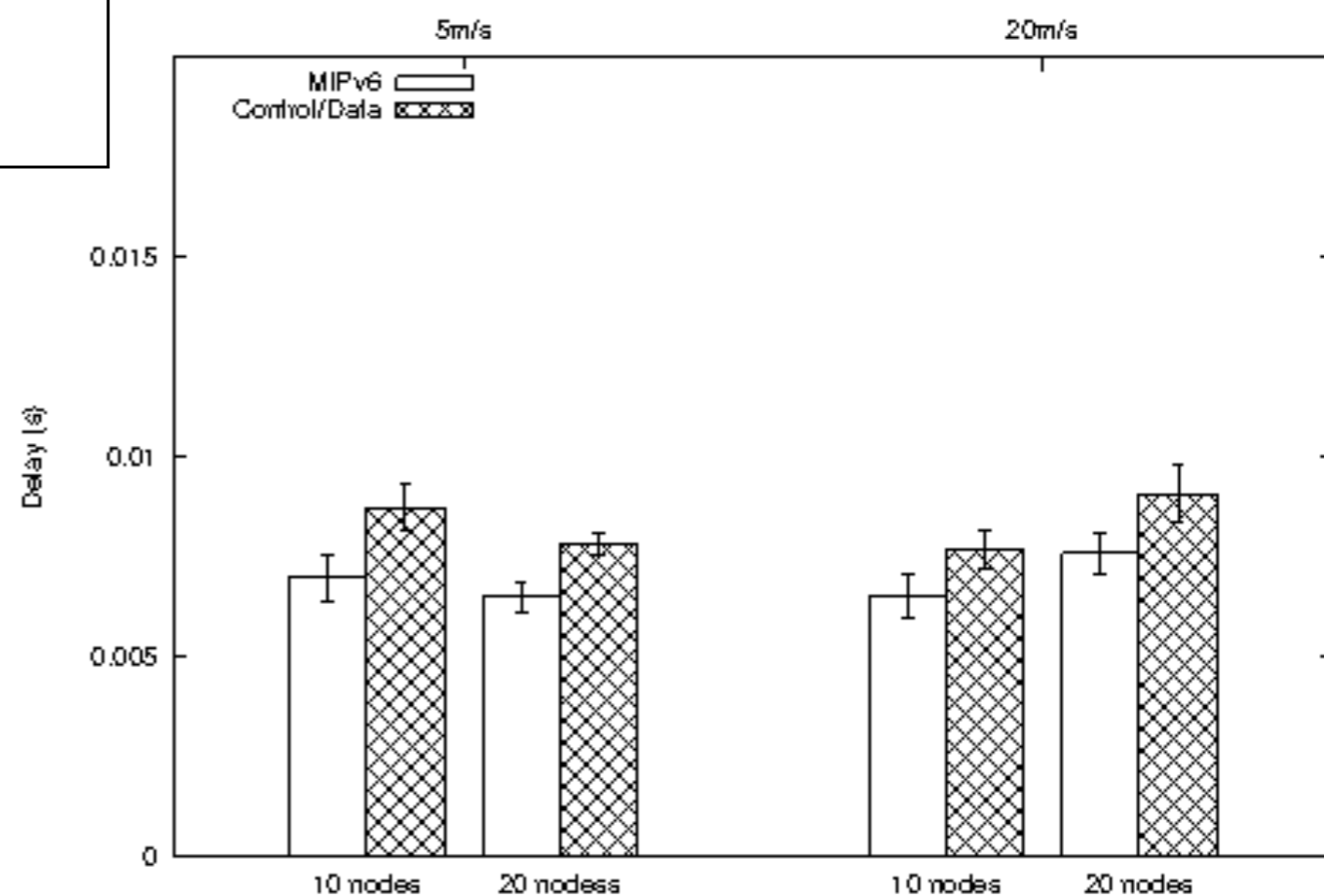
Some Results



Delay - Scenario 1



Delay - Scenario 2

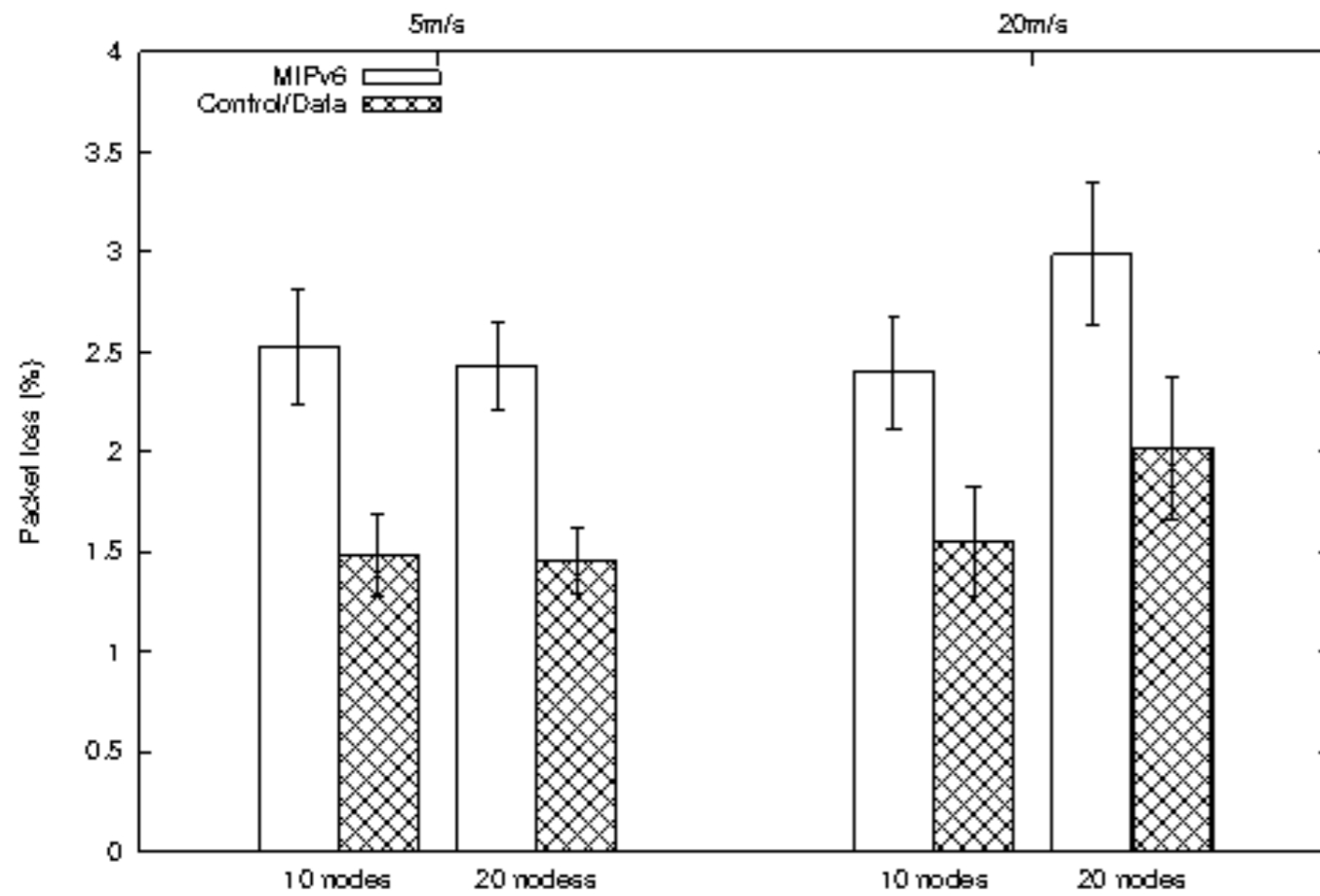


Some Results

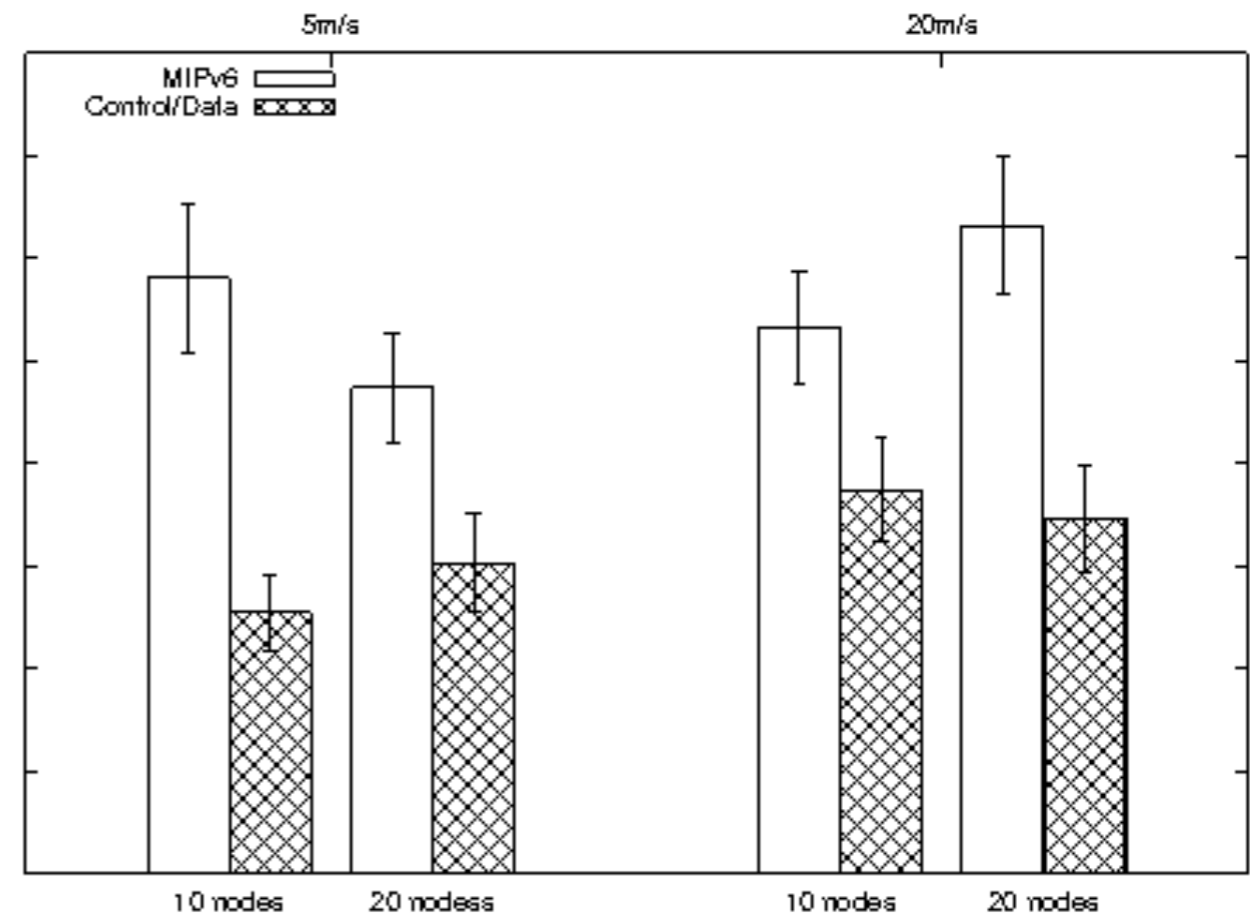
Packet Loss



Packet Loss - Scenario 1



Packet Loss - Scenario 2



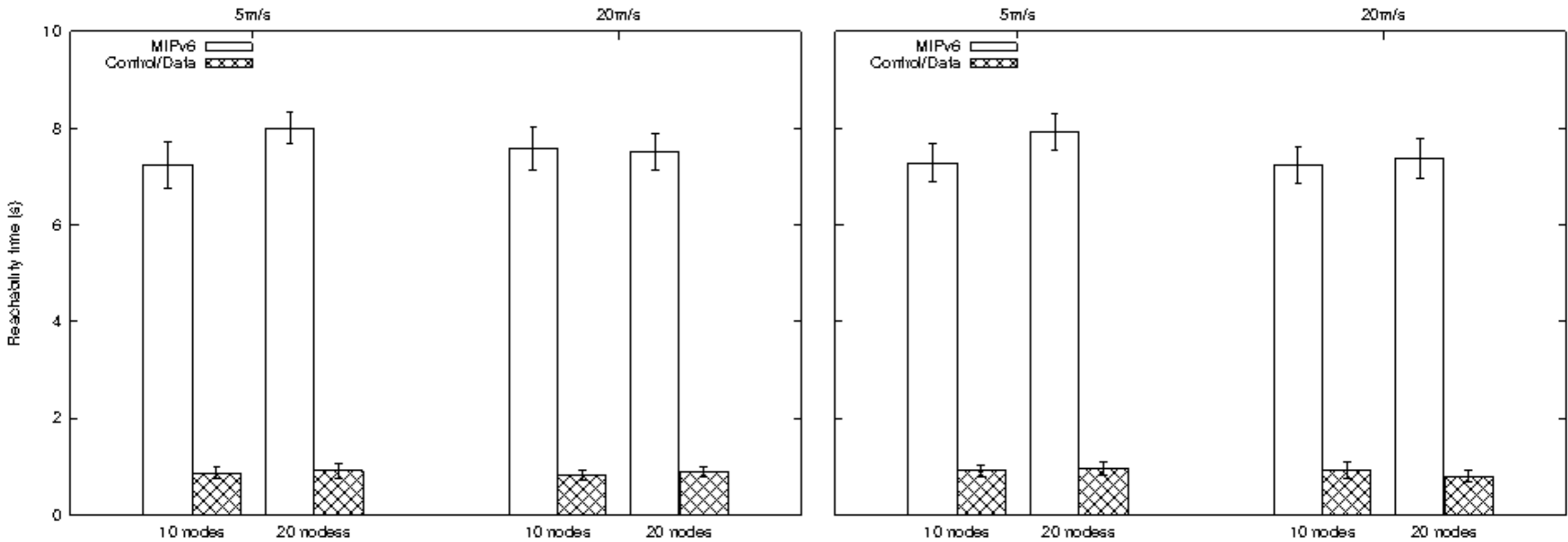
Some Results

Reachability Time



Reachability time - Scenario 1

Reachability time - Scenario 2



Conclusions and Next Steps



- **Conclusions:**
 - Control and data plane decoupling significantly improves the performance of mobility management solutions in dynamic environments
 - Lower packet loss
 - Significant increase in reachability times
- **Next steps:**
 - We are considering other decoupling approaches (not necessarily based on control and data plane)
 - Deploying our proposal on a realistic testbed (OpenWRT based)

Questions?



umm

user-centric mobility management

<http://siti.ulusofona.pt/~umm>

FCT

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