
A study of multimedia application performance over Multiple Care-of Addresses in Mobile IPv6

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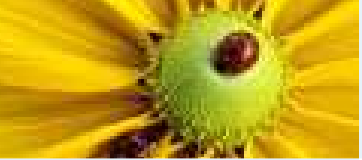
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Outline

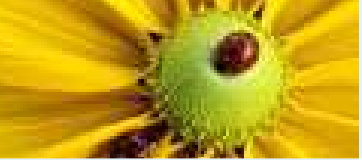
Outline

Introduction

Study

Conclusion

1. Introduction
2. Motivation
3. Evaluation
4. Methodology
5. Results
6. Conclusion
7. Next Steps



Introduction

Outline

Introduction

Introduction

Study

Conclusion

- Nodes are multi-access capable. Multihoming is a common configuration nowadays.
- Mobility Management protocols, such as Mobile IPv6 (MIPv6), need to support multiple addresses. Multiple Care-of Address (MCoA) enables MIPv6 nodes to support Multihoming, by supporting the registration of diverse addresses.



Motivation

Outline

Introduction

Study

Motivation

Motivation (cont'd)

Eval. Intro

Eval. Scenario

Eval. Methodology

Results VoIP

Results VoIP

Results Video

Results Video

Results Cost

Results Cost

Conclusion

Proposals for Multimedia applications follow “Always Best Connected” paradigm. Nevertheless evaluations:

- do not provide objective results;
- only consider IPv4 networks;
- do not consider the concurrent user of paths.

Proposals regarding MCoA performance:

- are based on old specifications (Internet Drafts);
- only consider data applications, e.g. gains in terms of capacity.



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Outline

Introduction

Study

Motivation

Motivation (cont'd)

Eval. Intro

Eval. Scenario

Eval. Methodology

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Results VoIP

Results Video

Results Video

Results Cost

Results Cost

Conclusion

How can multimedia applications benefit with multiple addresses?

Perform an objective evaluation of multimedia applications and MCoA with different address usage and within different types of failures.

Evaluation



Outline

Introduction

Study

Motivation

Motivation (cont'd)

Eval. Intro

Eval. Scenario

Eval. Methodology

Results VoIP

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Results Video

Results Video

Results Cost

Results Cost

Conclusion

Performed with:

- *MCoA++*, an implementation of MCoA in OMNET++. Available at: <http://mcoa.dei.uc.pt>
- *VoIPTool*, allows to send audio files in simulation (speech characteristics).
- ITU Perceptual Evaluation of Speech Quality (PESQ) tool to assess Mean Opinion Score (MOS).
- synthetic traffic to simulate Video streaming applications.



Evaluation - Scenario

Outline

Introduction

Study

Motivation

Motivation (cont'd)

Eval. Intro

Eval. Scenario

Eval. Methodology

Results VoIP

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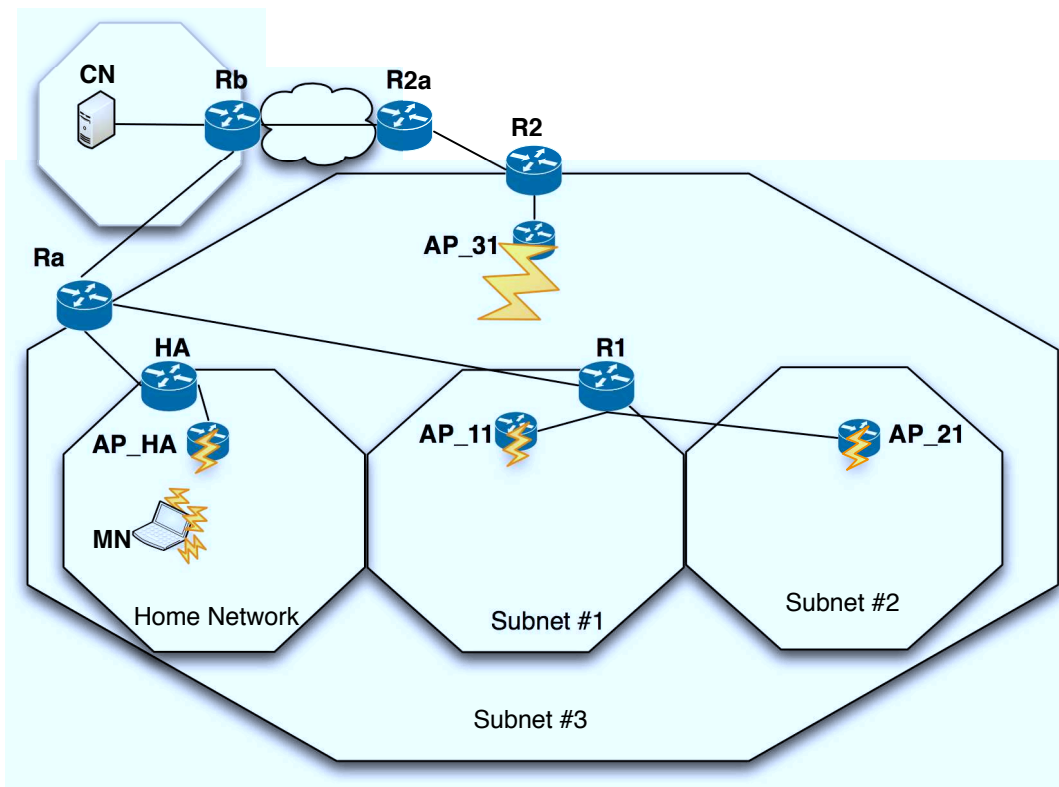
Results Video

Results Video

Results Cost

Results Cost

Conclusion



- Different wireless access technologies configurations.
- Different link propagation delays.



Evaluation - Methodology

Outline

Introduction

Study

Motivation

Motivation (cont'd)

Eval. Intro

Eval. Scenario

Eval. Methodology

Results VoIP

Results VoIP

Results Video

Results Video

Results Cost

Results Cost

Conclusion

- Two types of failures: One due to handovers-HO, and other due to failures in the network-Net.
- Network failures generated alternately between HA, R1 and R2.
- Different speed configurations: Pedestrian - 3km/h and Vehicular - 30km/h.
- Different ways of using multiple addresses: Simultaneously - SIM and single use - ONE.
- Use standard MIPv6 and MCoA procedures.

Results - VoIP Applications



Outline

Introduction

Study

Motivation

Motivation (cont'd)

Eval. Intro

Eval. Scenario

Eval. Methodology

Results VoIP

Results VoIP

Results Video

Results Video

Results Cost

Results Cost

Conclusion

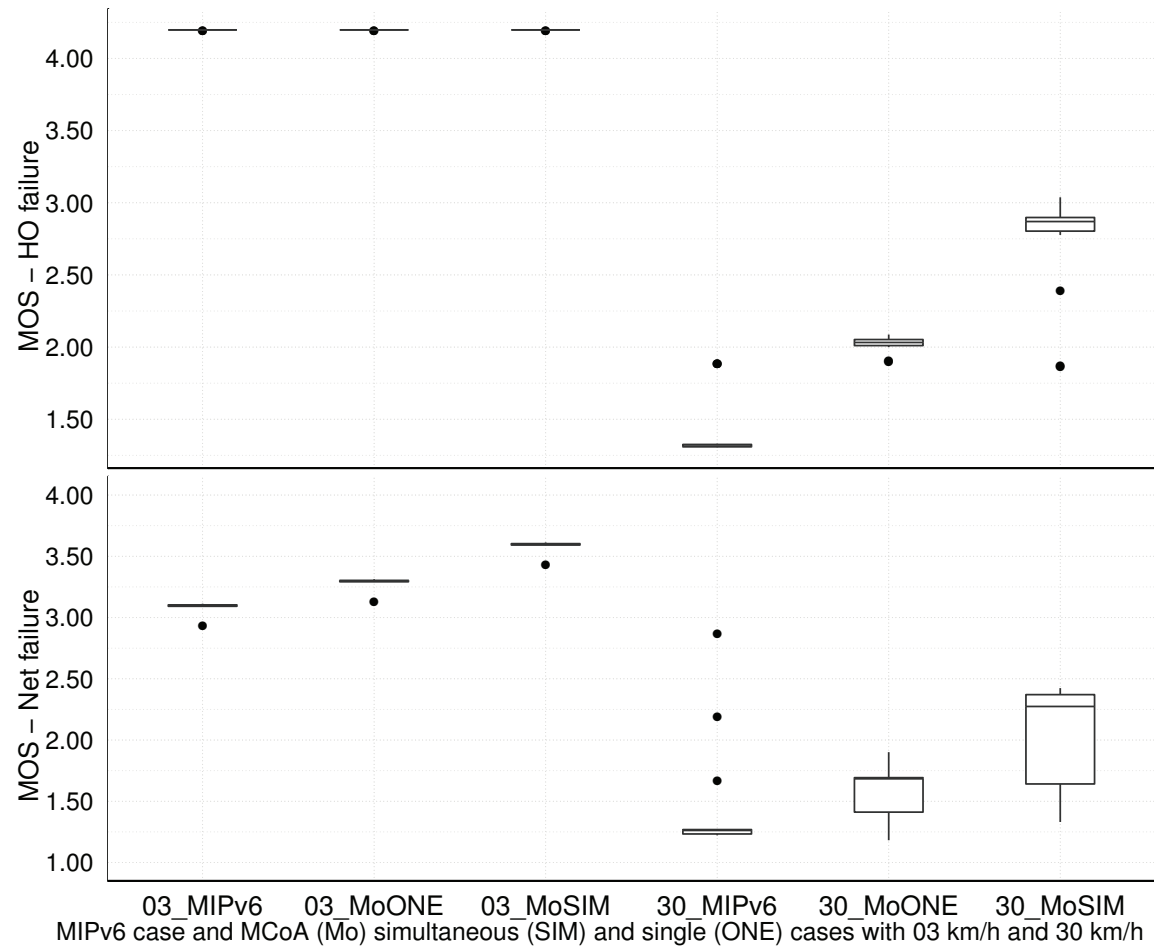


Figure 1: VoIP MOS



Results - VoIP Applications

Outline

Introduction

Study

Motivation

Motivation (cont'd)

Eval. Intro

Eval. Scenario

Eval. Methodology

Results VoIP

Results VoIP

Results Video

Results Video

Results Cost

Results Cost

Conclusion

- The simultaneous use of addresses provides perceptible quality, even in higher speeds.
- With single address usage quality is poor or bad.
- MCoA improves resilience of VoIP applications in comparison to MIPv6.
- Packet loss is higher in network failures and with higher speeds.

Results - Video Applications



Outline

Introduction

Study

Motivation

Motivation (cont'd)

Eval. Intro

Eval. Scenario

Eval. Methodology

Results VoIP

Results VoIP

Results Video

Results Video

Results Cost

Results Cost

Conclusion

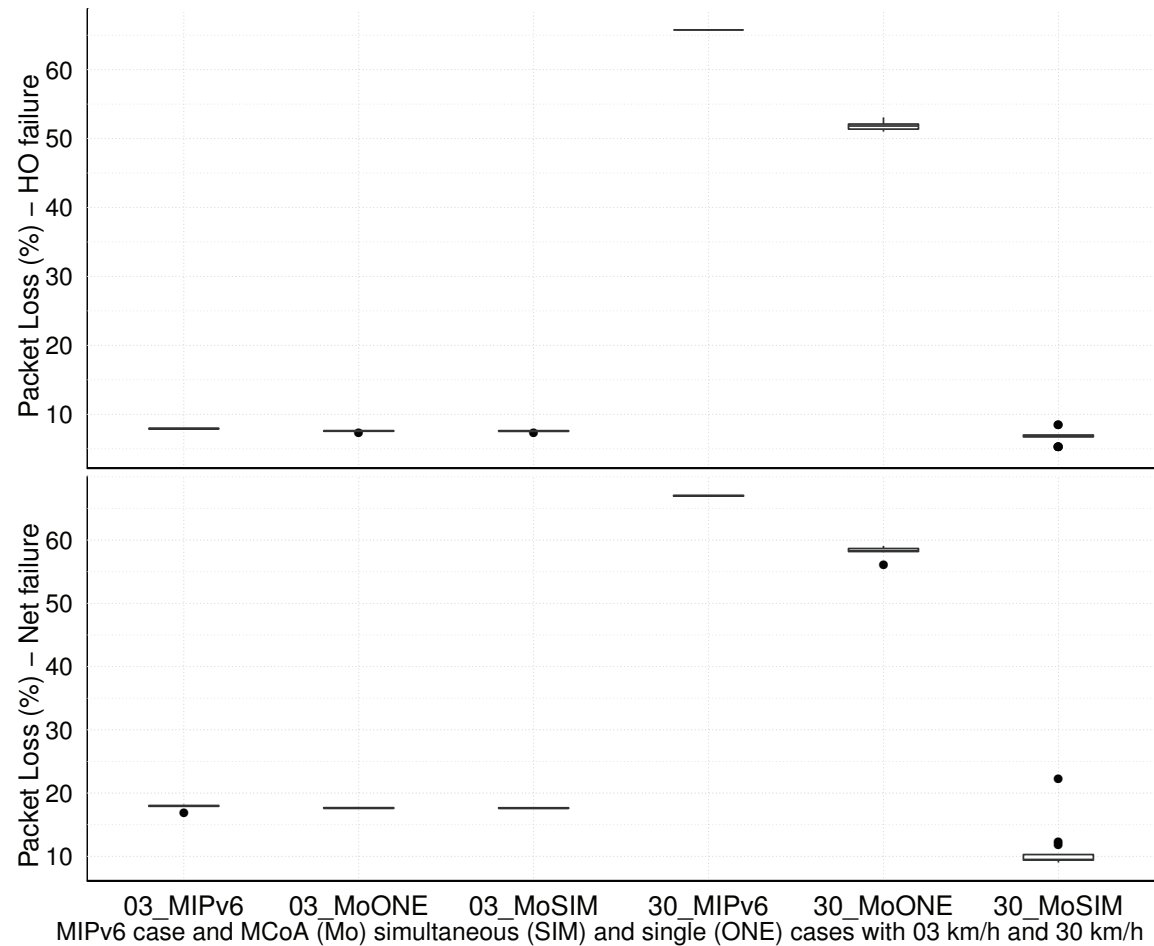


Figure 2: Video Packet Loss



Results - Video Applications

Outline

Introduction

Study

Motivation

Motivation (cont'd)

Eval. Intro

Eval. Scenario

Eval. Methodology

Results VoIP

Results VoIP

Results Video

Results Video

Results Cost

Results Cost

Conclusion

- The simultaneous use of addresses provides lower packet loss.
- MCoA improves resilience of Video applications in comparison to MIPv6.
- Packet loss is higher in network failures and with higher speeds.

Results - Signalling Cost

- Outline
- Introduction
- Study**
- Motivation
- Motivation (cont'd)
- Eval. Intro
- Eval. Scenario
- Eval. Methodology
- Results VoIP
- Results VoIP
- Results Video
- Results Video
- Results Cost**
- Results Cost
- Conclusion

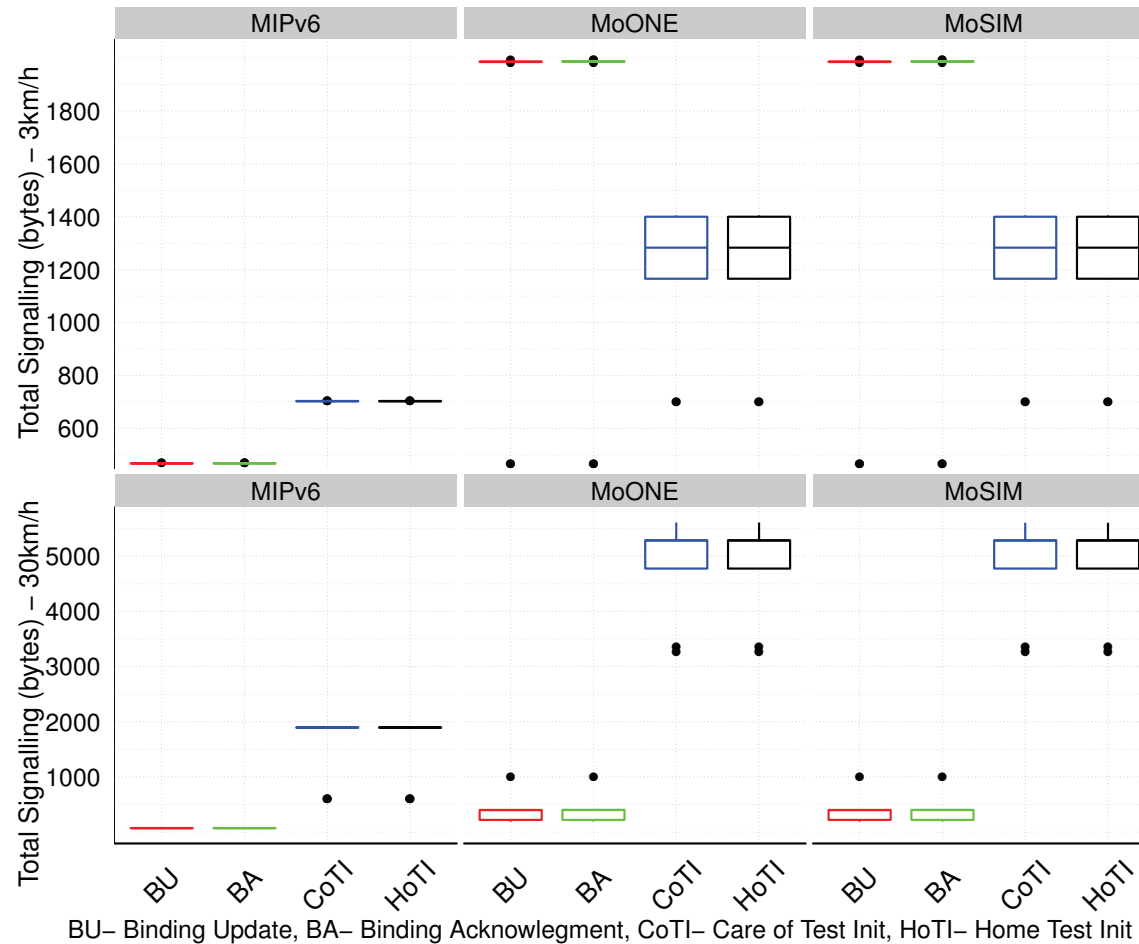


Figure 3: Signalling Cost



Results - Signalling Cost

Outline

Introduction

Study

Motivation

Motivation (cont'd)

Eval. Intro

Eval. Scenario

Eval. Methodology

Results VoIP

Results VoIP

Results Video

Results Video

Results Cost

Results Cost

Conclusion

Cost is assessed in terms of message size from signalling procedures of MIPv6 and MCoA.

- MCoA cases are based on the bulk registration mode (multiple addresses conveyed in a single message).
- MCoA introduces more overhead in comparison to MIPv6.
- Cost increases with higher number of handovers.
- Return routability messages (CoTI, HoTI) are exchanged more often in comparison to binding messages (BU, BA).



Conclusion

Outline

Introduction

Study

Conclusion

Conclusion

Final Notes

- All layers must act synchronized when aware of multihoming context.
- Multiple addresses improve multimedia application performance, in terms of resilience (when used simultaneously).
- The trade-off between cost and performance must also consider other metrics, such as monetary cost.



Final Notes

Outline

Introduction

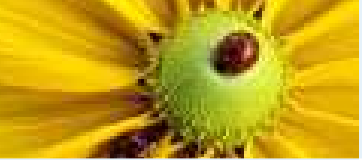
Study

Conclusion

Conclusion

Final Notes

- The mCoA++ code is available for free at <http://mcoa.dei.uc.pt>. You are welcome to try it out, and feel free to contact me (bmsousa@dei.uc.pt).
- A presentation with details on mCoA will be held tomorrow at main conference. You are invited to participate.



Outline

Introduction

Study

Conclusion

Thank You