



IPv6 Mobility Research at CTIE

Australian Telecommunications CRC
Next Generation Internet Program

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Centre for Telecommunications and Information
Engineering
Monash University

Hello, who are we?

- Centre for Telecommunications and Information Engineering (CTIE):
 - Research centre within Monash University
 - Part of ATcrc Next Generation Internet Program
 - Have an IPv6 testbed running
 - Developers of IPv6 Multimedia applications
 - Implementers of IPv6 Mobility protocols
 - Contributors to IETF Working Groups and standards on IPv6 and Mobile-IPv6
 - Diverse Research and Commercial Experience.
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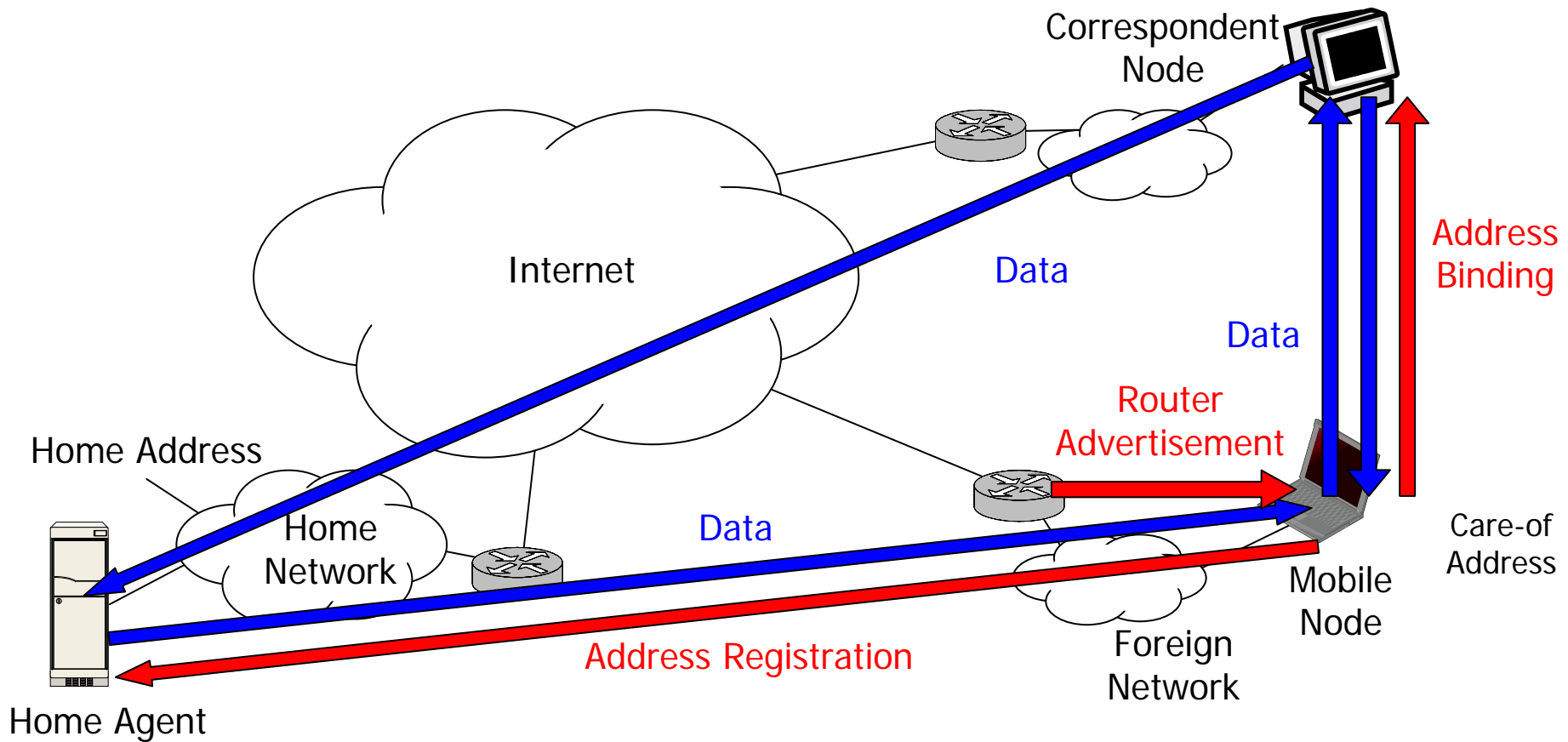
Mobile Packets the Future?

- Trends towards packetisation of everything
- Easier to incorporate different data streams
- User control of usage models
- We don't know what the applications will be (but we can take some guesses).
- Once we have IP connectivity, anything goes...

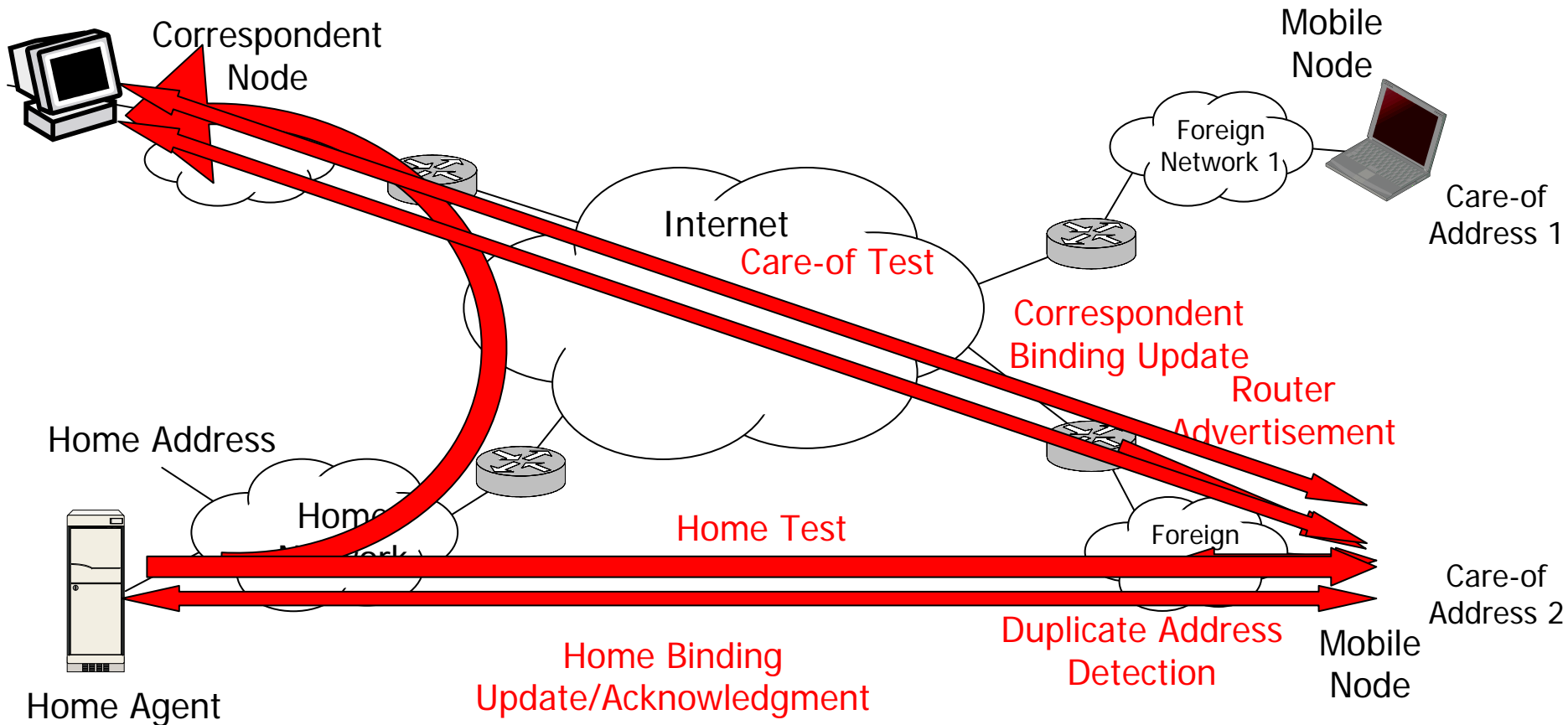
The Internet Mobility Challenge

- IP address is not only unique address, but tied to Network Topology
- Movement of IP device between networks relies on Layer 2 or Layer 3 context transfer.
- When Layer 3 transfer occurs, IP address changes.
- Higher layer protocols cannot handle IP address changes (e.g. TCP)
- IP Mobility must hide or prevent IP address changes for higher protocol layers

Mobile IPv6 System



Mobile IPv6 Handover



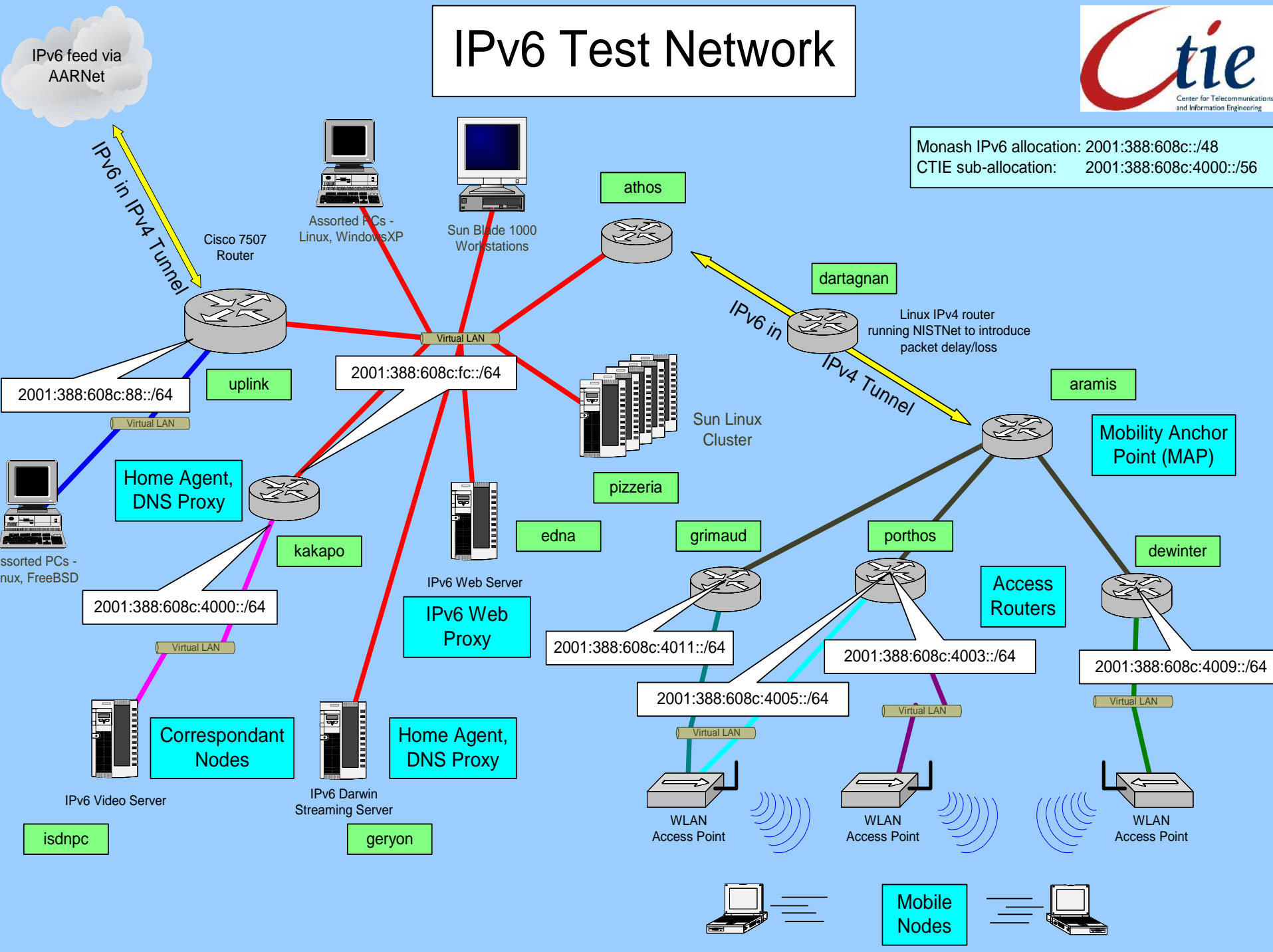
Four Delays

- Movement Detection Delay
- Router Advertisement Delay
- Duplicate Address Detection Delay
- Binding Update Delay

Potential Solutions

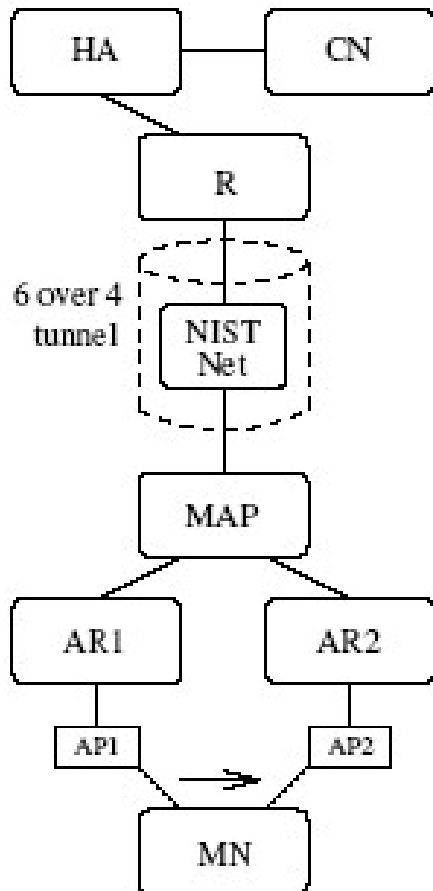
- Layer 2 triggers and fast Router Solicitation
- Fast Router Advertisement
- Optimistic Duplicate Address Detection
- Hierarchical MIPv6

IPv6 Test Network



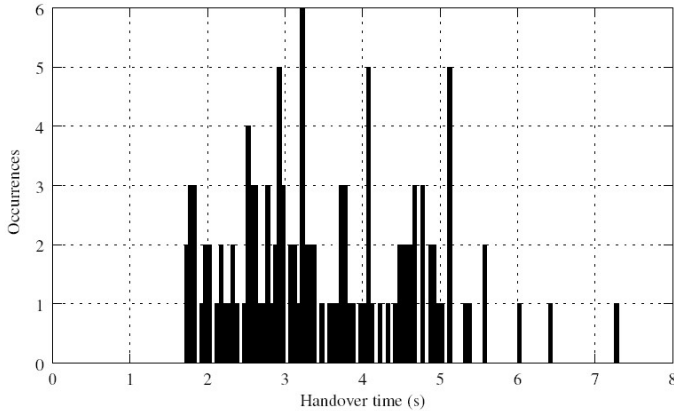
Monash IPv6 allocation: 2001:388:608c::/48
CTIE sub-allocation: 2001:388:608c:4000::/56

Test Environment

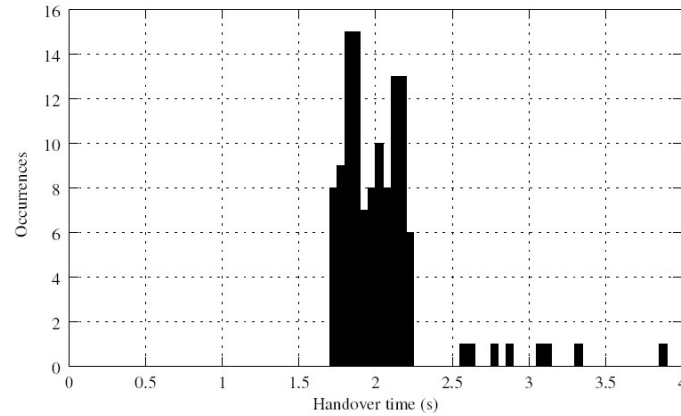


- Linux / mipl used for MN, HA, MAP, ARs, CN
- 802.11b APs
- NISTnet introduces $200ms$ RTT between MAP and HA
- 120 handovers per test, with non-repeating prefixes
- RAs sent every 3-4s (as per RFC2461)
- BU Piggybacking disabled
- L3 delay is measured from Link-up trigger to BACK reception.

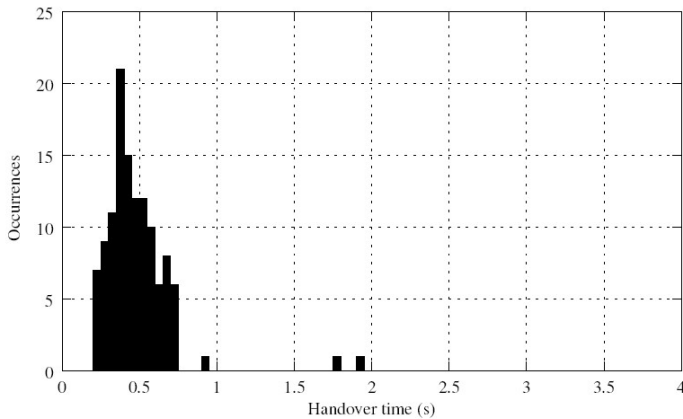
Some Results



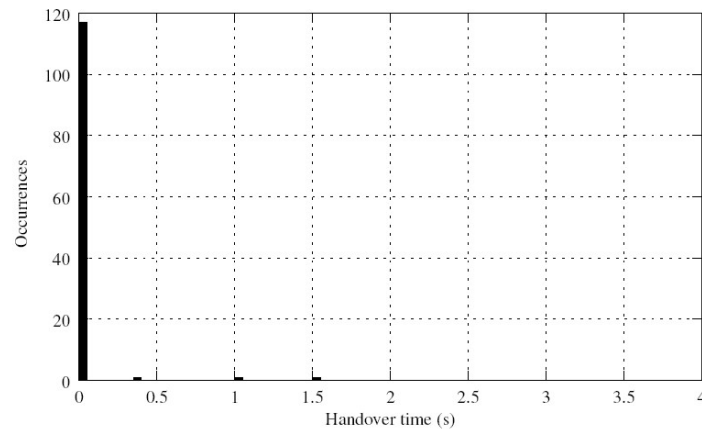
Base Case



+ Triggers



+ Optimistic DAD



+ HMIP & FastRA

Moving forward

- Detecting Network Attachment (DNA) IETF working group – Greg Daley Co-chair.
 - Link Identification
 - Deterministic FastRA
 - Optimistic DAD – IPv6 working group document
 - Moving towards Proposed Standard
 - Edge Handovers
 - Securing Proxy Neighbour Discovery
 - IPv6 Multicast
 - Simulation
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Thank you
