Non-Predictive Handovers

"Can we achieve acceptable real-time handovers using non-predictive techniques?"

- Prediction information may be unavailable or unreliable.
- Acceptable handover time for real-time voice services is $\approx 60ms$
- Keep It Simple, Stupid!

Four Delays

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

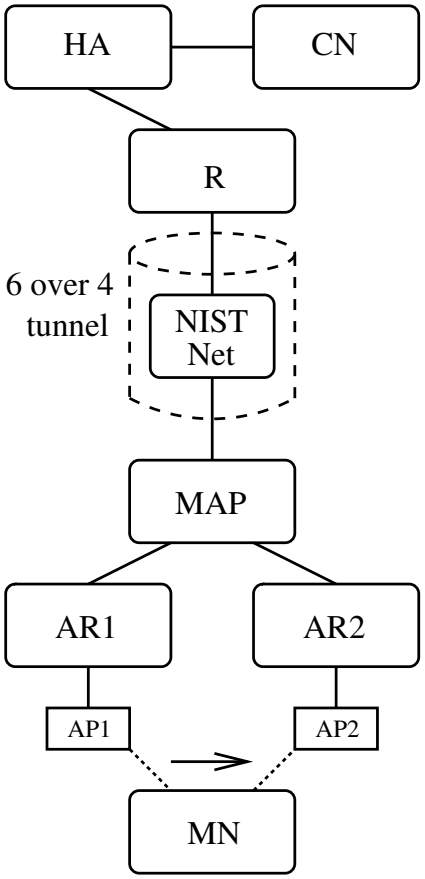
Potential Solutions

There are other potential mechanisms to address each delay, but for our testing we have concentrated on:

- *L2 Triggers* and *Fast RS*
- *Fast RA*
- *Optimistic DAD*
- *HMIPv6*

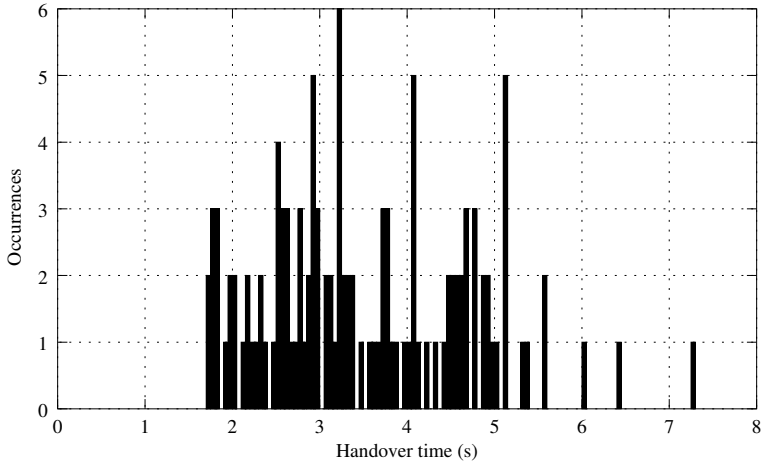
drafts: `draft-daley-mobileip-movedetect-00` ; `draft-mkhalil-ipv6-fastra-02` ; `draft-ietf-mobileip-hmipv6-06` ; `draft-moore-ipv6-optimistic-dad-02` .

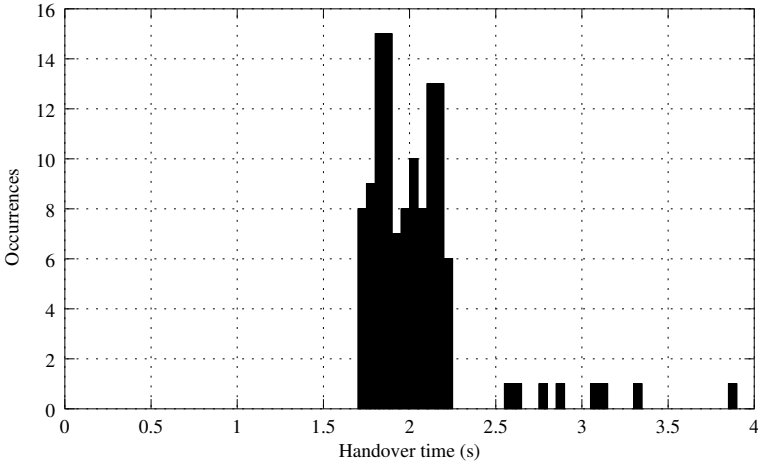
Testing



- 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.

Results 1





Base case (RFC-compliant)

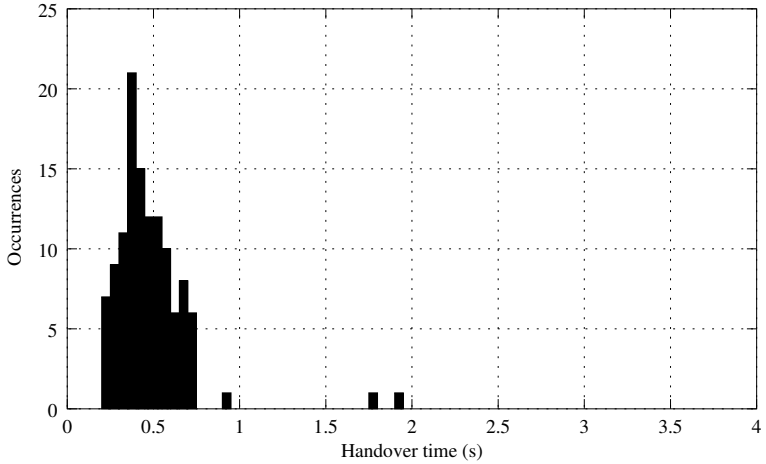
median = $3250ms$

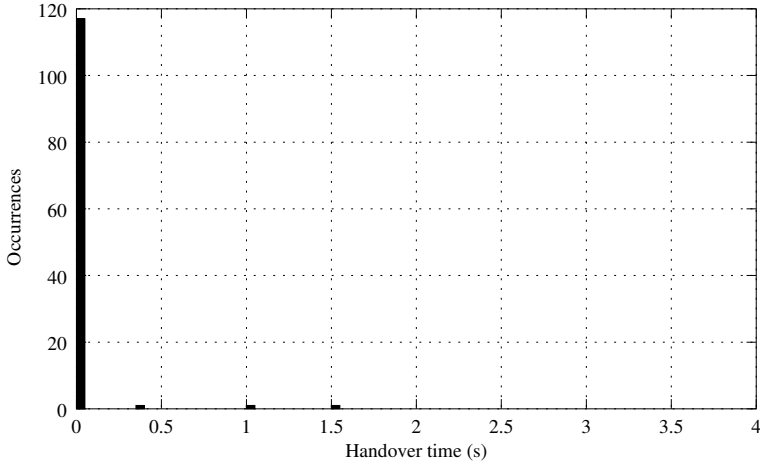
+ L2 Trigger + Fast RS

median = $1990ms$

- Note that the $1990ms$ includes a $500ms$ BU piggybacking delay bug ...

Results 2





+ Optimistic DAD

median $= 436ms$

+ HMIPv6 + FastRA

median $= 32ms; 95\% \leq 39ms$

- Note that there are still some outliers, caused by loss of NS packets.

Conclusions

- Sub $60ms$ L3 handovers are acheivable with non-predictive techniques.
- Layer 2 handover delay is much larger with 802.11b, around $400ms$.
- Perhaps new L2s will be more suitable!

Thanks To

- ATCRC - Australian Telecommunications CRC
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