IPv6 Mobility
Research at CTIE

Australian Telecommunications CRC
Next Generation Internet Program
@ Centre for Telecommunications and Information Engineering
Monash University

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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.
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

- Home Address
- Internet
- Mobile Node
- Correspondent Node
- Home Network
- Foreign Network
- Address Registration
- Router Advertisement
- Mobile Node
- Care-of Address
- Data
- Address Binding
- Home Agent
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Mobile IPv6 Handover

- Correspondent Node
- Home Agent
- Internet
- Mobile Node
- Correspondent Test Address
- Care-of Address 1
- Foreign Network 1
- Care-of Test Address
- Home Test
- Home Binding Update
- Duplicate Address Detection
- Router Advertisement
- Home Address
- Mobile Address 2
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
Test Environment

- Linux / mpi1 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
- + Optimistic DAD
- + HMIP & FastRA
- + Triggers
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
Thank you