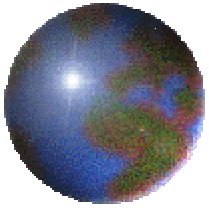

MIPL Mobile IPv6 for Linux

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Contents

- Overview of Mobile IPv6
- MIPL Mobile IPv6 for Linux
- Implementation of the protocol
- Installation
- Future directions

Motivation

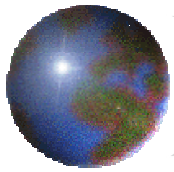
- A trend towards more mobile computers: laptops, PDAs, cell phones, etc.
- Users want their applications to work in spite of movement
- Connections should not break, required user actions should be minimal (no rebooting)
- Requirements on mobility support depends on the frequency of handoffs

Mobile IPv6 – why?

- Network layer mobility management
- MIPv6 enables connection oriented services (SSH, VoIP, etc.) during movement
- Reachability through the home address
- Intelligent use of multiple access networks, such as GSM/UMTS/WLAN => smaller bills & more bandwidth for the consumer

Mobile IPv6

- Provides significant improvements to MIPv4, one of the key incentives for transitioning to IPv6
- An integral part of the IPv6 stack
- Uses Mobility Header protocol for signaling
- Route optimization is a part of the protocol
- IPSec and Return Routability is used for authentication of the signaling
- No FAs, just routers



MIPL – Mobile IPv6 for Linux

- MIPL implements draft versions 10 – 20, in releases 0.5 – 0.9.5.1, 1.0 when MIPv6 becomes a RFC ;-)
- Core development team working for GO – project, significant contributions from several outside individuals and companies
- MIPL released under GPL, public bitkeeper
- Included in Familiar distribution for PDAs, Carrier Grade Linux and in the USAGI IPv6 stack

Project Background (1/2)

- MIPL was started as a student project at Helsinki University of Technology in a software engineering project course in 1999 with GO project as its customer
- Initial version of MIPL was released in June 2000 under GPL

Project Background (2/2)

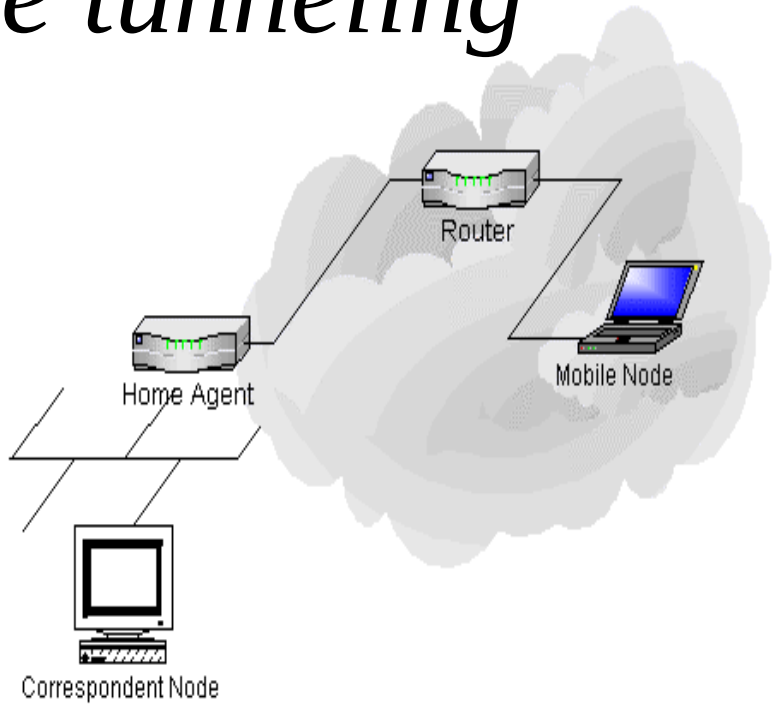
- The development has continued as a part of the GO project at Helsinki University of Technology:
  - Mobility in IP networks and its applications
  - Started in January 1998
  - Funded by the National Technology Agency and industrial partners

Movement detection

- Mobile Node, *MN*, listens to router advertisements
- MN uses current default router, if it is reachable *or* changes to new routers it has not heard of before (eager cell switching)
- MN probes current router with Neighbor solicitations every N seconds

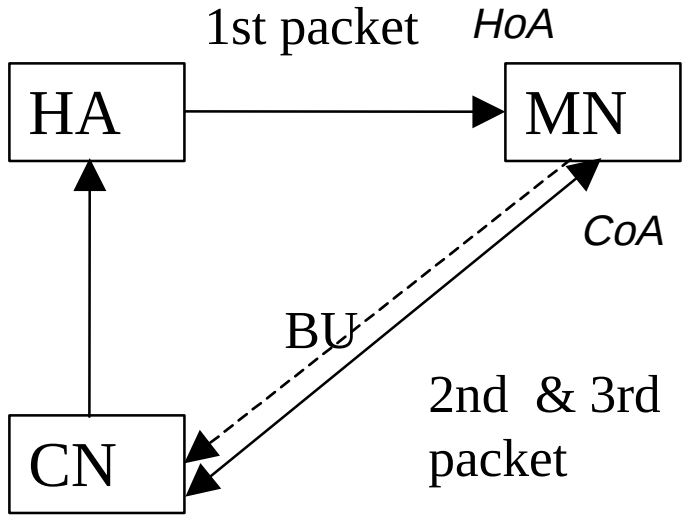
Mobile IPv6 – reverse tunneling

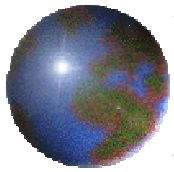
- After movement MN sends a Binding Update to its Home Agent
- HA keeps track of MN's location (Care-of Address, CoA)
- Traffic between home address of MN and CN is tunneled via HA



MIPv6 Route Optimization

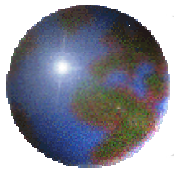
- Reduces the delay between MN and CN, probably also increases the throughput
- MN sends Binding Updates to CNs
- Authorization of BUs
- Return routability checks for home and care-fo addresses of MN
- MN – MN case





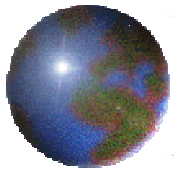
Multiple interface support in MIPL

- Mobile Nodes can have multiple interfaces
- User can set preferences on the use of interfaces (eth0, wlan0, gprs0,...)
- MIPL uses the most preferred *available* interface for all communications which use home addresses
- Vertical handoffs: eth0 -> wlan0 -> gprs0
- Included in MIPL, since 0.9.4



Simultaneous Multiaccess in MIPL

- Different applications have different needs, delay, bw, price, security...
- How to manage traffic independently for each application?
- Policies for different types of communications



Simultaneous multiaccess in MIPL

- Policies are mapped to multiple home addresses, which are visible to Cns and HA as independent mobile nodes
- Source address selection modified to enforce policies
- Code not published yet

MIPL and IPSec

- IPSec used for authentication of BUs and BAs between MN and HA
- IKE, RFC 2409, used for key negotiation
- Linux IPv6 IPSec is still work in progress and exists only for development series of kernel
- Integration during Spring 2003

MIPL – implementation details

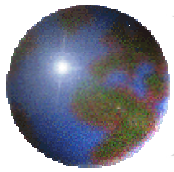
- Current version 0.9.5.1
- Memory footprint around 70KB
- Works with Linux kernels 2.4.xx and 2.5.xx as a kernel module
- Uses /proc filesystem and netlink for configuration and statistics

MIPL – installation

- Package available at http://www.mipl.mediapoli.com, also using IPv6
- Package contains source code for the mobile_ip6 kernel module and changes to the ipv6 module as a patch
- Requires (re)compilation of the kernel
- Functionality (CN/MN+CN/HA) cna be chosen when configuring the Linux kernel

MIPL, Further Research at HUT

- Mobile routers,
- Use with Ad Hoc networking (Globalv6)
- Security (CGA addresses)



Work based on MIPL

- Hierarchical Mobile IPv6 at Monash University in Australia (for MIPL 0.9.3)
- Per-Flow movement in Mobile IPv6 at RMIT in Australia (for MIPL 0.9.4)
- Proprietary multiaccess software at Ericsson demoed at Inet 2001 conference

Thanks