Mobile IPv6 in 6NET: An Overview

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Summary

- Mobile IPv6 Overview
- Status of the Protocol
- Available Implementations
- Deployment in 6NET
- Trials and Testing
- MIPv6++
- Related 6NET Deliverables
MIPv6 Overview

- Routing protocol for mobile IPv6 hosts
  - Nothing more, nothing less
  - Transparent to upper layer protocols and applications

- Uncommon protocol architecture...
  - Tries to avoid actively involving routers!
  - Protocol state held in end-stations
    - Mobile nodes
    - Correspondent nodes
  - One exception... the Home Agent
MIPv6 Operation

- Mobile Nodes ‘Acquire’
  - Home address
  - Home agent

- When away from home
  - Acquire care-of address
  - Register care-of address with home agent and any relevant correspondent nodes...
  - Mobile IPv6 ensures correct routing
MIPv6 Bindings Cache

- Maintains a mapping between the mobile node’s home address and its current care-of address
- Held by home agents and correspondent nodes
- Provides info to allow correct routing of IPv6 packets to mobile node
- Provides a de-coupling between an IPv6 address and routing information
MIPv6 and Security

- **Authentication**
  - Massive security / denial of service attack in MIPv6 as described so far
  - What’s to stop an attacker sending bogus Binding Update messages?
  - IPSec protects signalling between mobile node and its home agent
  - ‘Return Routability’ test allows correspondent nodes to determine binding updates are authentic

- **Privacy**
  - IPSec between the mobile node and its home agent is control traffic only!
Status of the Protocol

- Current specification is an Internet Draft
  - accepted by IESG for RFC status
- No RFC number yet...
  - currently in RFC editor’s queue
- MOBILEIP wg now finished
- MIP6 wg
  - continuing work on developments that are required for wide-scale deployments
- MIPSHOP wg
  - Signalling and HO optimisation
Available Implementations (v24 compliant)

- **Linux**
  - 2.4.x kernel versions, 2.6 coming

- **BSD**
  - KAME stack [http://www.kame.net](http://www.kame.net)
  - FreeBSD 4.9, NetBSD 1.6.2, OpenBSD 3.4

- **Cisco**
  - IOS technology preview available by request
    - ‘ohanami’ EFT

- **Microsoft**
  - Expect beta release sometime in Q4 2004
Deployment in 6NET

- Several MIPv6 Testbeds
  - Various implementations
  - Different focus for each testbed

- Overall goal is to investigate deployment issues for both small and large scales
  - Implementation issues
    - Ease of setup
    - Interoperability
  - Autoconfiguration / bootstrap
  - Handover performance
  - Privacy, security
  - Multicast
# MIPv6 Testers

<table>
<thead>
<tr>
<th>Partner</th>
<th>MIPv6 Nodes</th>
<th>Implementations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ULANC</td>
<td>HA, MN, CN</td>
<td>Microsoft, Cisco, KAME, MIPL</td>
</tr>
<tr>
<td>UCL</td>
<td>HA, MN, CN</td>
<td>MIPL</td>
</tr>
<tr>
<td>Fokus</td>
<td>HA, MN, CN</td>
<td>MIPL, KAME</td>
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<td>MIPL, Cisco</td>
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</tbody>
</table>
6NET MIPv6 Home Agents

- Microsoft
- Cisco
- KAME
- MIPL
- ULANC
- OULU
- TELIN
- PSNC
- Fokus
- ULP
- Cisco
- MIPL
- KAME
Trials and Testing

- Now we have a standard...
- Protocol conformance
- Interoperability
- Handoff performances
- Input for deliverable ‘Final MIPv6 Support Guide’
  - Cookbook / How-To for people wishing to deploy MIPv6 on small or large scale
Trials and Testing (2)

- TAHI test suite
  - also used in Connectathon
    - [http://www.connectathon.org/](http://www.connectathon.org/)

- IETF Remote Interop Testing
  - similar to 6Bone testing
  - [draft-kniveton-mipv6-remote-testing-00](draft-kniveton-mipv6-remote-testing-00)
  - [http://list.etsi.org/plugtests-mip6.html](http://list.etsi.org/plugtests-mip6.html)
Remote MIPv6 Demo

Remote Demo Network

Network A

Network B

Network C

Home Network for MN1 and MN2

Home Network HA for CN

HA1

HA2

MN1

MN2

CN
MIPv6 ++

- 'Seamless' Handovers
  - Need to eliminate both latency and loss
  - Fast handover implementation for Linux
    - performance analysis vs vanilla handovers

- Network Mobility using MIPv6
  - Mobile routers have home agents like in normal MIPv6
  - Route optimisation problem
  - Some interesting deployment scenarios...
Remote Network Support

- Leaf networks in Rural Locations
  - Microwave / WiMAX links
- Flexible access to on-line resources for response team
- Provide temporary Internet connectivity to the remote site
Mobile Library

- Mobile library offering Internet access and virtual library service
- Could cover many libraries from one mobile station
- Use whatever uplink is available
Related 6NET Deliverables

http://www.6net.org/publications/

- D4.1.1 Survey and Evaluation of MIPv6 Implementations
  - somewhat out of date
- D4.1.2 Initial MIPv6 Support Guide
- D4.1.5 Multicast with Mobile Hosts: Analysis and Performance Evaluation
- To come...
  - D4.1.3 Mobile IPv6 Handovers: Performance Analysis and Evaluation
  - D4.1.4 Final MIPv6 Support Guide