

# **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
  - <http://www.ietf.org/internet-drafts/draft-ietf-mobileip-ipv6-24.txt>
  - 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
  - MIPL <http://www.mobile-ipv6.org/>
  - 2.4.x kernel versions, 2.6 coming
- BSD
  - KAME stack <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

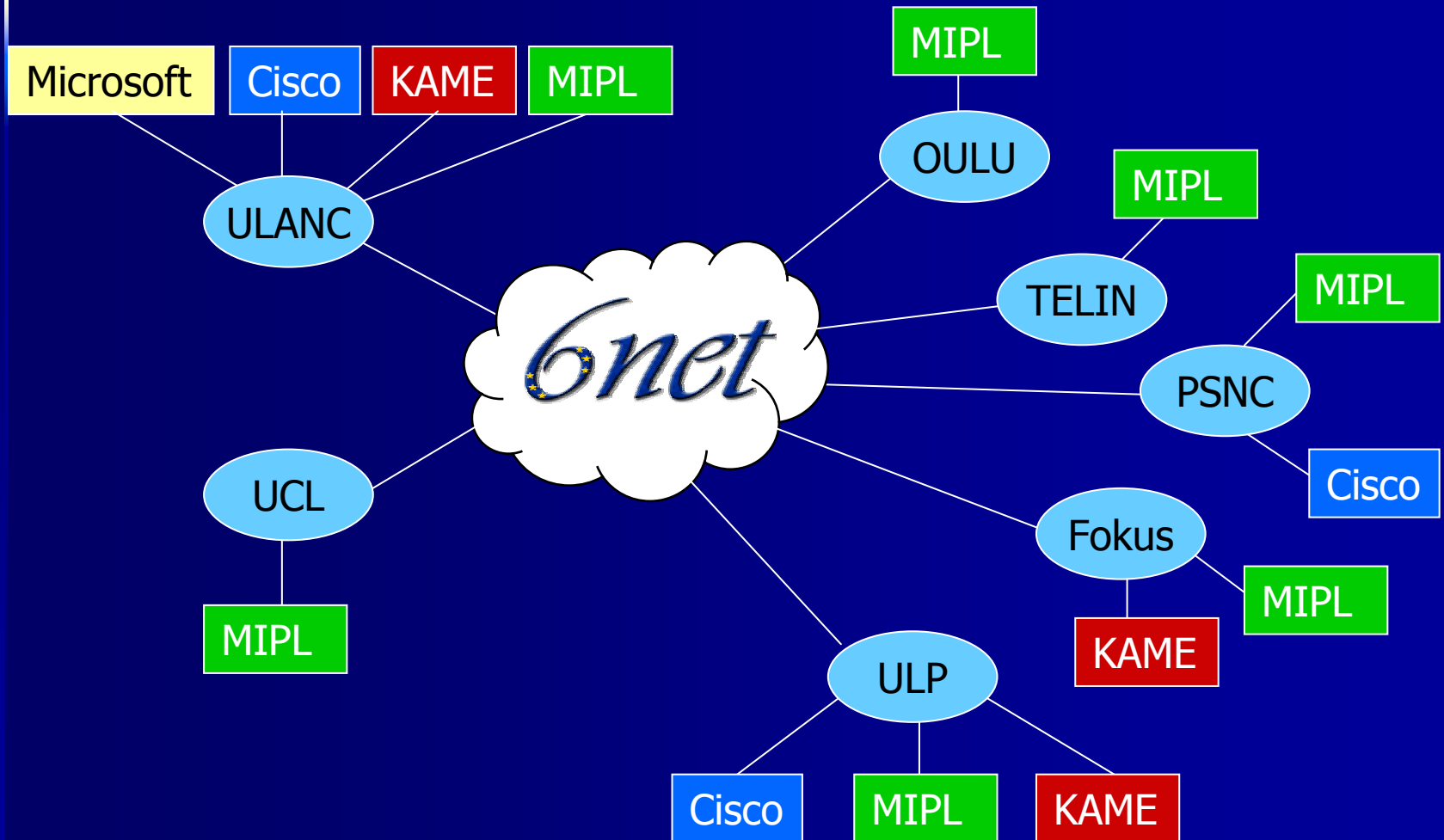
# Deployment in 6NET

- 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

Partner	MIPv6 Nodes	Implementations
ULANC	HA, MN, CN	Microsoft, Cisco, KAME, MIPL
UCL	HA, MN, CN	MIPL
Fokus	HA, MN, CN	MIPL, KAME
OULU	HA, MN, CN	MIPL
ULP	HA, MN, CN	Cisco, MIPL, KAME
TELIN	HA, MN, CN	MIPL
PSNC	HA, MN, CN	MIPL, Cisco

# 6NET MIPv6 Home Agents



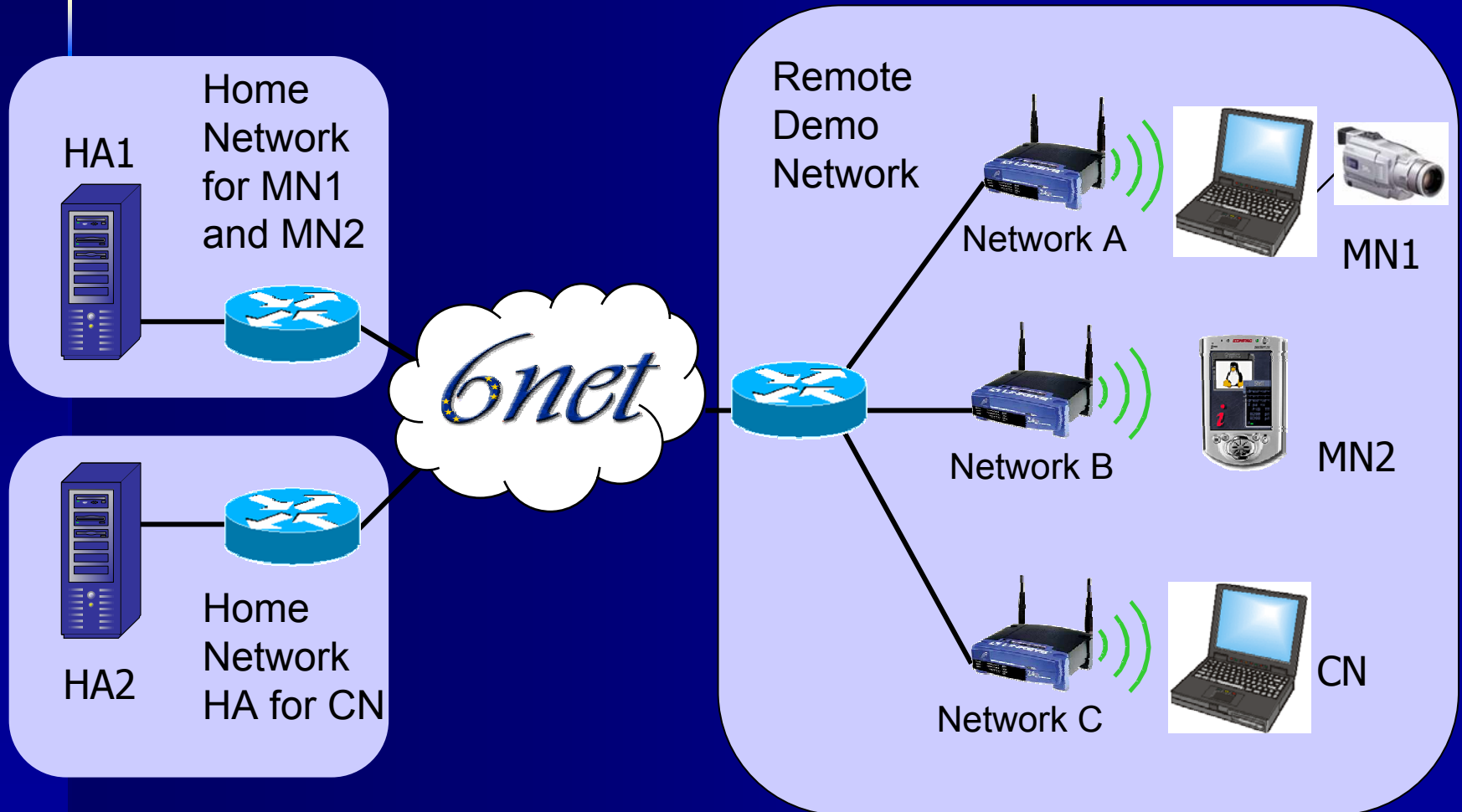
# Trials and Testing

- 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
  - <http://www.tahi.org/mipv6/release.html>
  - also used in Connectathon
    - <http://www.connectathon.org/>
- IETF Remote Interop Testing
  - similar to 6Bone testing
  - draft-kniveton-mipv6-remote-testing-00
  - <http://list.etsi.org/plugtests-mip6.html>

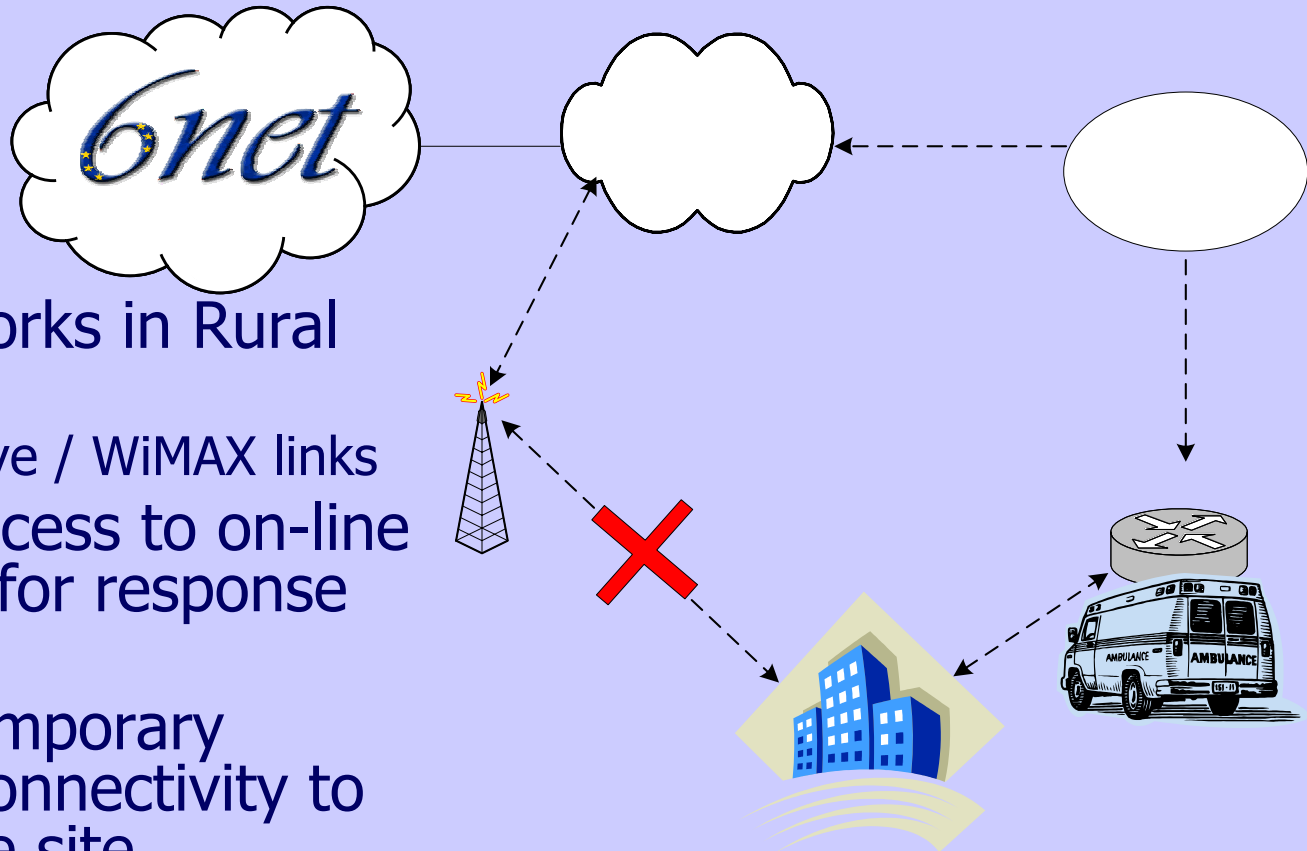
# Remote MIPv6 Demo



# 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