# Security Achitectures for Mobile IPv6

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T Systems

# Overview

- Work in the 6WINIT Project
- Security Analysis of Mobile IPv6
- Possible Security Architecture
- Implementation
- Outlook

# WINIT

UCL

BT

IABG

UMM

T · · Systems ·

University of Southampton

WIND

VTT

NTT

ETRI

# Topics in 6WINIT

**Validate introduction of Wireless Internet in Europe**

- Based on IPv6 + GPRS and UMTS/3GPP
- Both personal and terminal mobility
- Full range of IPv6 Facilities
- Procedures for IPv6-2-3G Nets
  - Including IPv4/IPv6 network and application integration
- Investigate problems providing a trans-national wireless delivery service
- Early IPv6-ready applications testing
- Implement handsets and edge devices

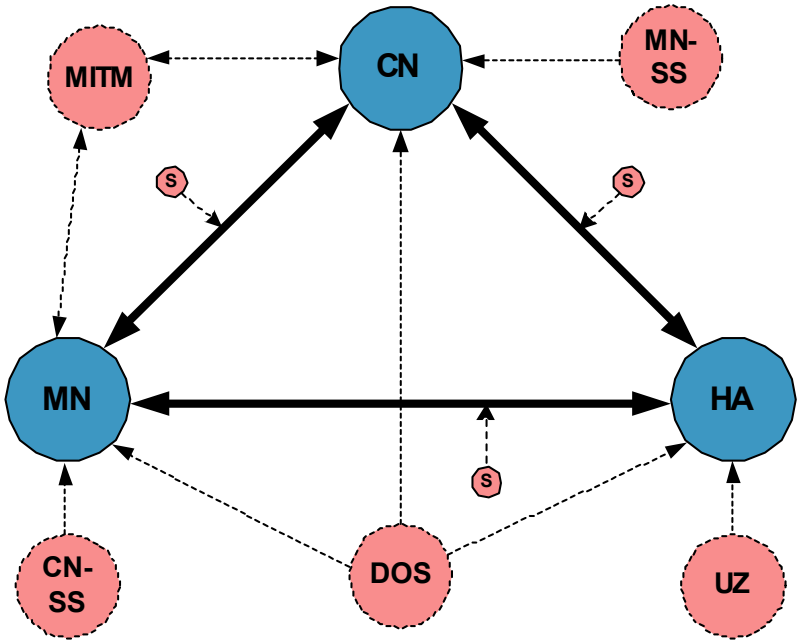
**Validate the feasibility of running real applications**

# Security Issues in Mobile Scenarios

**Mobile Scenarios are designed to provide freedom for the user to roam about - they are susceptible to  to by their very design**

- distinguishing between legitimate and illegitimate use
- authentication, authorisation and accounting of use across administrational domains
- denial of service
- creating, distributing and enforcing policies
- eavesdropping

# Security Analysis of Mobile IPv6




| Tread | Possible Solution | Abbr. |
|---|---|---|
| Man in the Middle | Authentication of Control Messages | MITM |
| Eavesdropping | Line Encryption | S |
| Manipulation of Binding Cache (DoS) | Authentication of Control Messages | DOS |
| ICMP Attack | Access Lists for ICMP Requests on Router | DOS |
| Unauthorised Access | User Authentication, Access Lists, AAA | UZ |
| Session Stealing | Authentification of Control Messages | MN-SS CN-SS |
| Profiling | - | |

# Security Analysis of Mobile IPv6

| Company / Project | Open Source | Draft Status | Security | Platform | Further Support |
|---|---|---|---|---|---|
| Ericsson/Telebit | No | 13 | No | Telebit Router | Yes |
| Microsoft | No | 12 | Status not clear | Windows | Yes |
| MIPL | Yes | 15 | Yes | Linux | Yes |
| Lancaster | Yes | 5 | No | Linux | No |
| Monarch | Yes | 3 | No | BSD | No |
| NEC | Yes | 13 | Yes | BSD | Yes |
| Cisco | First version planned for 4/2002 | | | | |

- Currently most MIPv6 Implementations do not support secure control messages.
- A number of security issues is left to other protocols
- Scalability issues due to lack of 'Global PKI'

# Proposed Architecture for ‘Closed Systems‘

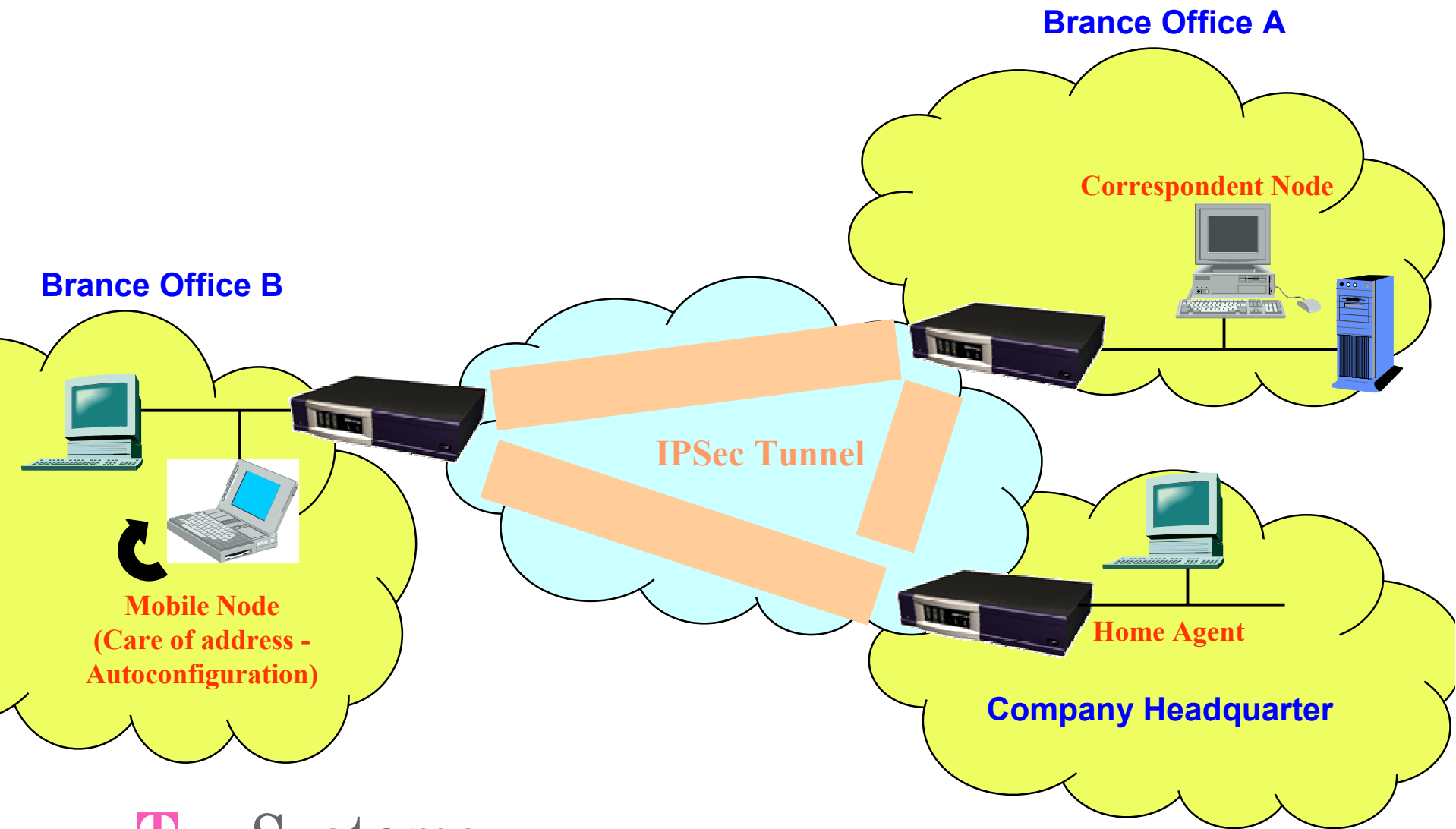
**What is a closed system**

- One administrative domain
- Users/machines are known in advance
- Single use policy
- Dedicated software environment

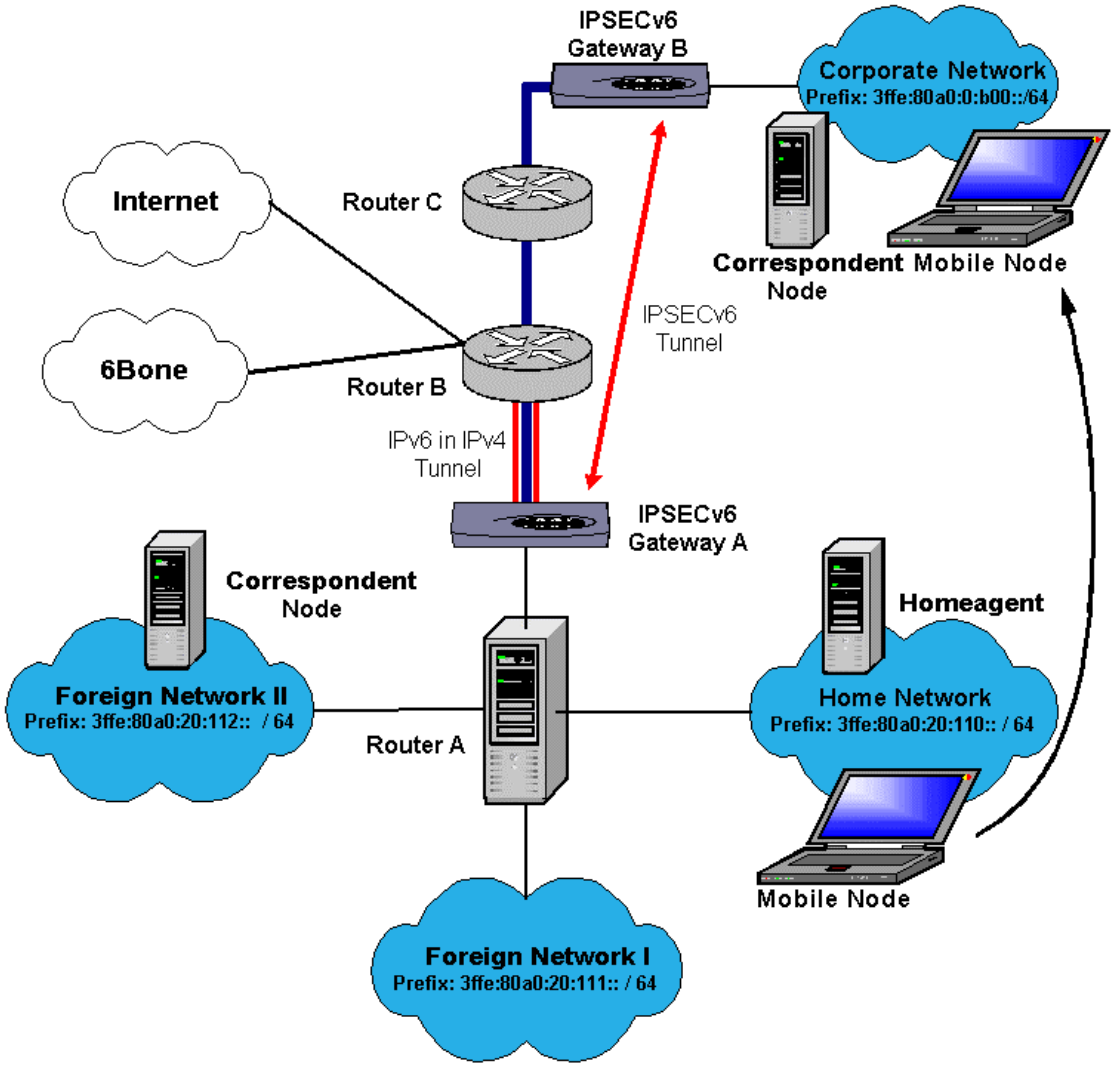
**Characteristics of an closed system**

- Authentication of users can used predefined tokens (MAC,...)
- Firewalling keeps out the rest
- Threads from within
  - Illegitimate use
  - Playful users
- No need to be 100 per cent standards compliant

# Proposed Architecture for ‘ Closed Systems‘



# Lab Setup and Findings




**Security Gateways:**

- FreeSWAN (IABG)

**Mobile IPv6:**

- MIPL

# Lab Setup and Findings

**Findings:**

- Authentication of Binding Updates not yet possible (MIPL freezes)
- No implementations for Draft 16/17 (Reverse Routability)
- Solution for small installations
- Critical components are missing
  - PKI
  - AAA
  - Policy Server
- All hosts need to support Mobile IP!

# Outlook

**Things to do:**

- Interworking (eg. FreeSWAN/MIPL, 6WIND Edge Device)
- Status of standardisation (New Drafts)
- Integration of MIP and IPsec Gateway on one Machine
- Thorough testing and validation of security
- Integration with AAA and PKI
- Securing Open Mobile IPv6 Installations

# Thank you for your interest!

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