PiSA and Mobile ACcess Project

Tobias Heer, Klaus Wehrle
Distributed Systems Group
RWTH Aachen University
Goal

• Ubiquitous Wi-Fi access in the cities of Aachen and Monschau

• Private participation and collaborative networking (Wi-Fi sharing as basis)
  – Security and mobility

• Location-aware services
  – Navigation
  – 3D visualization
Basic Network Components

Service domain* 1

Service domain* N

Service Gateways (SG)*

Service certificate*

Membership certificate

Community Operator (CO)

Mobile Guest (MG)

Host AP (HAP)

Server

Internet

Secure tunnel

IP traffic

Trusted Relay (TR)

Tobias Heer, RWTH Aachen University
Challenges

• Make a patchwork-like system appear homogeneous
  – Private and company access points
  – No homogeneous trust and network structure
  – Need to separate different networks
• Suboptimal AP placement
  – Indoor – APs are placed to serve needs of residents
  – No outdoor usage considered
  – → Limited range and QoS is challenging
• Management and Trust
  – Membership management
  – Legal issues
• Legacy support for non-HIP clients
  – Infrastructure-based mobility in homogeneous networks
Why HIP?

• HIP provides required key features
  – E2E Authentication
  – E2M Authentication
  – Tunnel
  – Mobility

• HIP provides the complete security solution for Mobile ACcess
  – Client and service authentication
  – Authentication of CO and between other components
Partners

• 9 Partners from Industry and Academia
• Coordination: RWTH Aachen University
Early Results

• Prototype implementation
  – Userspace
  – Tradeoff: Development time vs. performance
  – Custom packet handling by tunnel manager

• Support for:
  – Native clients (HIP + middlebox authentication)
  – Legacy clients (off-the-shelve devices)
  – openWRT routers
Focus of the Evaluation
Prototype – Router Throughput

Throughput of a PISA prototype running on a WRT160NL commodity wireless router
Connection delay for establishing an on-demand service connection between a WRT160NL router and a service gateway.
Prototype – Client Throughput

E2E TCP throughput for a Nokia N900 (600 MHz) mobile phone and an Asus Eee PC T91 (1.3Ghz) in native and legacy mode.

Tobias Heer, RWTH Aachen University