**Knowledge Platform**

The purpose of our Knowledge Platform is to provide an information overlay to standard networks. The overlay will provide a common control channel between the different nodes of a network.

- **Knowledge Agent**
  - Gives access to the knowledge overlay
  - Manages information brokering to and from the node
  - Accessed by local software and other Knowledge Agents

- **Knowledge Trees**
  - Node Tree
    - Stores the structure of the information available locally at the node
    - Available at every node
  - Shared Tree
    - Stores the structure of the information available in the whole subnet (home)
    - Available at dedicated nodes
    - Accessed by the Knowledge Agent

- **Knowledge Store**
  - Stores the information on the node
  - Accessed by the Knowledge Agent

**Remote Access**

- **Inter-Home connectivity**
  - NAT breaks the end-to-end connectivity model of the Internet
  - NAT/FW-Traversal

- **State of the Art**
  - Not available for legacy applications
  - Applicability issues
  - Overhead through connectivity tests (ICE)

- **Reuse of already gained knowledge**
  - NAT-Test decoupled from NAT-Traversal
  - Results in a much faster connection establishment

- **Decisions based on**
  - Supported NAT-Traversal techniques
  - User-Input
  - Registered Applications

**Field-Test Results**

<table>
<thead>
<tr>
<th>Technique</th>
<th>Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>UDP Hole Punching</td>
<td>88.98%</td>
</tr>
<tr>
<td>TCP-Init Hole Punching</td>
<td>52.65%</td>
</tr>
<tr>
<td>TCP-Traversal</td>
<td>83.78%</td>
</tr>
<tr>
<td>TCP-Traversal excl. tunneling</td>
<td>94.99%</td>
</tr>
<tr>
<td>UPnP</td>
<td>13.01%</td>
</tr>
</tbody>
</table>

http://nattest.net.in.tum.de

**P2P Applications**

- **Dynamic Service Access and Control**
  - Remote Service Access
  - Remote Control of home appliances

- **Service Signalerization**
  - Video streaming services or telephony applications

- **P2P Security**
  - Guaranteed identities in overlays using Trusted Computing Technology

- **P2P Applications**
  - Storage and backup solutions for e.g. configuration

**Security and Trust**

- **AutHoNe IDs**
  - Cryptographic Identifiers for homes, devices and users
  - Used for routing inside and between homes

- **Home Certification Authority**
  - Home Gateway certifies devices and users
  - Certificate expresses membership to a certain home

- **Trust Relationships between homes and devices**
  - Based on certificate exchange

- **Trusted Computing in Home Networking**
  - Protection of keying material
  - Prevention of identity theft
  - Novel and secure applications in home networking

**Metering**

We are establishing a versatile metering infrastructure for our AutHoNe-networks.

- **Obtain knowledge of the network state additional to that from “regular” nodes**
  - Detect bottlenecks
  - Detect malfunction
  - Detect errors
  - Detect security risks

- **Be highly customizable concerning the metered values as well as the topology**
  - Adopt the metering process to the situation inside the network
  - Integrate nodes with different capabilities into the metering process
  - Aggregate Knowledge dynamically
  - Overcome the borders of single metering tasks through the newly available connection over the AutHoNe-control-overlay

**Video Streaming**

- **(Cross Domain) Media Streaming based on DPWS**
  - Discovery of Services through Multicast
    - Knowledge based approach for Transcoding
    - Knowledge Platform gives the address for the appropriate transcoder, e.g. small devices need certain bandwidth and do not accept HD
    - Transcoding is done transparently and can be seen as a web service

- **Authentication of Users based on cryptographic IDs**

- **Content browsing through DPWS**

- **Stream Protection**
  - SSL tunnel
  - DRM