ANTS – a knowledge based approach

- Easy communication between different networks necessary
  - Access to the video disk recorder
  - P2P applications
  - Facility managers applications
- Most homes use Network Address Translation (NAT) to access the Internet
  - NAT breaks the end-to-end connectivity model of the Internet
  - NAT/FW-Traversal problem
- Existing solutions to the problem and their drawbacks
  - Explicit support by the NAT is needed
  - ALG, UPnP, NAT-PMP
  - NAT-behavior based approaches
  - Applicability knowledge regarding accessibility of the mapping
  - User-preferences and policies
  - Switch to UPnP (although unsucessful) if nothing else works
  - UPnP may be faster for SSP dependent on the number of consecutive connections

ANTs vs. ICE

- ANTS architecture consists of three layers and five modules
  - Input Module
    - Session manager holds registered applications
    - NAT-Tester for gathering knowledge
  - Knowledge and Decision Module
    - Makes decisions for the other modules
  - Application Interface
    - ANTS socket API: for new applications
  - TUN-based approach: for legacy applications
  - NAT Traversal Module
    - Actual techniques
  - Signaling Module
    - Paning of XML-Messages
    - Communication with the RP

Architecture

NAT Traversal Service Categories

- Not only the success rate of a NAT-Traversal technique counts
  - Four NAT-Traversal Service Categories were identified for different scenarios
- Each makes assumptions about the available infrastructure
  - Support at the NAT itself (e.g. an ALG or UPnP)
  - The requester (STUN or signaling)
  - The service (UPnP support at service)
  - The network (presence of infrastructural nodes)
- Requester side NAT-Traversal (RNT)
  - Applications that actively initiate a connection (e.g. SIP/SDP)
- Global Service Provisioning (GSP)
  - Service should be globally accessible (e.g. a web server)
- Service Provisioning using Pre-Signaling (SSPS)
  - Pre-Signaling through Rendezvous-Point
- Secure Service Provisioning (SSP)
  - Only authorized users can allocate mappings
  - Created mapping can only be accessed by the creator

Evaluation

- Reliability Evaluation
  - Success rates for different NAT-Traversal techniques
  - Results adapted to our defined service categories
  - We did a public field test covering > 1200 different NATs in the wild
  - NAT-Tester and detailed results at http://natptest.net.in.tum.de
- Probabilities for a direct connection
  - UDP Traversal: 85%
  - TCP Traversal: 82%
  - TCP inclusive tunneling: 95%
  - Otherwise: Data relay
- Performance Evaluation
  - ANTS vs. ICE
  - Introduced delay much smaller and constant due to knowledge based approach