HIP and NAT

<draft-stiemerling-hip-nat-01.txt>

Martin Stiemerling, Juergen Quittek
{stiemerling|quittek}@netlab.nec.de

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HIP and NAT

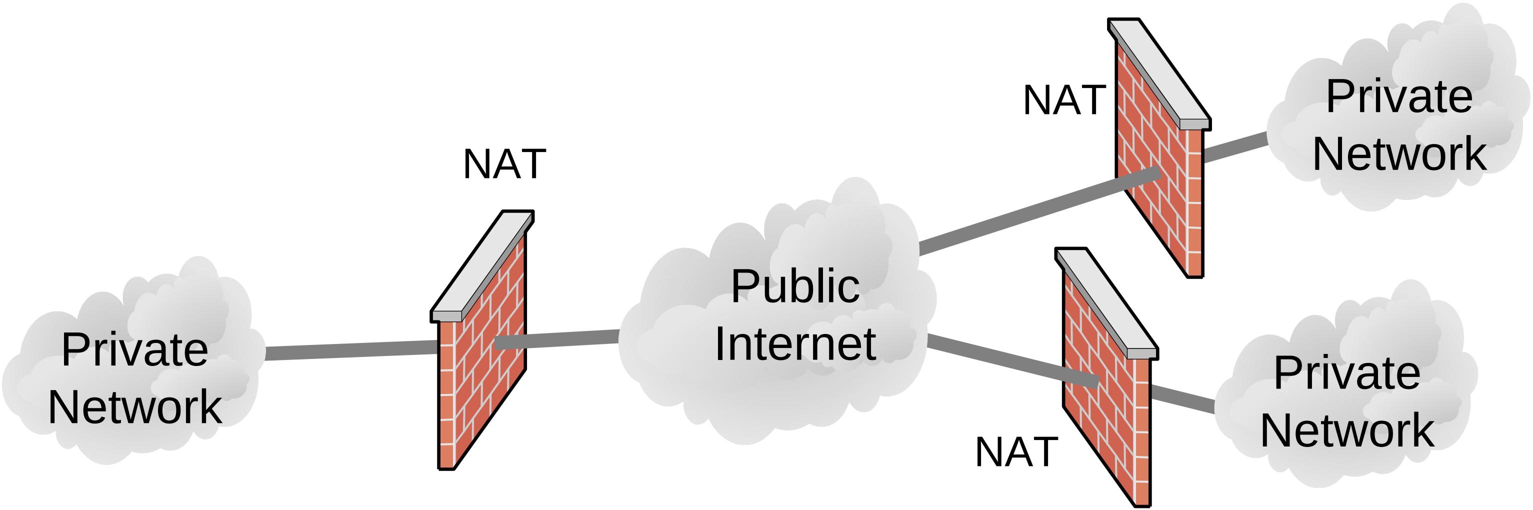
- What is the document about
  - Problem statement
  - Analysing HIP and NAT inter-working
  - Shows up problems
  - Points out some directions for solutions
- -00 presented at IETF 59 HIPRR BOF
- *Does not promote the use of NATs*
  - Takes just care about fact that NATs are out there and how to deal with them

Changes to -00

- Added section about “HIP unaware NATs”
  - How can HIP run even with them
  - NATs are deployed and won’t move
  - HIP should work even with them
- Removed error with upper layer checksum
- Added clarifications

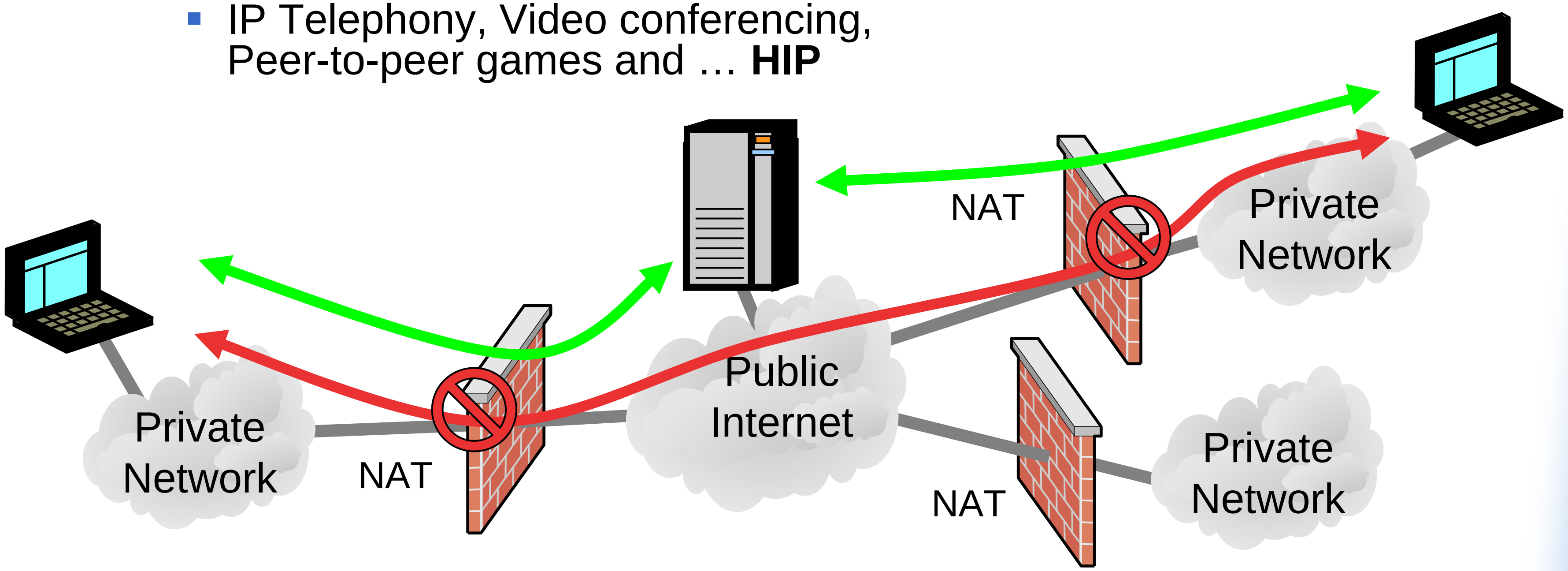
Network Address Translators

- Network Address Translators are integral components of the Internet
  - can multiplex many private IP addresses into few public IP addresses
    - typically: port-based multiplexing (probably not required for IPv6)
  - block traffic from the outside (rather a firewall function)
  - hide internal network structure
  - enable flexible network renumbering
    - change of ISP (without internal renumbering)
    - change of private network addressing (without notifying ISP, public DNS)
- NATs are not just IPv4-specific
  - even organizations owning IPv4 class A network address spaces use NATs



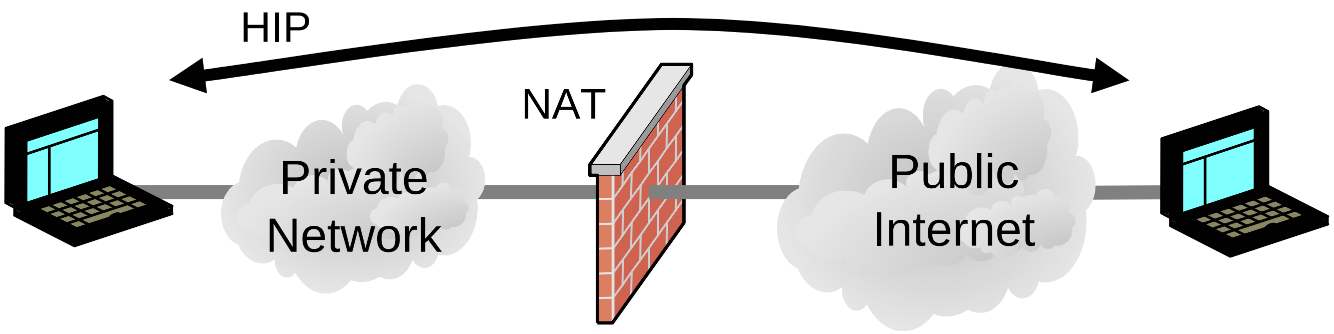
The NAT Problem

- Applications using fixed port numbers can pass Firewalls and NATs with static configuration
  - Particularly **client-server** applications
    - HTTP, SMTP , FTP, SSH
- Firewalls and NATs block applications that choose port numbers dynamically
  - Particularly **peer-to-peer** applications
    - IP Telephony, Video conferencing, Peer-to-peer games and … **HIP**



Problems with HIP Base Exchange

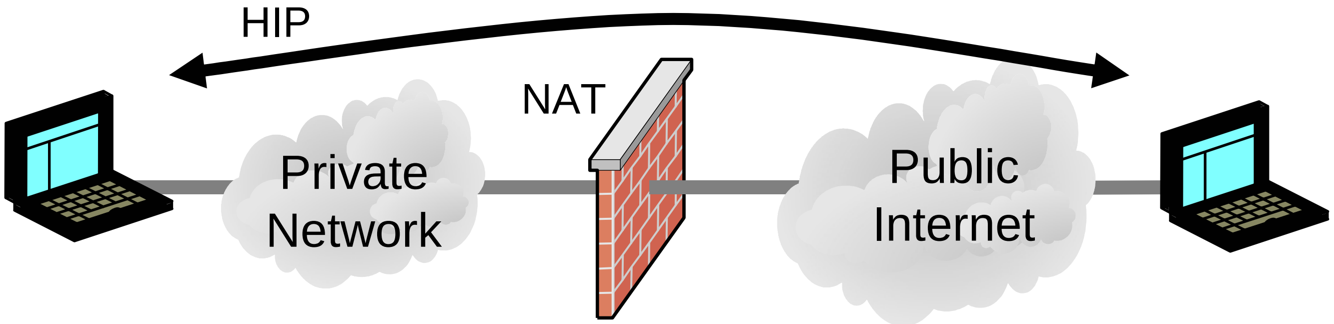
- HIP Transport
  - IPv6: in specific extension header
  - IPv4: as IP payload or as UDP payload
- Scenario 1: Base exchange initiated in private network
  - IPv6 and IPv4 using IP payload do not work with current (multiplexing) NATs
    - NATs do create state for TCP/UDP ports and ICMP codes
    - They need to be extended to do the same for HITs
    - would work well with non-multiplexing (IPv6) NATs
  - IPv4 over UDP works, but not if source port is fixed (to 272)



Problems with HIP Base Exchange

Scenario 2: Base exchange initiated in public network

- Public IP address at NAT need to be known
  - Could be handled by rendezvous server
    - Needs to be considered when designing rendezvous protocol
- multiplexing NATs need to be extended to support HIT multiplexing



Problems with IPsec Transport (1)

- All known problems of IPsec apply
  - See draft-ietf-ipsec-nat-reqts-06.txt
- ESP-only works through NAT, AH does not
- But: NAT breaks TCP/UDP checksums
  - But HIP helps here: Use of HITs

Problems with IPsec Transport (2)

- Multiplexing NATs need to support IPsec SPI multiplexing
  - Outbound SPI value independent of inbound SPI value
- NATs must learn corresponding outbound and inbound SPI values
- NATs could monitor HIP base exchanges
  - Processing overhead
- Signalling Protocol
  - Use of protocols, such as NSIS or MIDCOM protocols (or NAT MIB?) to tell NAT about SPIs
    - see nsis and midcom WG charters

Problems with REA

- REA packet exchange to notify about external address
  - REA: draft-nikander-hip-mm-02.txt
- REA packet contains sending host's IP address(es)
- Receiver needs to get the sending host's public address(es) at the NAT
- Solutions:
  - NAT translates REA messages
    - (too?) strong requirement for NAT
  - Sending host already sends its public address at the NAT
    - Problem: How to obtain the external address?
    - Solution: Could use MIDCOM or NSIS protocols (or NAT MIB) or STUN (RFC 3489, needs to be extended for this application)

Conclusion

- We do not promote usage of NAT
- We do not mandate changes to NATs
  - Some recommendations are given for updating NATs
- Is it expected that HIP for IPv4 will use UDP in future
  - Currently specified in Appendix E of draft-ietf-hip-base-00.txt
  - Any comments?
- Why is this work interesting for RG:
  - Without considering NATs HIP is going to have troubles
  - Charter says “mechanisms for HIT-based firewalls and NAT devices” and more
  - It’s manifold issue: modifying NAT, not modifying NAT, etc. needs all to be considered for HIP