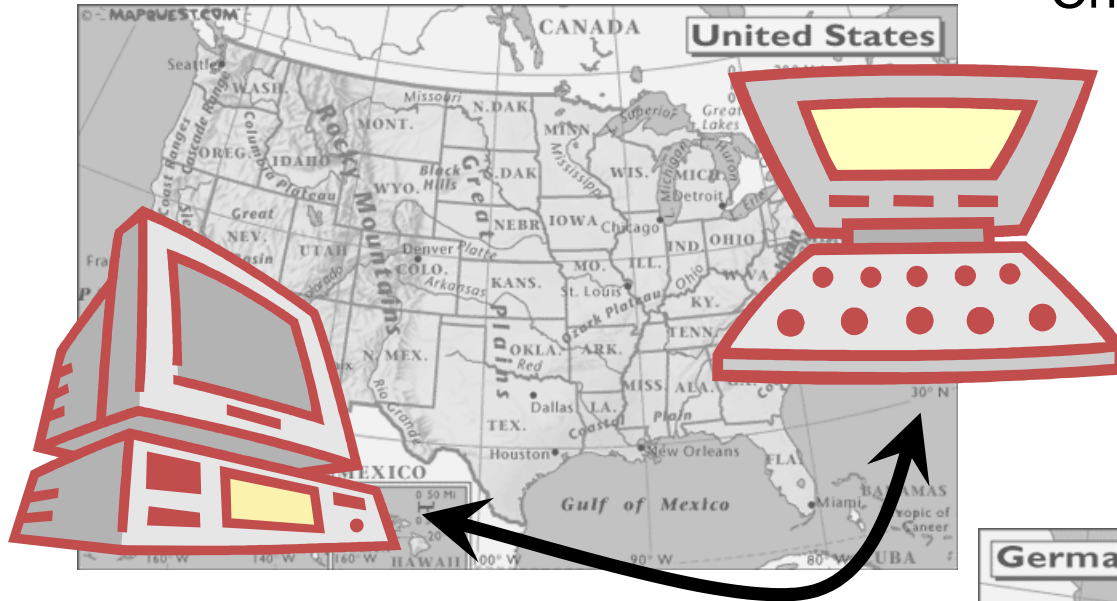


Efficient End-to-End Mobility Support in IPv6

Christian Vogt, chvogt@tm.uka.de



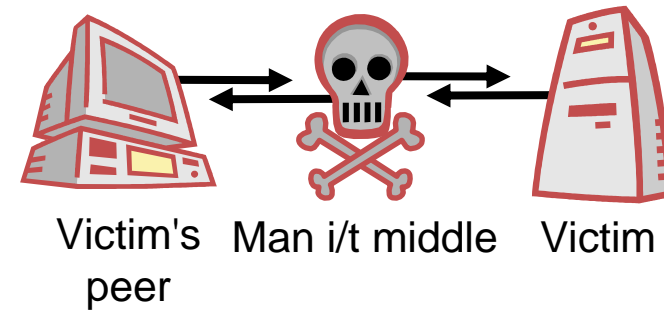
VoIP or FTP

- What makes Route Optimization slow
- How we make it better
- Analysis
- Implementation and ongoing work
- Involvement in IETF, IRTF



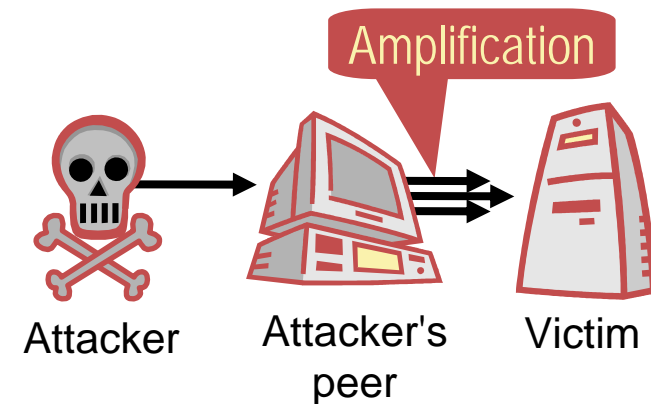
Issue 1: Impersonation

- Connection hi-jacking
- Eavesdropping
- Man-in-the-middle attacks
- DoS



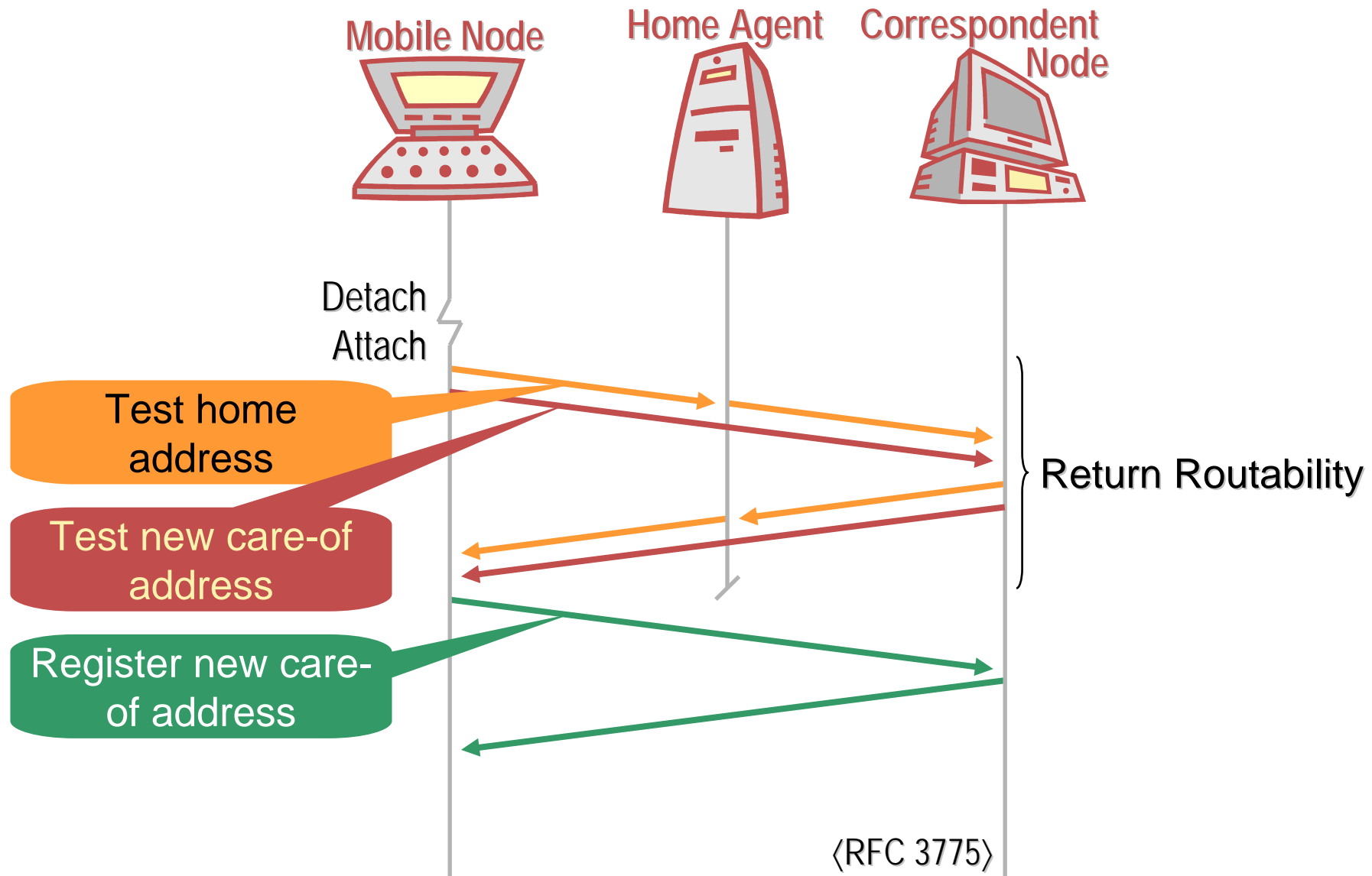
Issue 2: Packet misdirection

- Flooding

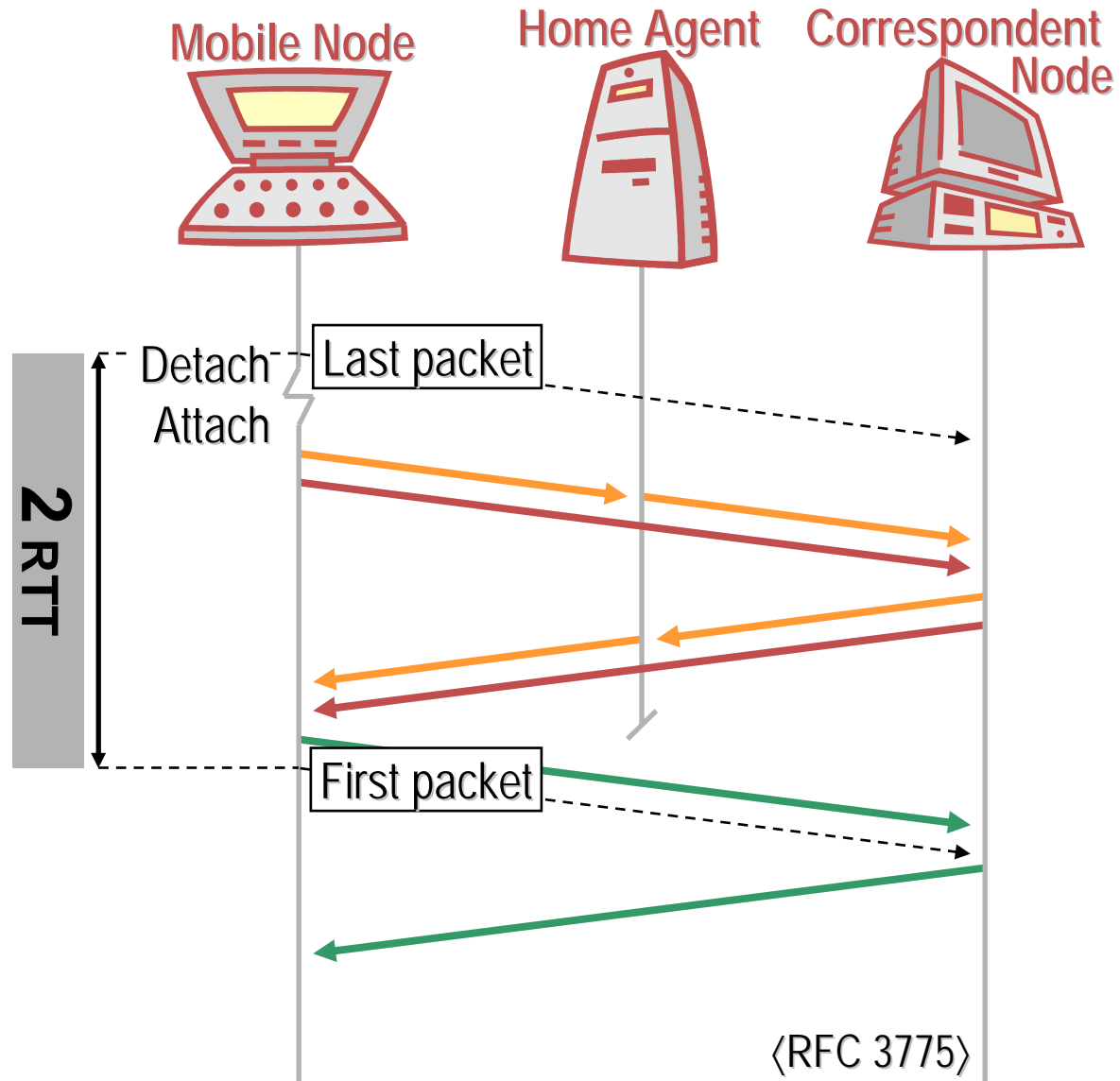


But: Peers don't share credentials!

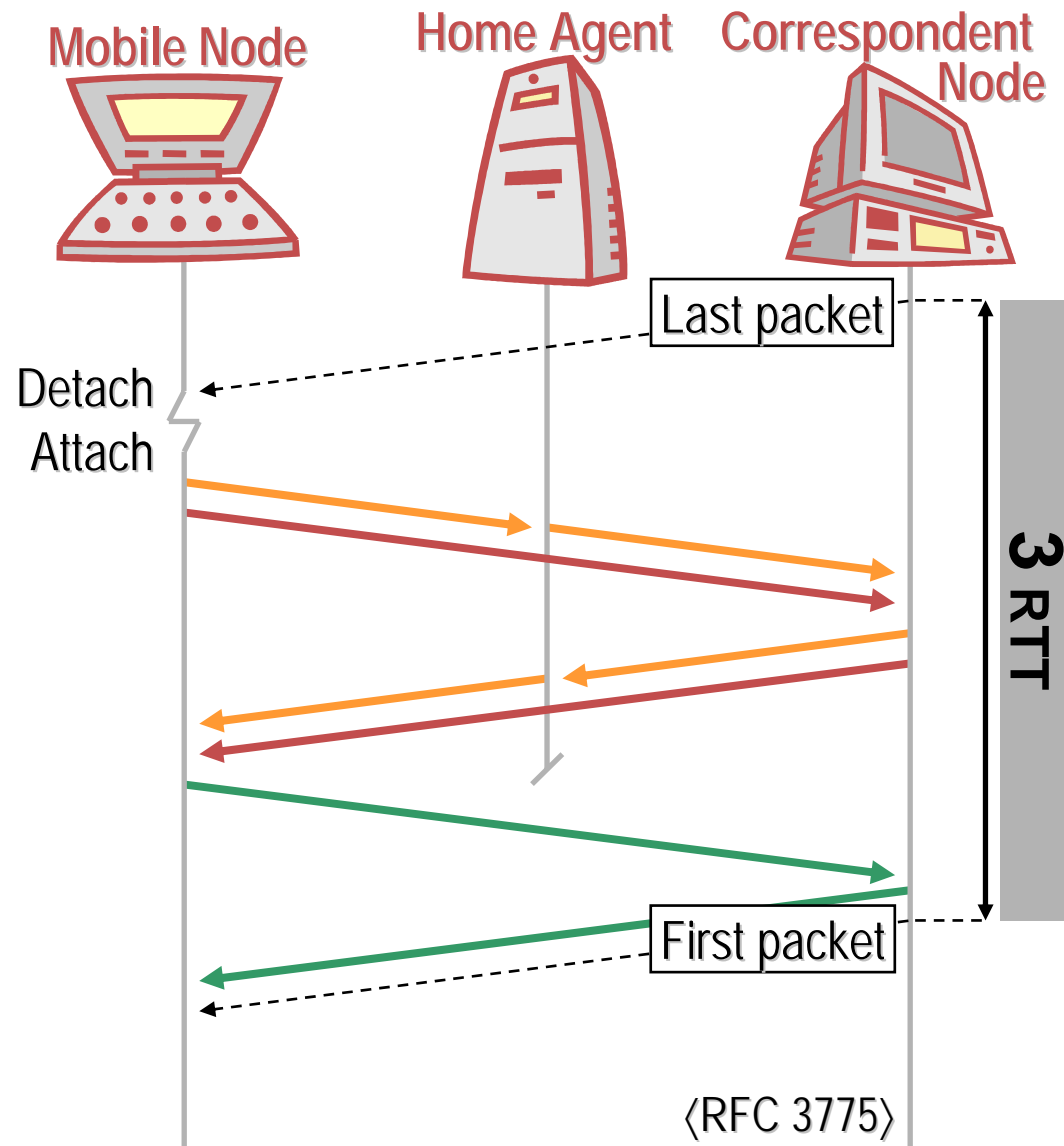
What Mobile IPv6 Does About This...



...And How This Performs



...And How This Performs



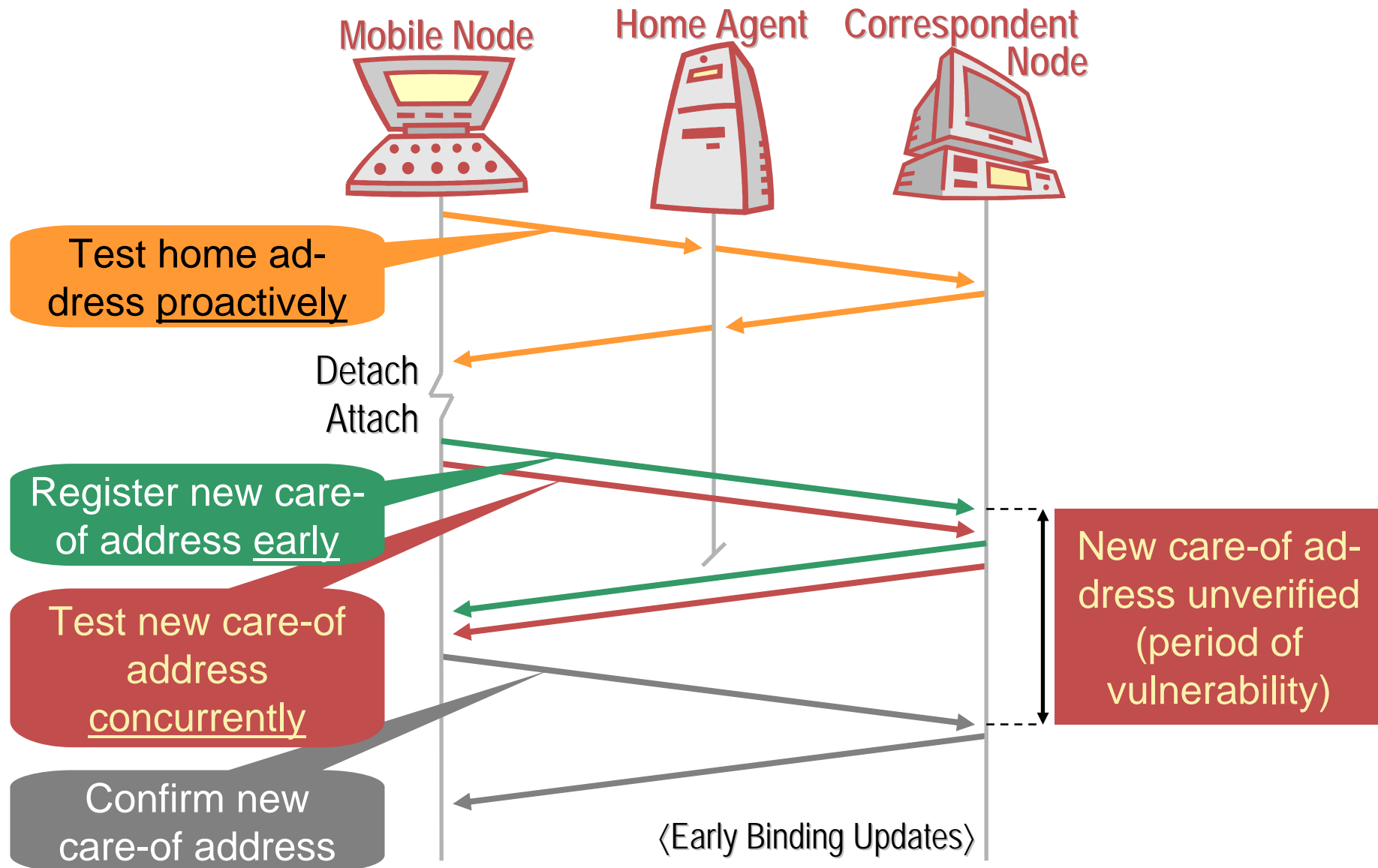
Need Optimization Which...

- significantly reduces handover latency
across domains and without special network support

Related Work

- Local: Hierarchical Mobile IPv6, Fast Handovers
 - pro: low latency, zero packet loss
 - con: network support required, no inter-domain optimization
- End-to-end: Cryptographically Generated Addresses
 - pro: cryptographic verification of home-address, no reachability test
 - con: care-of-address test still required

Our Approach: Early Binding Updates



Observation

- Amplification makes redirection-based flooding attractive

Idea

- Make amplification impossible
- \Rightarrow Make flooding unattractive

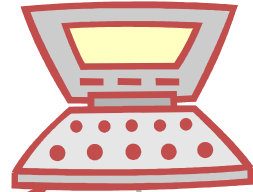
Our Solution

- Weigh data sent to unverified care-of address against data sent by mobile node

Our Solution: Credit-Based Authorization



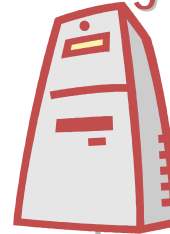
Mobile Node



Acquires credit by sending pkts.

Consumes credit for being sent pkts. to unverified care-of address

Home Agent



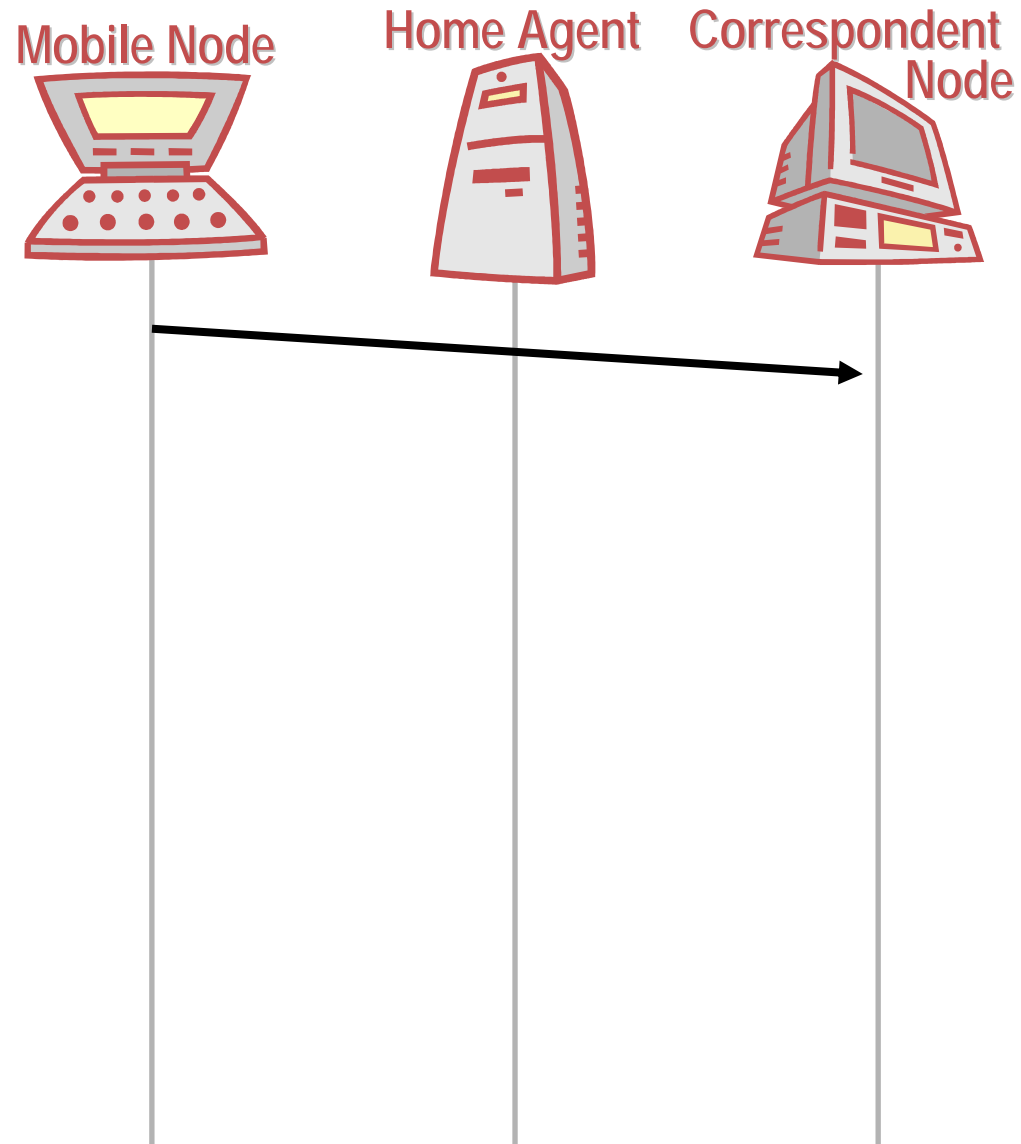
Correspondent Node



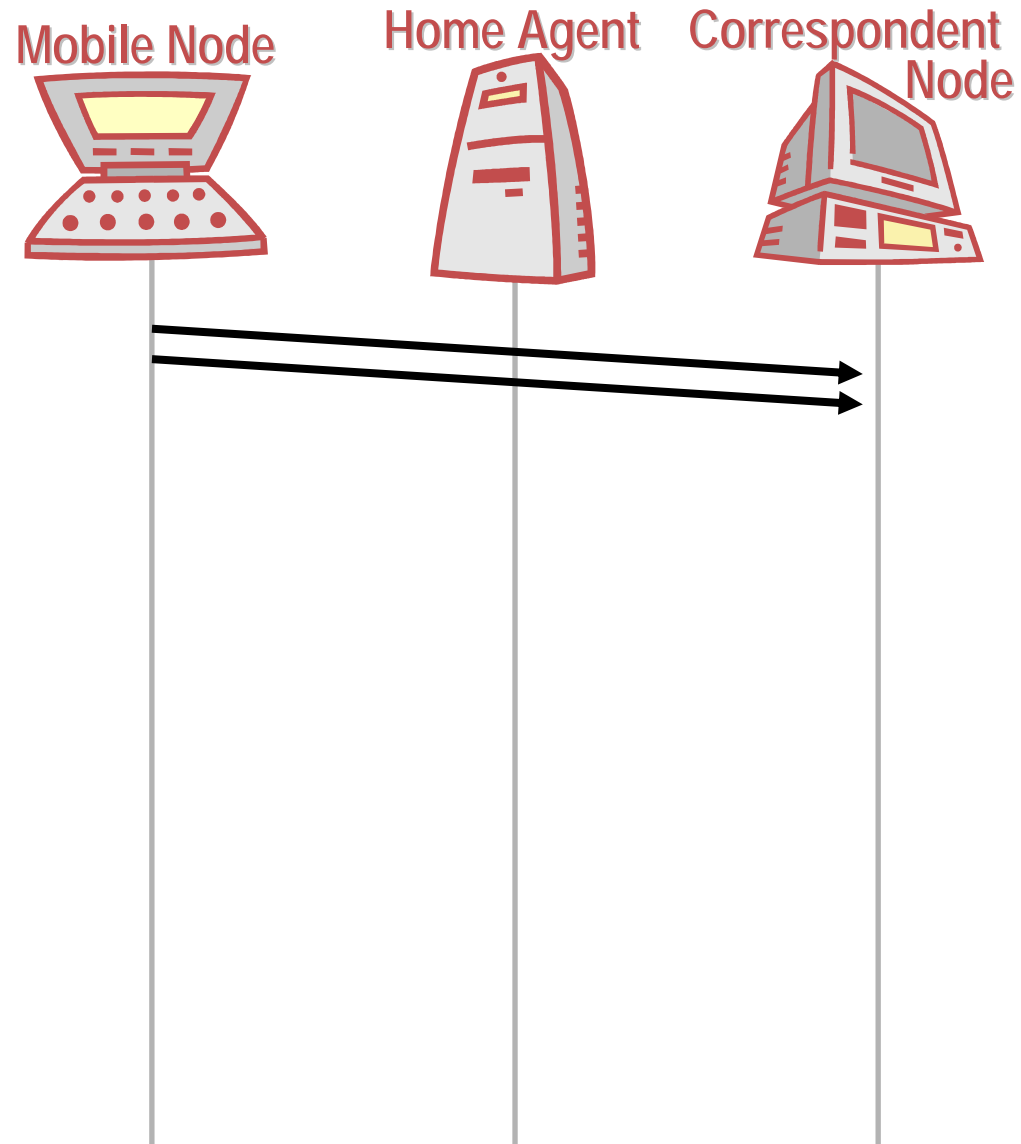
Maintains credit account



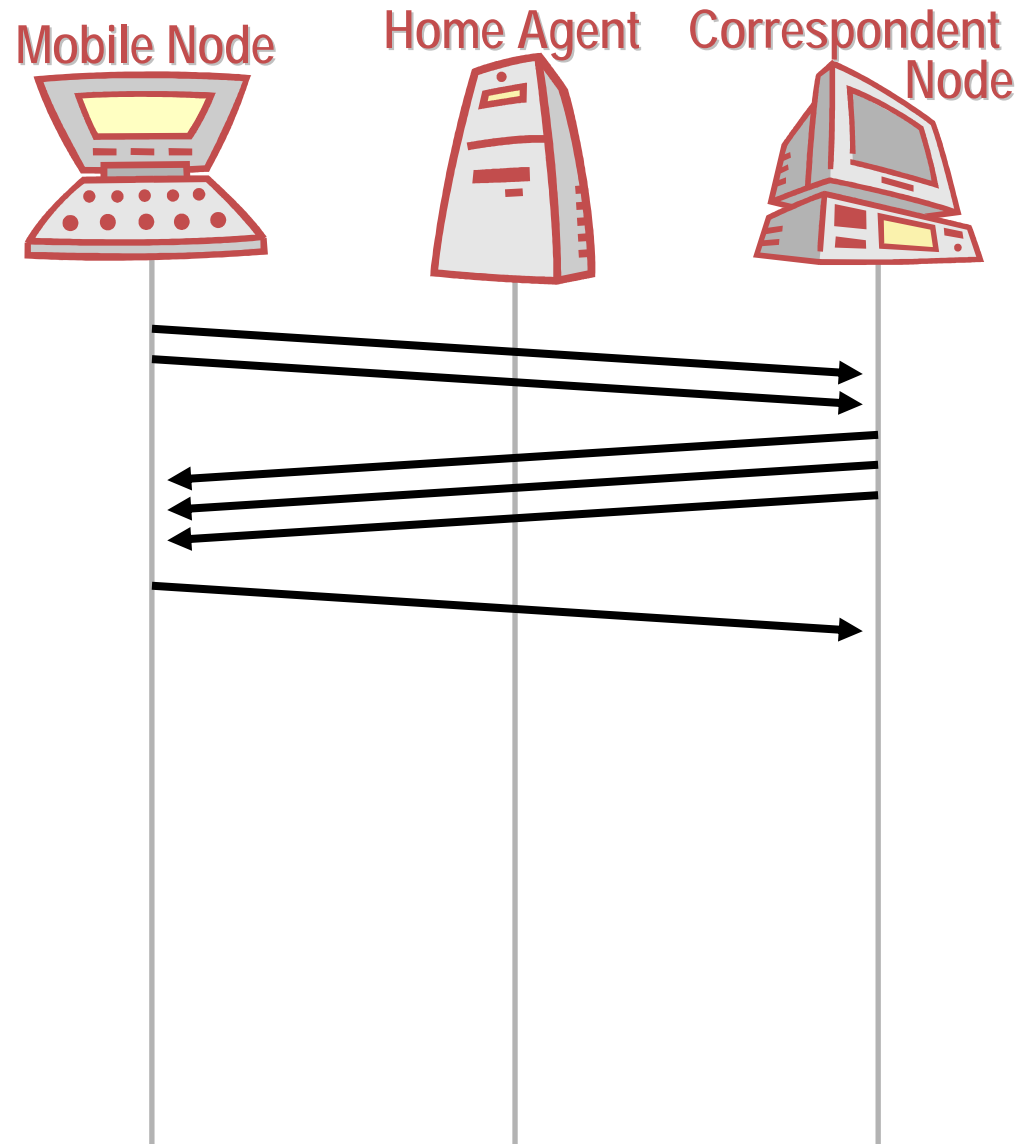
Our Solution: Credit-Based Authorization



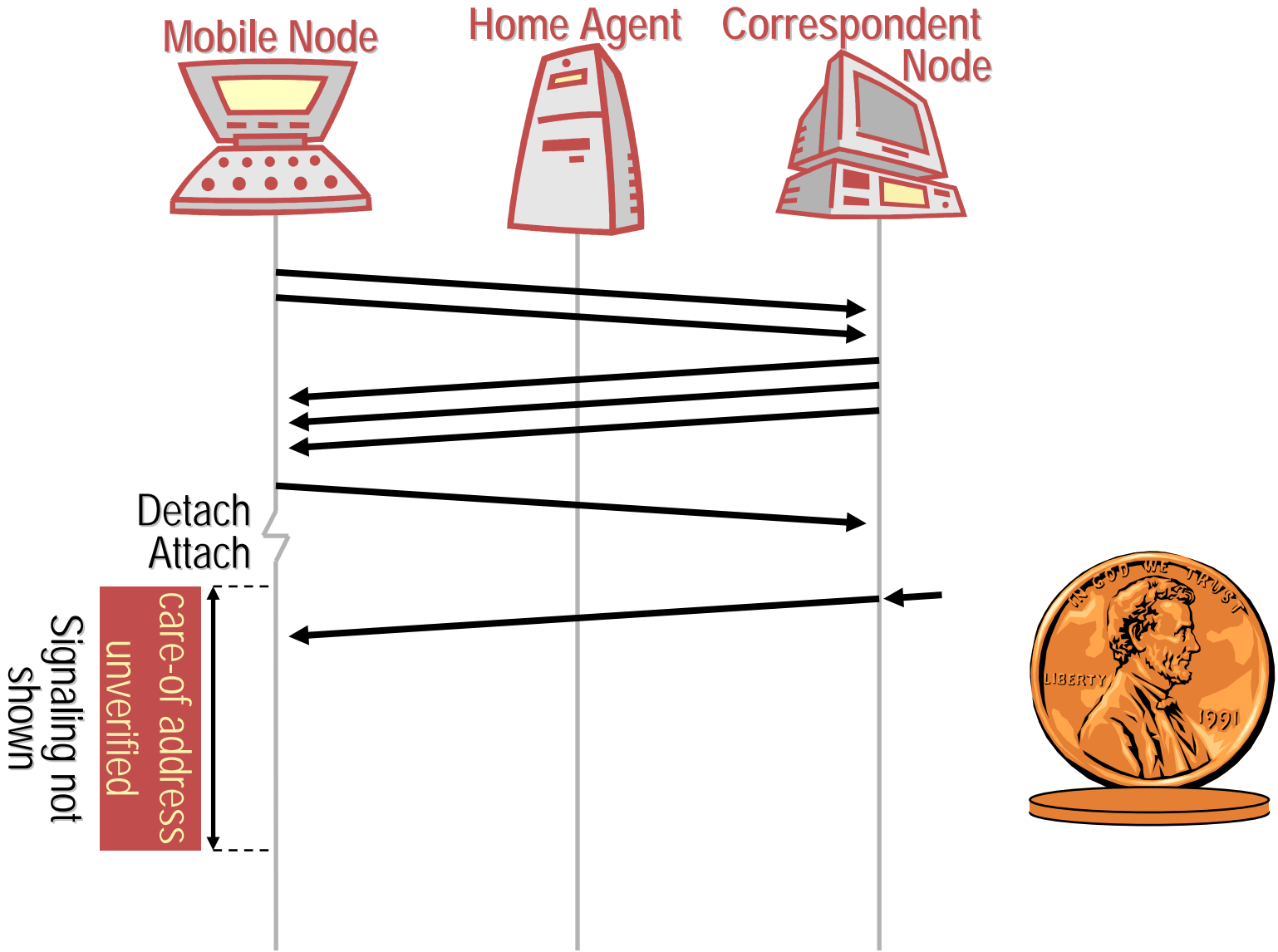
Our Solution: Credit-Based Authorization



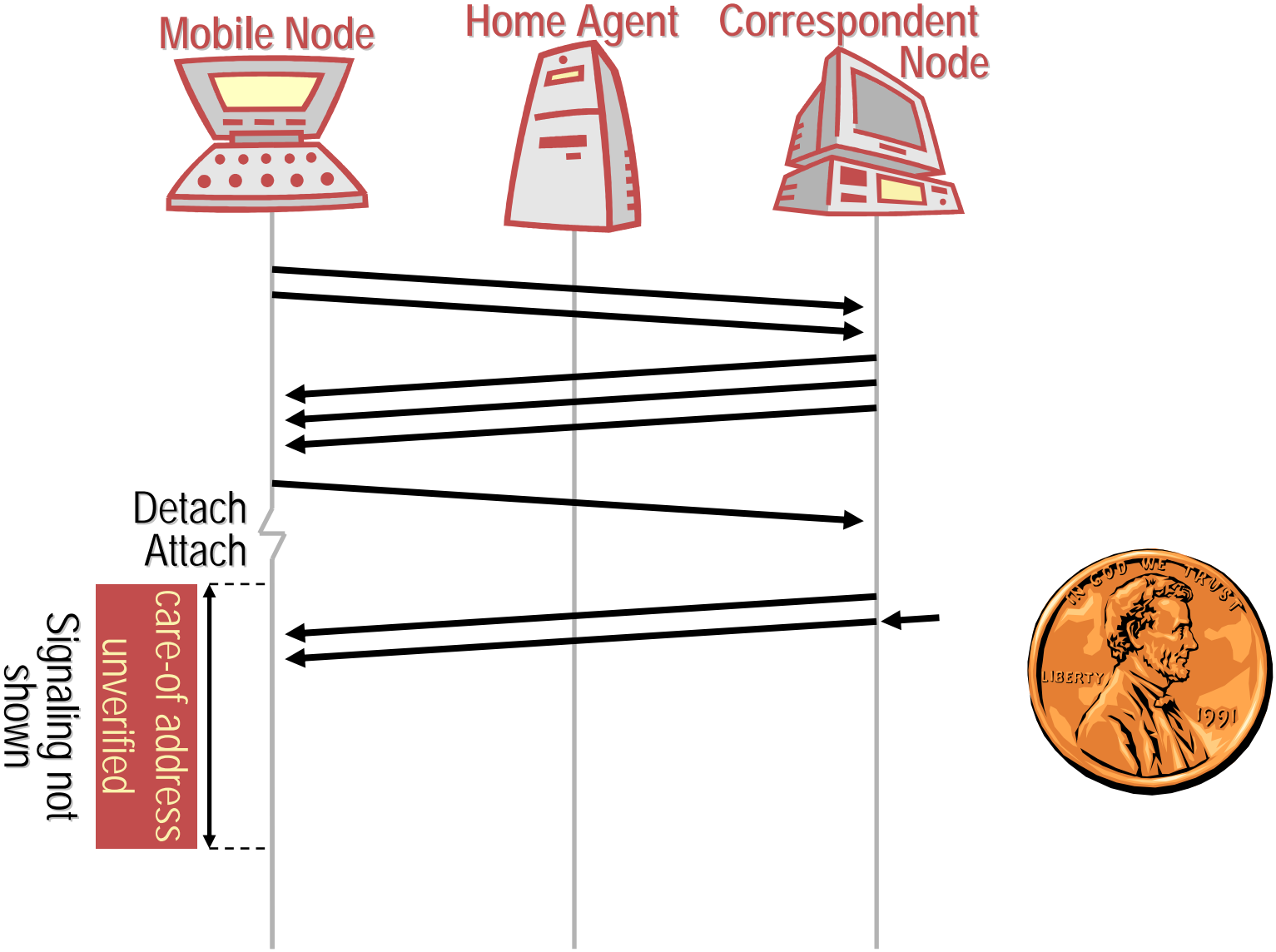
Our Solution: Credit-Based Authorization



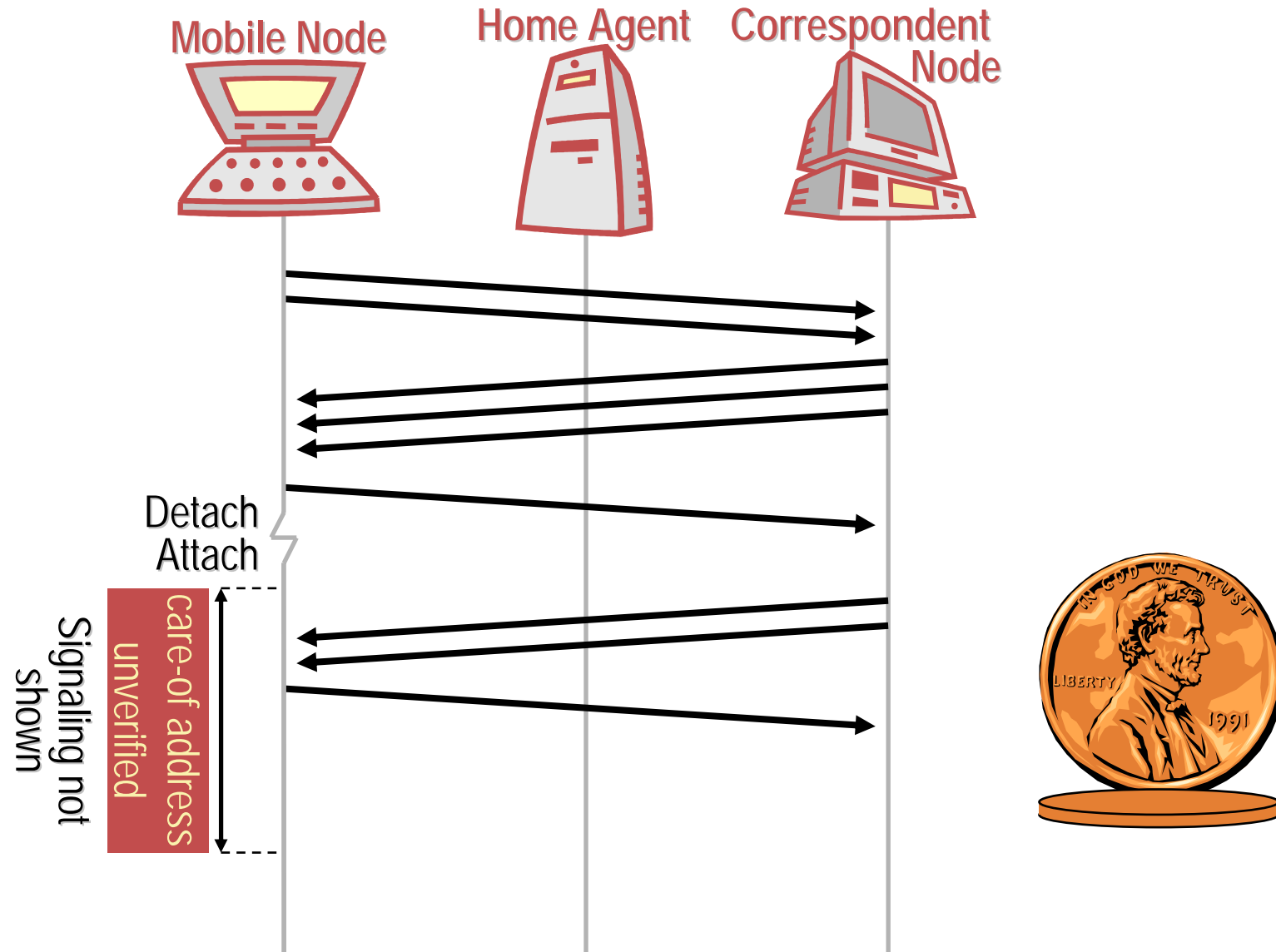
Our Solution: Credit-Based Authorization



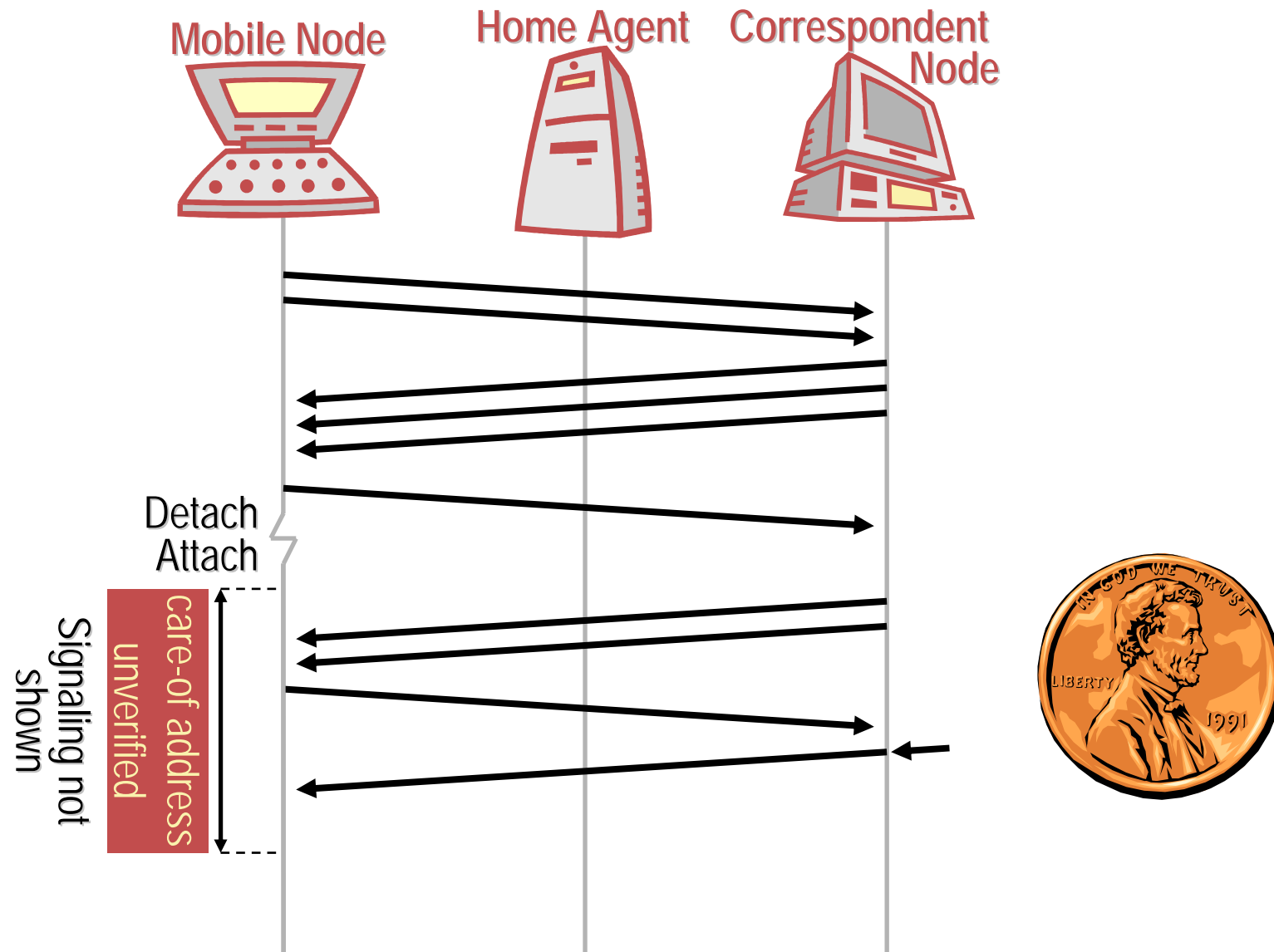
Our Solution: Credit-Based Authorization



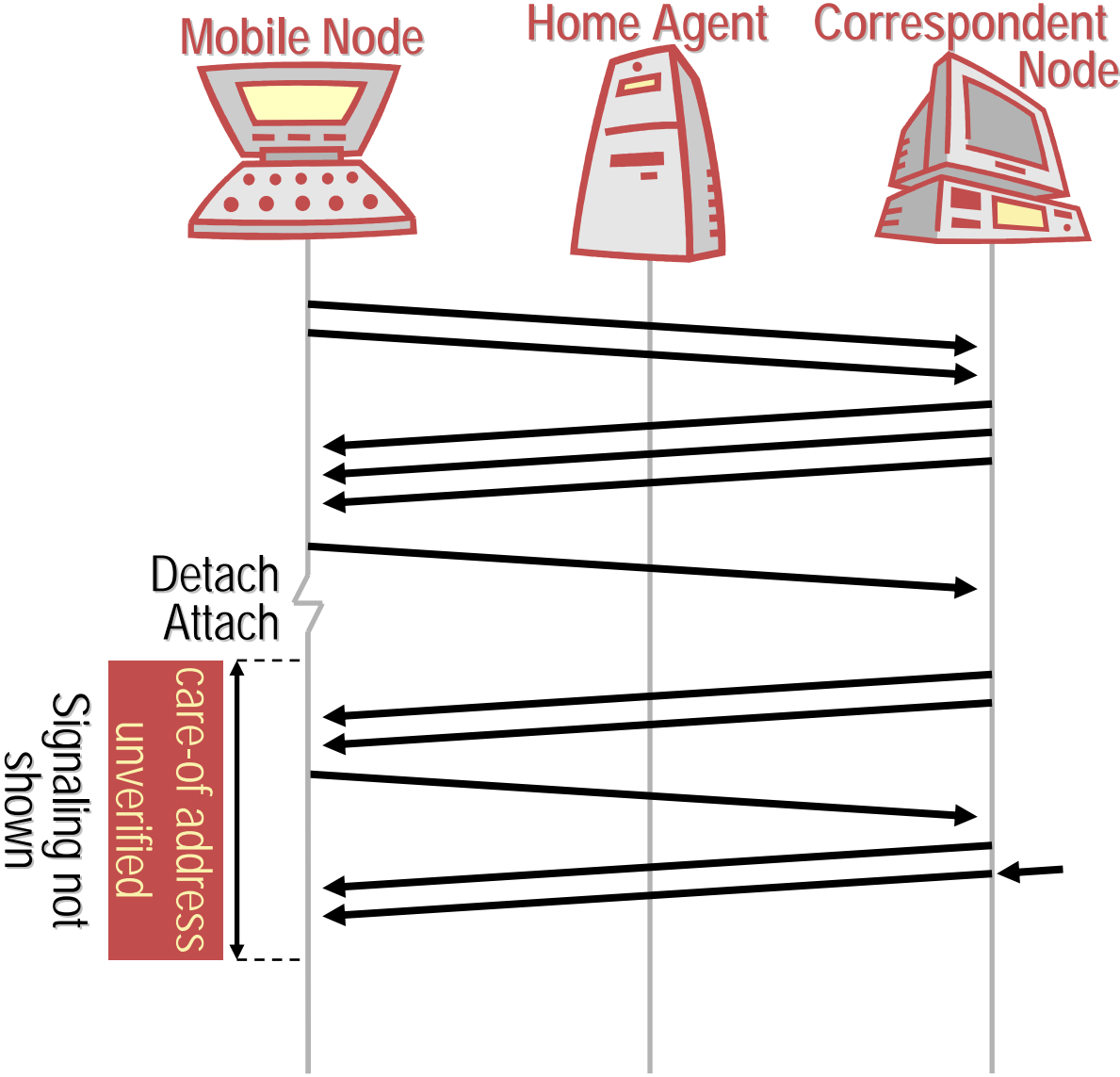
Our Solution: Credit-Based Authorization



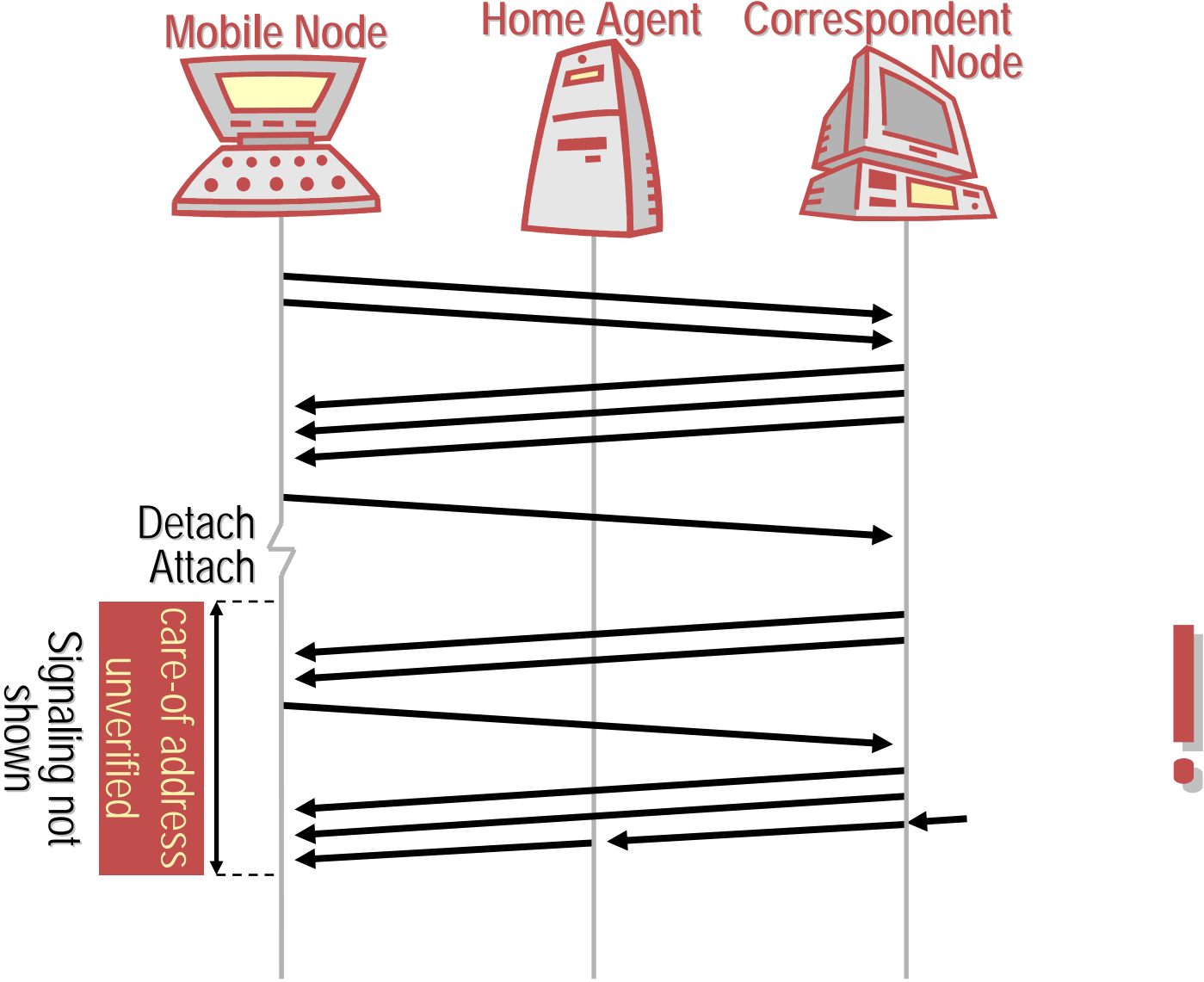
Our Solution: Credit-Based Authorization



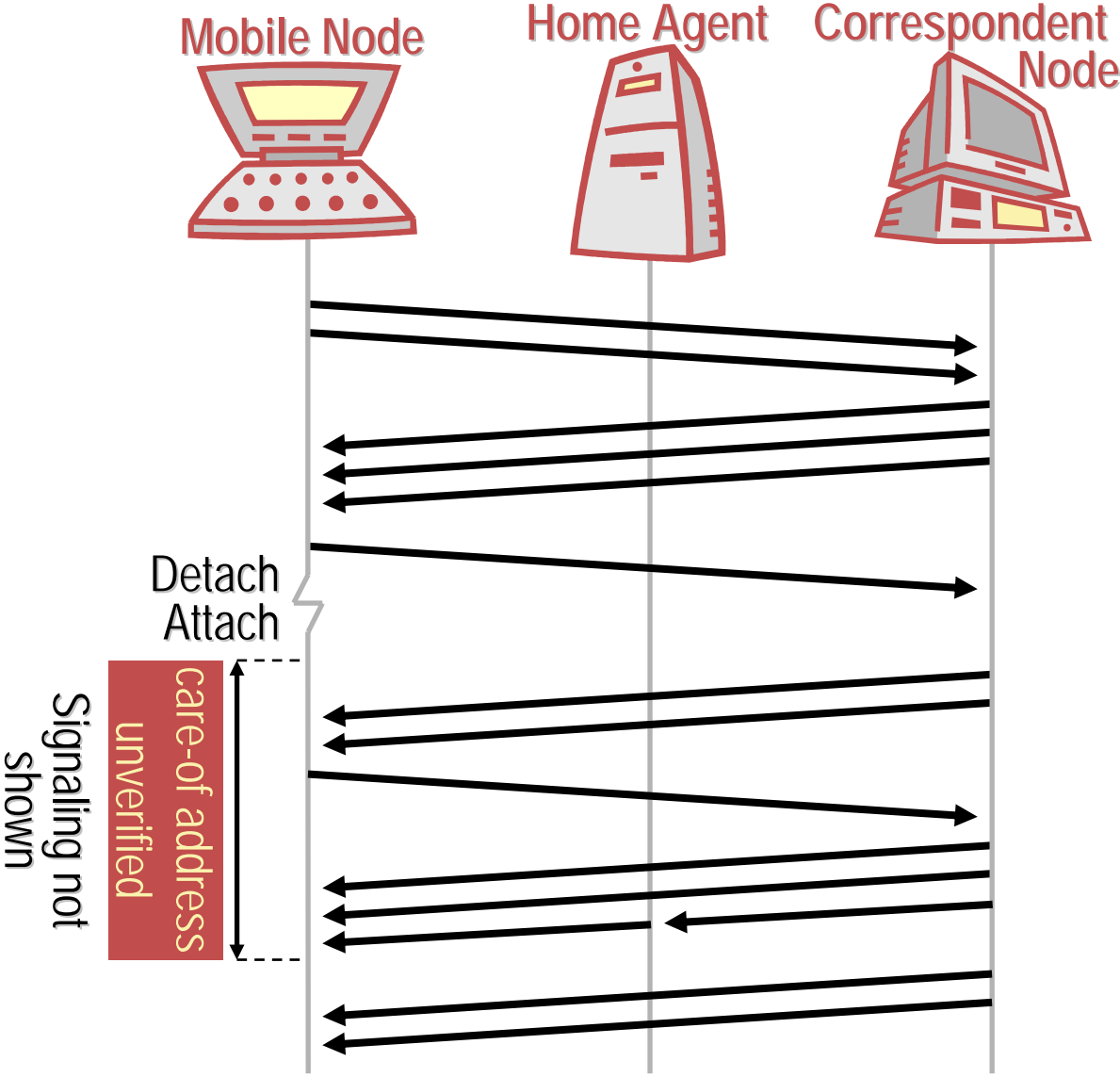
Our Solution: Credit-Based Authorization



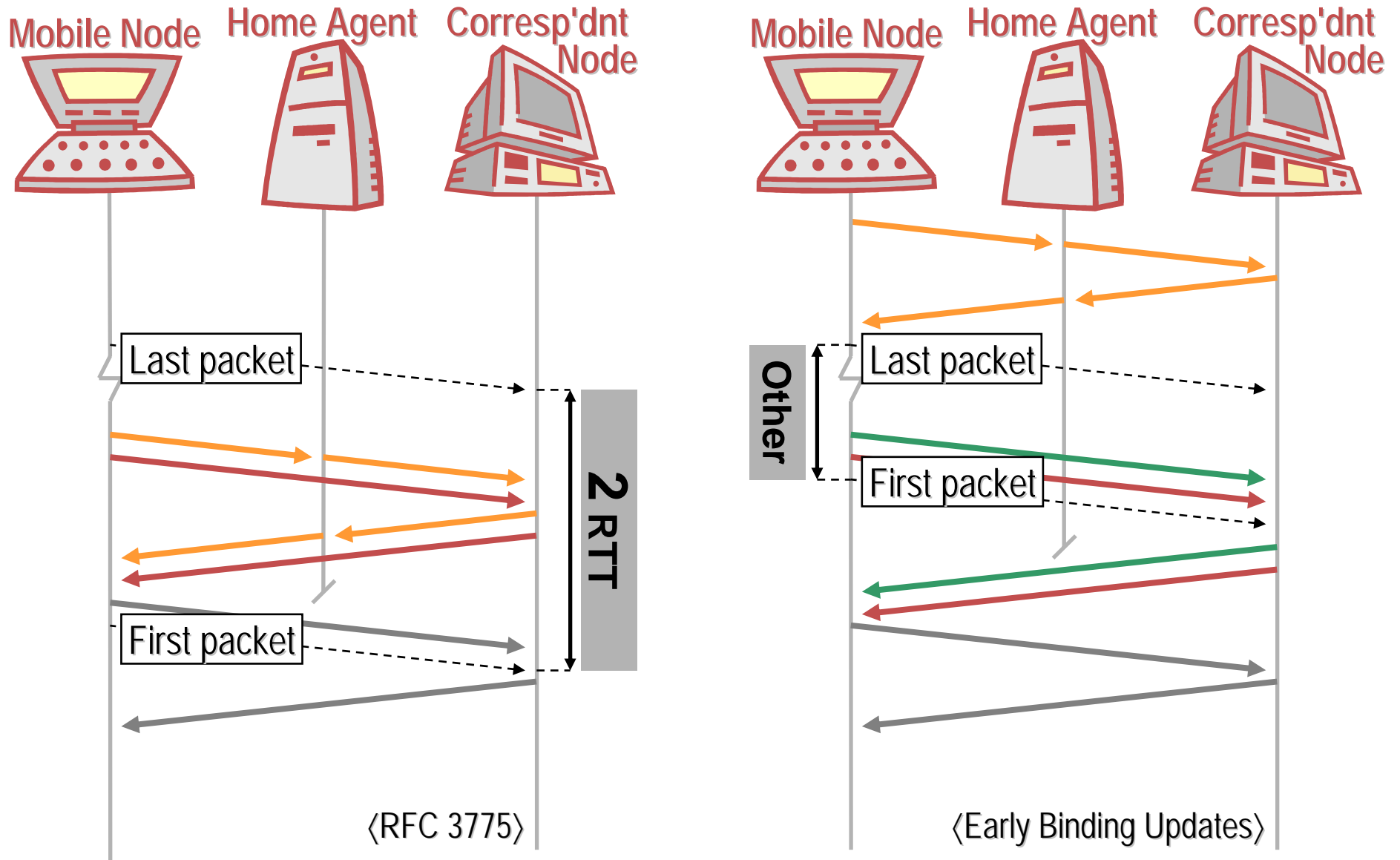
Our Solution: Credit-Based Authorization



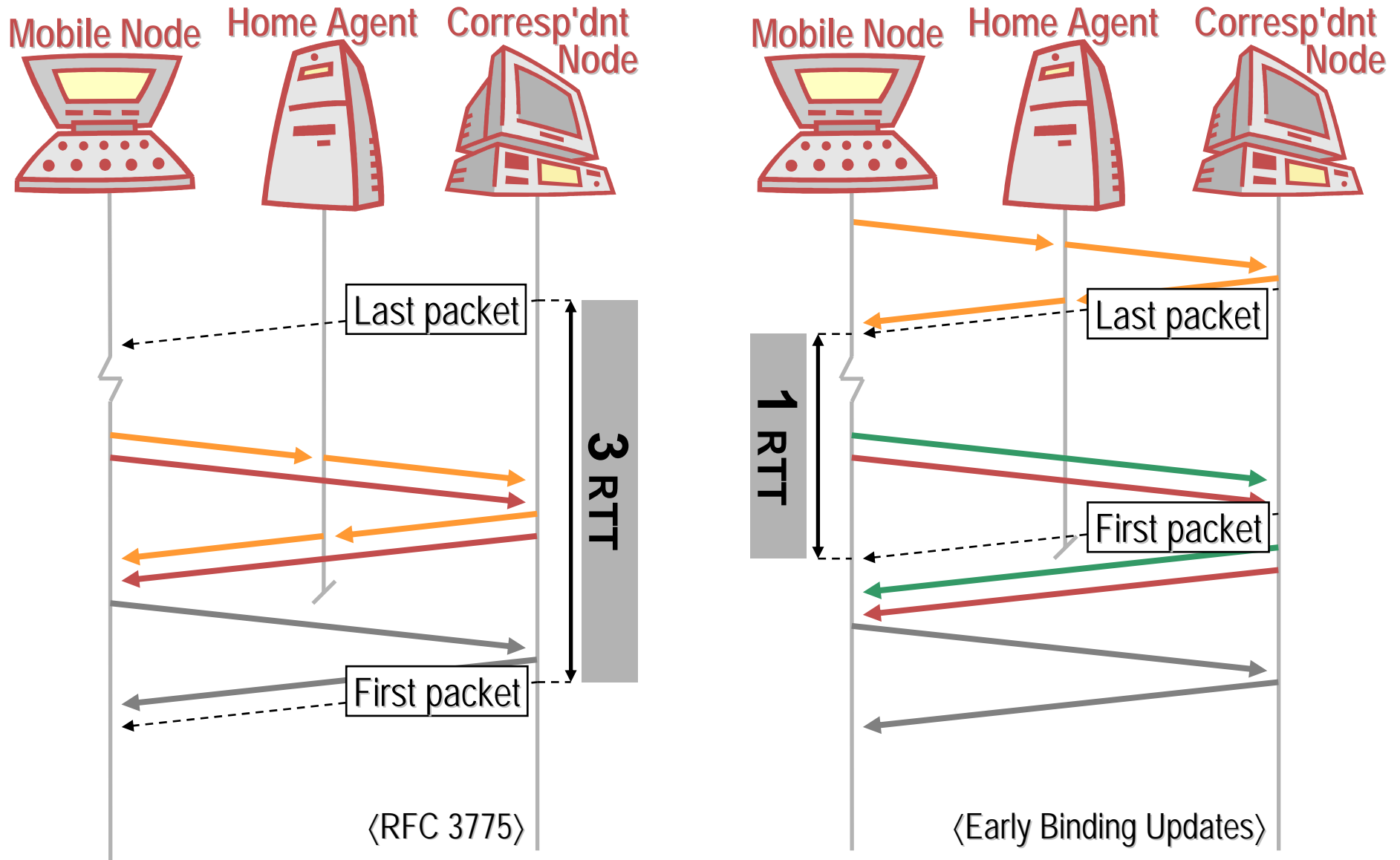
Our Solution: Credit-Based Authorization



How Much Do We Benefit?



How Much Do We Benefit?

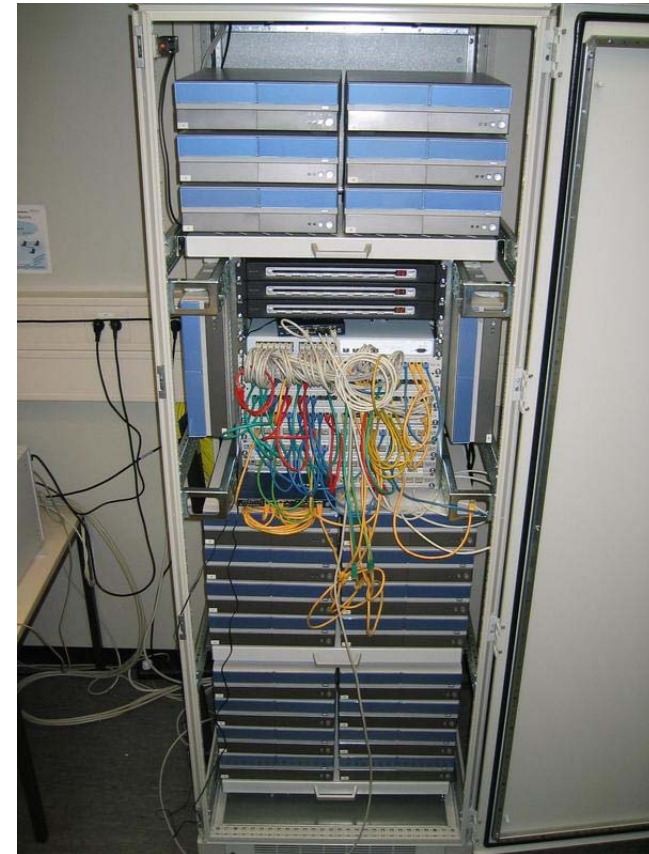


Ongoing work in IETF, IRTF

- EBU and CBA, related mobility work
 - draft-vogt-mobopts-early-binding-updates-00.txt
 - draft-vogt-mobopts-credit-based-authorization-00.txt
 - draft-irtf-mobopts-ro-enhancements-01.txt
 - draft-vogt-dna-relocation-01.txt
 - draft-arkko-mipv6-binding-lifetime-extension-00.txt
- CBA now integrated into HIP
 - draft-ietf-hip-mm-02.txt
- CBA integrated with CGA-based MIPv6
 - draft-arkko-mipshop-cga-cba-01.txt

Still on the agenda

- Impacts on TCP and applications?
- Proactive registration before handover



Implementation

- FreeBSD 5.3
- Kame-Shisa Mobile IPv6