Introduction to HIP

DoCoMo Labs USA

Pekka Nikander

Ericsson Research Nomadiclab & Helsinki Institute for Information Technolog

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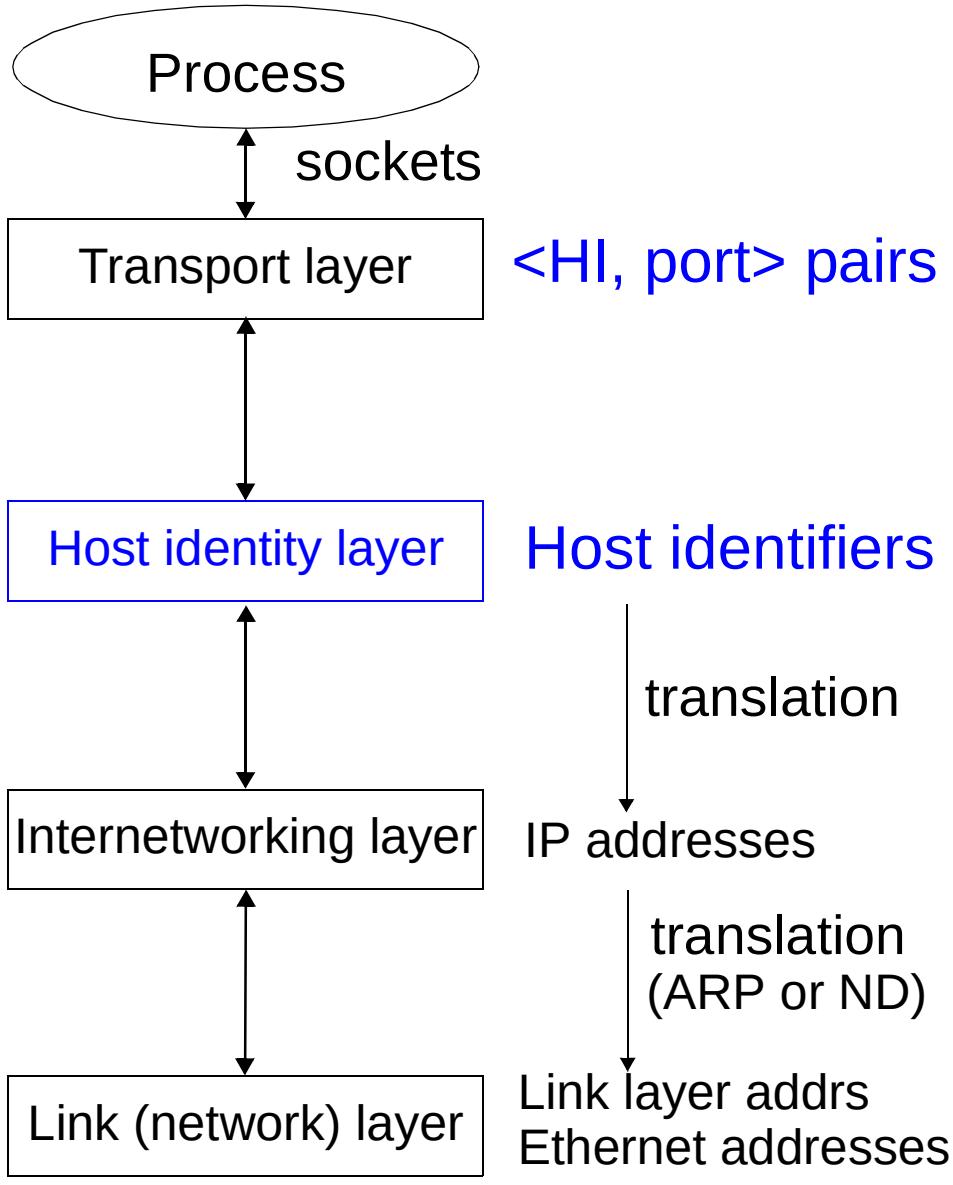
Introduction

- Once upon a time computers were big and bulky …
  - … and now I usually carry five computers with me.
- Once upon a time Internet connectivity was a luxury …
  - … but in a few more years it will be ubiquitous.
- Internet addresses still are *addresses* (locators) …
  - … but today they work poorly as end-point *identifiers.*
- Since Mobile IP(v6) is such a gross hack …
  - (and I know since I was in the security desing team)
  - … maybe it is a time to rethink everything.

- Host Identity Payload (HIP) is a concrete attempt to rethink the architecture — we may be right, we may be wrong, but we try, and hopefully we learn.

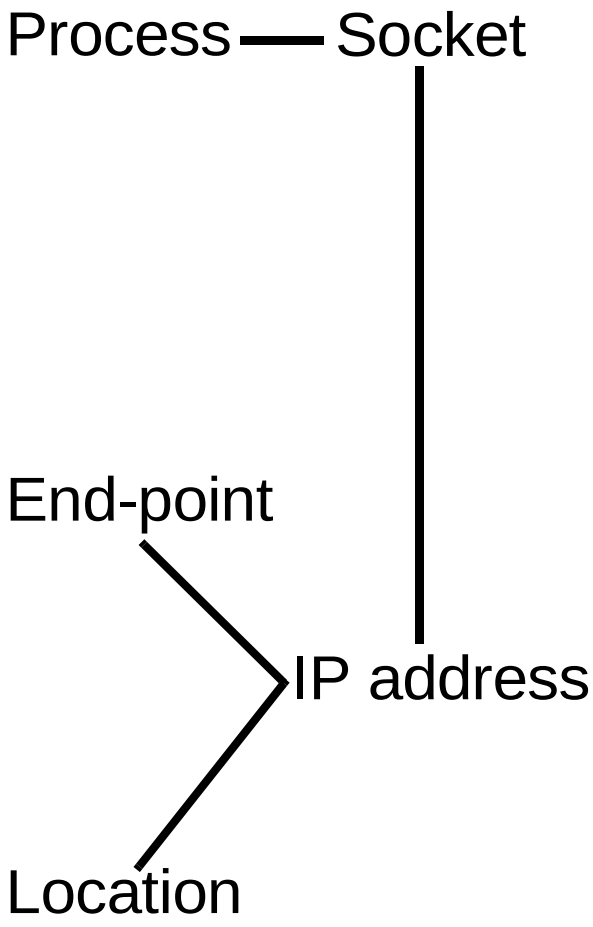
The Basic Idea of HIP

- A new layer
- A new Name Space: Host Identifiers
  - Public keys!
  - Represented as hash values, Host ID Tags (HIT)
- Sockets bound to the Host IDs, not IP addresses
- HIs translated to IP addresses transparently in the kernel

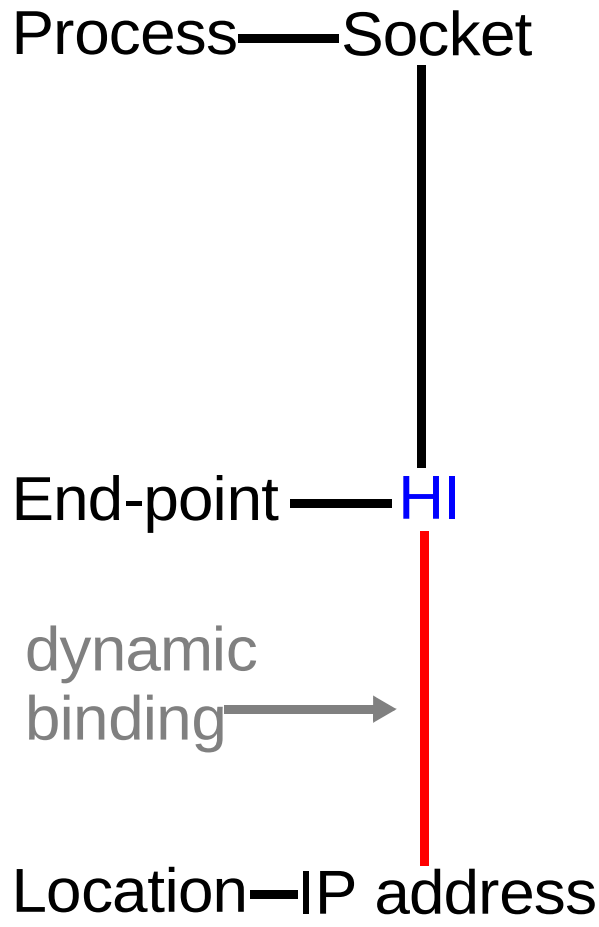


Bindings

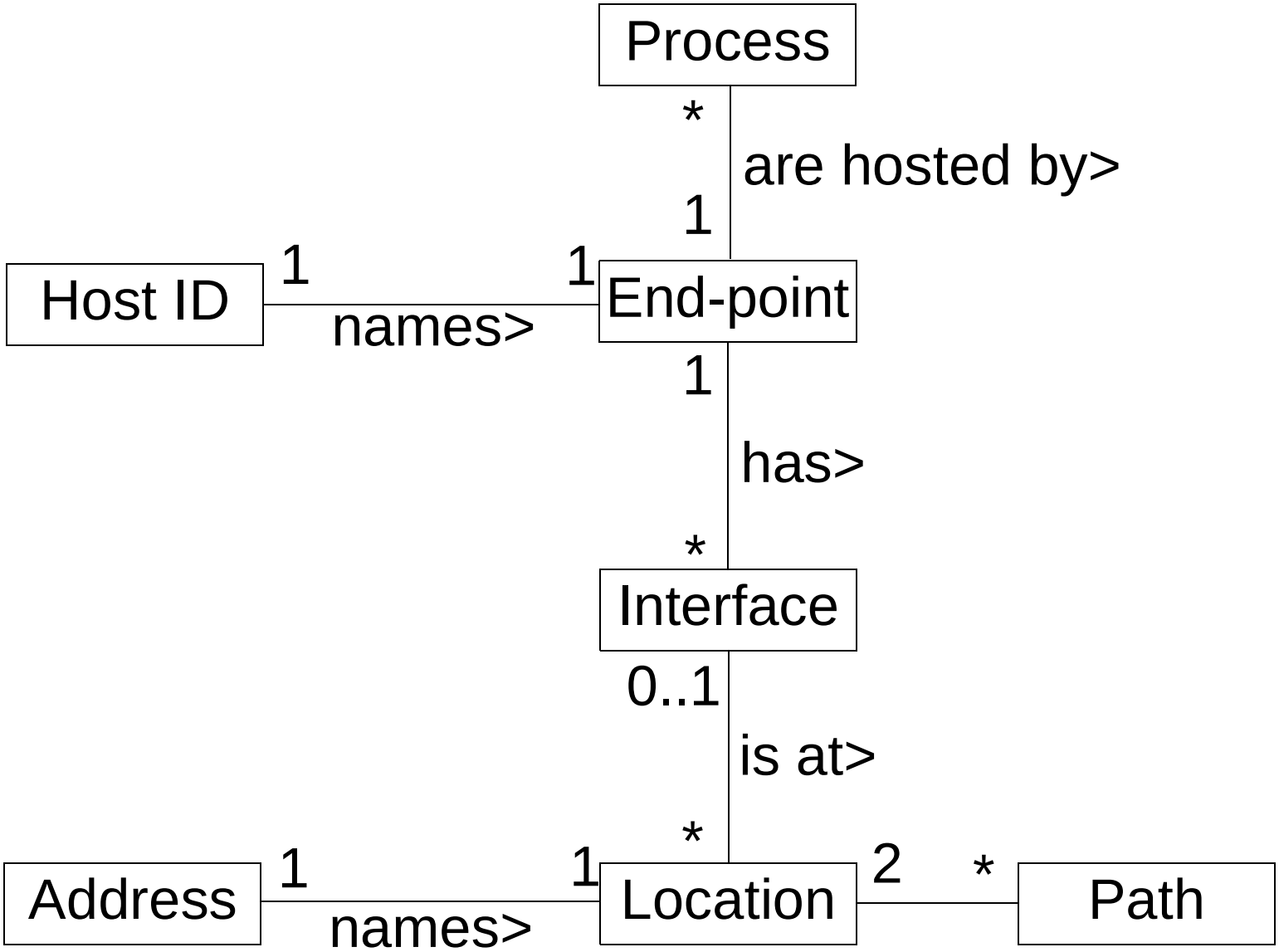
Bindings in the current architecture



Bindings in the new architecture



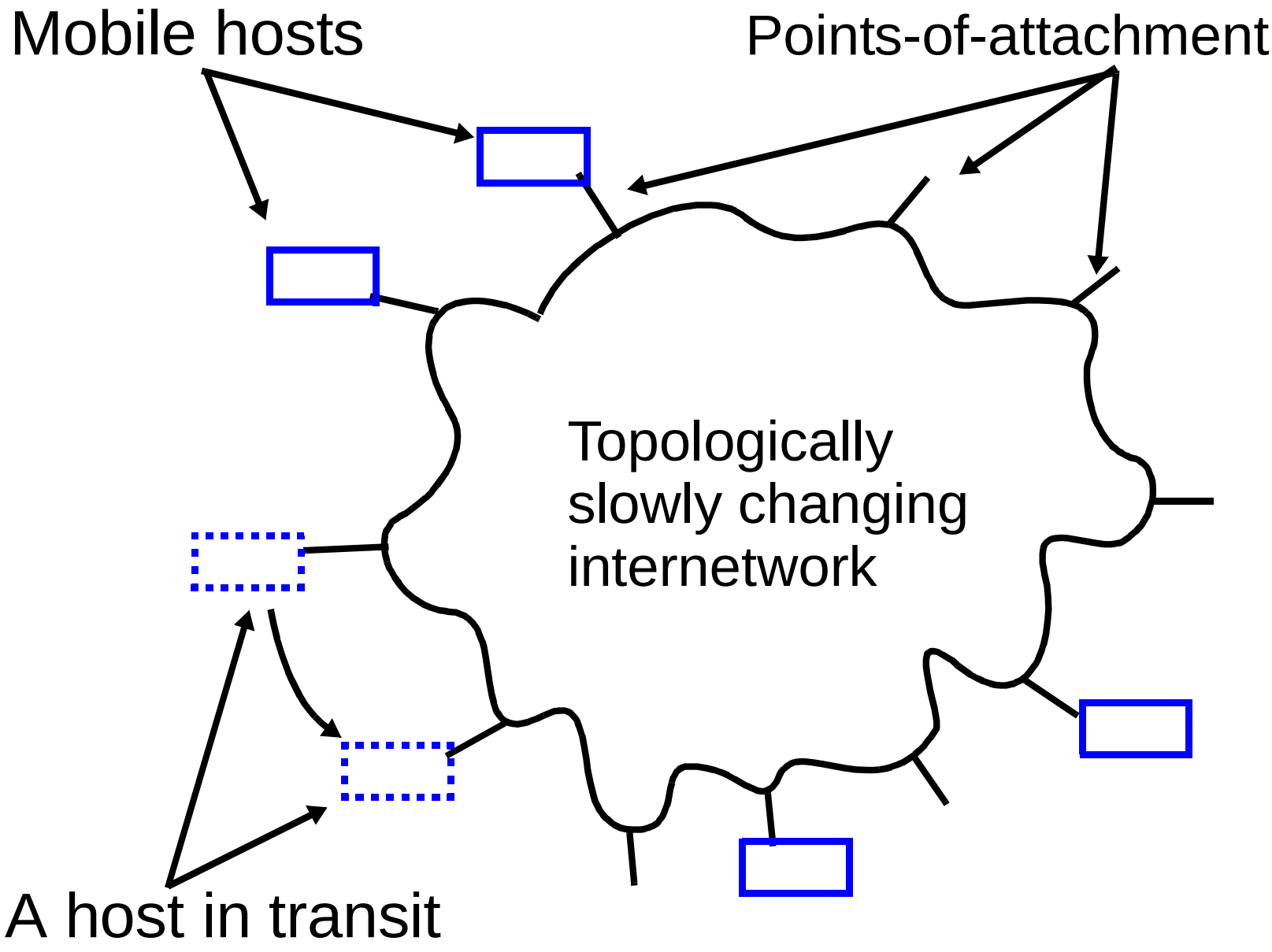
Conceptual model



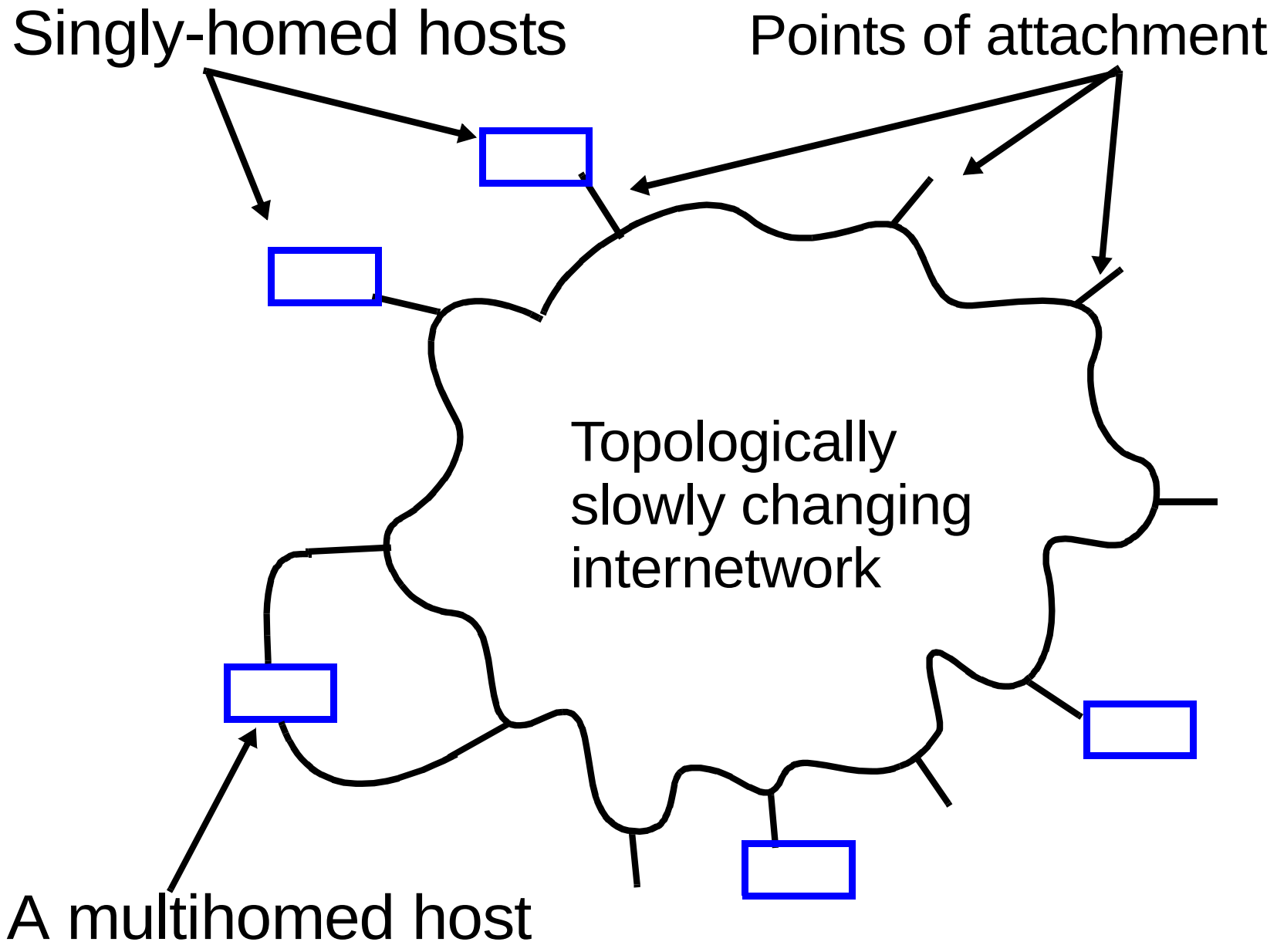
End-host Mobility & Multi-homing

- HIP seems to solve end-host mobility and multi-homing problems almost trivially
- Mobility and multi-homing become *duals* of each other
  - A mobile host has multiple addresses *serially*
  - A multi-homed host has multiple addresses *parallelly*
- Also easy to explain the difference between
  - process mobility (migration) and node mobility
  - end-host multi-homing and site multi-homing
- The thinking can be *folded* into a *Virtual Interface Model*
- Resulting *Architecture* is relatively small and beautiful

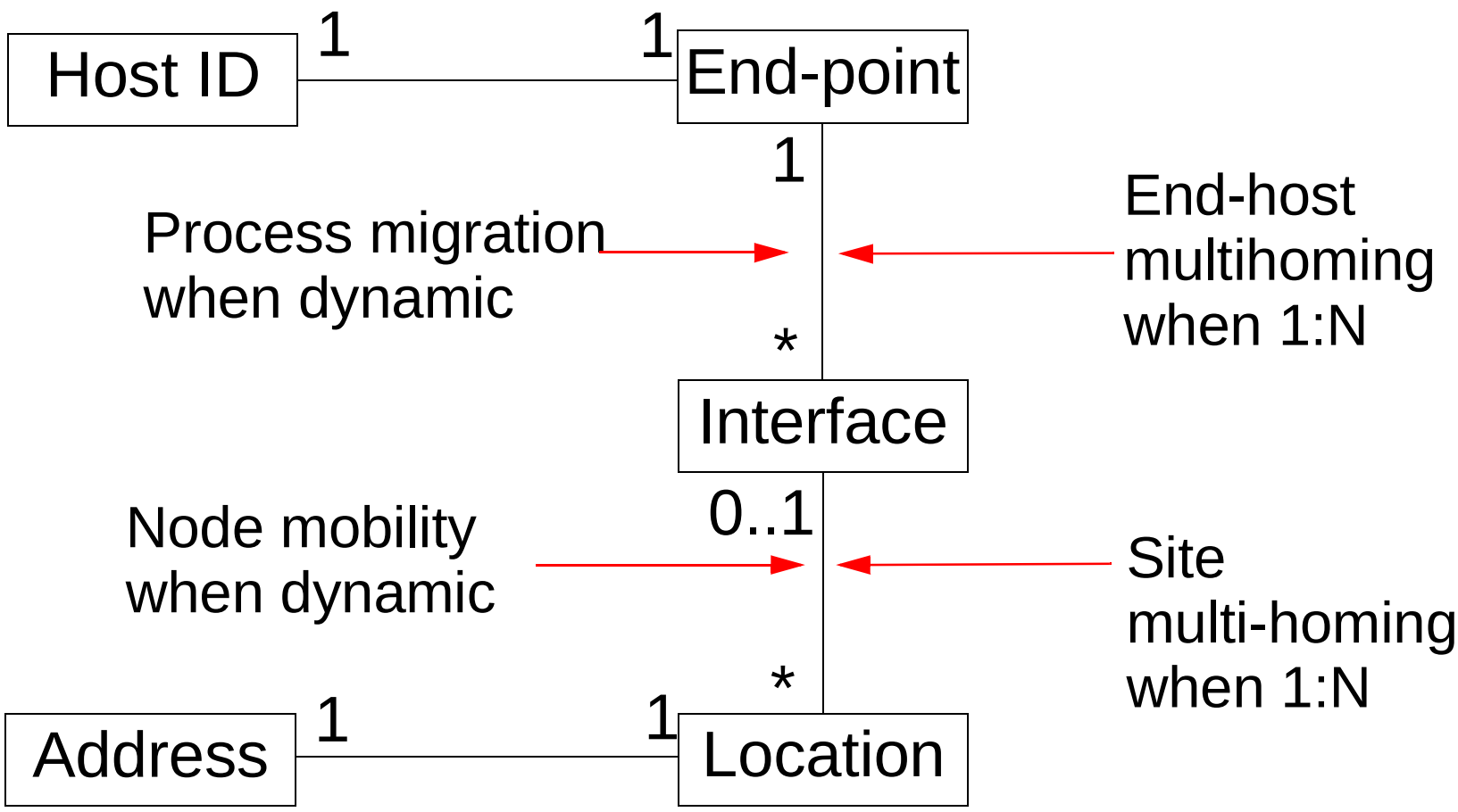
End-host Mobility Model



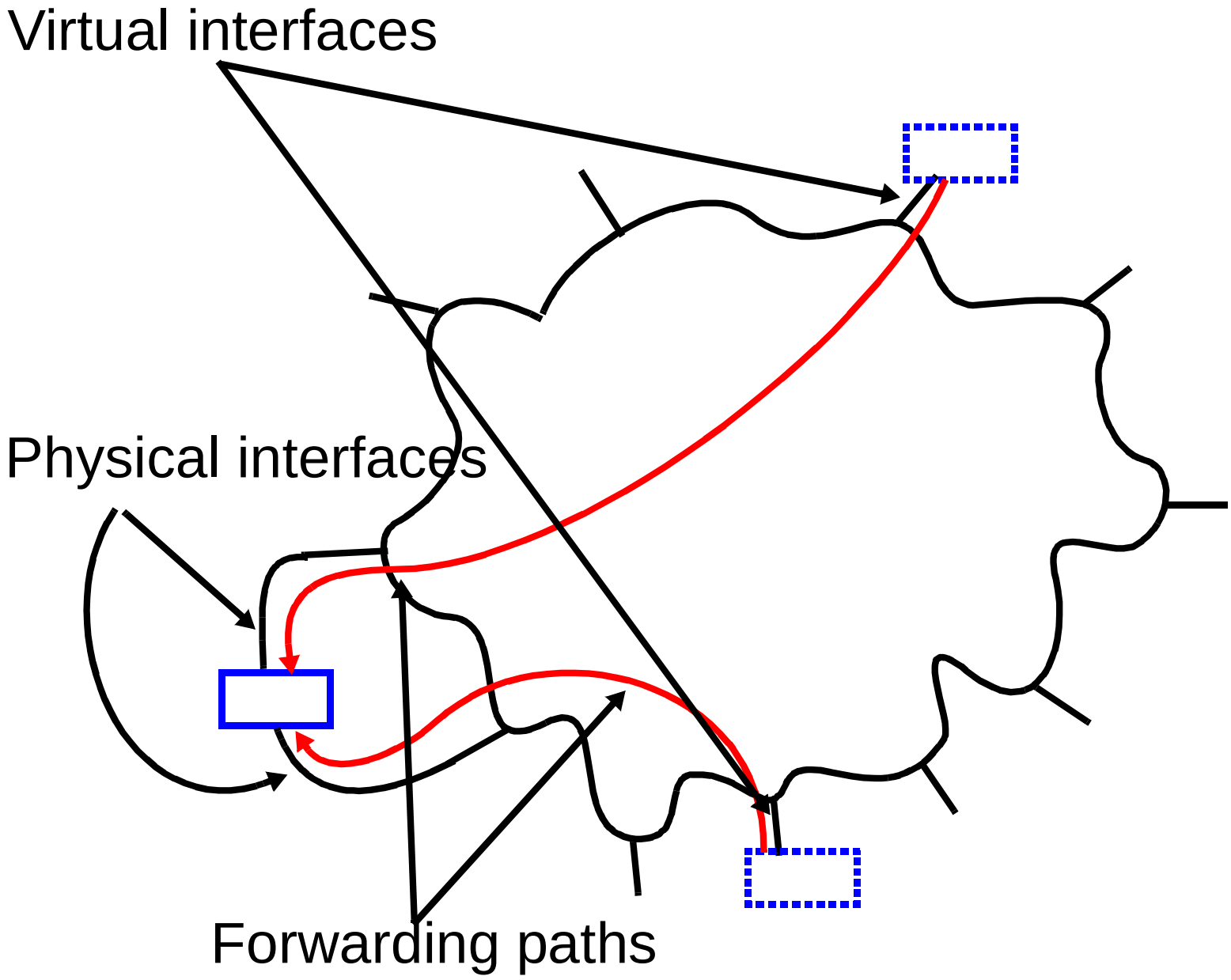
End-host Multi-Homing model



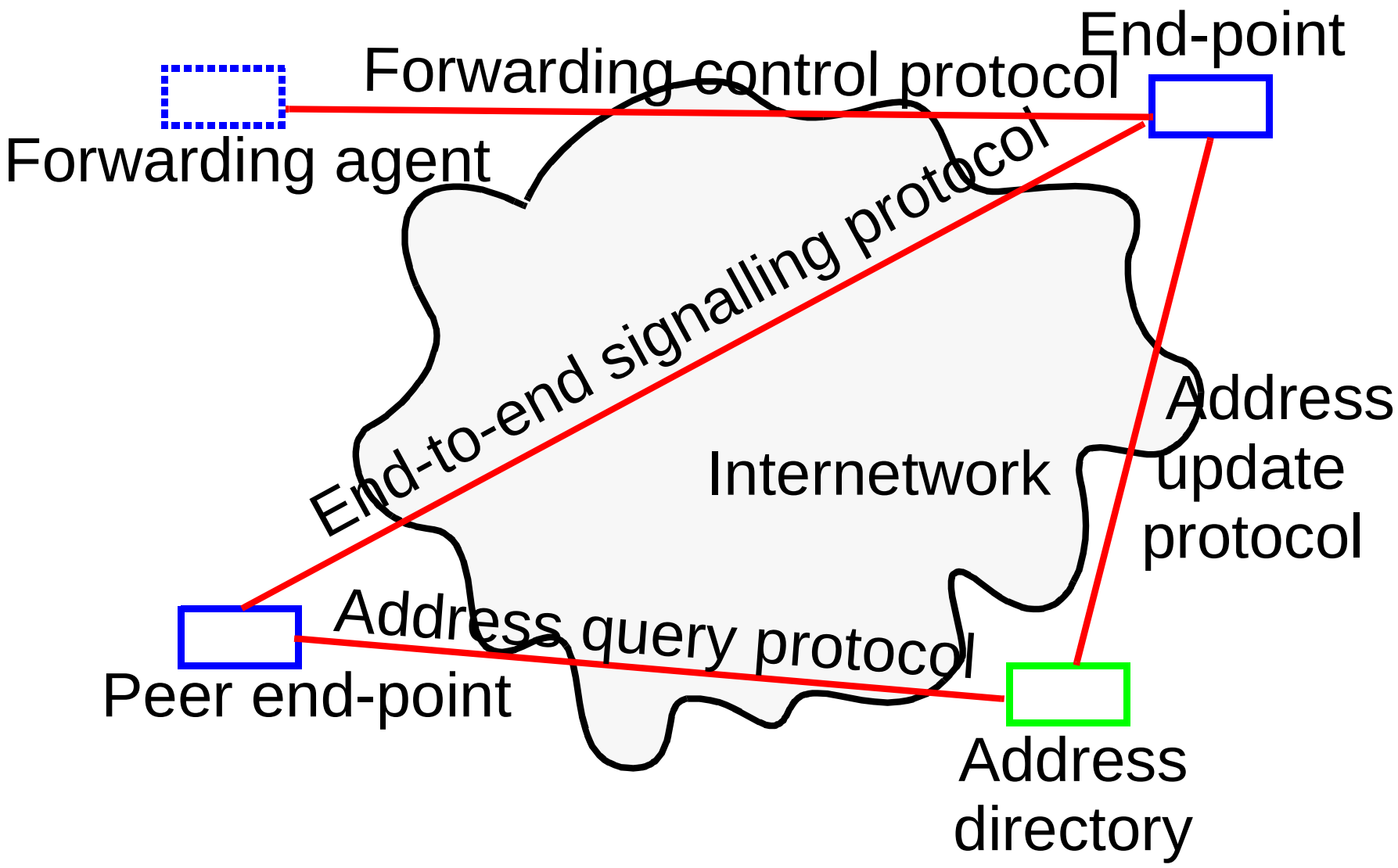
Conceptual model



A Virtual Interface Model



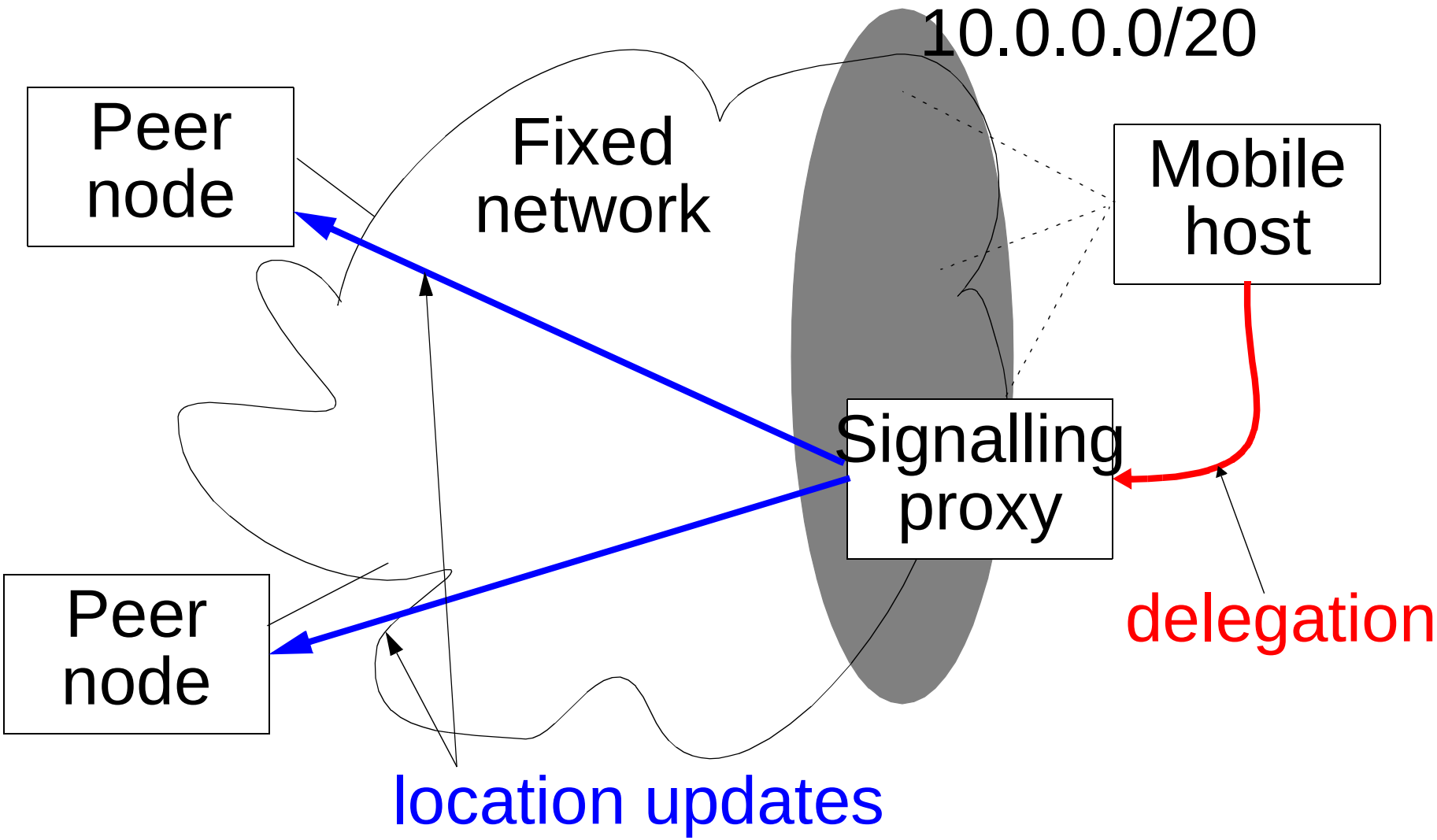
Components in the Architecture



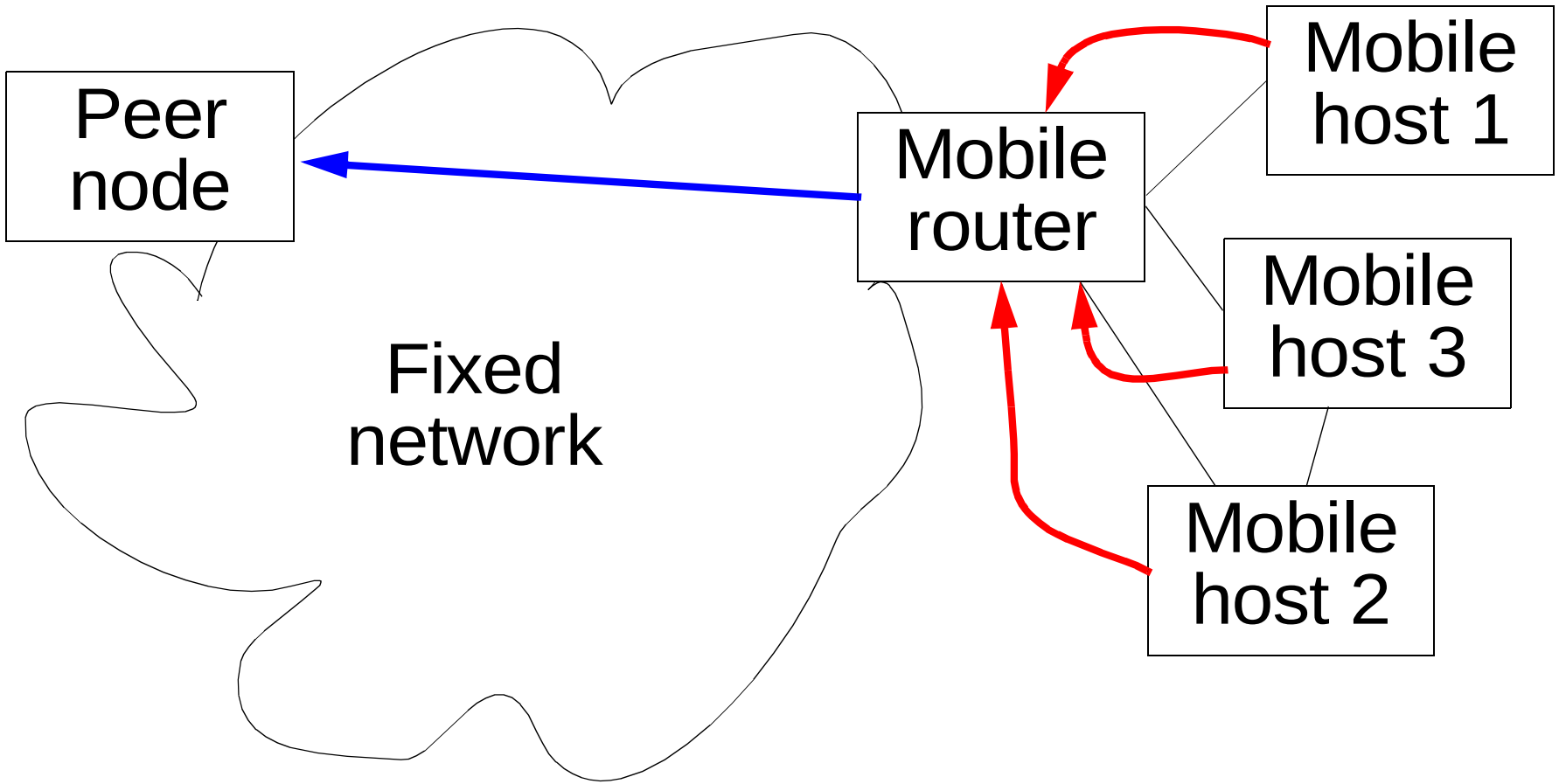
HIP for Monets

- Basic idea: Delegate right to send location updates
  - Remember, HI is a public key
- Use authorization certificates
  - SPKI, Keynote 2 or even PKIX
- The HI owner signs a certificate, delegating the right to send location updates on its behalf, to another HI
  - (HI_{Alice}, HI_{Bob}, right to send location updates)

Basic delegation



Delegation to Mobile Router



Summary

- A concrete, down-to-earth attempt to "fix" the Internet
  - Deployment can start at end-points
  - No changes required to routers
  - Can be made to work with firewalls relatively easily
  - Supports NAT, but requires HIP-capable NAT boxes
  - Backward compatibility can be provided with proxies
- Seems to solve almost trivially
  - end-host mobility
  - end-host multi-homing
- Provides components for
  - site multi-homing
  - monets