

Home Agent Assisted Route Optimization (HAARO) between Mobile IPv4 Networks

IETF 70, Vancouver, BC, Canada

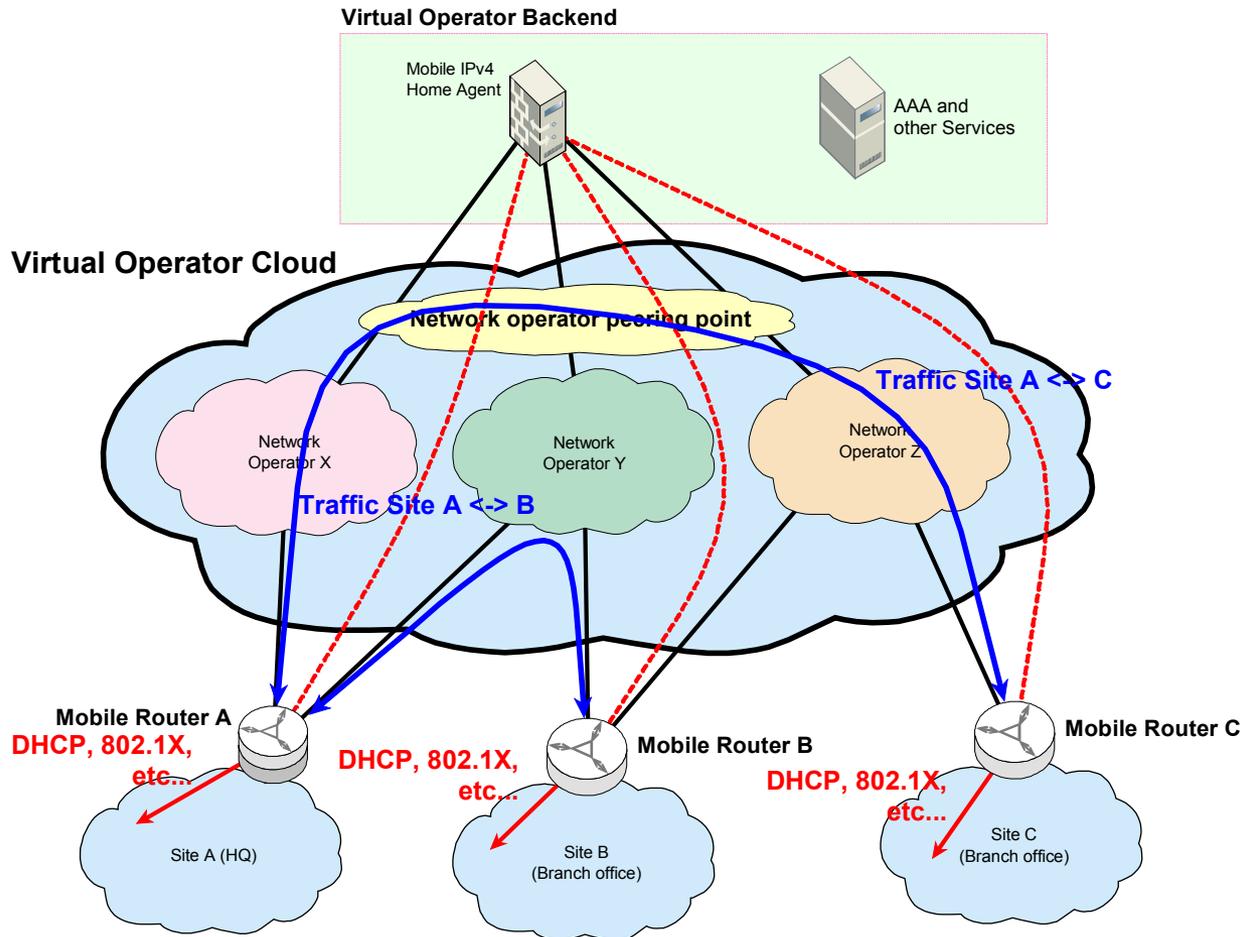
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Background and motivation

- Technological enabler for virtual operator (“service provider”) model
 - “Redundant array of inexpensive bit-pipes”
 - Instead of expensive 99,999% uptime SLA connection, use
 - \$10/mo DSL/cable from N different network operators (ISPs)
 - Multihoming over multiple connections
 - No need to run routing protocols with the network operators
 - No need to set up BGP peering and AS’es for customer network
 - Not possible with cheap consumer DSL, anyway...

Traffic patterns



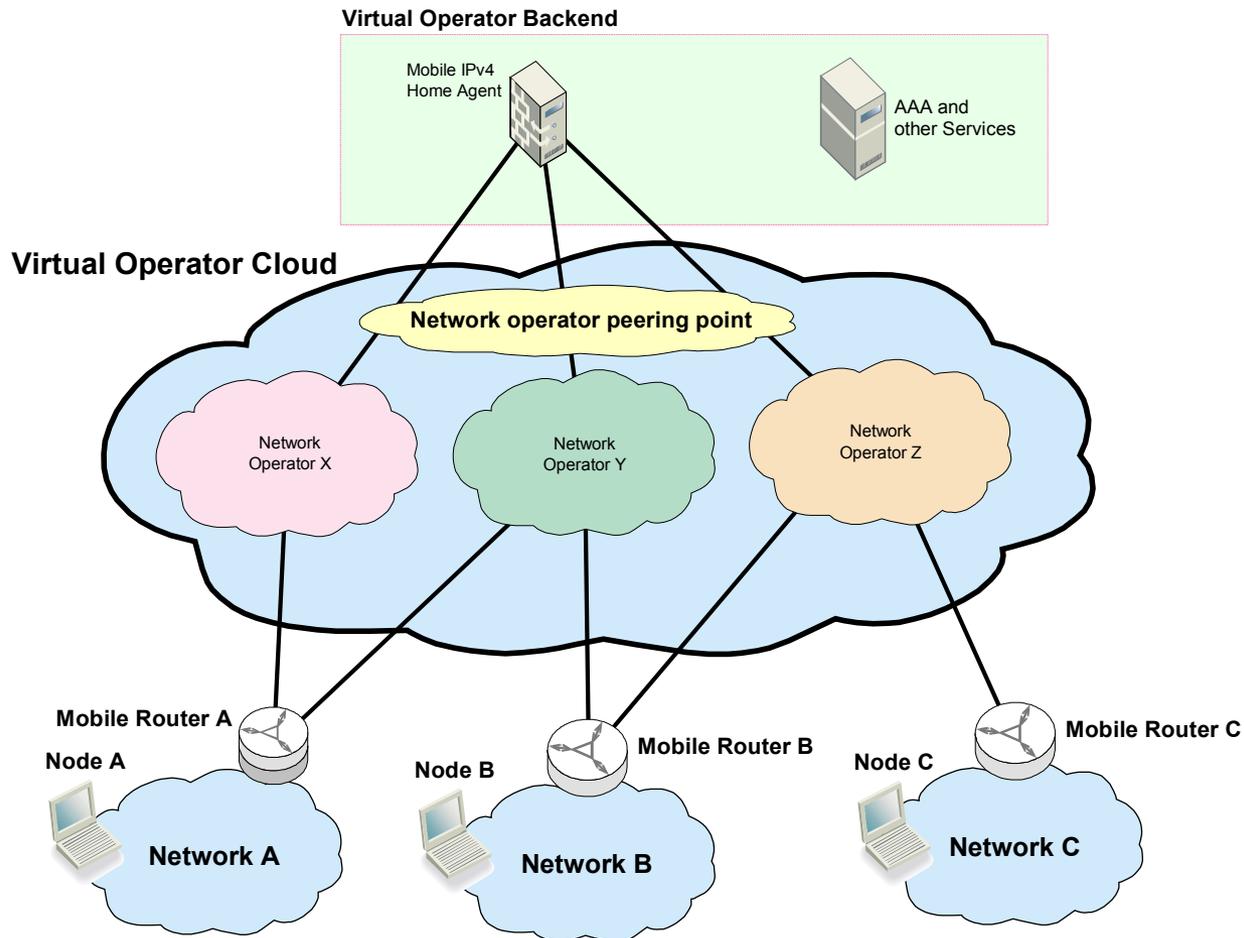
draft-makela-mip4-nemo-haaro

- Basic idea: Since HA knows which MR owns which Mobile Network, distribute this information to MRs as well
- Allows for RO to happen between networks (and Mobile Nodes) connected to single HA
 - If a generic "discovery" mechanism is provided, other methods in the draft work also in more general case

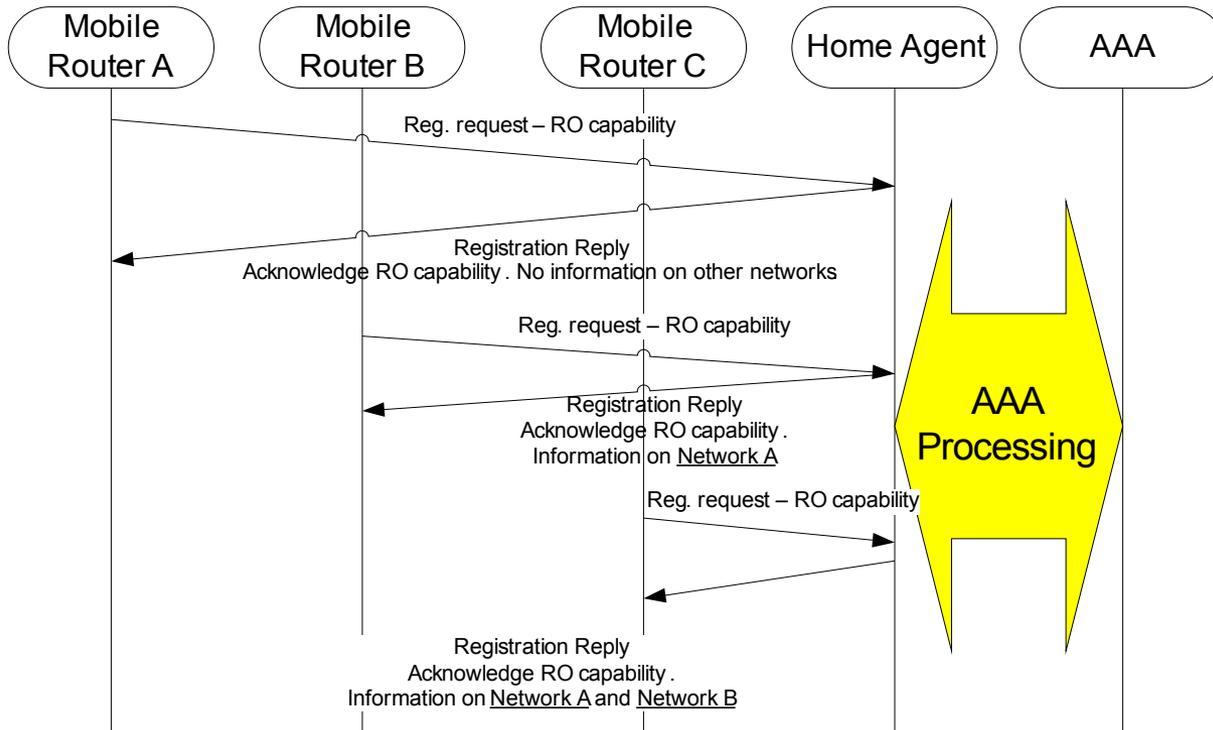
New information elements/extensions

- Draft defines
 - Extension for MR to indicate route optimization capability (MR → HA)
 - Route optimization prefix advertisement extension (HA → MR)
 - Table of MR HoAs and associated networks
 - Authentication-related extensions (MR ↔ MR)
 - RR check, one new authenticator
 - Care-of-address extension for establishing tunnels (MR ↔ MR)

Example scenario: Starts with no networks registered at HA



Registration process



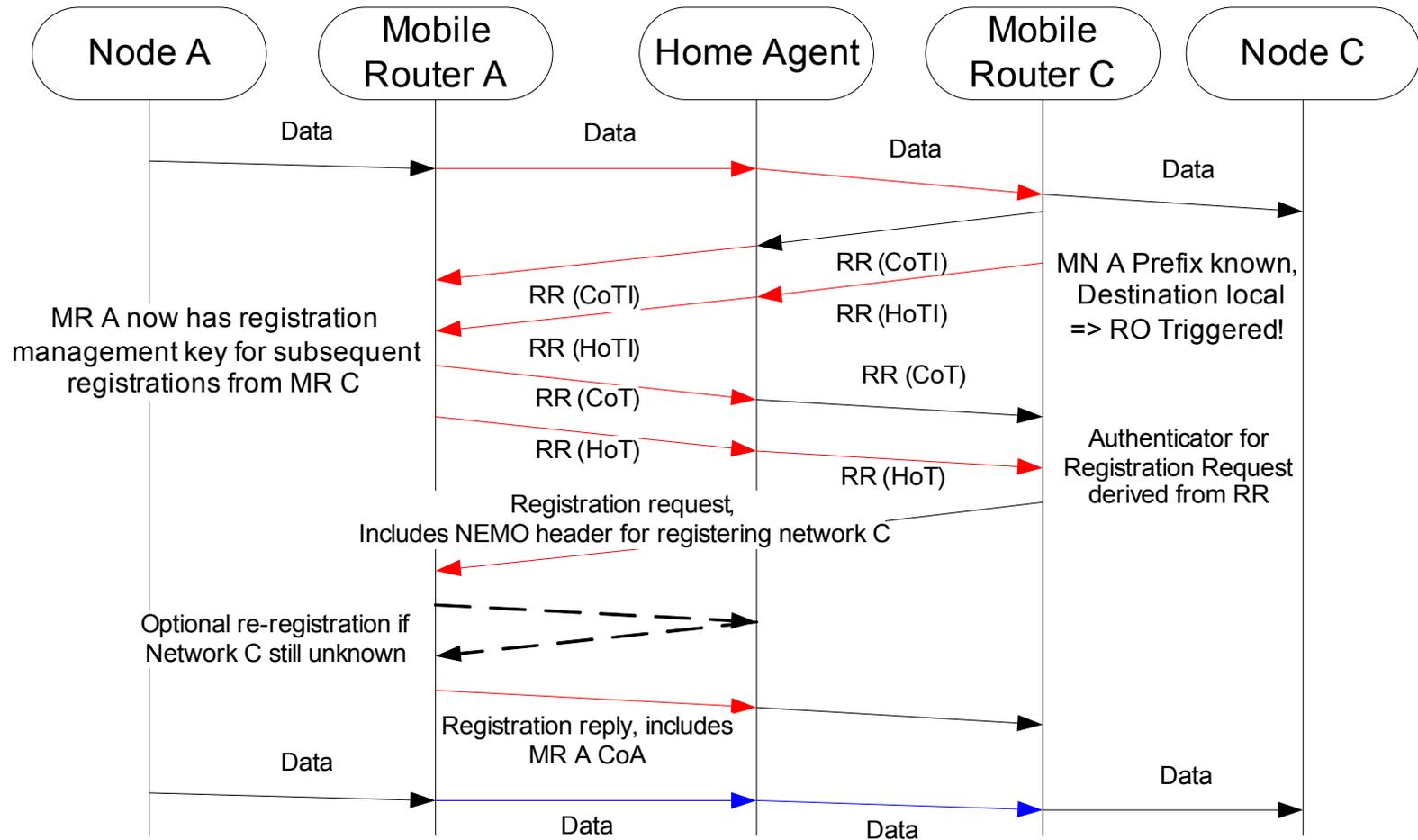
Route optimization prefix advertisements

- Used in registration replies
- Describes, of each HAARO-capable router known to HA
 - Mobile router(s) Home Address(es)
 - Prefix(es)
 - Realm(s)
- ➔ MR C will be aware of networks A and B
- ➔ MR B will be aware of network A
- **NO** explicit "routing updates"
 - Convergence not needed, but will happen with re-registrations (eventually) if networks don't move

Establishing the MR \leftrightarrow MR: Return Routability check

- Assumption: Mobile routers trust HA
 - MR's do **NOT** have access to backend AAA
- HA \Rightarrow MR: Trustworthy MR HoAs
- Return routability establishes
 - Peer MR with a specific Home Address is reachable via specific Care-of Address
 - Creation of shared secret
- RR: Trustworthy CoA \leftrightarrow HoA binding
 - \rightarrow MR's know each other's CoA

RO triggered by Node A sending packet to Node C



Firewall/NAT considerations

- Signaling
 - Conducted through HA, addressed to MR HoA's
 - NAT/FW considerations for signaling already taken care of – if HoA's are reachable, signaling is possible
- Tunnels between MRs
 - Prefix information includes flag on whether MR is behind NAT ('O' flag)
 - Mandates use of UDP encapsulation, requires that UDP tunnel is initiated from inside
 - Signaling can still be initiated from outside!

Questions & comments?
Consider a WG item?

