

# The Global HAHA Operation at the Interop Tokyo 2008

`draft-wakikawa-mext-haha-interop2008-00.txt`

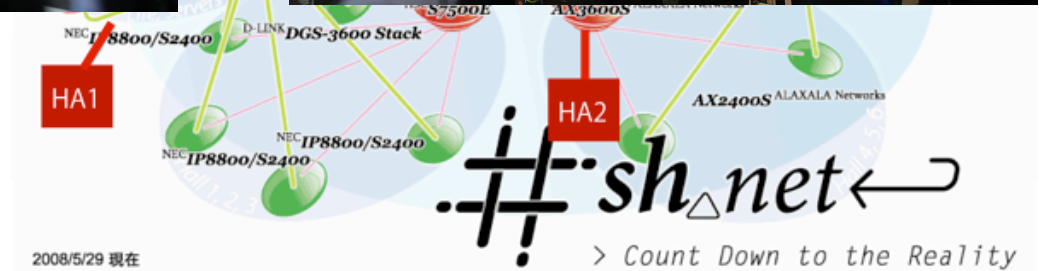
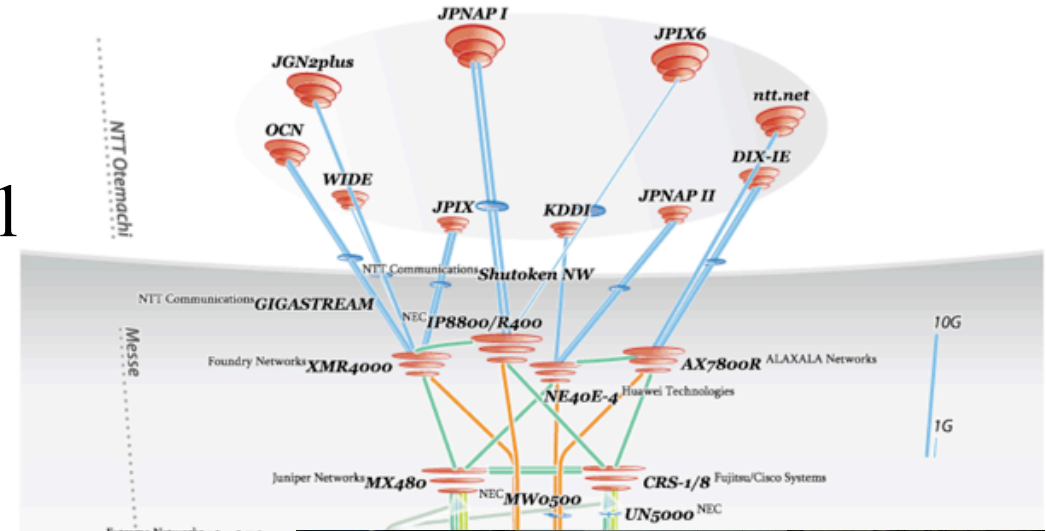
## Interop Tokyo 2008

- One of the biggest exhibition/conference for network equipment/service vendors. The Network Operation Center (NOC) team builds an experimental advanced network called "ShowNet" as a backbone of the event. The experimental network was connected to several peering points (Internet Exchange Point) by more than **120G bps links** in this year. Our global HAHA experimentation was served as a part of "ShowNet".

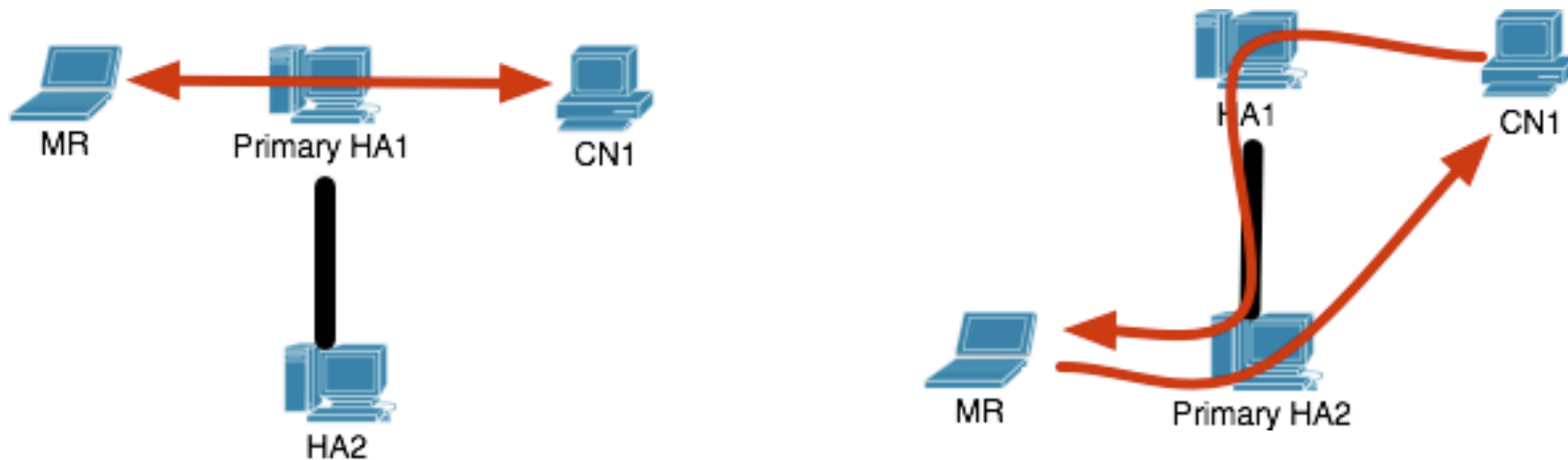


# Interop Tokyo 2008 Topology

- Interop-jp 2001:3e8::/32
- Several peering connections to realize real Internet
- Roughly divided into 2 parts, Hall 123 and Hall 45
- Two halls located in the same building and Hall 45



## How it works? (Simple HAHA)



- MR's BU is always routed to the closest HA (primary HA)
- The primary HA notifies the MN's registration to other HAs. The other HAs create the host route to MR via the primary HA. (Binding Cache is not synchronized between HAs)
- If CN's packet is routed to non-primary HA as show in the right figure, the packet is re-directed to the primary HA according to the host route on that HA.



# TestBed Overview (June 11-13, 2008)

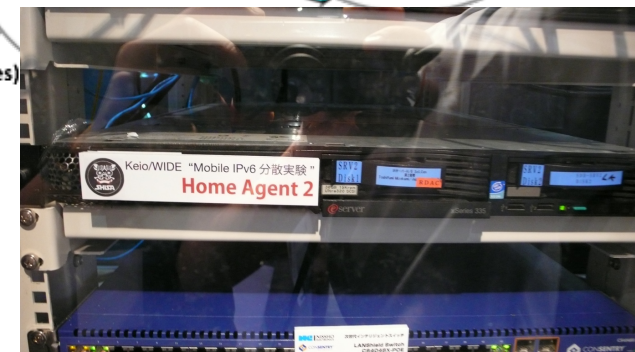
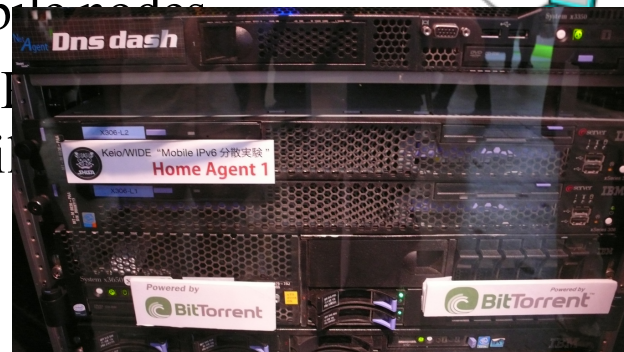
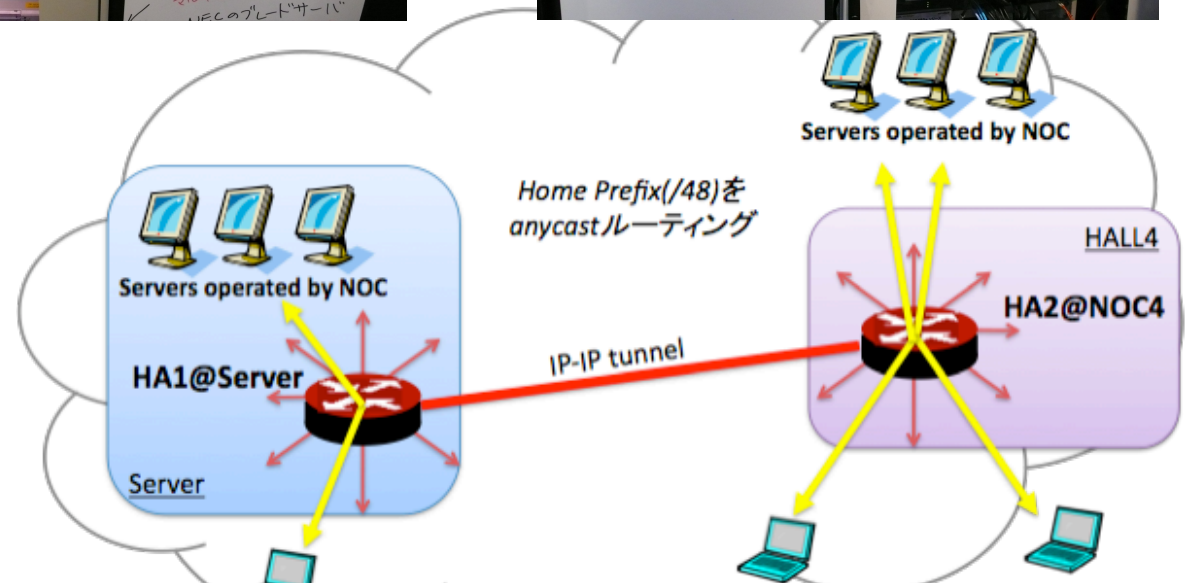
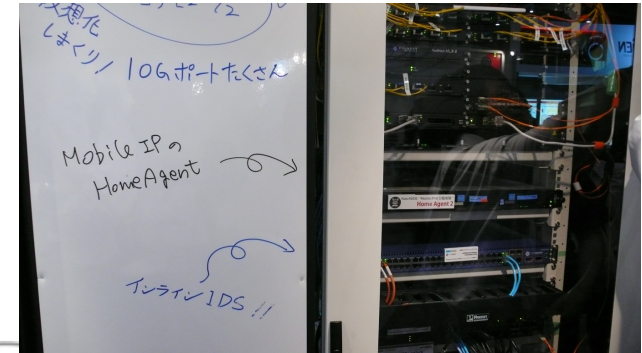
- Network Configuration

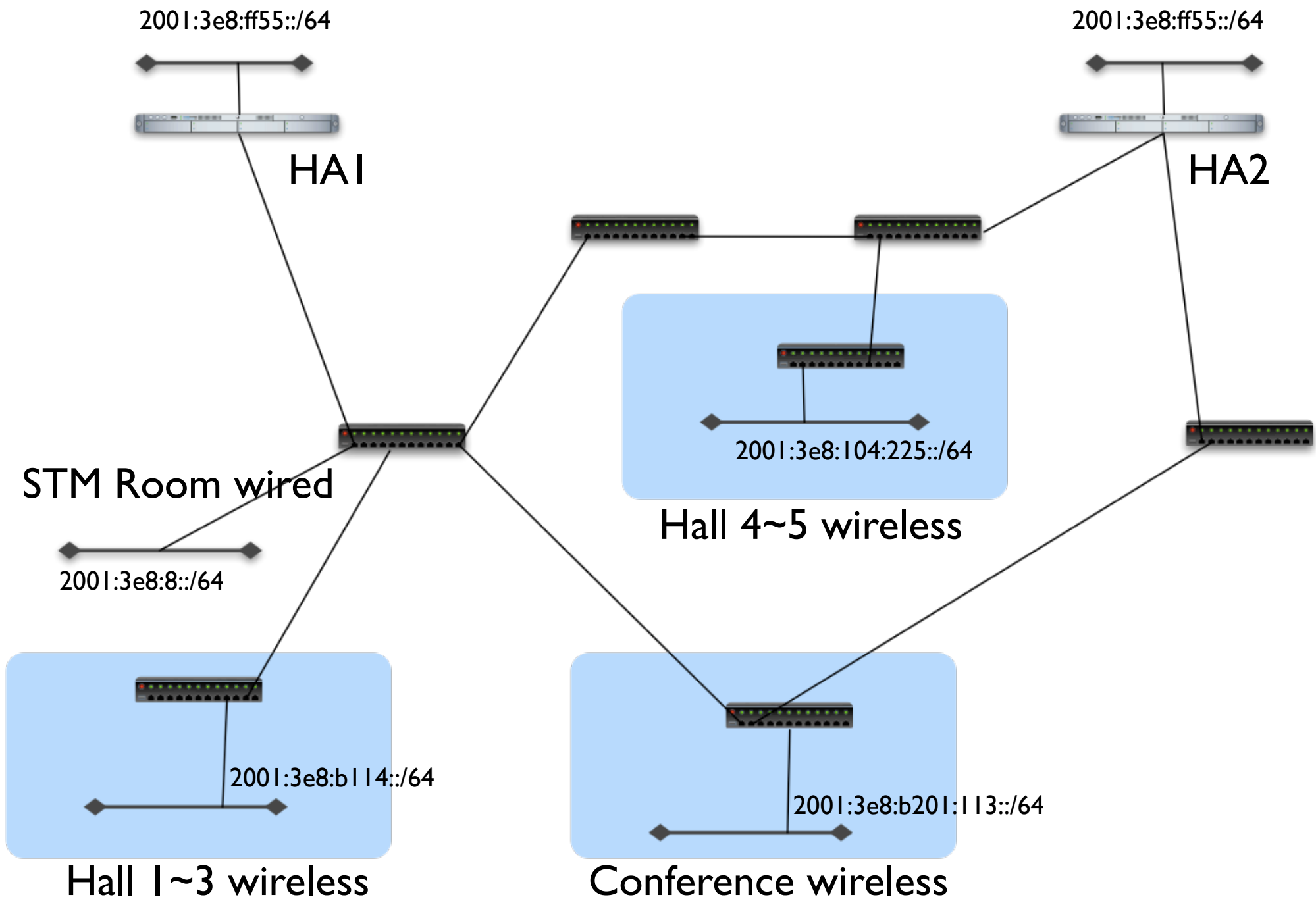
- 2001:3e8:ff55::/64 advertised in anycast manner by OSPF

- We use /64 for the network prefix (2001:3e8:ff55::/64)

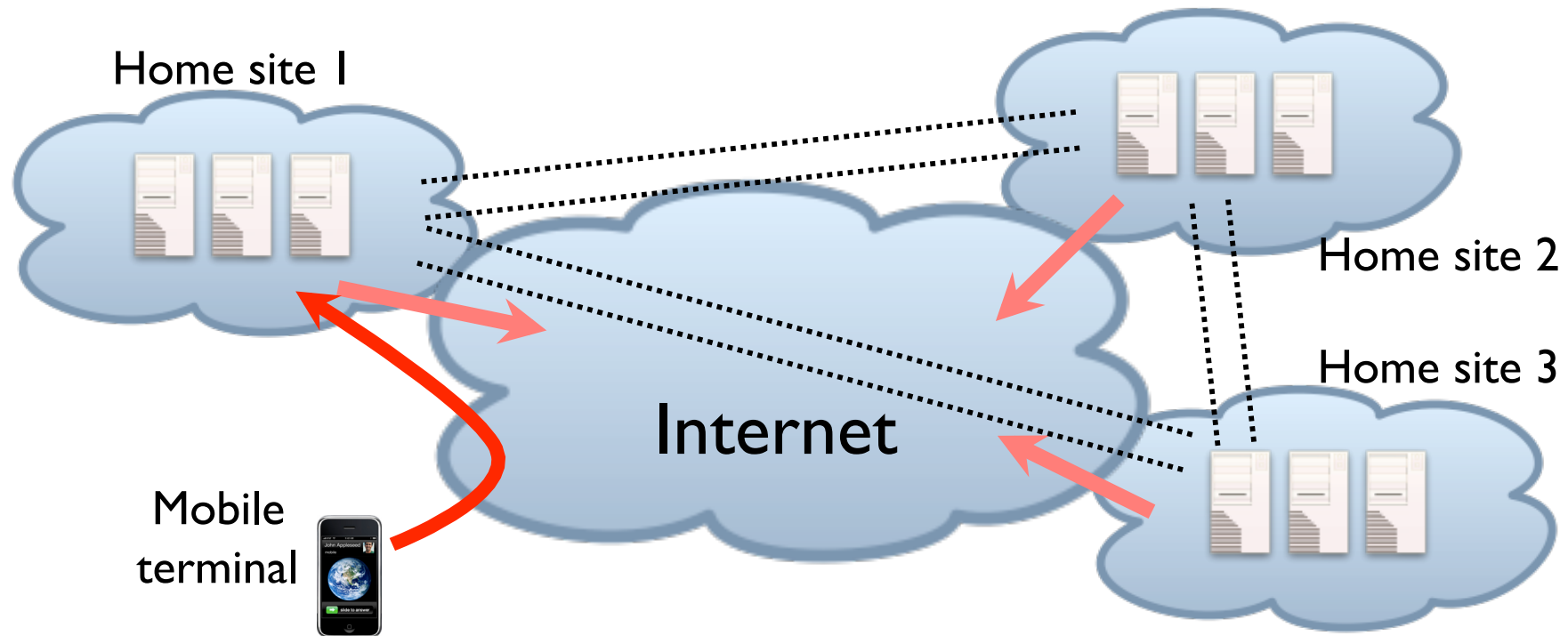
- Implementations

- 2 of SHISA based NetBSD home agents
- 6 of SHISA based NetBSD mobile nodes
- Several UMI Ubuntu mobile nodes





## Another Global HAHA Testbed



- The initial testbed: 4 different locations at IIJ (Japan), WIDE (Japan), WIDE (U.S.A.) and KOREN (Korea)
- 2001:200:a000::/35 (AS4690) is used for this experiment
  - IIJ (Japan) and WIDE have started advertising the route

## References

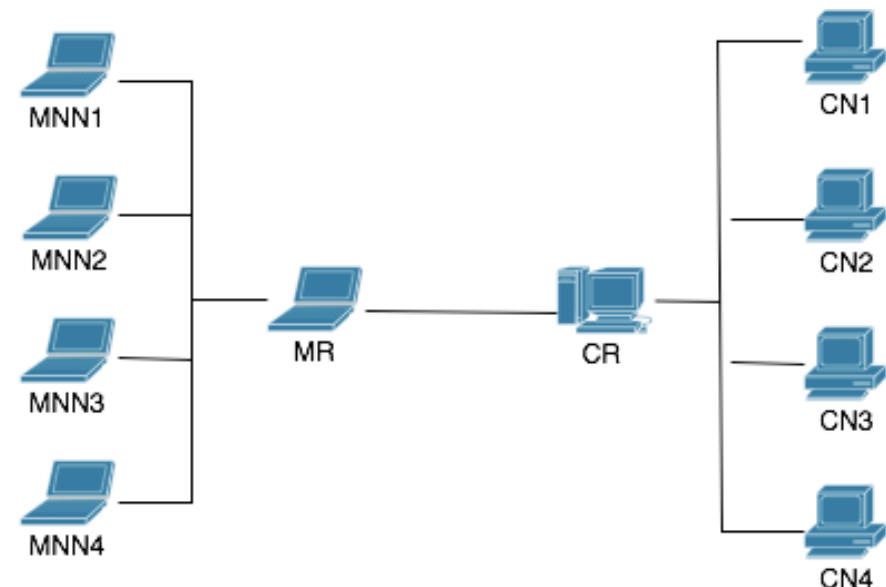
- About Interop Experimentation
  - [http://www.mobileip.jp/interop2008/in\\_English.html](http://www.mobileip.jp/interop2008/in_English.html)
- SHISA: Mobile IPv6 Implementation on BSD-platform  
<http://sourceforge.net/projects/shisa/>
- Ryuji wakikawa, Guillaume Valadon, Jun Murai.,  
"Migrating Home Agents towards Internet-Scale Mobility  
Deployments", ACM 2nd CoNEXT Conference on Future  
Networking Technologies, Lisbon, Portugal. 4-7 December  
2006
- draft-thubert-mext-global-haha-00.txt
- draft-wakikawa-mip6-nemo-haha-spec-01.txt



# The Design Consideration of Correspondent Router draft-wakikawa-mext-cr-consideration-00.txt

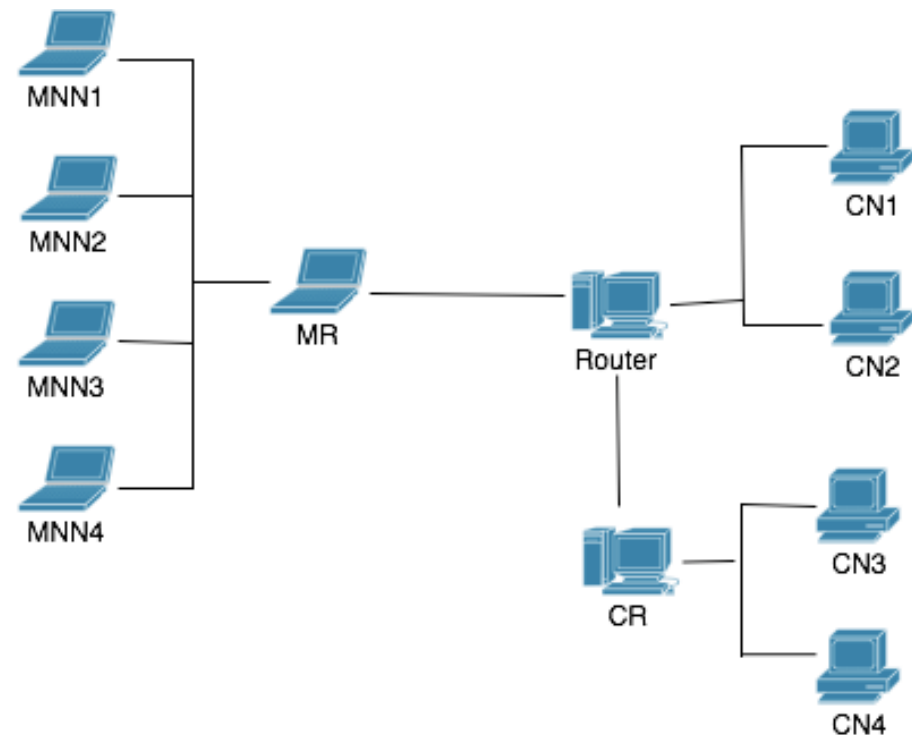
# Triggering Route Optimization

- MR and CR are both intermediate nodes of end-end communications
- How can MR trigger RO based on ?
  - 5 tuples (src,dst,sport,dport,proto)?
  - policy?
- If this is static configuration, fine. Otherwise, we need a mechanism between MNN and MR to exchange which flow will be optimized.
- If MR does RO with CR for MNN1-CN1, is it acceptable that communication between MNN2 and CN2 are also optimized?



# Correspondent Router Discovery

- Two scenarios:
  - CR is on the path between MNN (MR) and CN
    - ex. MNN1- CN3
  - CR is NOT on the path between MNN and CN
    - ex. MNN1 – CN1



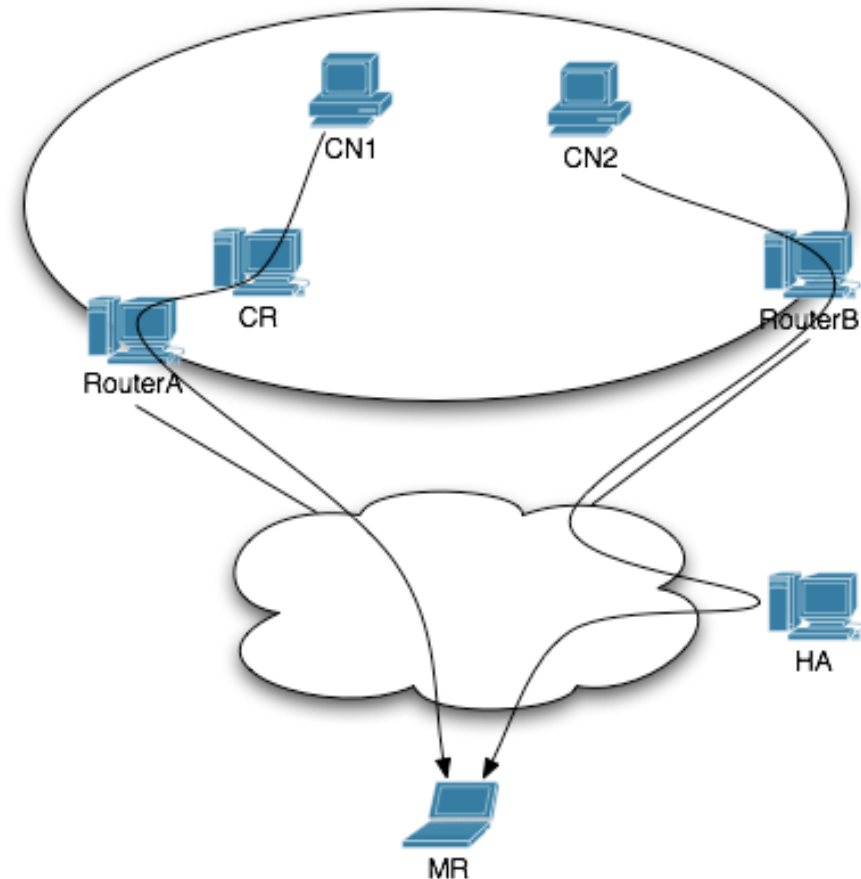
## Binding Registration to CR

- CR is not always belong to a same administrative domain of MR. Thus, we need strong security consideration how to send BU to CR.
- Binding Registration for “Mobile Network Prefix” or “an address of MNN”
  - If the whole prefix is registered, how can you verify ownership of the mobile network prefix ?
  - RFC3963 has **prefix table** to verify this ownership. This prefix table is not available on CR.
- In HAHA, HA is belong to the same administrative domain of MR, it is relatively easier than CR’s case.



# Routing

- Route from MR to CR is always optimized, since MR is always capable of intercepting a packet and delivering it to CR.
- The reverse path (from CN to MR) is not always optimized based on the location of CR
  - How can you guarantee that CR intercept all the MR's packet?
- HAHA does not have this problem, since each HA advertise MR's prefix by anycast. The closest HA can always handle MR's traffic.



## Summary

- In order to design CR for NEMO, strong network and configuration assumptions are required.
  - Who will manage CR?
  - What is statically available information on both MR and CR?
    - Mapping information of CR and CN?
  - How is topology of CR and CN?
  - Where is CR ?
    - If topology is not correctly setup, RO might not be completed.
- Without these assumptions, it is very challenging to design a CR protocol.
- <http://tools.ietf.org/html/draft-wakikawa-nemo-orc-01>