

# Mobile IP

- Ability to retain IP address while being mobile
- Ordinarily, it does not:



# Mobile IP - basic ideas

- Mobile host has a “home network”
- Host’s IP address is in the subnet of its home network
- When in home network, just like any other host
- When in foreign network, it retains its IP address from home
  - Special kind of forwarding needed

# Assumptions from RFC 5944

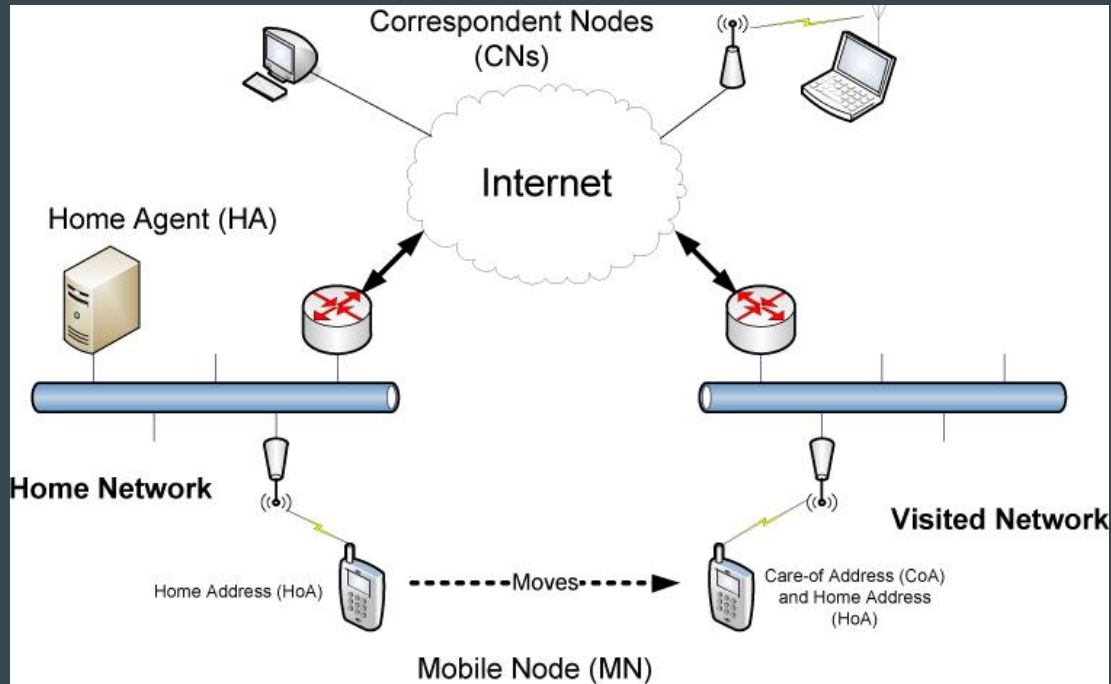
*“...no additional constraints on the assignment of IP addresses. That is, a mobile node can be assigned an IP address by the organization that owns the machine.”*

*“...mobile nodes will generally not change their point of attachment to the Internet more frequently than once per second.”*

*“...IP unicast datagrams are routed based on the Destination Address in the datagram header (and not, for example, by source address).”*

# Applicability

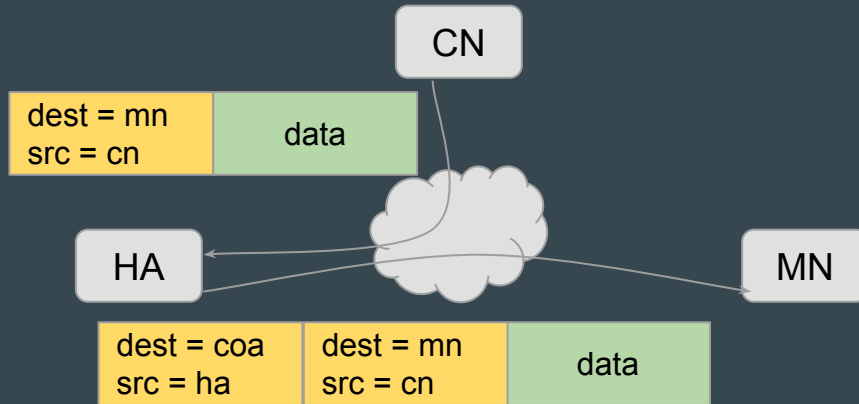
- “Macro” vs. “micro” mobility
  - Distinction: does host retain IP address or not?



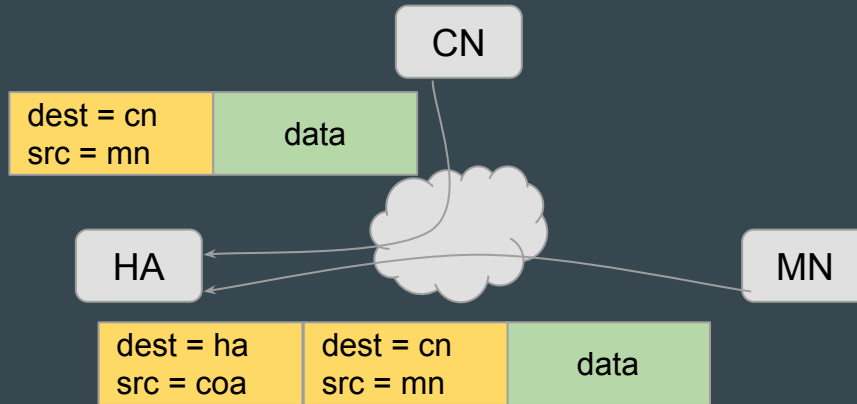
# How it works

- Mobile node acquires a “Care-Of Address,” (CoA)
- Mobile node sends a “binding update” to Home Agent (HA)
- HA forwards messages between mobile node and Correspondent Nodes (CNs) using *tunneling*
  - An implementation of tunneling: *encapsulation*

# CN → MN



# MN → CN





# Variants

- *A foreign agent* may be tunnel-termination point at visited network
- *Route optimization:*
  - MN informs CN of move
  - CN sends packets directly to CoA
  - Need a kind of “hand off” from HA

# Question - how would HA work?

How does HA become a proxy for the MN in the home network?

- How does it get IP packets destined for MN to be forwarded to it?

# Host choices with regards IP datagrams

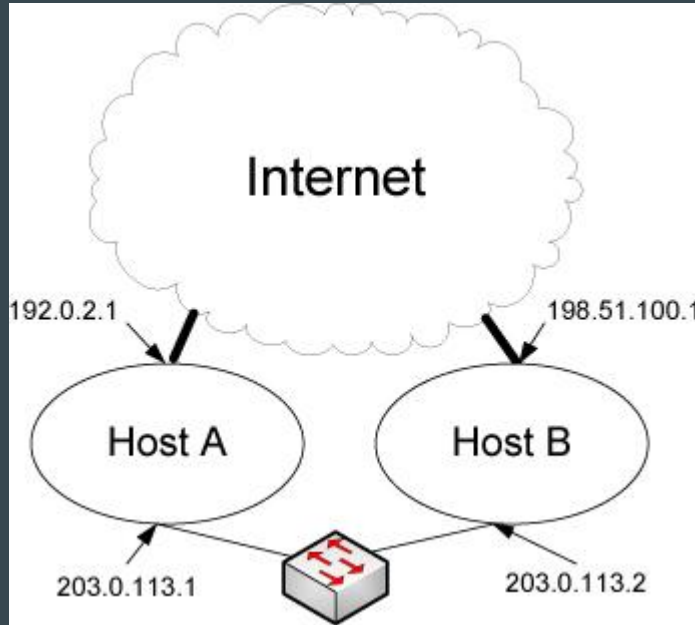
If a host is multi-homed:

- Issue 1: if packet is received on interface  $i$ , what destination addresses are considered valid for acceptance?
- Issue 2: which interface should it use to send out a particular IP packet?

# Issue 1

- *Strong host*: accept only IP packets whose destination address corresponds to interface.
- *Weak host*: accept IP packets whose destination address corresponds to any interface.

Why is this a big deal?



- If Host A is a strong host, Host B cannot send packets destined for 192.0.2.1 via local network.
- If Host B is weak host, attacker from Internet may spoof packet and make it appear as though it originated in local network.

# Issue 2: address selection

- Particularly an issue with “dual-stack” hosts
  - Host runs both IPv4 and IPv6 on same interface
- Multiple addresses configured on same interface

# Issues 2, contd.

Follow a bunch of rules to choose from amongst possibilities.

Similar rules for selection of destination and source address.

Intent of rules: establish a partial-order of possibilities.

# Issues 2, contd., some rules for source address selection

We want to send a packet to  $D$ .  $A$  and  $B$  are my interface addresses. Let  $S$  be source address we choose for the packet.

- Prefer same address.  $D = A \Rightarrow S = A$
- Prefer same *scope*. E.g.,  $D = \text{link-local address} \Rightarrow S = \text{link-local address}$
- Use longest matching prefix:  $CPL(D, A) > CPL(A, B) \Rightarrow S = A$ 
  - $CPL$ : “Common Prefix Length” - # bits that are the same, starting at left.
- Prefer outgoing interface:
  - if interface  $i$  chosen for packet to be sent out, and choose as  $S$  an IP address that is configured on  $i$ .