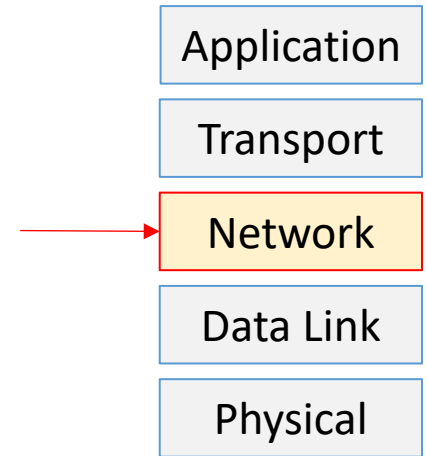


Lecture 20:

Mobile IP

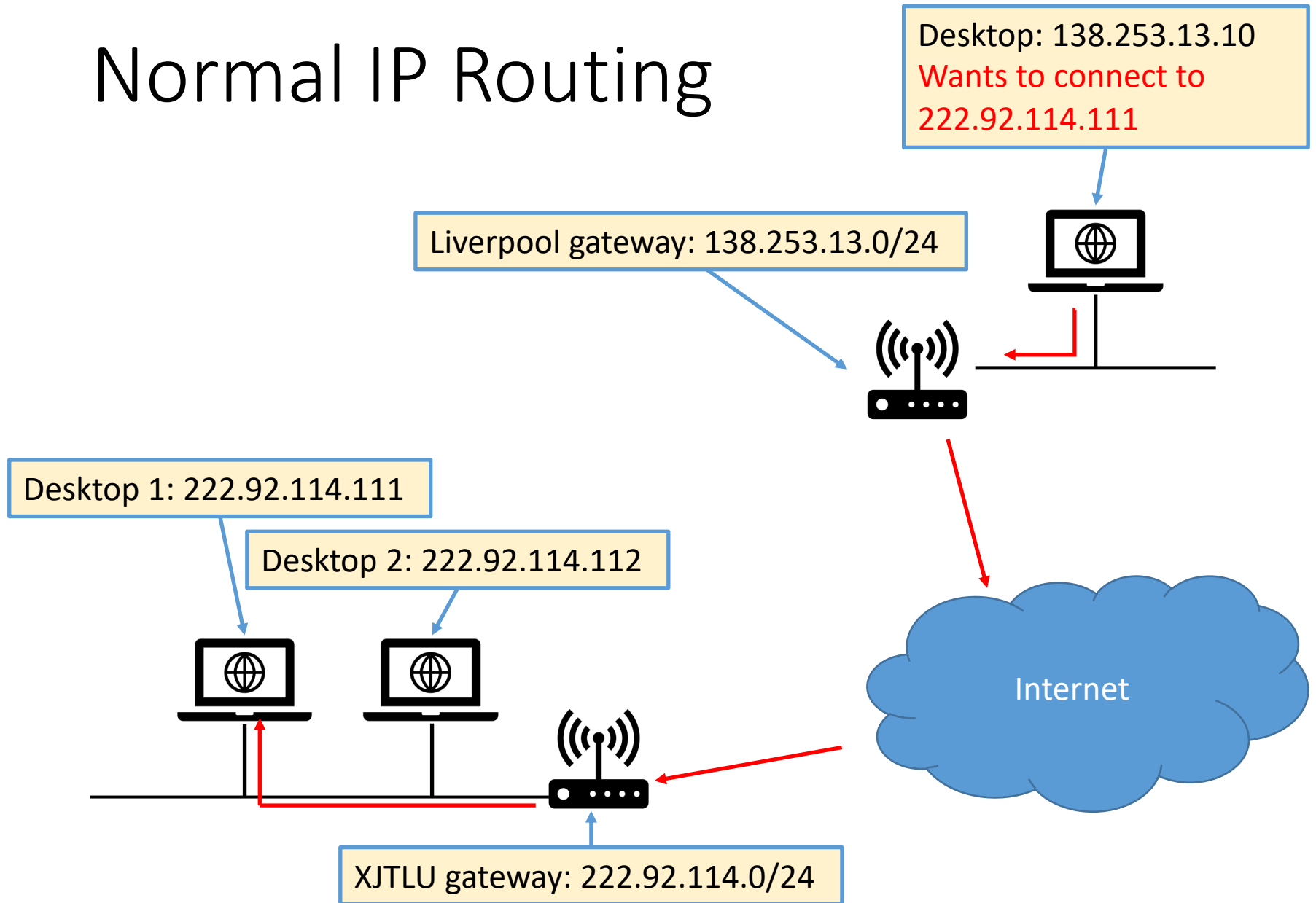
Jianjun Chen (Jianjun.Chen@xjtlu.edu.cn)

Mobile IP



- The internet started at a time when no one had thought of mobile computers.
 - When you move from one network to another, your IP also changes.
 - How is then possible for another computer to find you without knowing this new address?
- Mobile IP is important if your computer is a “service provider” rather than a “service consumer” and need to move from one network to another frequently.
 - E.g. Emergency communication with permanent and quick reachability via the same IP address.
 - Not useful if you are carrying your laptop around to just watch videos.

Normal IP Routing



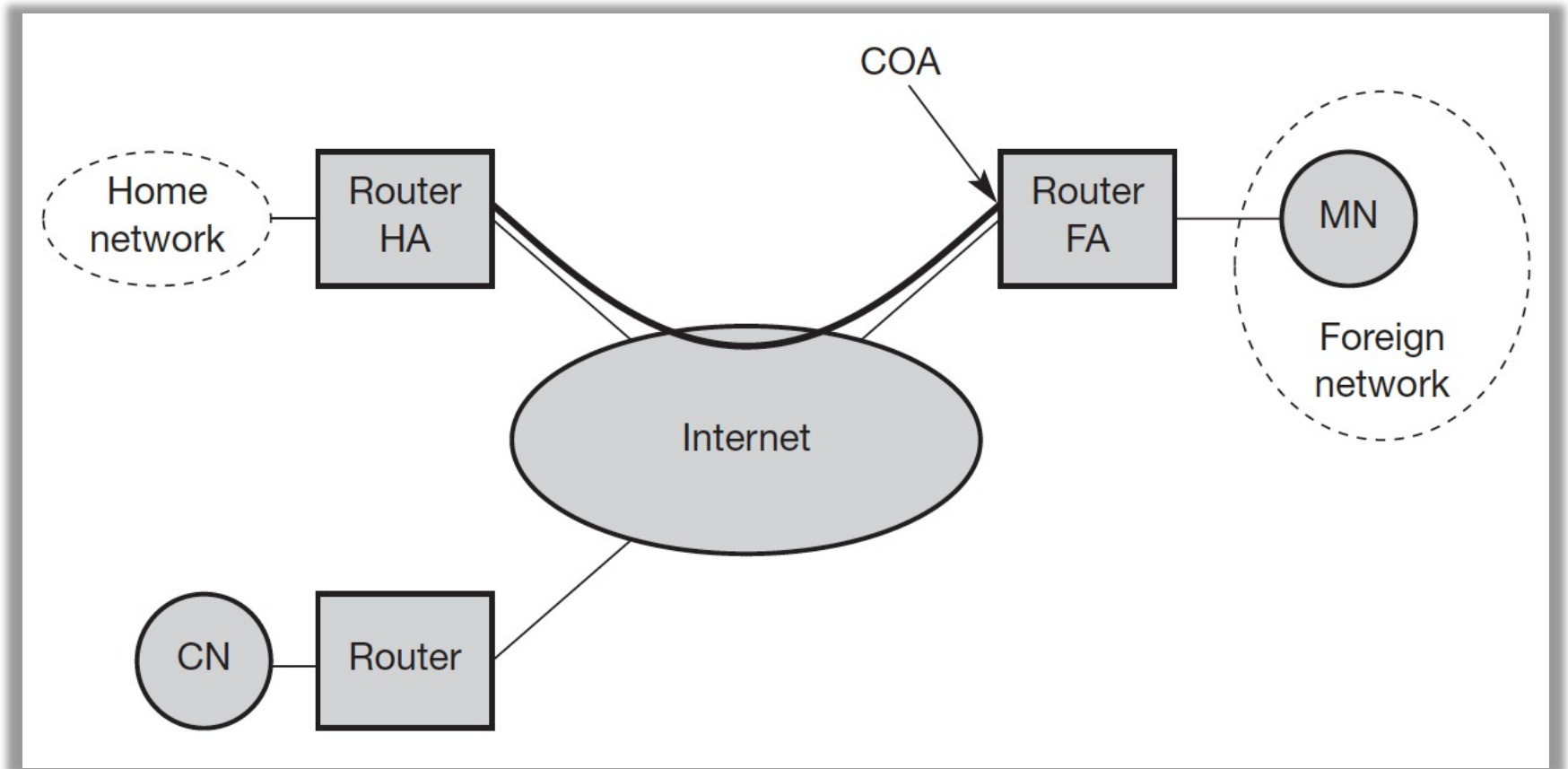
Issues with Normal IP Routing

- Desktop 1 will not receive a single packet as soon as it leaves its home network.
- Workaround 1: How about using dynamic DNS?
 - DNS info needs some time to update(propagate).
 - Changing IP address while still having a TCP connection open means breaking the connection.
- Workaround 2: Creating specific routes in routers?
 - Routers are built for fast forwarding, not for fast updates of routing tables.

Mobile IP

- **Goal:** “have a dynamic IP address and still want to be permanently reachable using the same logical computer name”
- The core idea of Mobile IP is **tunnelling**.
- The specification for Mobile IP is defined in RFC 3344 “IP Mobility Support for IPv4”
 - <https://tools.ietf.org/html/rfc3344>

Mobile IP: Example



Mobile IP: Terminologies

- Mobile node (MN)
 - An end-system or router that can change its point of attachment to the internet using mobile IP.
- Correspondent node (CN)
 - Another node that communicates with the MN.
- Home network (HN)
 - The network where MN belongs to.
- Foreign network (FN)
 - The network which MN is currently visiting.

Mobile IP: Terminologies

- Care-of address (COA)
 - defines the current location of the MN from an IP point of view. All IP packets sent to the MN are delivered to the COA, not directly to the IP address of the MN.
 - Think of it as a “delegate IP”.
- Home agent (HA)
 - The HA provides several services for the MN and is located in the home network. The tunnel for packets toward the MN starts at the HA.
- Foreign agent (FA)
 - Like HA, it acts as tunnel endpoint and forward packets to the MN.

Agent Discovery Methods

- How does the MN discover that it has moved?
- Mobile IP describes two methods (RFC 1256):
 - Agent advertisement
 - Agent solicitation
- Agent advertisement:
 - foreign agents and home agents **advertise their presence** periodically using special agent advertisement messages.

Agent Discovery Methods

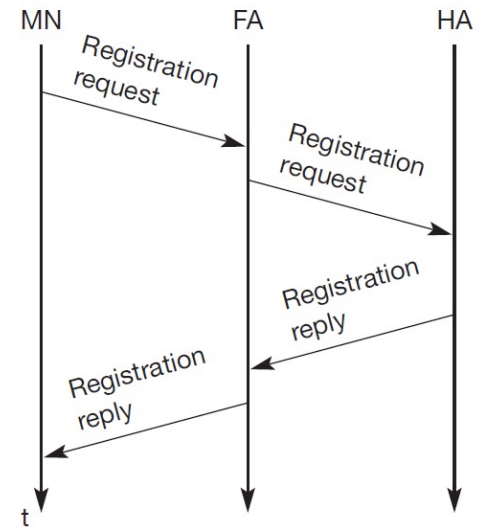
- Agent solicitation:
 - If no agent advertisements are present or the inter-arrival time is too high, the MN will actively sending packets to find agents.
- After using either of these two methods, the MN will get a care-of-address (COA).
 - The FA in FN will receive IP packets and forward to MN.
 - It is needed because the MN might have a LAN address instead of WAN address.
 - If MN gets a WAN address, the COA will just be this WAN address. (also called co-located COA)

Registration of COA

- Now MN has a COA in FN, it is time to inform (register) this new COA with the home agent.
- There are two situations possible:
 - If the COA is at the FA. We need to form a tunnel from HA to FA.
 - If the MN gets a WAN address. We need to form a tunnel from HA directly to MN.

If COA is the FA

- The process is shown on the left:

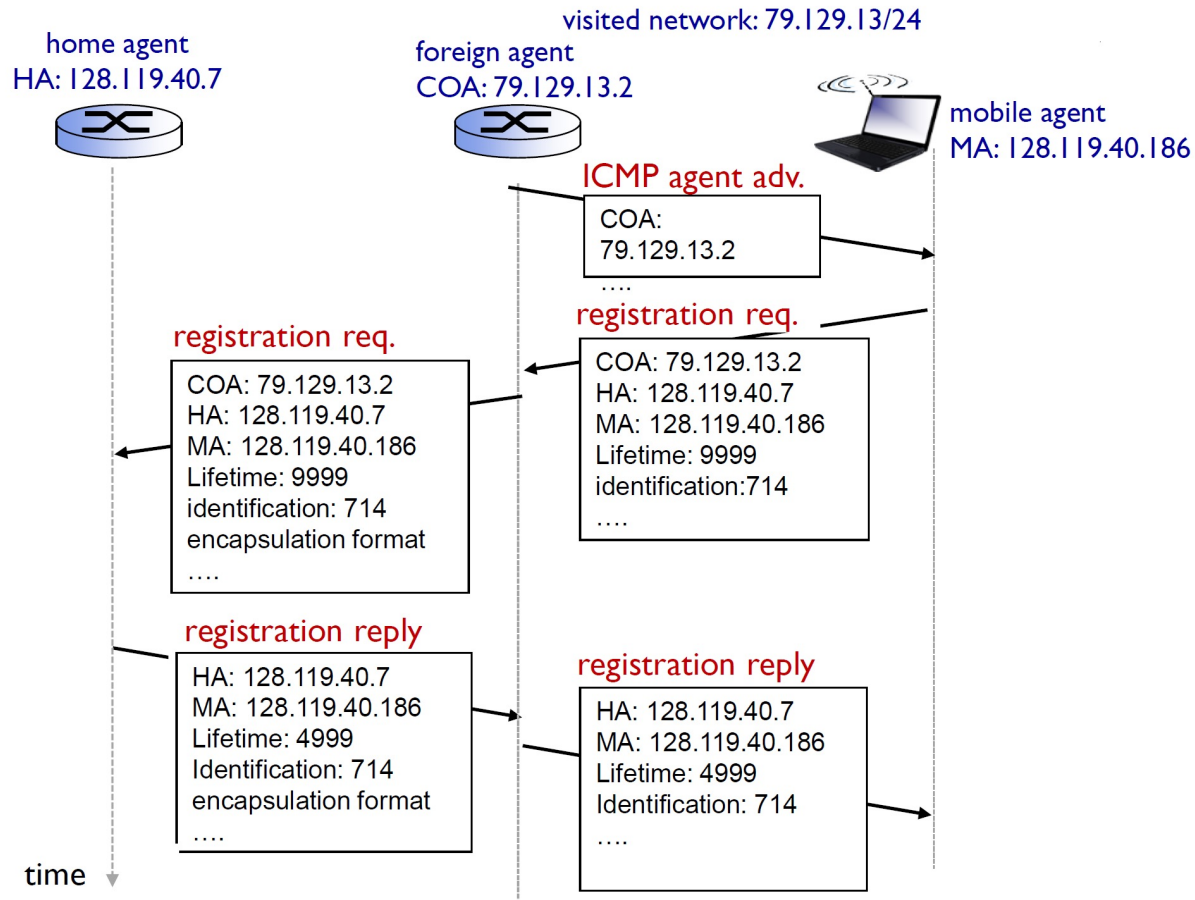


- UDP packets are used for registration requests

0	7	8	15					16	23	24	31
type 1		S	B	D	M	G	r	T	x	lifetime	
home address											
home agent											
COA											
identification											
extensions ...											

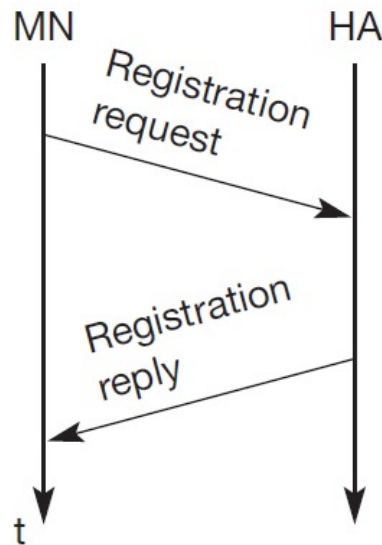
Need to reregister this binding before it expires

If COA is the FA



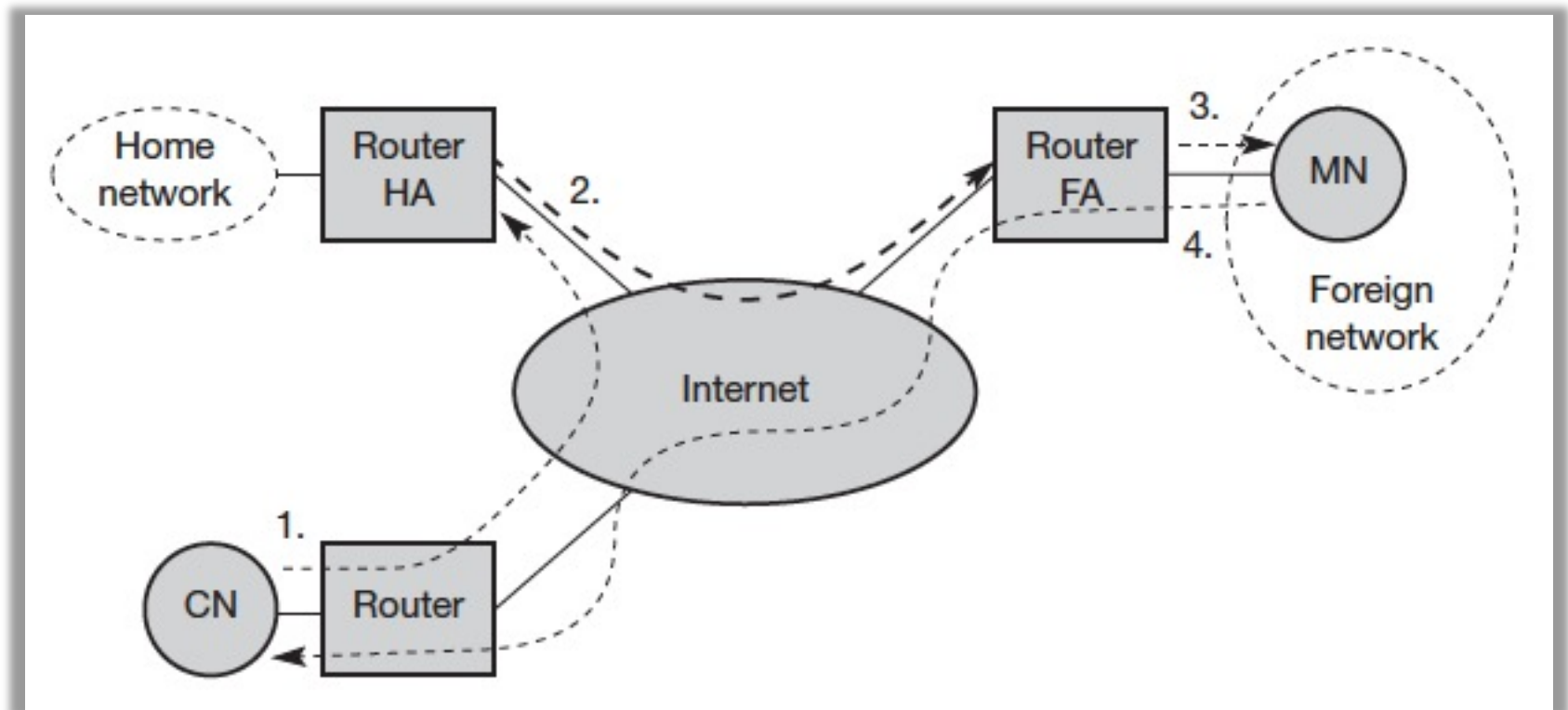
If the MN Gets a WAN Address

- If the COA is co-located, registration can be simpler.
- MN then becomes the endpoint of the tunnel itself.
- Packets sent to HA will be forwarded directly to MN.



Mobile IP: IP Packet Delivery

1. CN sends an IP packet to the MN.
2. HA intercepts the packet, knowing that MN is currently not in its home network. A new header is put in front of the old IP header showing the COA as new destination and HA as source of the encapsulated packet.
3. The foreign agent decapsulates the packet, removes the additional header. Then forwards the original packet to MN.
4. MN replies the CN. Packet goes to FA and then forwarded directly to CN.



From the view of correspondent nodes, the IP address of MN is always the IP address of HA.

CSE 311: Review

Review

- No Android coding.
- Only mobile network, content awareness and UI design.
- No “what is” questions for mobile network.
- Only “How to” questions.