

CS 372 Lecture #40

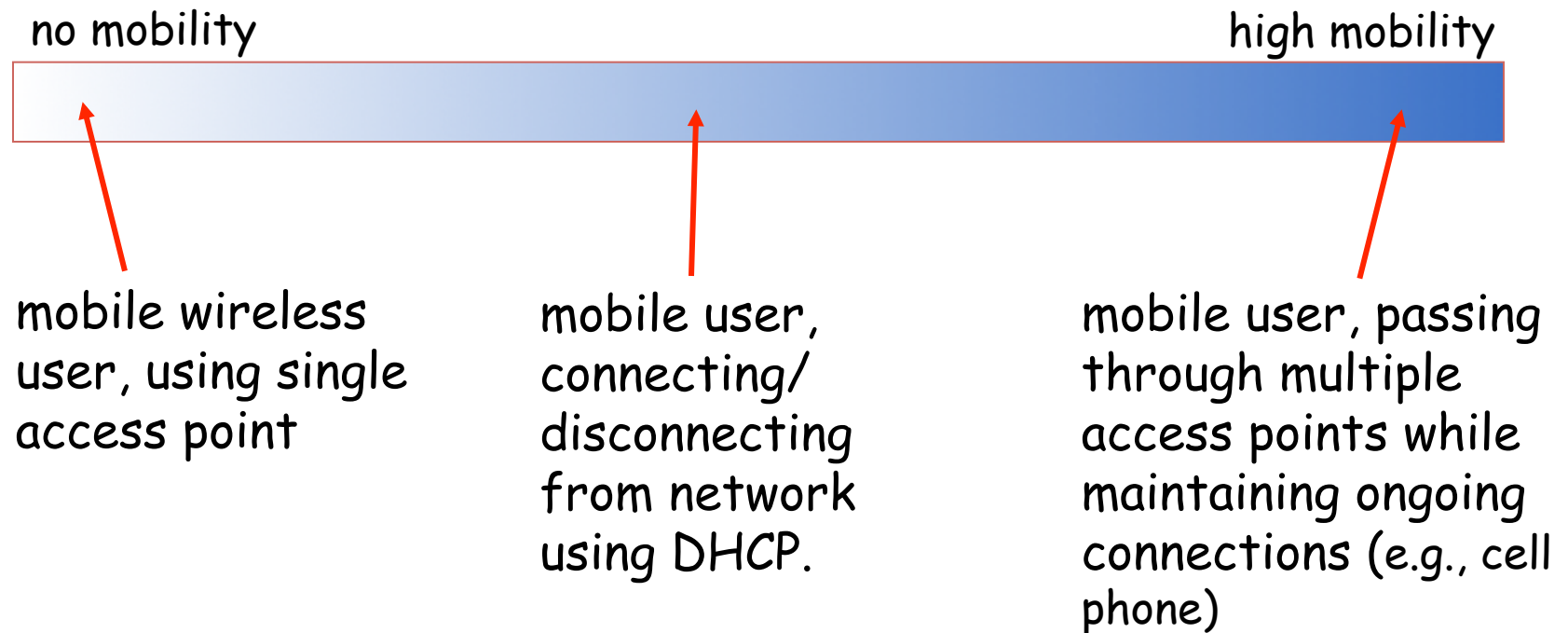
Mobility

- definitions
- configurations
- issues

Note: Many of the lecture slides are based on presentations that accompany *Computer Networking: A Top Down Approach*, 6th edition, by Jim Kurose & Keith Ross, Addison-Wesley, 2013.

What is mobility?

- spectrum of mobility, from the network perspective:

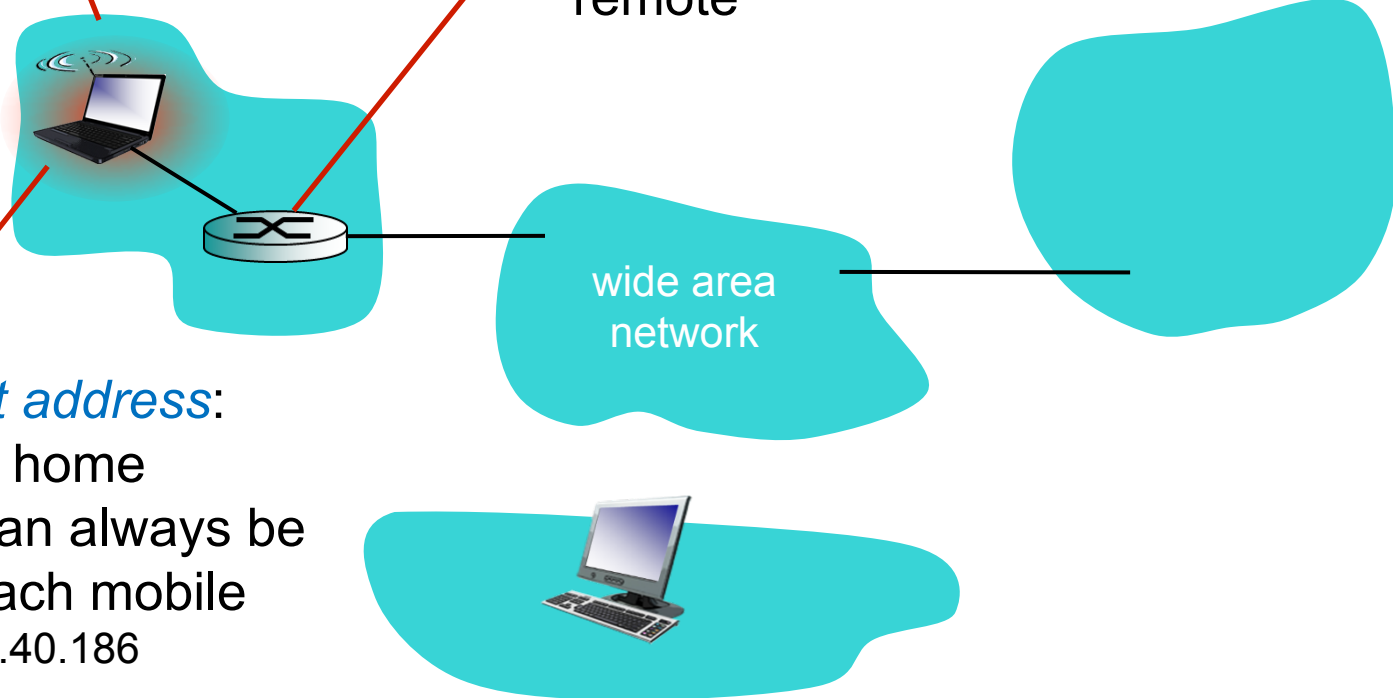


Mobility vocabulary

home network: permanent
“home” of mobile
(e.g., 128.119.40/24)

home agent: entity that will
perform mobility functions on
behalf of mobile, when mobile is
remote

permanent address:
address in home
network, can always be
used to reach mobile
e.g., 128.119.40.186



More mobility vocabulary

permanent address: remains constant (e.g., 128.119.40.186)

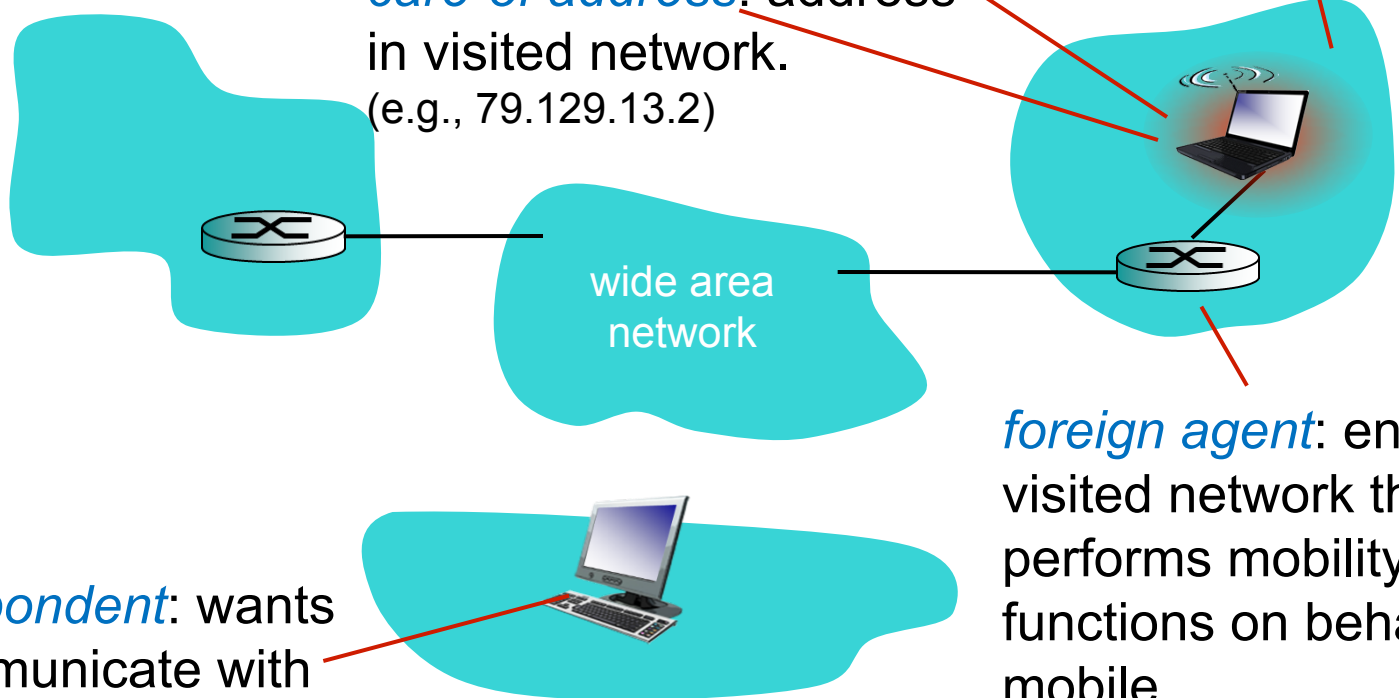
visited network: network in which mobile currently resides (e.g., 79.129.13/24)

care-of address: address in visited network. (e.g., 79.129.13.2)

wide area network

foreign agent: entity in visited network that performs mobility functions on behalf of mobile.

correspondent: wants to communicate with mobile



Mobility: two approaches

- Let routing handle it:
 - routers advertise permanent address of mobile-nodes-in-residence via usual routing table exchange
 - routing tables indicate where each mobile device is located
 - no changes to end systems
- Let end-systems handle it:
 - *indirect routing*
 - communication from correspondent to mobile goes through home agent
 - then forwarded to remote
 - *direct routing*
 - correspondent gets foreign address of mobile
 - then sends directly to mobile

Indirect routing (simplified)

- mobile uses two addresses:
 - *permanent address*: used by correspondent
 - mobile location is transparent to correspondent
 - *care-of address*: used by home agent to forward datagrams to mobile
- *triangle routing*: correspondent-home-network-mobile
 - inefficient when correspondent and mobile are in same network
- if mobile user moves to another network
 - user's **mobile** registers with **new foreign agent**
 - **new foreign agent** registers with **user's home agent**
 - **user's home agent** updates **care-of address** for mobile
 - correspondent's packets continue to be forwarded to mobile
 - ... but with **new care-of address**

Direct routing (simplified)

- mobile uses one + one addresses:
 - *permanent address*: used by correspondent to get care-of address
 - mobile location is not transparent to correspondent
 - *care-of address*: used by correspondent directly
 - overcomes triangle routing problem
- if mobile user moves to another network
 - new foreign agent gets user's home agent from former foreign agent
 - new foreign agent assigns new care-of address for mobile
 - new foreign agent notifies correspondent and user's home agent of new care-of address for mobile
 - user's home agent updates care-of address for mobile
 - correspondent continues direct communication with mobile
 - ... but with new care-of address

Wireless/mobility: impact on higher layer protocols

- Logically, impact should be minimal ...
 - best effort service model remains unchanged
 - TCP and UDP currently run on wireless/mobile
- ... but performance-wise:
 - packet loss/delay due to bit-errors and handoff
 - discarded packets, delays for link-layer retransmissions
 - TCP interprets loss as congestion
 - will decrease congestion window unnecessarily
 - longer delay
 - RTS/CTS and collisions
 - care-of addressing/forwarding
 - limited bandwidth of wireless links
- Many unsolved problems
 - Research areas !

- Mobility
 - spectrum
 - definitions
 - home/foreign agents
 - permanent/care-of addresses
 - correspondent
 - direct/indirect routing
 - performance problems