# Wireless and TCP: Performance Issues

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Example #1

- Wireless TCP Performance Problems

Low capacity, high error rate

Wired Internet

Wireless Access

High capacity, low error rate

Hard to distinguish losses here from losses here

Example #1 (Cont'd)
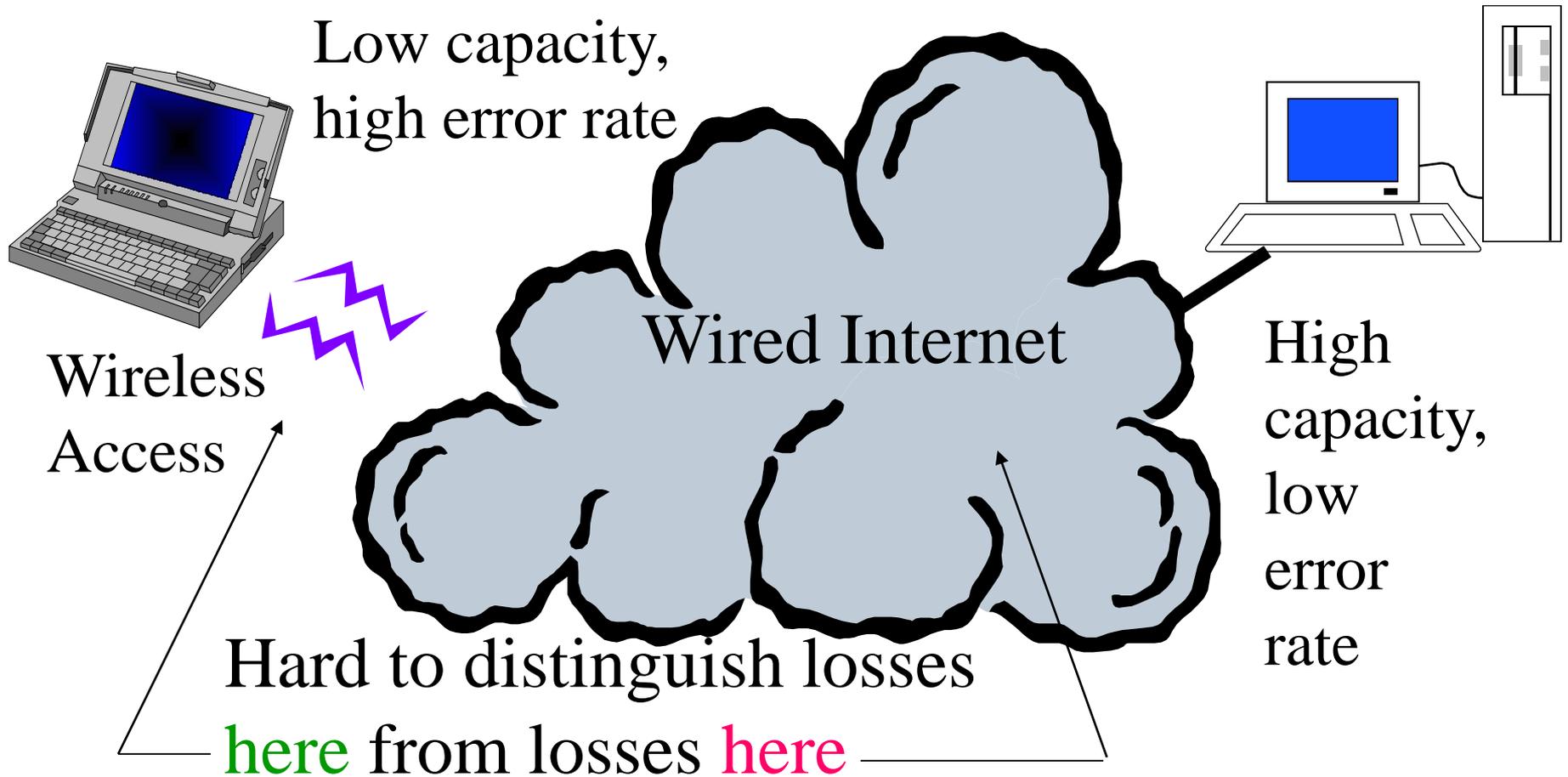
- Solution: "wireless-aware TCP" (I-TCP, ProxyTCP, Snoop-TCP, split connections…)

Example #2
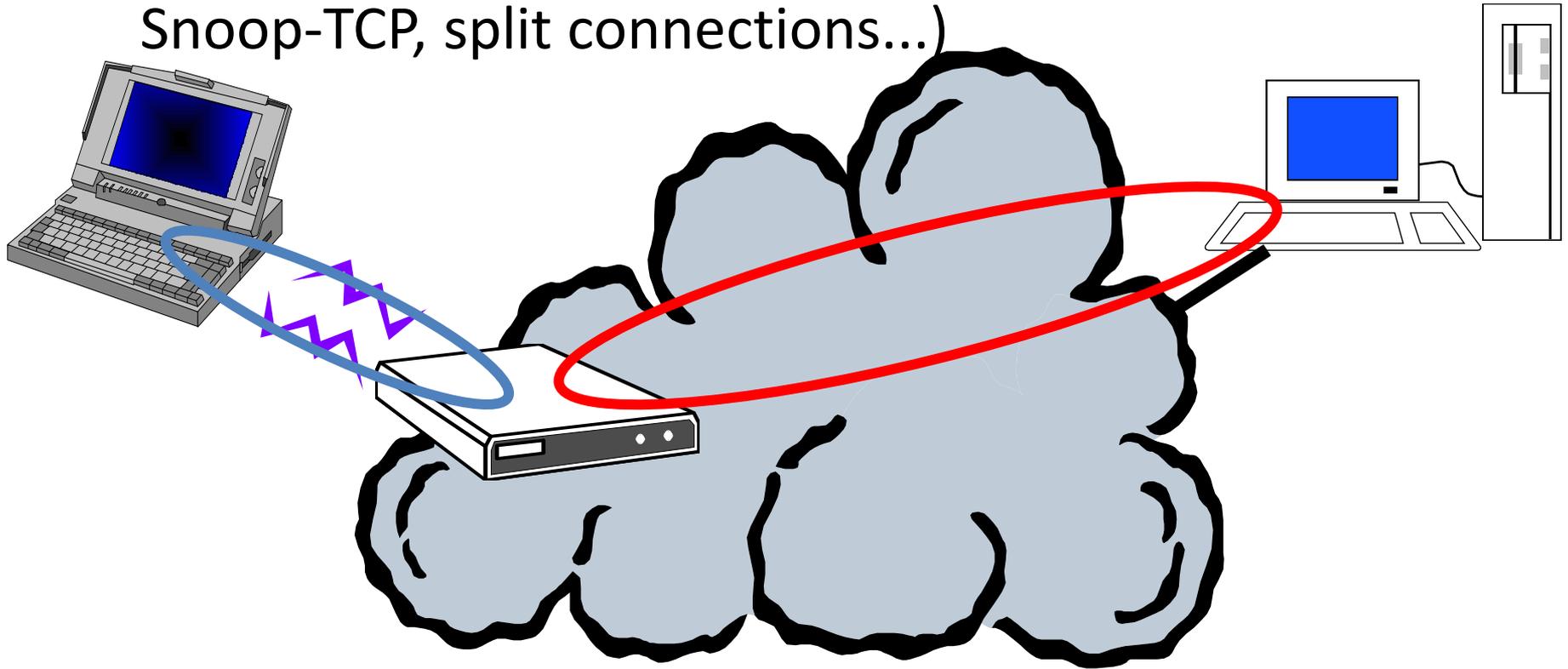
- Wireless TCP Fairness Problems
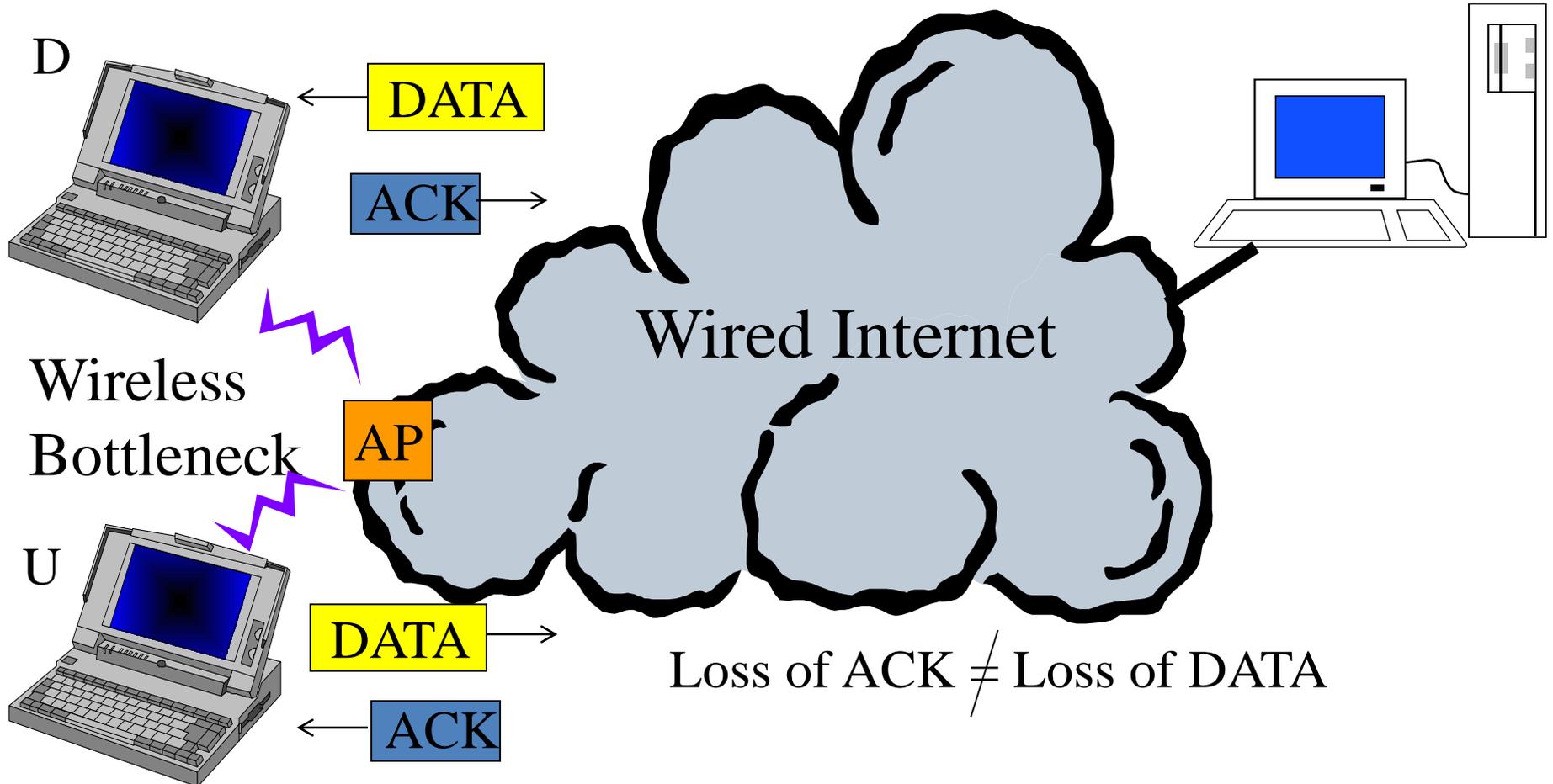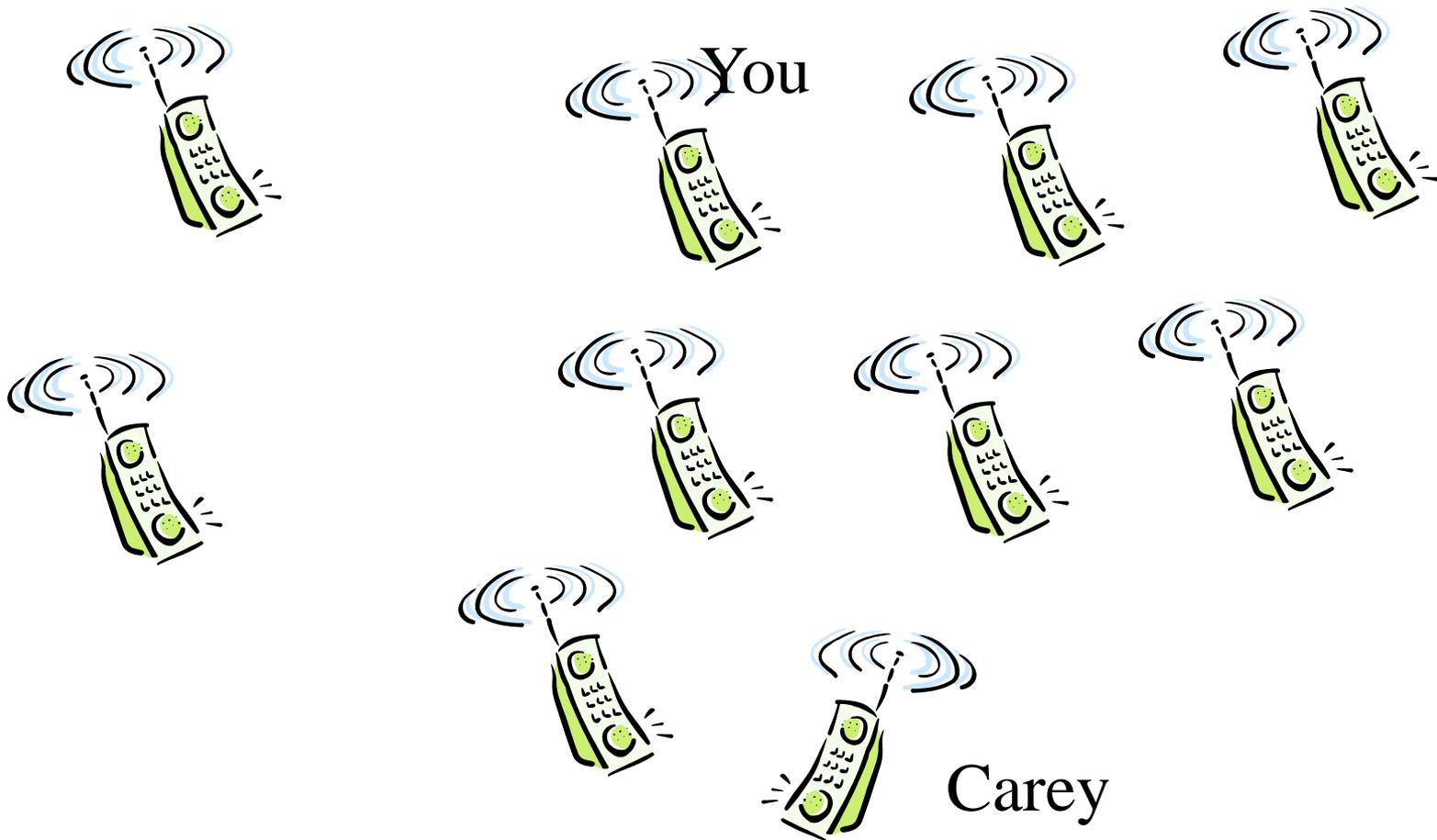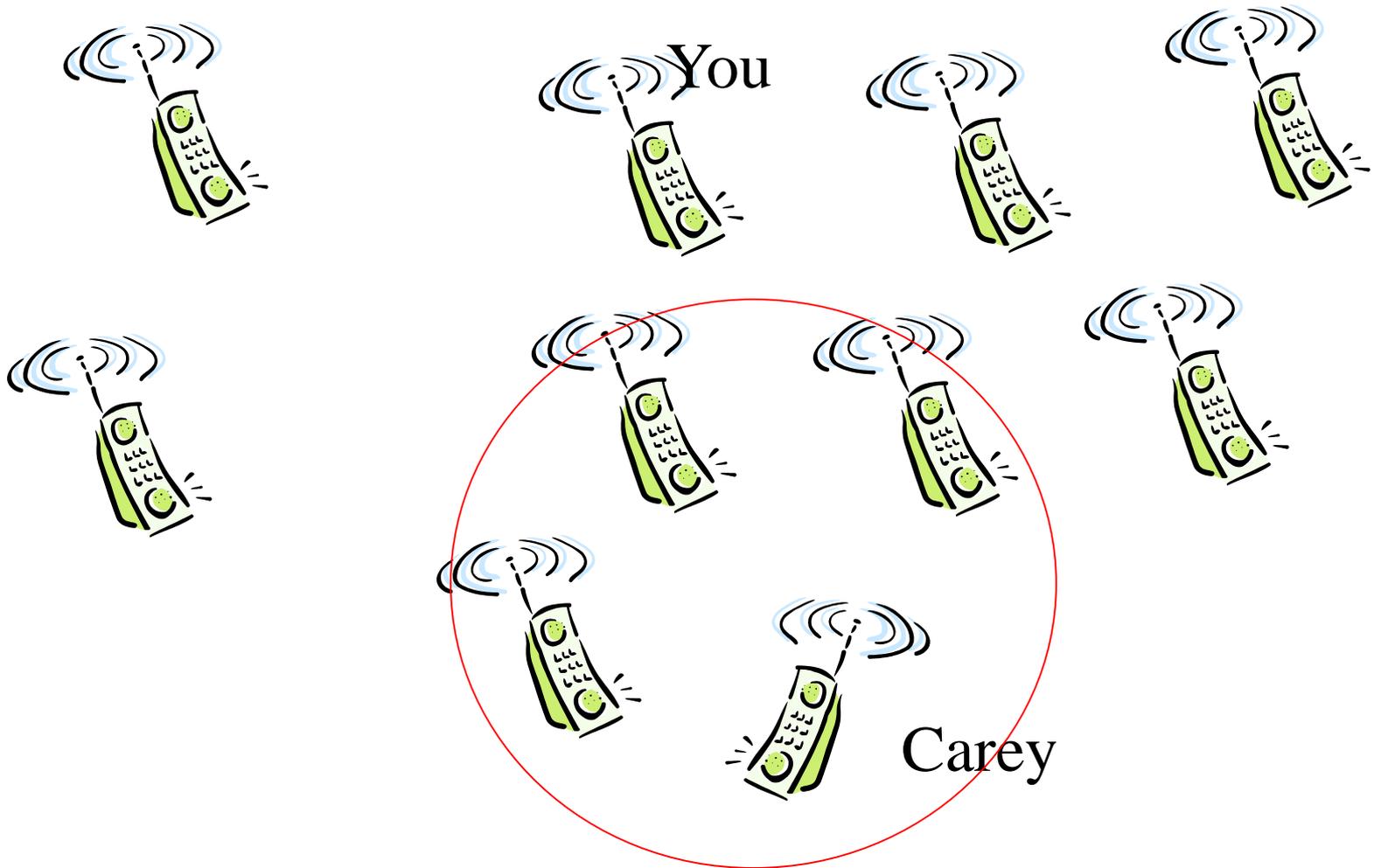
Example #3

- Multi-hop "ad hoc" networking

You

Carey

Example #3 (Cont'd)

- Multi-hop "ad hoc" networking

You

Carey

Example #3 (Cont'd)

- Multi-hop "ad hoc" networking

You

Carey

Example #3 (Cont'd)

- Multi-hop "ad hoc" networking

Example #3 (Cont'd)

- Multi-hop "ad hoc" networking

Example #3 (Cont'd)

- Multi-hop "ad hoc" networking

Example #3 (Cont'd)

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Example #3 (Cont'd)

- Multi-hop "ad hoc" networking

You

Carey

Example #3 (Cont'd)

- Multi-hop "ad hoc" networking

You

Carey

Example #3 (Cont'd)

- Multi-hop "ad hoc" networking

Example #3 (Cont'd)
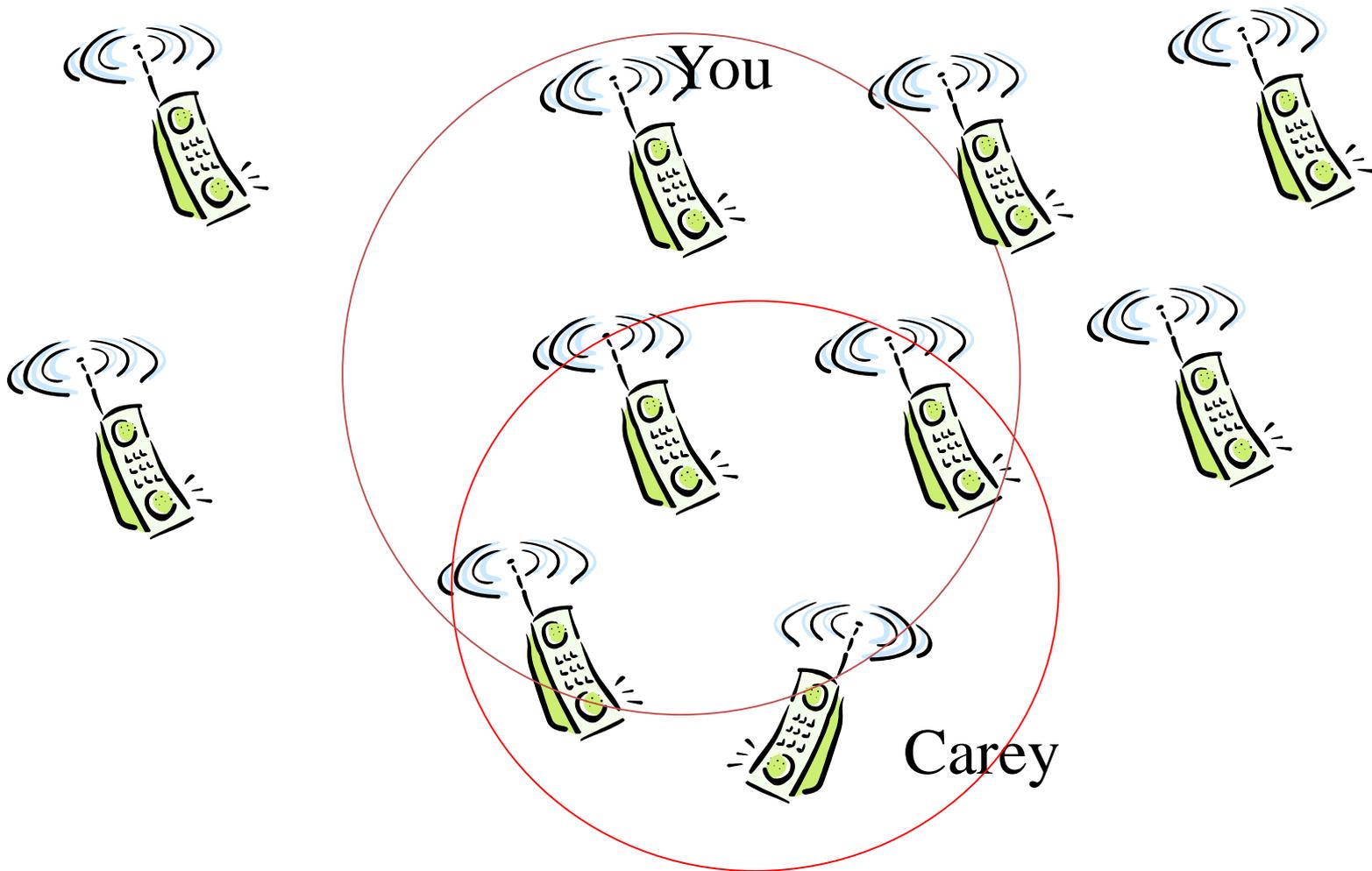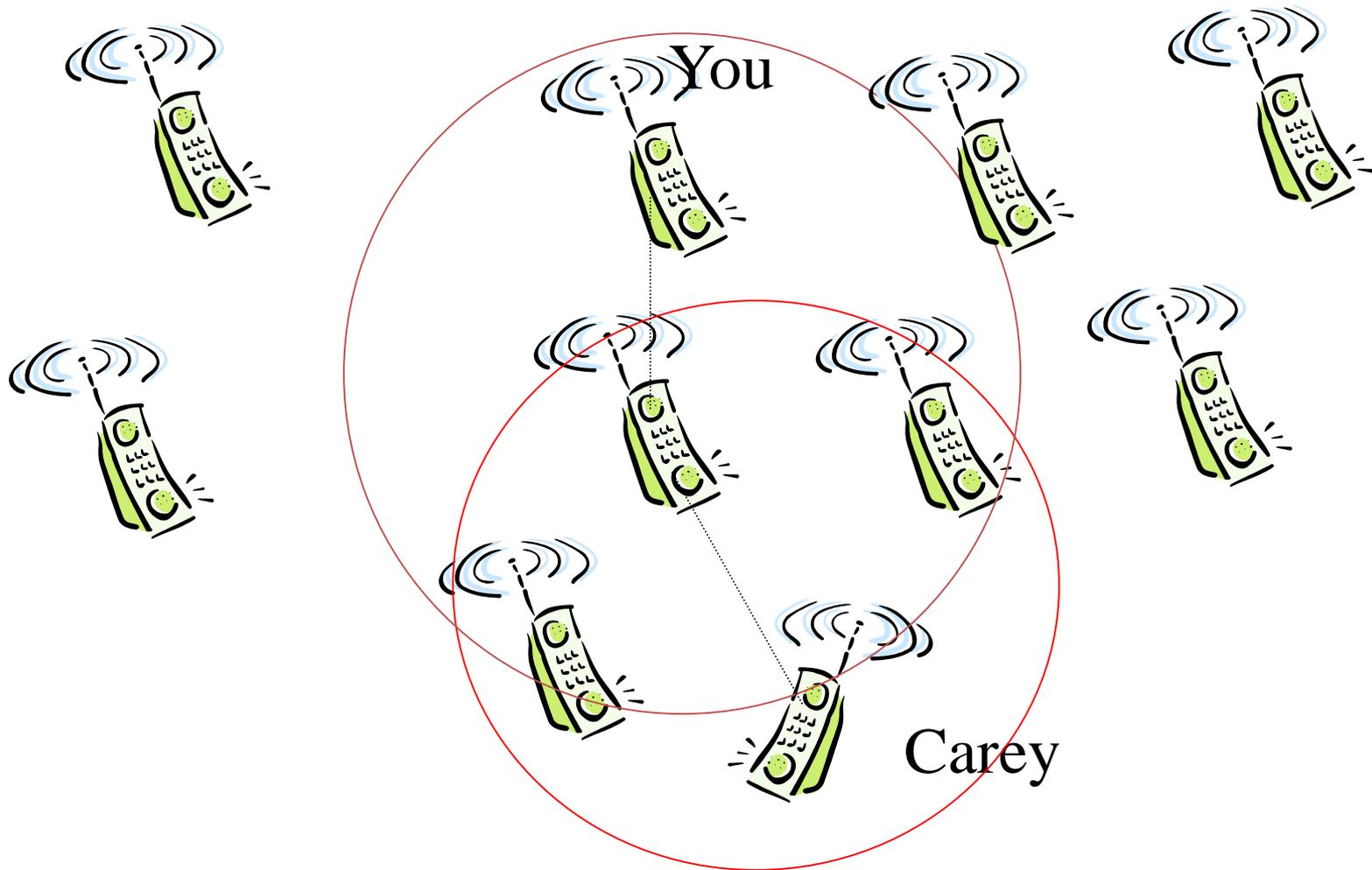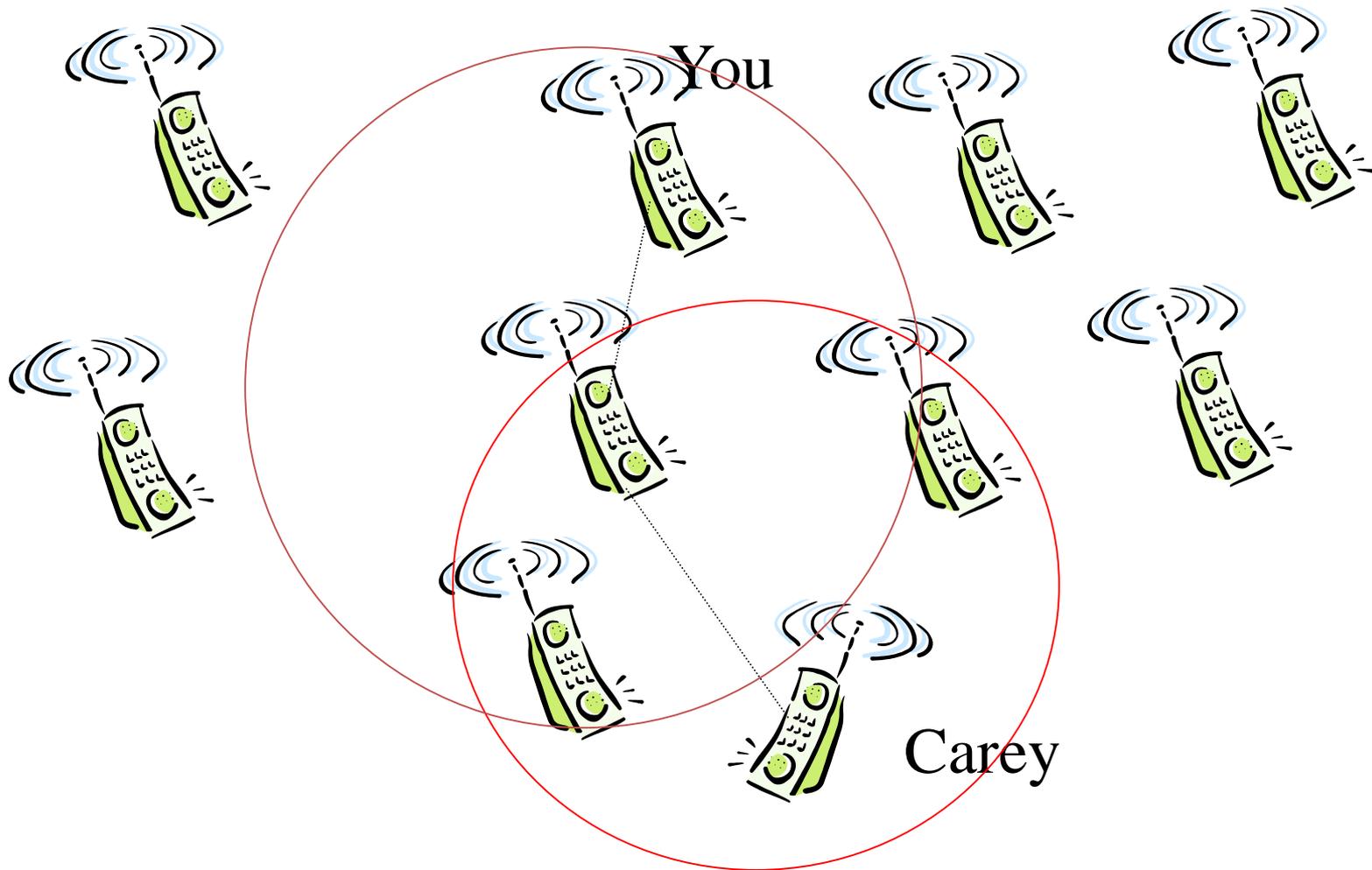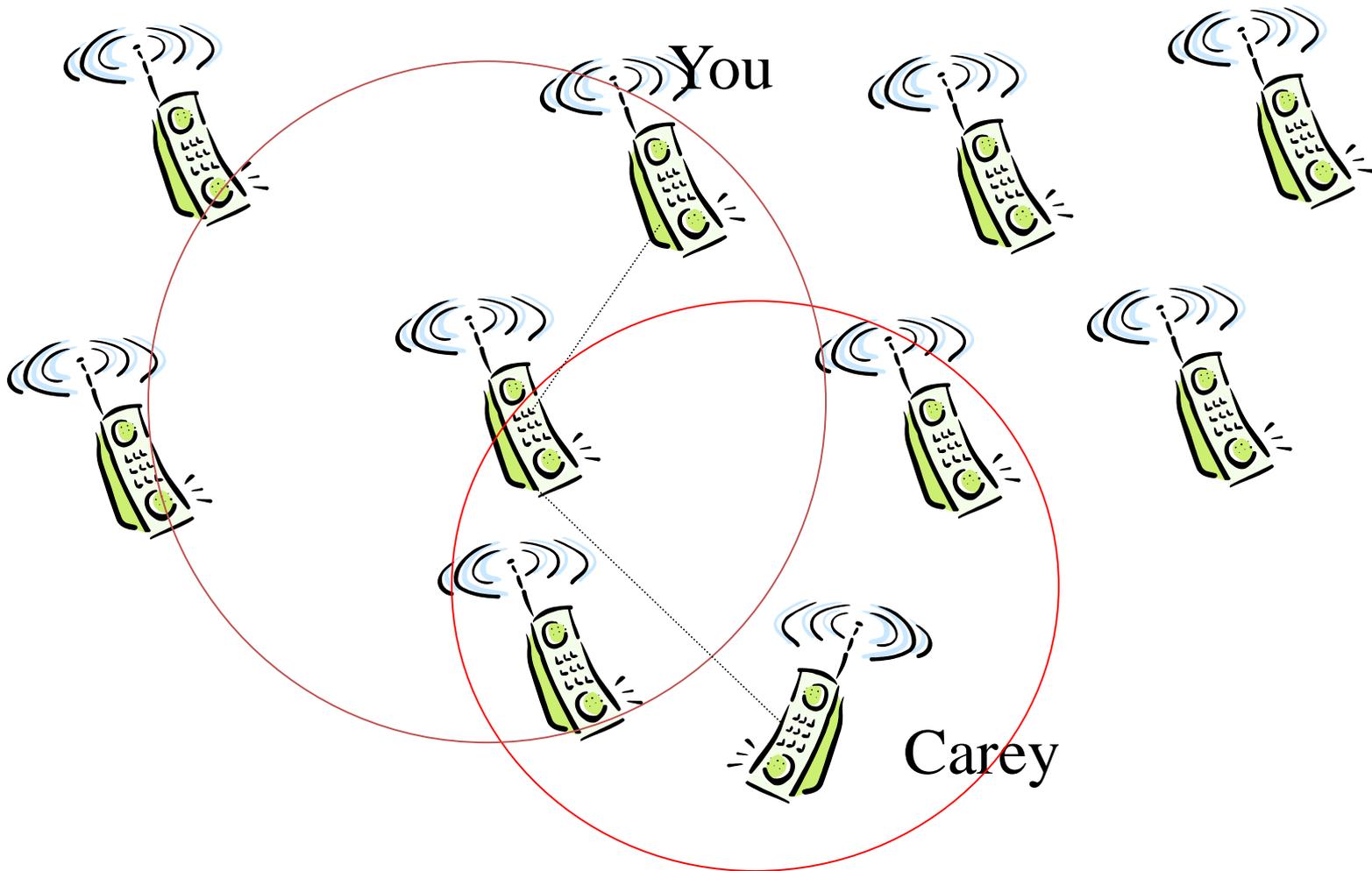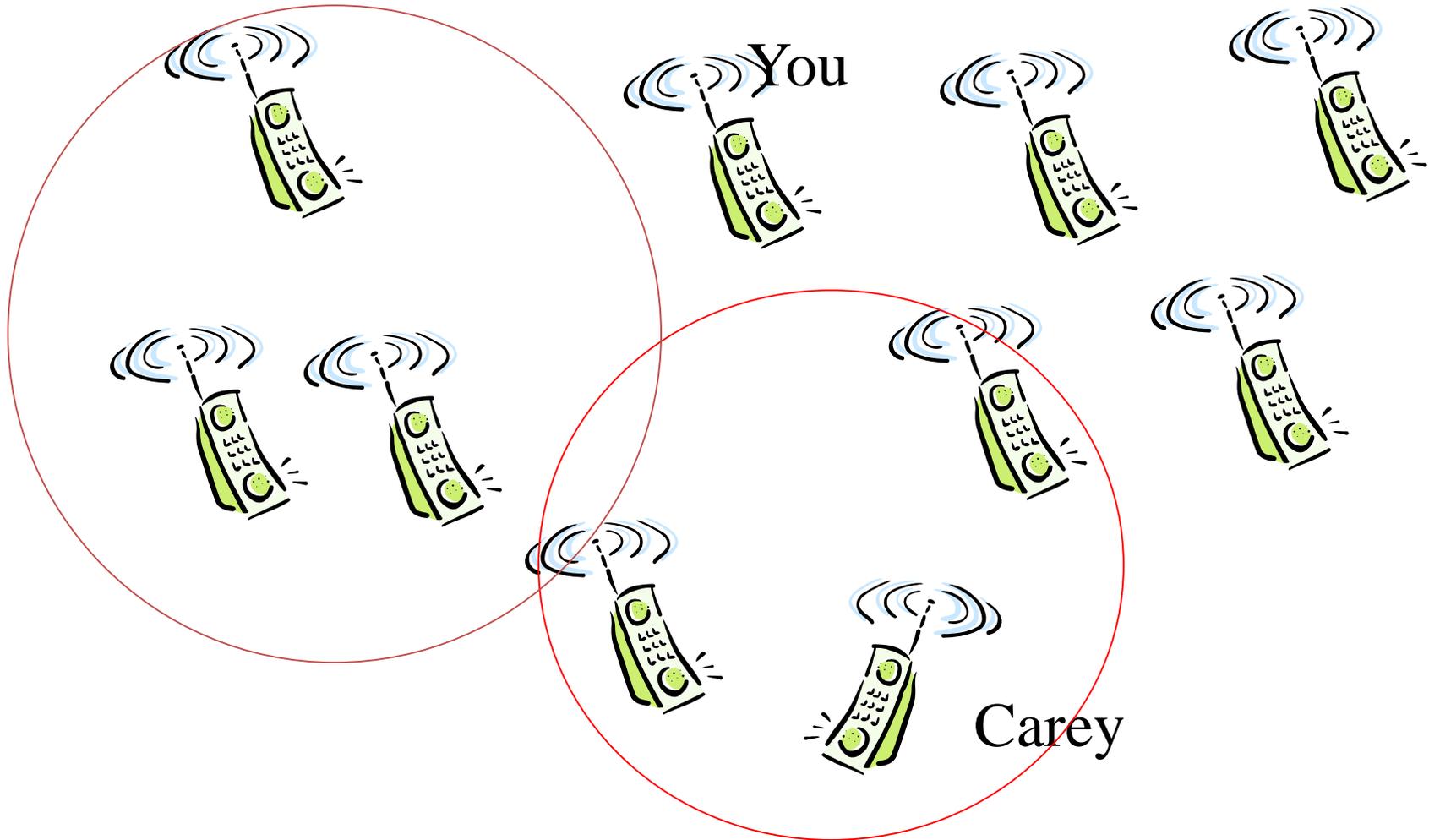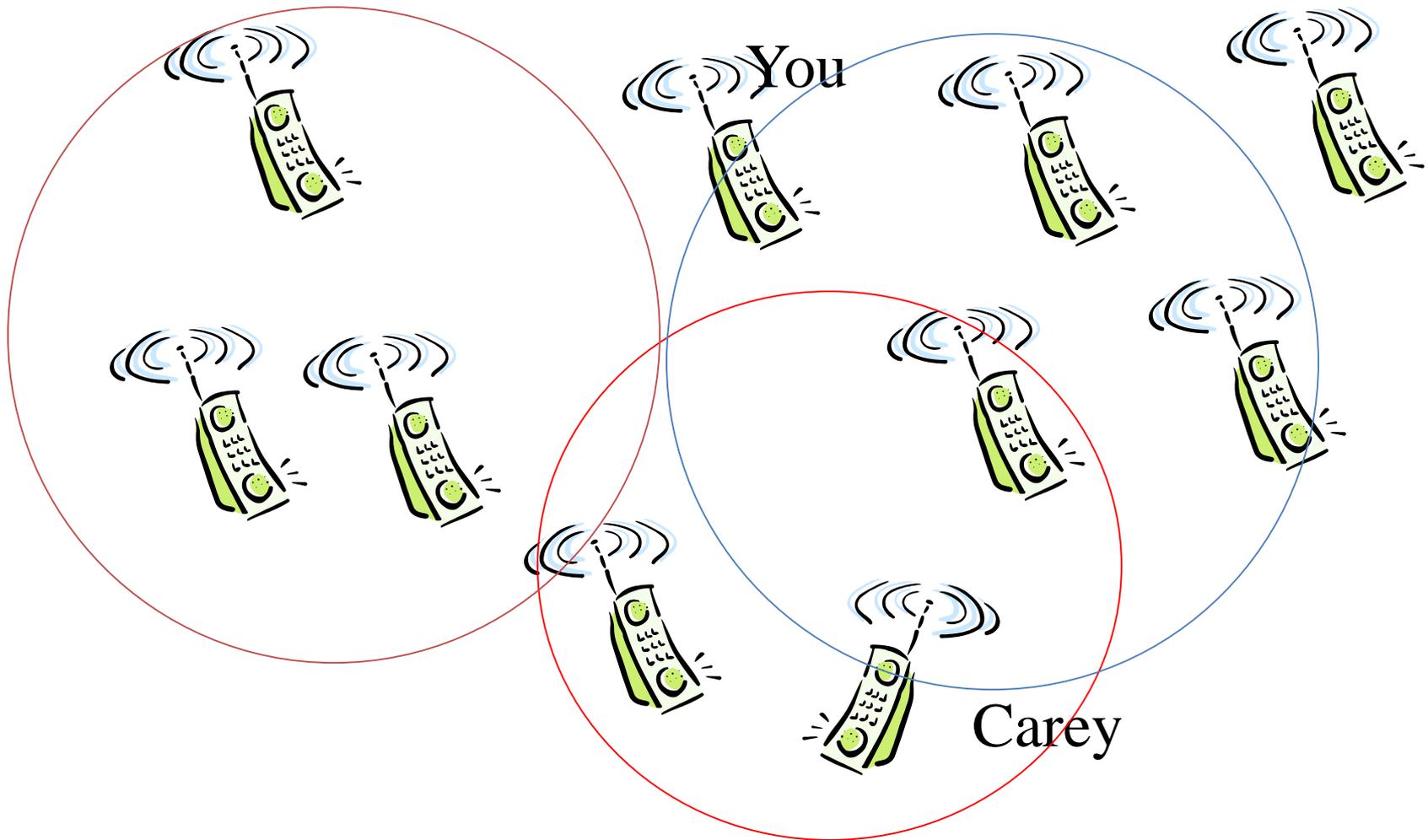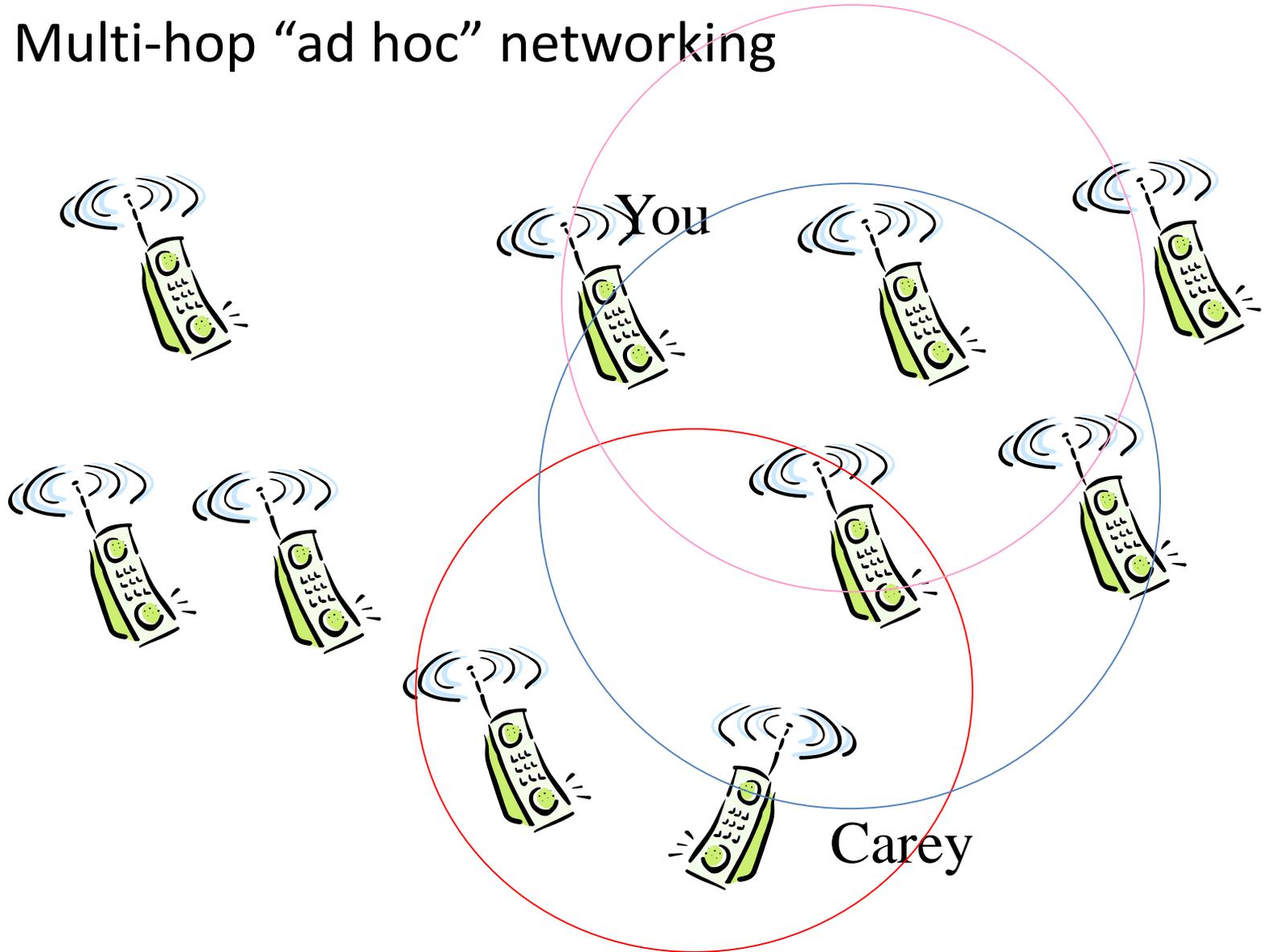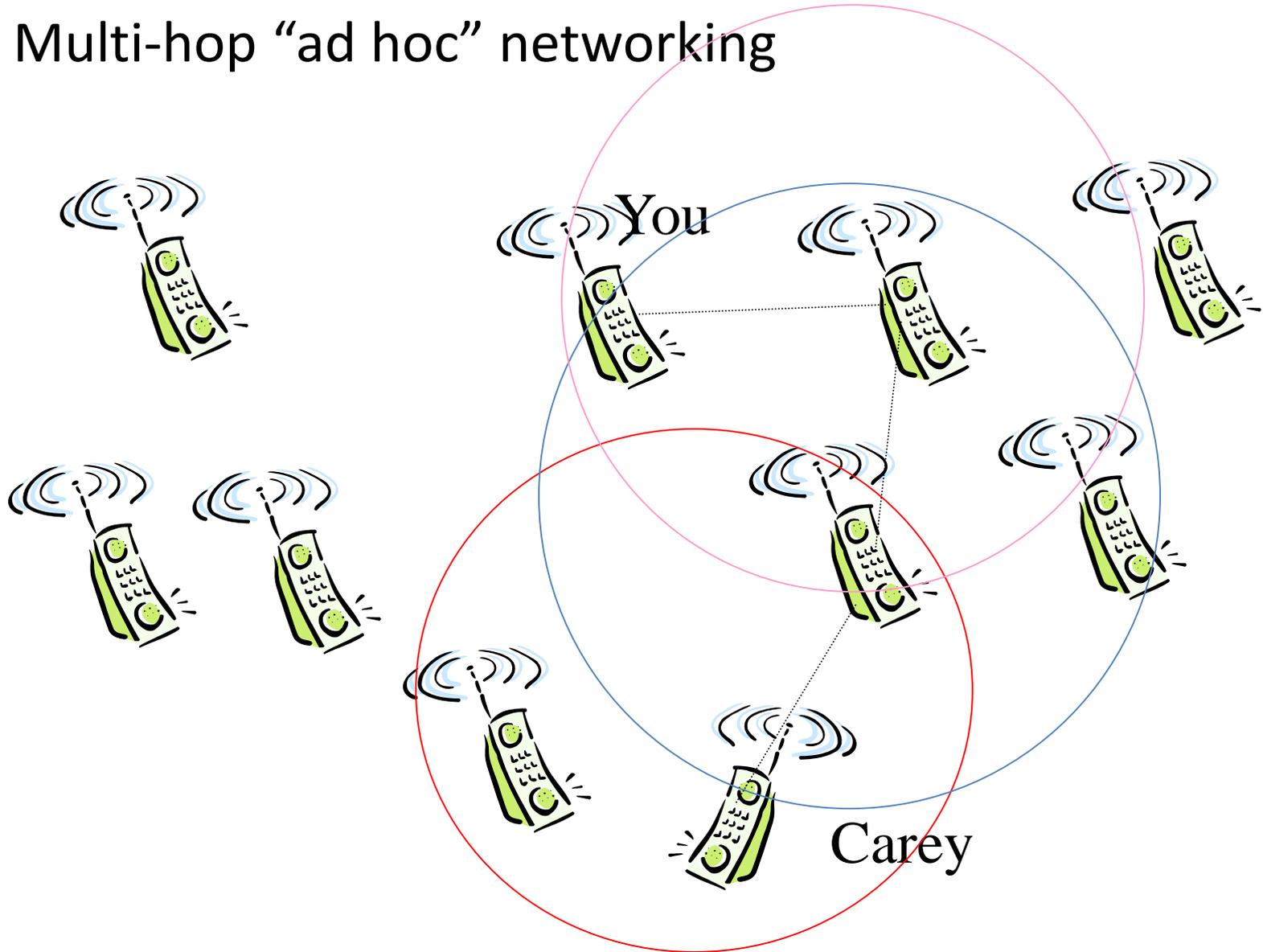
- Two interesting subproblems:

  — Dynamic ad hoc routing: node movement can disrupt the IP routing path at any time, disrupting TCP connection; yet another way to lose packets!!!
  possible solutions: Explicit Loss Notification (ELN)? Handoff? Route prediction?

  — TCP flow control: the bursty nature of TCP packet transmissions can create contention for the shared wireless channel among forwarding nodes; collisions between DATA and ACKs
  possible solutions: rate-based flow control? Burst mode? Spatial reuse of channels?

- TCP is the "four wheel drive" of transport layer

- Wireless is a newly emerging technology with rapidly growing deployment popularity

- "TCP" and "Wireless" don't fit together well

- Sometimes it can be a bumpy ride!! ☺

- Making TCP smarter about wireless helps!