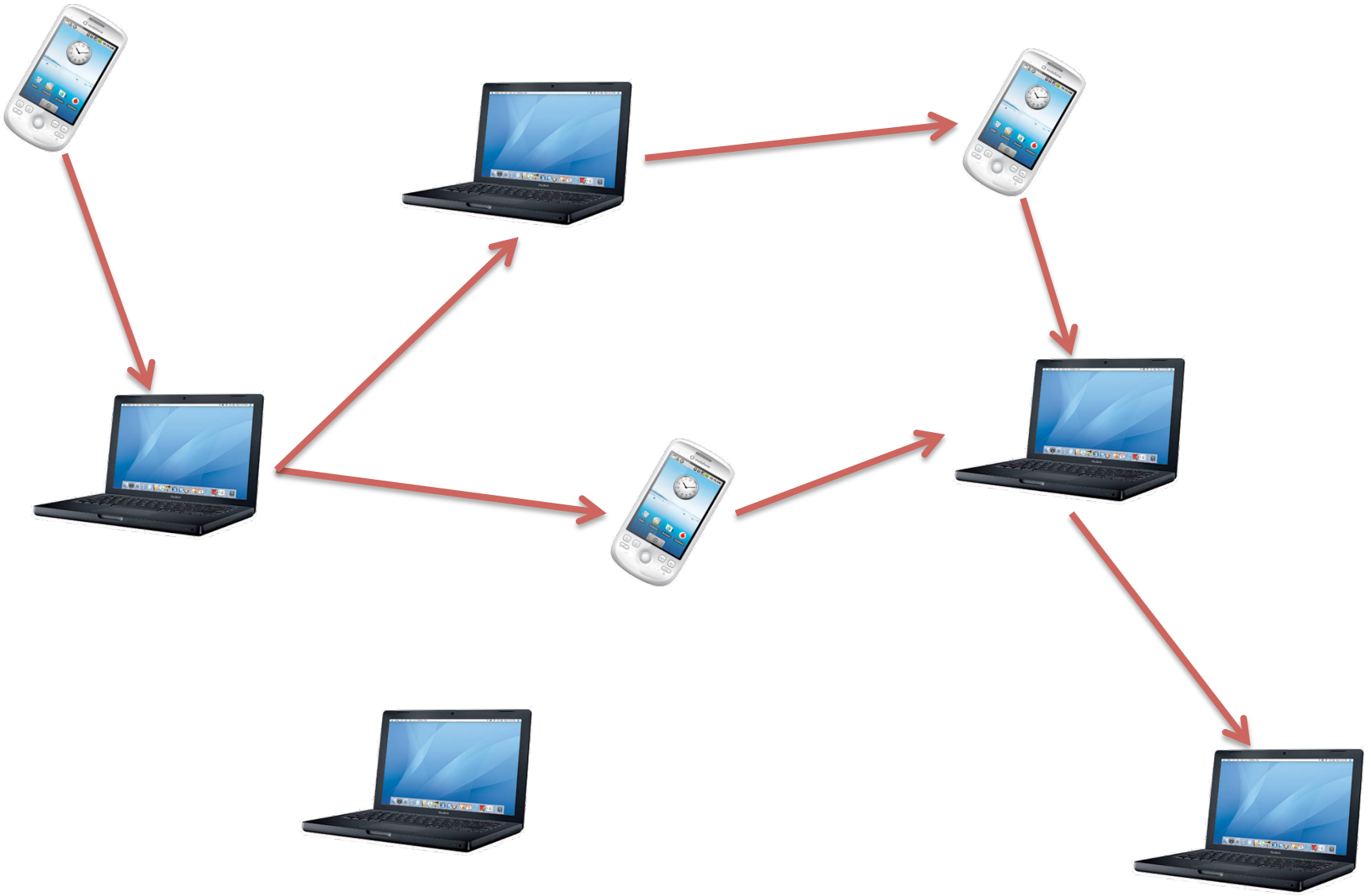
MANET Simulation Lab

Mobile Ad-hoc Networks (MANETs)



Properties of MANETs

- All nodes are routers
- Nodes may be mobile
- Typically using 802.11 (ad-hoc mode)
- Challenges
  - Routing must update quickly
  - Routing traffic should be minimal to save battery and bandwidth
  - Address auto-configuration
  - Internet connectivity

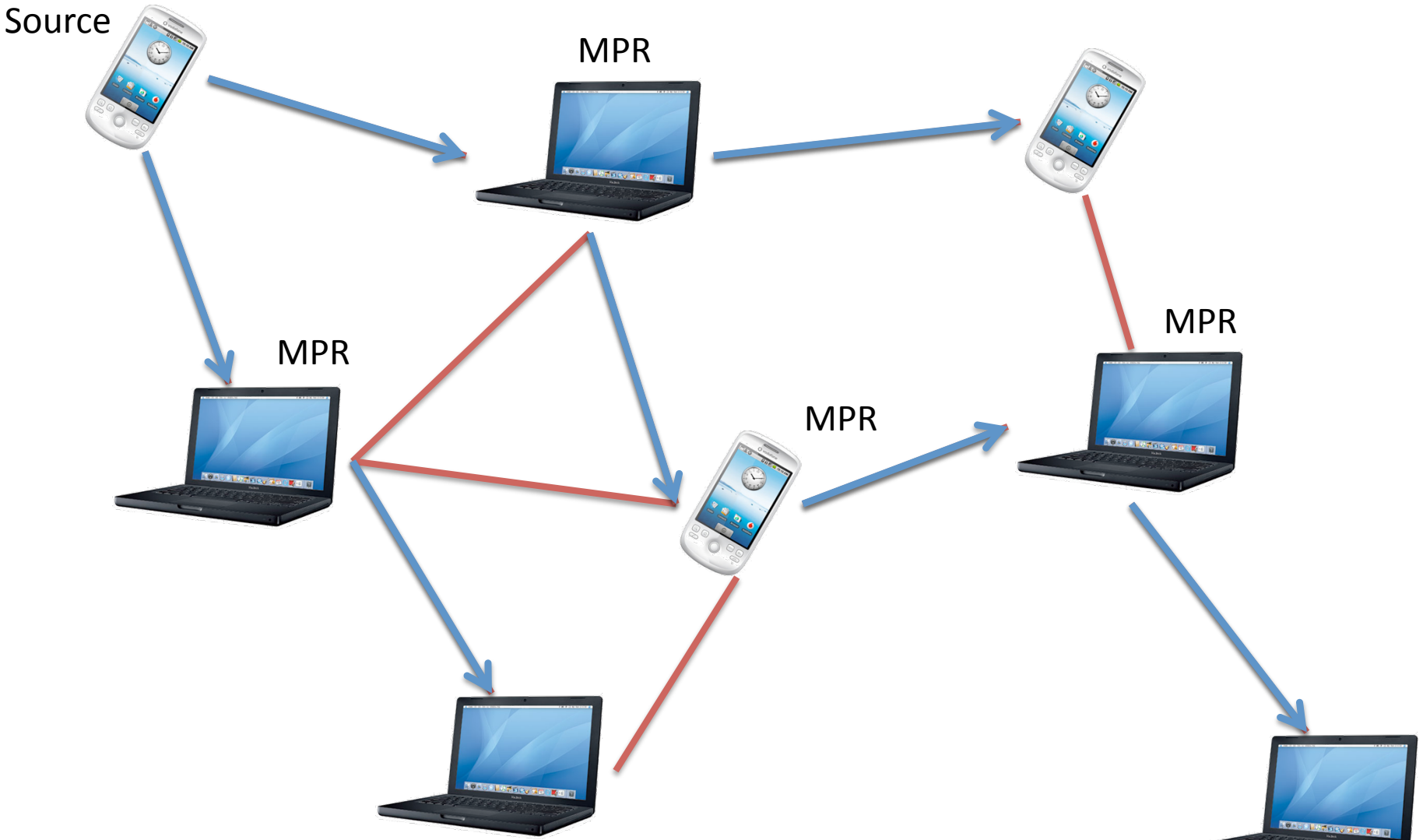
Routing Strategies

- Two dominant strategies
  - Proactive (**OLSR**, TBRPF, OSPF)
    - Complete view of the network
    - Periodic routing updates
  - Reactive (**AODV**, DSR, DYMO)
    - Partial view of the network
    - On-demand routing
- You will study differences of these two strategies through simulations

Optimized Link State Routing

- Proactive routing protocol (IETF RFC 3626)
- Similar to OSPF but with optimizations
  - Periodic Flooding of link state
  - Complete graph of the network computed by each node (Dijkstra)
  - Multi-point relays for efficient flooding
- **-** ~10 second re-routing delay
- **+** No route discovery delay

OLSR Link State Flooding

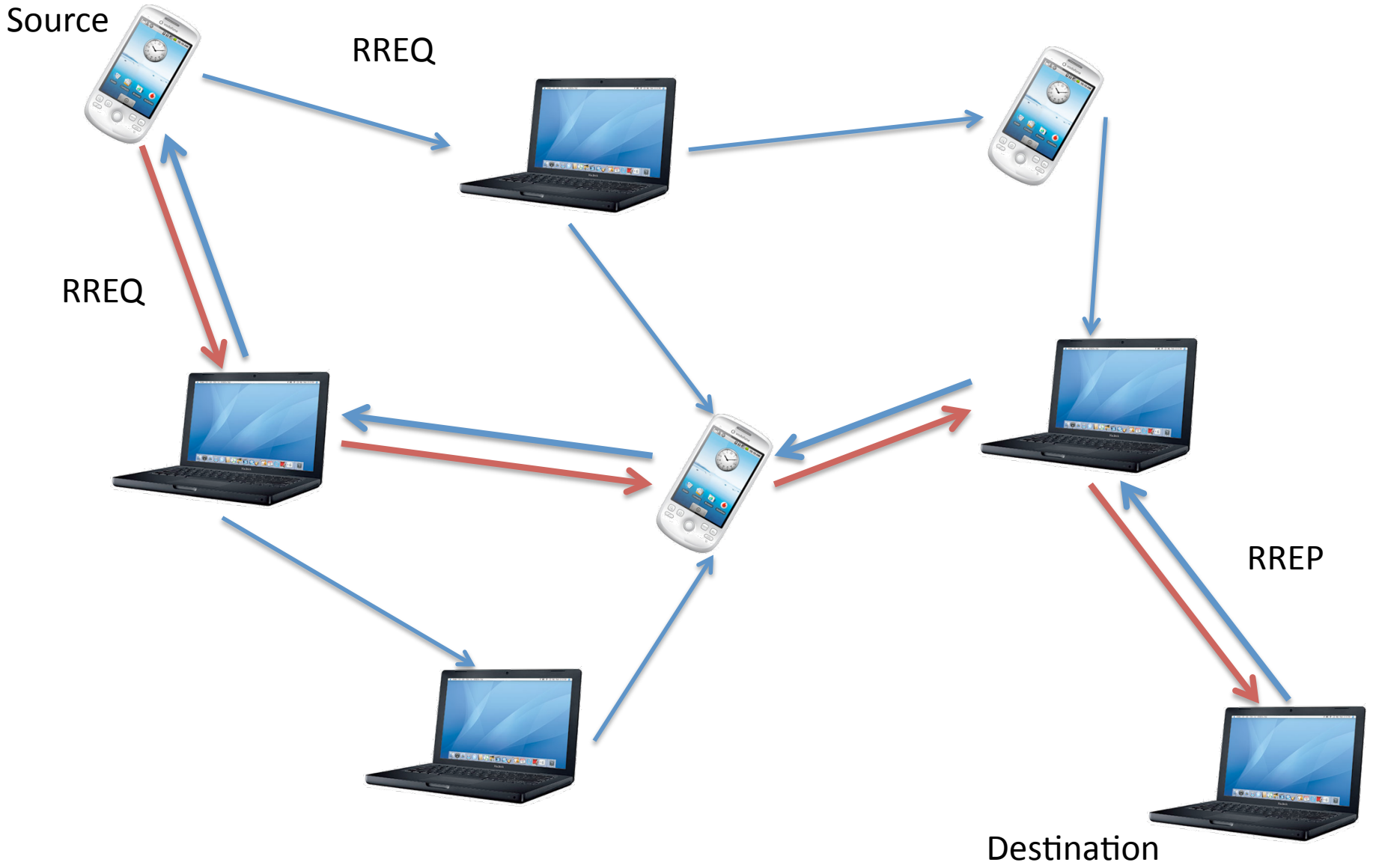


MPR = **M**ulti-**P**oint **R**elay

Ad-hoc On-Demand Distance Vector

- Reactive routing protocol (IETF RFC 3561)
  - Route discovery with RREQ-RREP mechanism
  - Route maintenance
  - Error handling and messaging using RERR
  - Optional route repair
- Each node have partial view of network
- **-** Increased routed discovery delay
- **+** Reduced control traffic overhead
- **+** Quick reaction to topology changes

AODV Route Discovery



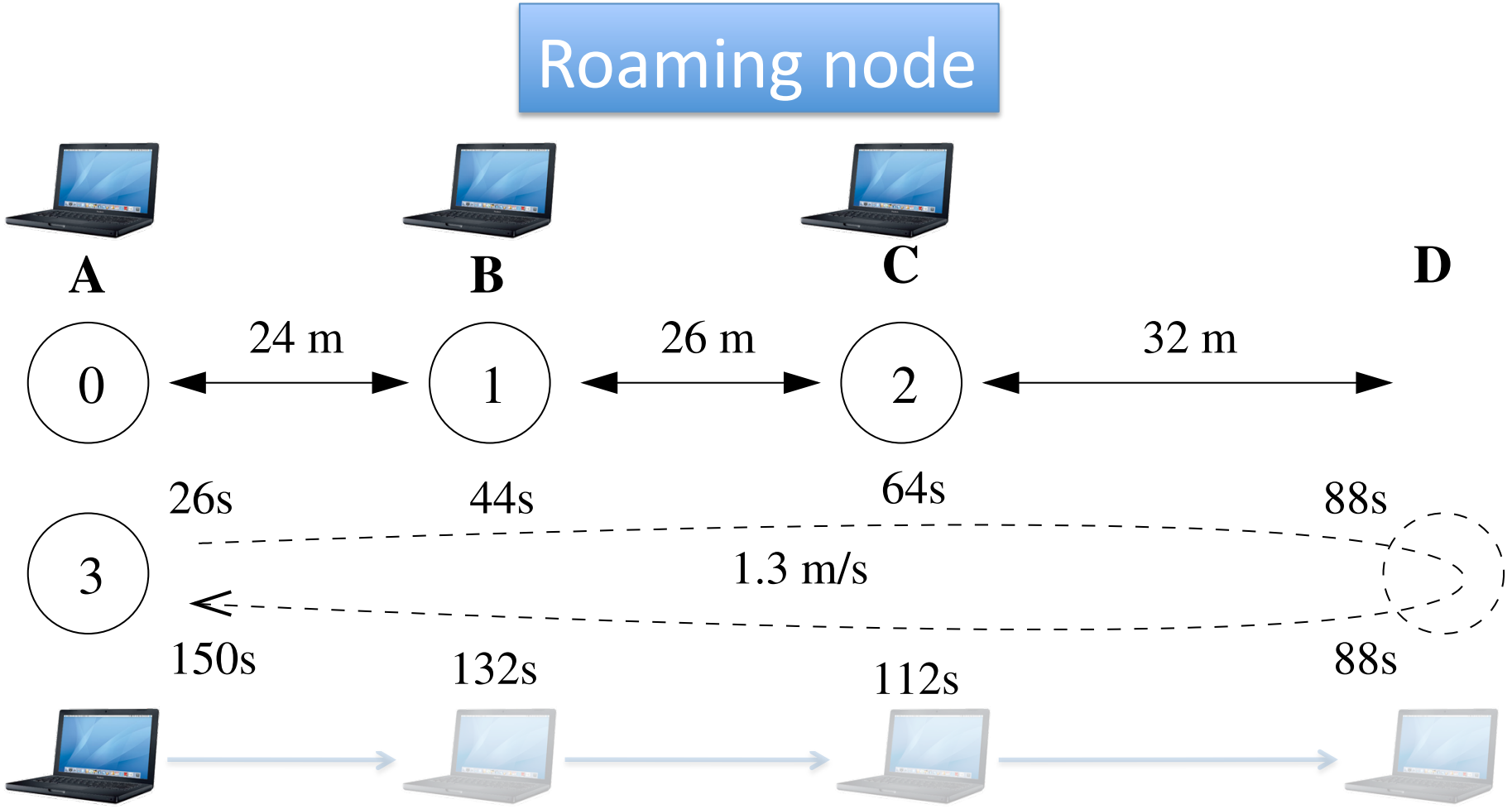
Assignment and Goals

- **Study performance differences in routing strategies**
- Get hands-on experience with practical scientific work
- Familiarize yourselves with a de-facto standard simulation tool (ns-2)
- Learn about methodologies and tools used by researchers

Tools

- Network Simulator 2 (ns-2) for simulations
  - One of the first free simulation tools
  - Written and maintained by research community
  - Free to use, open source
- Roaming node scenario (TCL script)
- Gnuplot
- Perl
- *Package with skeleton scripts, tools and instructions on course web page*

Simulation Scenario

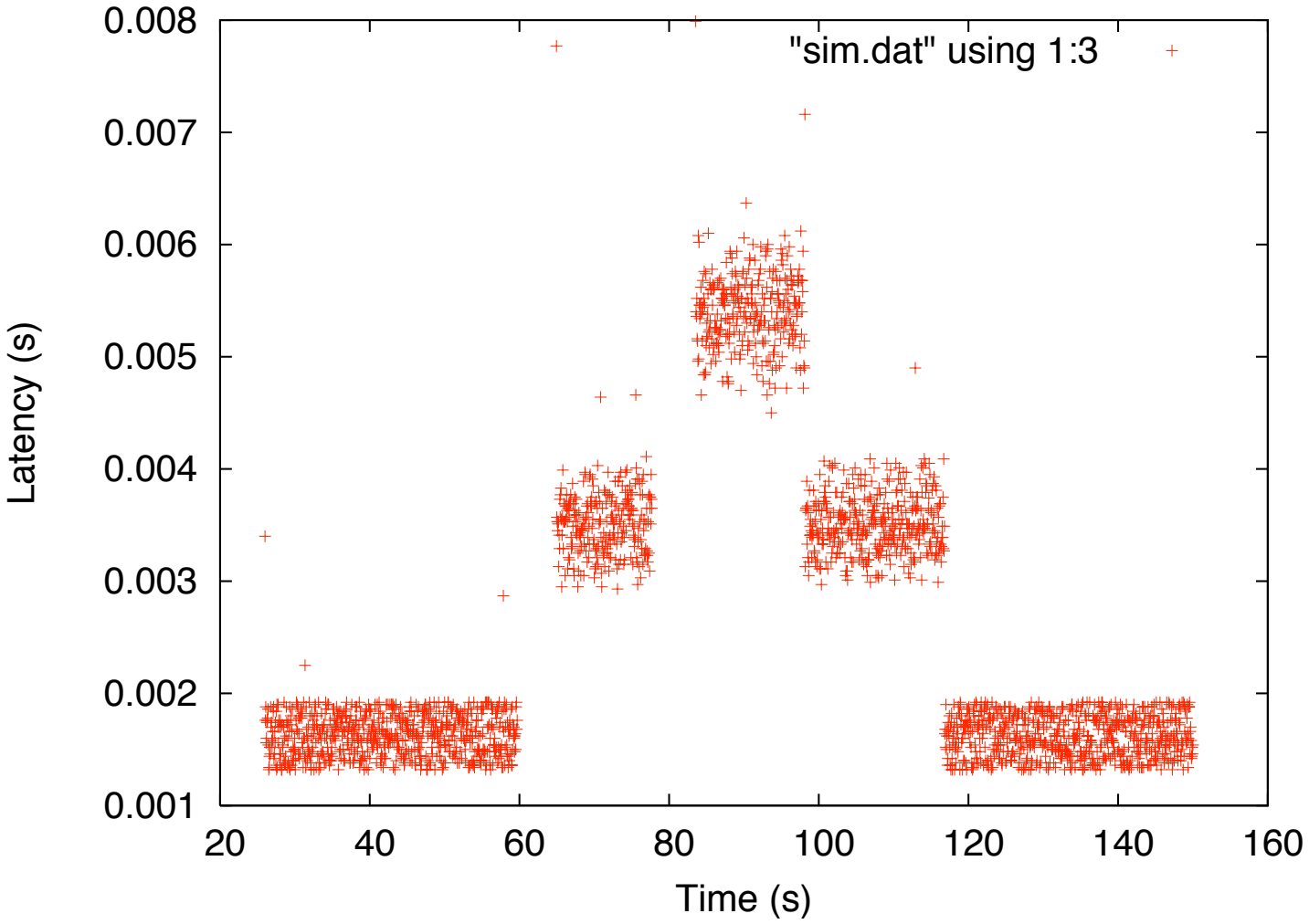


Constant Bit-Rate traffic (UDP) from node 3 to node 0

Analysis

- Find out how differences in routing strategy affect the results
  - Look for “anomalies” in graphs, or things that stand out
  - Do not just refer to proactive vs. reactive when explaining differences
  - Explain what happens relative the scenario and time of event
- Show in your explanations that you have understood how the protocols operate

Latency Analysis Example



Hand-in Procedure

- Follow instruction on web page and in documentation
  - Fill in questionnaire
  - Fill in hand-in form
  - Hand-in lab in postbox 50, house 1, floor 4
- Deadline 27th of May at 2359 (hard!)