

# Using NS2 Presentation 3

Mobile nodes

# Mobile nodes

- Similar to wired nodes
  - Use ns2 “node” method to create nodes
  - But FIRST, set appropriate parameters for the node generator
- Two important differences between wired nodes (as in the previous example) and wireless nodes
  - Links are not used; communication is via a wireless channel
  - Nodes have a location and may move during the simulation

# Node initialization

- Use the Simulator object's node-config method before invoking the node method
  - See example
- Can set many parameters for all subsequent nodes generated

# Wireless channel

- Mobile node uses a complex model for determining with which other nodes it can communicate
  - Link layer similar to wired LAN allowing multiple nodes to contend for the channel
  - Arp to map network to physical addresses
  - Priority queueing, giving priority to routing
  - Mac layer is 802.11 distributed coordination function

# Wireless channel cont'd

- Continuing down the mobile node model:
  - Network interface approximates Direct Sequence Spread Spectrum radio interface
  - Radio propagation model is Friss-space model ( $1/r^2$ ) at near distances and two ray ground model ( $1/r^4$ ) at far distances
  - Antenna model is omni-directional with unity gain
- All of the above DETERMINE when the signal at a node from another node is sufficiently strong that a packet can be successfully received

# Node movement

- Two methods are available:
  - Random movement built in to ns2
  - Explicitly setting node movement from the otcl script
- For both methods, the topology should be set first
  - Rectangular area to which the mobile nodes are restricted, for example
    - `set topo [new Topography]`
    - `$topo load_flatgrid 1000 1000`

# Built in node movement

- For each node which is to move use:
  - *MobileNodeObjectReference* start
- The node will be initially positioned at a random point in the topology
- The node will move at a randomly generated speed in a random direction
- The movement will be periodically updated
- The documentation is vague about details

# Explicit movement

- Set the initial position of the node:
  - *NodeObjectReference* set X\_ *xCoordinate*
  - *NodeObjectReference* set Y\_ *yCoordinate*
  - *NodeObjectReference* set Z\_ *zCoordinate*
- At appropriate times, set the node motion:
  - *NodeObjectReference* setdest  
*xDestination yDestination speed*
  - The node sets itself to move from its current position in a straight line toward the destination at the specified speed



# Typical use of explicit motion

- The initial position of every node is set at the beginning of the simulation
- “*at time*” commands are used to schedule changes in motion of each node
- The motion change commands can be:
  - Pre-scheduled by executing a large number of “*at time*” commands before the simulation actually begins
  - Created while the simulator is running; typically each “*at time*” command would schedule the next one

# External movement generators

- A movement generator is included in the ns2 sources and others are available on the Internet
- Typically these generate an otcl source file containing the commands to set initial position and to schedule movement direction changes
  - Typically the movement source code is kept in a separate file and “included” using a `source` command
  - It is **ESSENTIAL** that the nodes be created using the same naming convention as used by the generator