New Routing Protocol
- We present a new routing protocol that is suitable for the Line in the Sand demo
- This protocol is simple:
  - it requires each mote to send only one three-byte message every 3 seconds
- This protocol is reliable:
  - it can overcome random message loss and mote failure

The Logical Grid
- The motes are named as if they form an M*N logical grid
- Each mote is named by a pair (i,j) where
  - i = 0 .. M-1 and j = 0 .. N-1
- The mote connected to the PC is (0,0)
- Physical connectivity between motes is a superset of their connectivity in a logical grid

The Routing Protocol
- Neighbors
  - Each mote (i, j) has
    - two low-neighbors (i-H, j) and (i, j-H)
    - two high-neighbors (i+H, j) and (i, j+H)
  - H is a positive integer called the tree hop
  - If a mote (i, j) receives a message from any mote other than its low- and high-neighbors, (i, j) discards the message

Choosing the Parent
- Usually, each mote (i, j) chooses one of its low-neighbors (i-H, j) or (i, j-H) to be its parent
- If both its low-neighbors fail, then (i, j) chooses one of its high-neighbors (i+H, j) or (i, j+H) to be its parent. This is called inversion

Fault Tolerance of the Routing Protocol
- 1. One or more nodes are depleted of power or destroyed.
- 2. The network reforms around the dead nodes and continues to work.
- 3. Nodes are moved, swapped, or perturbed.
- 4. Nodes re-establish communication through new neighbors and continue to work.

Protocol Message
- If a mote (i, j) has a parent, then every 3 seconds it sends a message with three fields:
  - connected(i, j, c)
  - (i, j) is the mote’s id,
  - c is the mote’s inversion count
- Every 3 seconds, mote (0, 0) sends a msg with three fields: connected(0, 0, 0)