

### Project 1 – Epidemic broadcast

Consider a 2D floorplan with  $N$  users randomly dropped in it. A random user within the floorplan produces a *message*, which should ideally reach all the users as soon as possible. Communications are *slotted*, meaning that on each slot a user may or may not relay the message, and a message occupies an entire slot. A *broadcast radius*  $R$  is defined, so that every receiver who is within a radius  $R$  from the transmitter will receive the message, and no other user will hear it. A user that receives more than one message in the same slot will not be able to decode any of them (*collision*).

Users relay the message they receive *once*, according to the following policy (*p-persistent relaying*): after the user successfully receives a message, it keeps extracting a value from a Bernoullian RV with success probability  $p$  on every slot, until it achieves success. Then it relays the message and stops. A sender does not know (or cares about) whether or not its message has been received by its neighbors.

Measure at least the broadcast time for a message in the entire floorplan, the percentage of covered users, the number of collisions.

In all cases, it is up to the team to calibrate the scenarios so that meaningful results are obtained.

Project deliverables:

- a) Documentation (according to the standards set during the lectures)
- b) Simulator code
- c) Presentation (up to 10 slides maximum)