

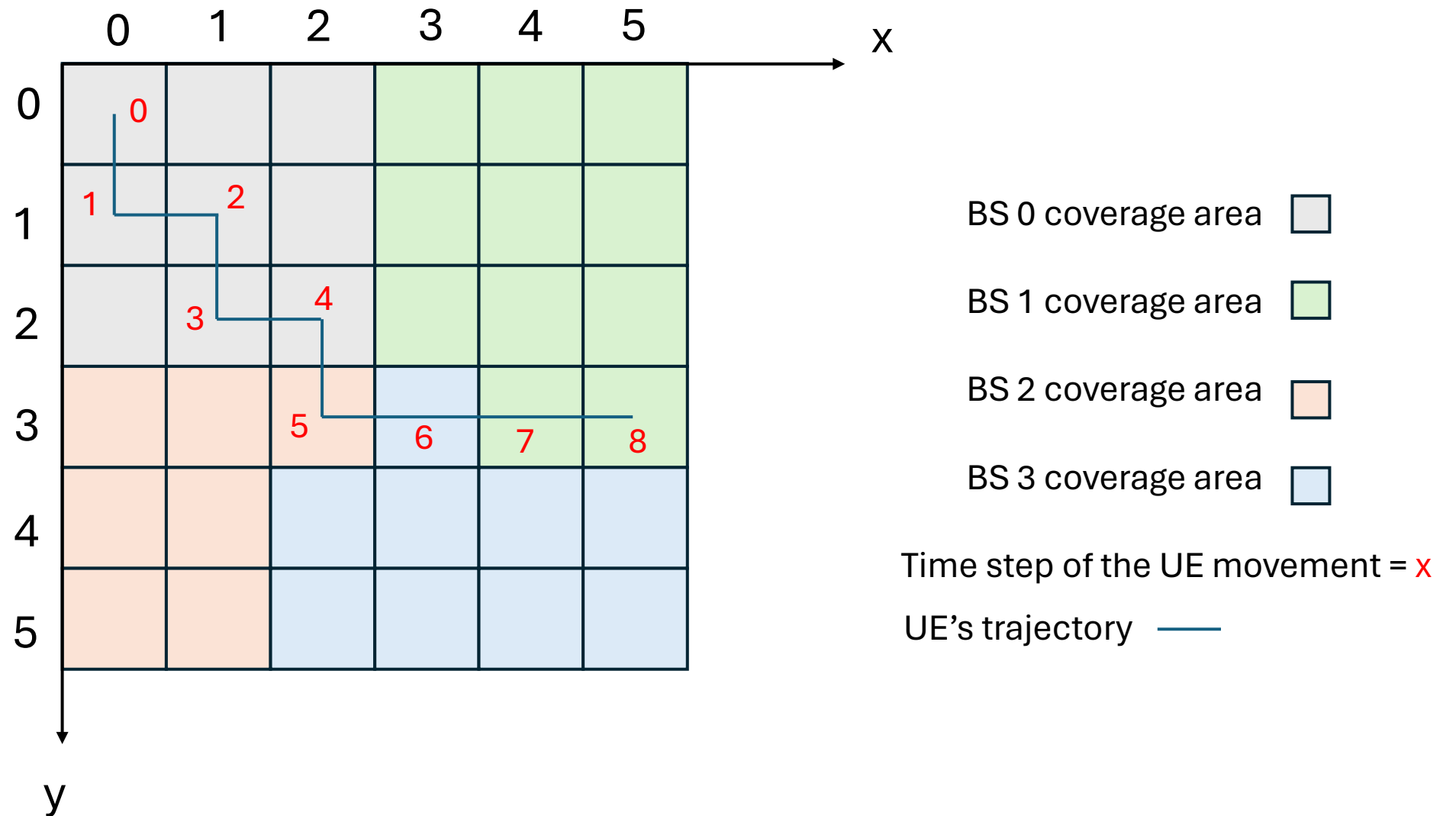
Course of Design of communication networks and systems

RL: Group 1 project

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Energy efficient BSs switch on/off while
maximizing UE's coverage time

Scenario depiction



Rules, Objective, Initial state, and Action

Rules:

- If in a time step the BS x is active, then it covers all the cells inside its coverage area.
- The UE moves one cell for each time step, following the trajectory reported in the figure.
- If during a certain time step, the UE is covered by at least one active BS, then the UE is considered covered for that time step (covered time +=1).
- If in a certain time step no BS covers the UE, then the UE is not covered (covered time +=0) .
- For each time step, the overall cost of activity is increased by the number of active BSs .

Objective: Maximizing the time steps the UE is covered (covered time) while minimizing the overall cost of activity of the BSs .

Initial state: At time step 0 the UE has a position (0, 0).

Action: For each time step the BS activity status can change from ON (1) to OFF (0).

Expected outcomes

- Set up the RL system and implement it.
- Use Q-learning to learn the optimal policy.
- Plot the cumulative reward per episode.
- Show what is the obtained on-off switching behavior.