Mobile Networks

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Project description

Universidade do Minho

Adriano J. C. Moreira

Dept. de Sistemas de Informação

Universidade do Minho

adriano.moreira@dsi.uminho.pt

Context (i)

A set of environmental sensors, to measure air pollution in real time, have been deployed across the city of Braga. These sensors collect data periodically, generating a certain amount of data that must be transmitted to a central repository in the Internet.

In order to minimize the communications costs, the sensors are not directly connected to the Internet. Instead, the sensors are equipped with low power, short range, radio-based communication interfaces.

These interfaces can be used by the sensors to communicate to nearby devices with similar interfaces.

Context (ii)

In order to send the data generated by the sensors to the repository, cars will be equipped with communication interfaces similar to those used by the sensors. As the cars pass nearby the sensors, they collect some data and, later, deliver them to a collecting portal. These portals are permanently connected to the Internet and upload all the data received from the cars.

The challenge

The challenge of this project is to estimate the minimum number of cars that must be equipped with communications interfaces that assure a maximum delay of 1 hour in the transmission of the data from the sensors to the repository.

Approach

The proposed approach to address this challenge is to resort to simulation.

The ONE simulator is an open source project that can be used to simulate the describe system:

(http://www.netlab.tkk.fi/tutkimus/dtn/theone/)

Technical details

- each sensor generates 10 kbyte of data per minute
- the communication interfaces are of type Bluetooth
- the total number of sensors is 100
- the total number of portals is 5, and they are spread across the city
- …

Millestones

- 12.11.2020 - first presentation:
  - prepare a presentation (a few slides) with:
    - the description of the status of the project
    - the approach used to model the city of Braga
    - the approach used to deploy the sensors and the portals
    - the current tasks
    - the current difficulties

Millestones

- 08.01.2021 - final report:
  - the final report should include:
    - a detailed description of the network configuration
    - a description of how the Bluetooth interfaces have been modeled
    - a description of the mobility model used for the cars
    - a description of the routing protocol used to route the data packets from the sensors to the portals
    - a description of the final simulation results

Millestones

- 14, 21.01.2021 - final presentation:
  - prepare a presentation (a few slides) with:
    - a brief description of the adopted approach
    - a detailed description of the final simulation results
  - prepare a demonstration showing:
    - the behaviour of the simulation scenario