Proposition de recherche doctorale

Analysis and Modeling of Content Dissemination in Disruption Tolerant Networks

Mots clés :

- **Directeur de thèse** : Serge Fdida
- **Co-encadrant(s)** :
- **Unité de recherche** : Laboratoire d'informatique de Paris 6
- **Ecole doctorale** : École Doctorale Informatique, Télécommunications, Électronique de Paris
- **Domaine scientifique principal**: Divers

Résumé du projet de recherche (Langue 1)

My thesis studies the practicality of news dissemination over a Delay Tolerant Network (DTN) in an urban area. The target application is the distribution of the electronic version of a newspaper in a large city. Therefore, although strict time constraints do not apply, spreading the information should be achieved within a reasonable delay. Two performance metrics, the spreading time and the message delay, are considered. The message delay is the delay required to transmit content from a mobile node to another node, while the spreading time is the delay needed for the content to spread over a part of the network. Firstly, our goal is to increase our understanding of the performance of a simple DTN environment when content is distributed solely through inter-contact of mobile nodes. We contribute both the close-form expression and the asymptotic expression of the expected message delay to the literature when considering the probability of interest/acceptance for given news in each contact. The asymptotic expression provides the insights on the efficient ways for improving the expected message delay in the case of an area with low or high density of mobile nodes. We also show a relationship between the expected message delay and the expected spreading time in such environment. Secondly, if the delay is found to be excessive, we suggest the deployment of some data kiosks in the environment to better support the dissemination of content. Data kiosks are simple devices that receive content directly from the source, usually using wired or cellular networks. A key issue when designing efficiently such network is to determine the number of data kiosks required to satisfy a performance target. We investigate both an upper bound and a lower bound of the number of data kiosks to distribute the content over a geographical area within an expected spreading time objective. We also show the important property that those bounds scale linearly with the contact rates between a mobile node and a data kiosk. Finally, we consider the question of the optimal location of data kiosks in a more realistic scenario where users move along a transportation system (like a subway or suburban train) that connects several regions. We provide an analysis used to decide which subway stop should host a data kiosk to optimize the spreading time. These findings support the view that the optimal location of data kiosks is influenced not only by the conditions of a region but also by the number of mobile users that will receive the contents. Analytical results are validated by simulations under a number of mobility models and real datasets.