Network coding for green 5G networks

Sujet proposé par Thi-Mai-Trang NGUYEN
Directeur de thèse: Thi-Mai-Trang NGUYEN
Unité de recherche UMR 7606 Laboratoire d'informatique de Paris 6
Domaine: Sciences et technologies de l'information et de la communication

Projet

Network coding is a technique that allows intermediate nodes to code received packets in order to reduce the number of transmissions required and increase network capacity. Several network coding mechanisms have been proposed for wireless networks such as COPE [1], BEND [2], DCAR [3], DODE [4] and DODEX [5].

Due to the ability of saving the number of required transmissions, network coding is a promising technique to save energy in wireless networks [6]. However, each node has to increase the local packet processing process. The first objective of this PhD thesis is to study this compromise and assess the level of « green » of network coding.

The 2020 vision on wireless network forecast seven trillion mobile devices serving seven billions mobile users [7]. This picture shows a huge amount of traffic in dense wireless networks that require advanced technique such as network coding to increase network capacity and help wireless network to be green. The second objective of the PhD thesis is to design and propose an integration of network coding into 5G network accesses.

While there are a large number of propositions on network coding for ad-hoc wireless networks, only few contributions on network coding in cellular networks are found in the literature. This PhD thesis expects a contribution on network coding for 5G cellular network accesses which have not been clearly defined by the 3GPP. In fact, network coding affect considerably the protocol design and the way network resources are allocated. It's an advantage to integrate network coding in an early stage of protocol design to avoid important changes.

The third objective of the PhD thesis is to model and evaluate the performances of the proposed mechanisms.


Enjeux

5G networks, network coding, green communications, MAC protocol design, resource allocation in cellular networks.