Proposition de recherche doctorale

Toward a Beaconless Geographic Routing with Cooperative Communications for Wireless Sensor Networks

Mots clés :

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- **Unité de recherche** : Services répartis, Architectures, MOdélisation, Validation, Administration des Réseaux
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- **Domaine scientifique principal**: Divers

Résumé du projet de recherche (Langue 1)

In Wireless Sensor Networks, the routing task is an essential service that forwards the sensor readings to some data collection points in the network on the basis of the multi-hop relaying. The routing task is particularly challenging as it should be realized in an energy efficiency manner with limited amount of information. Geographic routing is a promising approach because of its good scalability and local information use, but when deploying such approach, some problems still remain because of some practical difficulties. In this thesis, some techniques have been explored to address two issues in geographic routing protocols: i) Cost associated to: the wireless channel impairments due to fading, mobility patterns or high dynamic environment and ii) the management of constrained resources of the nodes. To tackle these issues, two protocols were presented: a beaconless Cooperative Geographic cross-layer protocol for ad hoc and sensor networks (CoopGeo) and a Relay-Aware Cooperative Routing protocol (RACR). Unlike traditional geographic routing protocols, CoopGeo deals the wireless impairments by means of a cross-layer framework where a beaconless geographic routing approach was used to build the route not only in a local manner, but also on the y worked with a relay selection mechanism to exploit the broadcast nature of the wireless communications. The RACR protocol exploits the coverage extension as a result from node cooperation to improve the non-cooperative geographic routing. It is an alternative to scenarios where network resources like energy should be preserved while respecting a Symbol Error Rate constraint (SER). Thus, the proposed routing protocol, enables a node to make a local route decision depending on the geographic location of a relay while this relay is selected with the purpose of providing the maximum coverage extension toward the destination. The results obtained from extensive evaluations of CoopGeo and RACR contributions, have demonstrated that both solutions are applicable to sensor networks with very variable channel environments or unpredictable changes in the network topology. Therefore, we have proved that our cross-layer vision of the problem provided an integrated solution to problems like inefficient routing paths, congested medium access, inaccurate location information, and lossy links.