Neighbourhood oriented TDMA scheme for the internet of things-enabled remote sensing

ABSTRACT

Throughout the world, Internet of Things (IoT) have been used in different application areas to assist human beings in numerous activities such as smart buildings and cities via remote sensing-enabled techniques. However, simultaneous transmission of packet(s) by multiple devices C_i, which are interested to start a communication session with a common receiver device, is one of the challenging issues associated with these networks. In the literature, various mechanisms have been presented to resolve the aforementioned issue without changing the technological infrastructures; however, neighbourhood information of sensor nodes is not considered yet. In IoT-enabled remote sensing, neighbourhood information of various devices plays a vital role in developing a reliable communication mechanism specifically for scenarios where multiple devices C_i are interested to start communication with a common destination module. In this paper, a neighbourhood-enabled TDMA scheme is presented for the IoT to ensure the concurrent communication of multiple devices C_i with a common destination device S_j preferably with a minimum possible packet collision ratio (if avoidance is not possible). The proposed scheme bounds each and every member device Ci to assign a dedicated time slot to its neighbouring devices in the operational IoT network. Furthermore, neighbouring devices Ci are forced to communicate within the assigned time slot. Simulation results have verified that the proposed scheme is ideal solution compared to the existing schemes for the IoT and other resource-limited networks particularly in scenarios where the deployment process is random.