

RELIABLE DATA BROADCAST FOR ZIGBEE WIRELESS SENSOR NETWORKS

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Abstract- As we know, the data transmission in the wireless networks is more unreliable than it is in the wired network environment. Although the virtual carrier sensing scheme can be used in the wireless unicast transmission, the multicast and broadcast still not utilize the acknowledgement mechanism for reliable transmission. This is due to the acknowledgement packets of broadcast transmission will cause much higher communication traffic and overhead. Since reliable data broadcast is critical and required in many applications in the wireless sensor networks, our study focuses on the ZigBee network which is a new industrial standard for sensor networks. Some previous related papers improved the broadcast reliability by introducing redundant transmission and increasing coverage ratio of every receiver node, but there still exists probability of packet loss and extra communication cost due to redundant broadcast. This paper proposes an efficient acknowledgement-based approach for reliable data broadcast in wireless sensor networks. Hierarchical acknowledgement mechanism, reduction of rebroadcast packets and ACK packets, degree-based ACK/rebroadcast Jitter, and parent-oriented retransmission are the key schemes to achieve the efficient data broadcast. Simulation results show that the proposed schemes can efficiently reduce the acknowledgement traffic as well as communication overhead and provide the high reliable data broadcast transmission in ZigBee networks..

Index terms: ZigBee, wireless sensor network, reliability, data broadcast, acknowledgement.