TITLE

ROURING RELIABILITY IMPROVEMENT IN IOT BASED MANET

BY

SYED TALIB ABBAS JAFRI

ABSTRACT:

To enable future massive Machine Type Communication (mMTC) in massive-IoT networks, a hybrid mode of infrastructure and ad hoc connectivity of nodes is required to fully realize the potential of future generation wireless networks. With the introduction of ad hoc connectivity between IoT devices, a number of performance challenges are faced which hinder the reliability and applicability of massive-IoT based networks. In this project, we have addressed two research challenges, namely queue management and routing metrics for IoT-based MANETs.

We have developed an active queue management technique namely AgRED (Aggressive Random Early Detection) for massive IoT-based MANETs. We have analyzed its performance under various ad hoc network configurations. Moreover, we have compared AgRED performance against two existing RED techniques as well as passive queue management techniques namely drop-tail and drop-head. In order to investigate AgRED under different transport protocols, we have compared AgRED performance under UDP with that of TCP. The results obtained through this analysis show that AgRED as a queue management technique outperforms existing RED techniques as well as passive queue management techniques.

In order to investigate better techniques for routing protocols in IoT-based MANETs, in this project, a new penalty for routing metric has been developed and implemented for Better Approach to Mobile Ad hoc Network - Advanced (BATMAN-adv). BATMAN-adv is a cross-layered, proactive routing protocol that does not provide complete topology information to each node, reducing the frequency of routing updates. In order to improve the performance offered by BATMAN-adv in IoT-based MANETs, a new hop penalty, namely split-hop penalty as a routing metric has been developed and tested on a network test-bed comprising of IoT nodes connected in ad hoc mode. The results obtained through this testing have been compared with the previously existing metric of BATMAN-adv. The results show an improvement of test-bed network performance in terms of the average round-trip time, throughput, jitter, and packet loss.

The obtained results show the improvement of reliability as proposed solutions provide better packet delivery ratio, reduced end-to-end delay, as well as increased throughput. Secondly, the applicability is also increased by customizing queue management techniques and routing metric to better fit IoT-based MANET use-cases