Performance comparison of two route optimisation schemes for AODV in MANETs

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Abstract: In this study, we extend performance evaluation of two different 'route optimisation' schemes proposed in Bilgin and Khan (2010) and Bilgin et al. (2010), with new performance metrics like normalised energy consumption, packet delivery fraction, average end-to-end delay, and average connection lifetime. In addition, we provide performance comparison of this two schemes against each other with pure AODV as a reference. The compared schemes are implemented as extension of AODV in ns-2 packet level network simulator. The first scheme, called *1-hop shrink*, periodically checks if there is any shortcut (i.e., direct connection) between *two endpoints of each successive and overlapped triplet* of nodes along active routes. On the other hand, the second scheme, called *multi-hop shrink*, periodically checks if there is a shortcut between *any two nodes* on a route by broadcasting a special packet starting from at the third node on active connections.

Keywords: route optimisation; mobility; MANET.

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Notes

1 Regrettably, Zapata's scheme has not been tested by extensive experiments, as is evidenced by the following oversight in the protocol's design: a node may have a valid routing table entry for the destination and yet might no longer lie on the connection itself. If such a node responds to an SREQ by sending an SREP, it will cause the formation of an invalid route.

2 We took this to be the strength of a received signal at 90% of the common transmission radius. For example, if the transmission radius is 250 m, then threshold level corresponds 225 m, when we consider the two-ray ground reflection model (Rappaport, 2001) as implemented in ns2.

3 Here the 0 represents the status of a flag in the packet header.

4 A further optimization is evident now, since such a shortcut can never be found by the source (the first node), or the second node. Thus, in scenarios where the assumption A5□ can be made (see Section 3.2), the shrinking operation is initiated by the third node within the connection, rather than at the source. In settings where assumption A5* cannot be made, identifying the third node may not be feasible: the multi-hop shrink scheme still operates correctly, but is slightly more wasteful in terms of control traffic overhead.

5 As noted earlier, this minor space requirement can be removed by considering a scheme in which shrink packets are generated probabilistically with probability 1/p every time a data packet is sent from the source node. However, this increases the time required to process each data packet, since random number generation takes time.

6 Admittedly, in this space optimization, the operation of the random number generator consumes time.