Impact of Route Caching on Route Discovery Delay in Ad Hoc Networks

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Abstract

Wireless ad hoc networks are used where a stationary communication infrastructure is lacking or is expensive or infeasible to deploy (e.g. disaster relief efforts, battlefield, etc.). Due to power limitation each station has a fixed range. It also acts as a router, relaying data packets for other stations to their final destination. One of the main challenges in the design of ad hoc networks is the routing protocol upon a dynamically changing topology, node energy constraints and the properties of the wireless channel.

On-demand routing protocol that is generally used in ad hoc networks is one that searches for a route to a destination node when a sending node originates a data packet addressed to the destination node.

Every on-demand routing protocol has to maintain some form of routing cache with the intention of avoiding route re-discoveries for each separate data packet and reduction of route discovery delay. Additionally, the route cache is not only used to cache routes for the purpose of originating packets, but also for the purpose of allowing nodes to answer Route Requests targeted at other node. Therefore, caching is an essential component of on-demand routing protocol for wireless ad hoc mobile networks.

A route caching is the main strategy to reduce the route discovery delay. It depends strongly on the expected number of hops from the source to the intermediate node which can answer with a route from cache. On the other hand, the cache itself may hold obsolete data presenting links between nodes that are no longer valid. This out-of-date information is a drawback that may decrease performance sooner than make it better.

We present the on-going work to analyse a route discovery delay and cache performance in ad hoc networks. We take into account a cache miss probability as the cache may hold obsolete data presenting routes that are no longer valid. The model helps to understand the effects of route caching in ad hoc networks.