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Adaptive Lightweight ORS in Mobile Adhoc Networks

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Abstract

The opportunistic data transfer in mobile ad hoc network is difficult. For that our solution is called Cooperative Opportunistic Routing in Mobile Ad hoc Networks (CORMAN) .Unfortunately, it ignores the inherent nature of broadcasting wireless communication link. Cooperative communication is an effective approach to achieving such a goal. A flow of data packets are divided into batches. All packets in the same batch carry the same forwarder list when they leave the source node. Proactive Source Routing (PSR), which provides each node with the complete routing information to all other nodes in the network. The forwarder list contains the identities of the nodes on the path from the source node to the destination. CORMAN generalizes the opportunistic data forwarding in EXOR to suit mobile wireless networks. When a batch of packets are forwarded along the route towards the destination node, if an intermediate node is aware of a new route to the destination In corman a new methodology has been implemented to provide a high security in the form of rumor riding where the message and key travels in a different path. It's a new approach where a large amount of data can be transferred securely in the infrastructure as well as infrastructure less environment.

Keywords: Corman, Proactive source routing, EXOR, OLSR, MANET, AODV.

Introduction

A mobile ad hoc network (MANET) is a wireless communication network where nodes that are not within direct transmission range establish their communication via the help of other nodes to forward data. It can operate without a fixed infrastructure, support user mobility, and falls under the general scope of multi-hop wireless networking. Such a networking paradigm originated from the needs in battlefield communications, emergency operations, search and rescue, and disaster relief operations. Later, it found civilian applications such as community networks. A great deal of research results on MANET's has been published since its early days in the 1980's, and the network layer has received the most attention. Two most important operations at the network layer are routing and forwarding. Data forwarding regulates how packets are taken from one link and put on another. Routing determines which path a data packet should follow from the source node to the destination. With different network types, topologies and performance objectives, abundant routing protocols with differing features and for various specific needs have been proposed. Many routing protocols in wireless network are fundamentally derived from two algorithms adopted in the Internet Link State (LS) routing [2] and Distance Vector (DV) routing. In LS routing, every node provide the cost to its neighbours to all other nodes in the network, so every node has the knowledge of the topology of the entire network and it can always select the best route to the destination. In DV routing, a node provide its neighbours the knowledge of the estimated cost to reach a particular destination, so every node can choose the most efficient neighbour as the next hop to reach a destination node. Because LS provides more information about the network structure than DV does, the LS usually have a larger overhead than DV. Meanwhile, routing protocols in MANETs are usually categorized as proactive and reactive according to their timing strategy. Proactive routing means that nodes in the network should maintain valid routes to all destinations at all time. Instead, reactive routing means the nodes in the network do not always maintain routing information. When a node receives data from the upper layer for a given destination, it must first find out about how to reach the destination. In general, most proposed routing protocols in MANETs can be categorized according to their different fundamental algorithms and timing strategies. For example, Destination- Sequenced Distance Vector is a proactive protocol based on DV, Ad-hoc On Demand Distance Vector is a reactive one based on DV, and Optimized Link State Routing is a proactive routing protocol using LS. Another important type of routing protocol is source routing, which is neither LS nor DV, where the entire route is included in the data packet. Although it might contain security vulnerable, the advantages prevails its possible weaknesses. Source routing protocols can not only provide routing information, but also control data forwarding when it is handled by intermediate nodes, which is quite different from IP forwarding used by LS or DV [9].

Related Work

Traditional MANET routing protocols are quite susceptible to link failure as well as vulnerable to malicious node attacks [7]. One of the main reasons is due to the property that a predetermined route must be established before packet transmission. (It is realized through periodic update for every node in proactive routing, or on-demand construction in reactive routing.) Such kind of route discovery and establishment process inevitably introduce a variety of control messages which can become an attacker's target and can be easily intercepted, modified or just dropped [5]. The QoS of the communication is thus degraded and even worse, the transmission could never be established. Zone-disjoint routes in wireless medium where paths are said to be zone-disjoint when data communication over one path will not interfere with data communication in other path [8]. This project has used this notion as a route selection criterion. However, zone-disjointness alone is also not sufficient for performance improvement. If the path length (number of hops) were large, that would increase the end-to-end delay even in the context of zone-disjointness [6]. So, it is imperative to select maximally zone-disjoint shortest paths. Adaptive Multipath Routing, Each node in the network uses its current network status information (approximate topology information and ongoing communication information) to calculate the suitable next hop for reaching a specified destination via multiple paths such that the interference with the nodes that are already involved in some communication gets minimized. Our goal is to distribute the network load along a set of diverse paths to achieve load balancing through multipath for an effective gain in throughput.

Objectives and Challenges

CORMAN is a network layer solution to the opportunistic data transfer in mobile ad hoc networks [3].Its node coordination mechanisms is largely in line with that of EXOR and its an extension to EXOR in order to accommodate node mobility.CORMAN has two objectives, 1) It broadens the application of EXOR to mobile multi-hop wireless networks without relying on external information sources, such as node positions.2) It incurs a smaller overhead than EXOR [1].

Overhead in route calculation

Corman relies on the assumption that every source node has complete knowledge of how to forward data packets to any node in the network at any time. To reduce the overhead in route calculation we need a lightweight solution.

Forwarder list adaptation

When the forwarder list is constructed and installed in data packets, the source node has updated knowledge of the network structure within its proximity but its knowledge about further areas of the network can be obsolete due to node mobility. This error becomes worse as the data packet is forwarded towards the destination node. To address this issue, intermediate nodes should have the ability to update the forwarder list adaptively with their new knowledge when forwarding data packets.

Robustness against link quality variation

When used in a dynamic environment, a mobile ad hoc network must inevitably face the drastic link quality fluctuation. A short forwarder list carried by data packets implies that they tend to take long and possibly weak links. For opportunistic data transfer, this could be problematic since the list may not contain enough redundancy in selecting intermediate nodes. This should be overcome with little additional overhead.[4]

Dynamic Source Routing Protocol

DSR is a reactive flat protocol. The main difference between DSR and all other reactive protocols is that it is based on source routing scheme. In source routing, the source node specifies the intermediate nodes sequence. In a DSR protocol, mobile nodes are required to maintain route caches that contain the source routes to all mobile nodes that it is aware. The entries in the route cache are updated as new routes are learned. When a node requires sending data to a destination node, it first refers its routing cache to determine if it has a route to the destination. If an unexpired route exists, it will use the route to send the packet.

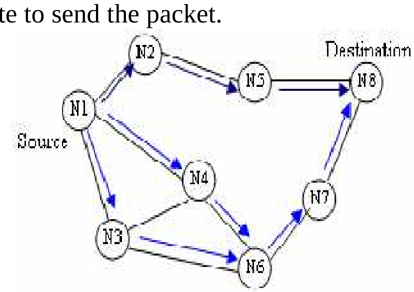

Figure-1:Route request Propagation

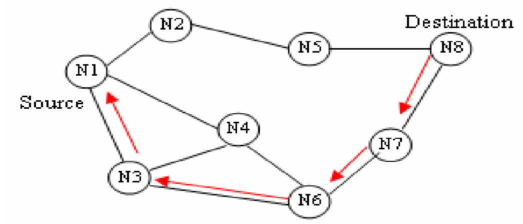

Figure-2: Route reply with reference of destination route cache

Optimized Link State Routing

OLSR is a link-state and proactive based protocol. Unlike distance victor protocols, link-state protocols do not relay on number of hops to the destination node. Instead, link-state algorithms determined the best route according to the link load, delay, bandwidth etc. Although calculating the best available route by this approach is more complicated than hop count, it is approved that link-state routes are more accurate and stable. Control overheads information is compact and retransmission number to flood these control messages is reduced comparing to pure link-state protocols. The perfect network context for OLSR is low mobile and dense ad hoc networks. OLSR overhead control signals do not require for a reliable transmission link, which is very suitable for wireless networks. OLSR supports node mobility as far as it is traceable by its neighbours. Overhead control signals are periodically broadcasted by each node in the network. The period between each signal is determined according to the nodes expected speed. Each node N in the network, selects a set from the next hop neighbours called multipoint relay nodes.

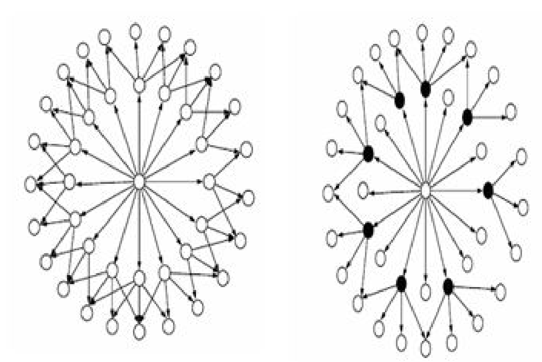

Figure-3: OLSR routing mechanism

System Model

Proactive Source Routing

PSR runs in the background. So that nodes periodically exchange network structure information. It converges after the number of iterations equal to the network diameter. At this point each node has a spanning tree of the network indicating the shortest path to all other nodes

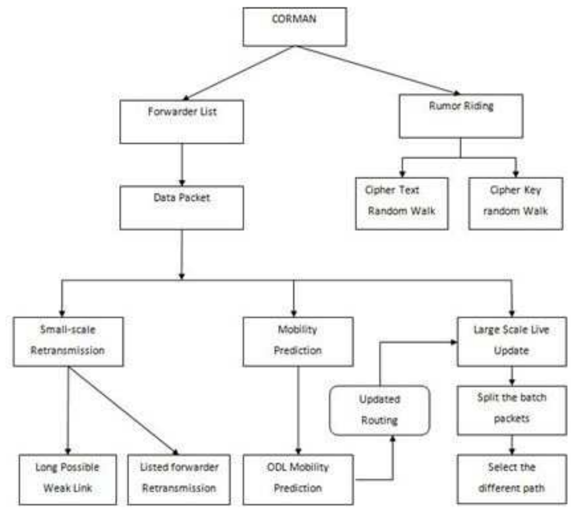

Figure-4: System Architecture

Large scale live update

When data packets are received by and stored at forwarding node, the node may have a different view of how to forward them to the destination from the forwarder list carried by the packets. Since this node is closer to the destination than the source node. When the packets with this updated forwarder list are broadcast by the forwarder, the update about the network topology change propagates back to its upstream neighbour. The neighbour incorporates the changes to the packets in its cache.

Small scale retransmission

A short forwarder list forces packets to be forwarded over long and possibly weak links. To increase the reliability of data forwarding between two listed forwarders, CORMAN allows nodes that are not on the forwarder list but are situated between these two listed forwarders to retransmit data packets if the downstream forwarder has not received these packets successfully. Since there may be multiple such nodes between a given pair of listed forwarders, CORMAN coordinates retransmission attempts among them extremely efficiently.

Results

Snapshots shown below explain how each node finds the energy level of its neighbouring intermediate nodes to find out the shortest path by which it traverses to the destination node. By which the energy level of each node is balanced effectively.

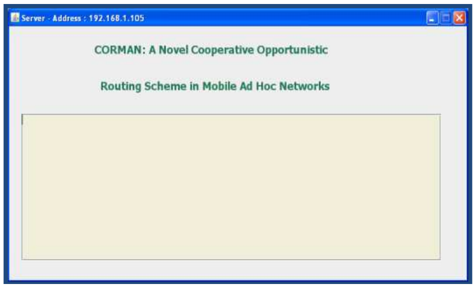

Figure-5: Shows the formation of Networks

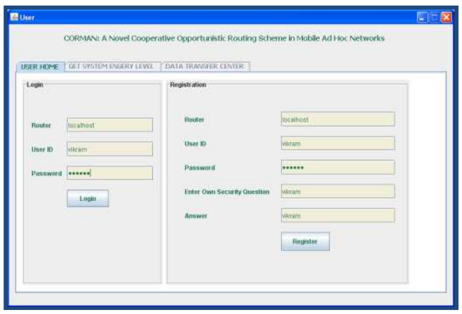

Figure-6: Shows the user's Registration with server

Figure-7: Shows the pop up for registration success

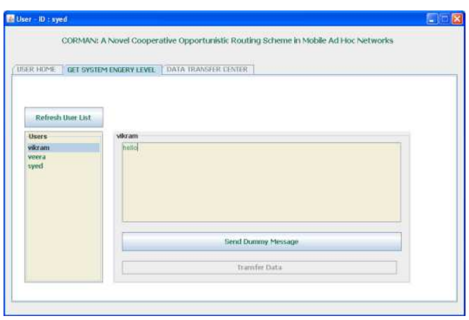

Figure-8: Shows the sending of dummy message within the nodes

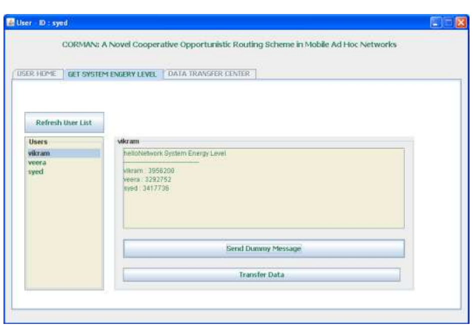

Figure-9: Calculation of Energy Level

Conclusion

In particular, the PSR is motivated by the need of supporting opportunistic data forwarding in mobile ad hoc networks. In order to generalize the milestone work of ExOR and its function in such networks a proactive source routing protocol is going to be implemented. Such protocol is expected to provide more topology information than distance vector. By implementing this concept both the data and network privacy is maintained than the existing system

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