# DATA TRANSMISSION IN WIRELESS ADHOC NETWORK

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**Abstract:** Wireless Ad-hoc network is a collection of two or more wireless nodes equipped with wireless communications and networking capability. They communicate with each other without the need of centralized administration, in which all nodes potentially contribute to routing process. Most existing ad hoc routing protocols are susceptible to node mobility, especially for large-scale networks. When a data packet is sent out, some of the neighbour nodes that have overheard the transmission will serve as forwarding candidates, and take turn to forward the packet if it is not relayed by the specific best forwarder within a certain period of time. By utilizing such in-the-air backup, communication is maintained without being interrupted. This paper presents data transmission using a secure for spontaneous wireless ad hoc networks which uses an hybrid symmetric/asymmetric scheme and the trust between users in order to exchange the initial data and to exchange the secret keys that will be used to encrypt the data.

***Keywords:- Data transfer, spontaneous wireless network, Ad-hoc network, secure protocol, Data Management, Caching.***

## I. INTRODUCTION

A wireless Ad-hoc network is a collection of two or more wireless nodes equipped with wireless communications and networking capability. They communicate with each other without the need of centralized administration. A wireless ad-hoc network is the collection of autonomous nodes that communicate in multihop manner to maintain connectivity [1]. A Wireless ad hoc network sometimes called "Mobile Adhoc Network" or a "Mobile Mesh Network" is a wireless network, comprised of mobile computing devices (nodes) that use wireless transmission for communication without the aid of any established infrastructure or centralized administration such as a base station or access point. It is a self –configuring network of mobile nodes connected using wireless links forming a random topology. The nodes move freely and randomly. Each node in Wireless ad-hoc network acts both as a host and a router to forward messages for other nodes that are not within the same radio range. Ad hoc wireless networks can be deployed quickly anywhere and anytime as they eliminate the complexity of infrastructure set up. Application of wireless ad-hoc network range from military operations and emergency disaster relief, to commercial uses such as community networking. Most of these applications demand a secure and reliable communication. In Wireless Ad-hoc Network routing protocols are divided into three categories named proactive routing protocols, reactive routing protocols and hybrid routing protocols.

## II. AD-HOC ROUTING PROTOCOLS

DSR: Dynamic Source Routing (DSR) is a reactive protocol [2]. In this the routes are computed when required and after that they are maintained. It does not advertise periodically. In this routing technique, the source node determines the complete path (sequence of nodes) of packet, through which the packet has to pass and the source node clearly mentions this route in header of packet.

Dynamic Source Routing protocol is based on the concept of source routing and it includes two operational components: Route Discovery & Route Maintenance. This protocol also includes 3 types of route control messages:
RREQ(Route Request), RREP(Route Reply) and RERR(Route Error). In MANET, when a node wants to send a packet but it does not have a route to destination in its route memory(cache) then it broadcast a RREQ packet to initiates route discovery process. This RREQ packet contains source node address, unique sequence no., empty route record and destination node address. When each intermediate node receives the route request first time, it checks own route cache.

If it doesn't have any route to destination, then it will add own address to route record and rebroadcast RREQ packet. If it have route, then it reply back a RREP packet to source node. This reply has complete record of route from source to destination. If route request is received by destination node, then it will send RREP packet back to source and also copy route record present in route request. The discovered routes are not longer valid over the time because of node movement. The route error packets are sent to accomplish the route maintenance mechanism. In the situation of link broken, the node sends back a route error packet, when it detects link failure, to source node. When a route error message is received by each node then they removes all broken link's route from its cache. In Dynamic Source Routing, each transmitting node is responsible for confirming that packet have been received by next hop (along source route).

AODV: Ad-hoc on-demand distance vector (AODV) is a reactive protocol [3]. It also offers low network utilization. When needed, it requests a route & does not maintain routes for the nodes which do not actively participate in communication. It also uses a destination sequence number and this destination sequence number corresponds to a receiver (destination) node which was requested by a routing source node. In case of multiple routes from request source to destination, the source takes the route having highest sequence number. The destination sequence number is used to make AODV routing protocol loop free. The messages used by the nodes to communicate with each other, in AODV are: Route Request (RREQ), Route Reply (RREP), Route Error (RERR) and HELLO. Where the RREQ and RREP are used for discovery of route and remaining two are used for route maintenance. Das[4] has also proposed performance comparison of two on-demand routing protocols (DSR & AODV) for ad-hoc networks.

DSDV: Destination Sequenced Distance Vector (DSDV) is basically a Proactive routing protocol [5]. This type of protocol maintains routing information about each node in network. It solves the major problem associated with the Distance Vector routing of wired. In this protocol, each mobile station has to broadcast the entries of its routing table to each of its current neighbours. The entries in the list are updated throughout the network periodically or when the topology changes. Each node has to store their routing information. In wireless ad-hoc networks, to each destination, DSDV protocol guarantees loop-free paths.

## III. LITERATURE REVIEW

Berkeley SmartDust project [6] - has proposed a lightweight model for wireless network communication between resource starved smart sensor nodes, and provided convincing initial demonstrations. However, the Berkeley proposals, in common with many others, only consider the network to be ad-hoc. The application is assumed to be a sequential source and sink for network level events. We believe that the full benefit of ad-hoc networking can only be realised if the application is also engineered to be as ad-hoc as possible. This means that one must avoid any assumptions of consistency and completeness that lead to large requirements for state maintenance in the application layer. In other words the links between collaborating nodes that collectively form the distributed application must be informal and non-deterministic wherever possible. This requirement can be generalised as ad-hoc communication, where communication implies transfer of semantic understanding. An appropriate analogy is with informal human networks, where information is circulated through ad-hoc exchange of gossip when individuals meet. We therefore propose an ad-hoc communication model based on gossip-like mechanisms.

In earlier work [7], we demonstrated the importance of having a reliable platform for experimentation and fast prototyping of ad hoc wireless sensor networking in addition to suitable simulation models. In our case the Lego RCX was used as an experimental node. The H8/3292 micro-controller along with serial communication interconnected to infrared circuitry, provides native 50% and 75% duty cycle for internal infrared diodes running with a 38KHz carrier; this arrangement provides 2400 bps raw signalling that could be speed up to 76KHz carrier for up to 4800 bps. Vahdat and Becker [8] have also proposed a mechanism for ad hoc communication using Gossip techniques and some of the conclusions suggest that the probability parameter used for message dispersion can be modified to achieve different performance goals; although their work has not taken mobility impact into consideration. Vahdat and Becker's proposal is aimed at networks with connectivity scarcity, and they have demonstrated high utilisation through measurements of buffer usage. However, their proposal cannot take advantage of multiple participants for data exchange and depends heavily on a pre-assumed session time length. This leads to difficulties in mobile scenarios where the lifetime of a connection is transient and likely to be shorter than the session length. For gossip-based routing Li et.al [9], expose how a simple internal event, like tossing a coin with specific probability, could be used for controlled spreading of data through the network, and have proposed the use of hash functions to describe the contents of the local queue to be exchanged later in anti-entropy sessions that lead to message interchange. This also implies a heavier requirement for state maintenance than our proposal.

Several algorithms have been proposed by various authors to address the data caching and replacement mechanism in adhoc networks.

### *A. Cooperative Caching*

In [10], author has proposed distributed caching strategies for ad hoc networks according to it nodes may cache highly popular data that passes by or record the data path and use it to redirect future requests. Among the schemes presented in [10], the approach called HybridCache best matches the operation and system assumptions that we consider; we thus employ it as a benchmark for evaluating the proposed solution. In [11], a cooperative caching technique is presented it provides better performance than HybridCache. This method is based on the formation of an overlay network composed of "mediator" nodes, so it is applicable only to fixed topology networks. In [12] Y. Du proposed a complete framework for data retrieval and caching in mobile ad hoc networks. It is built on an underlying routing protocol and requires networkwide "cooperation zone" parameter. In adhoc networks, maintaining network connectivity is either impossible or more communication expensive than the querying/caching process. The "cooperation zone" parameter makes the method hard to configure in adhoc networks. Y. Zhang [13] proposed the solution in vehicular ad hoc networks, this method aims to find the most popular and relevant data matching a user query and a popularity-aware data replacement scheme.

***B. Content Diversity***

G. Cao [14] proposed a method where mobile nodes cache data items which are not there in its neighbors to improve data accessibility. This method aims at caching copies of the same content farther than a given number of hops and it requires the maintenance of a consistent state among nodes and is not efficient in adhoc networks. The same concept is also exploited in [15], where nodes with similar interests and mobility patterns are formed into a cluster to improve the cache hit ratio and in [16] T. Hara presented a solution, where neighboring nodes implement a cooperative cache replacement strategy. In both methods, the caching management is based on instantaneous feedback from the neighbor nodes,
which requires lot of hello messages and leads to overhead and waste of bandwidth in the network.

***C. Caching With Limited Storage Capability***

In [6], author proposed a centralized and distributed solutions to the cache replacement problem, which aim to minimize data access costs when network nodes have limited storage capacity. The centralized solutions are not feasible in ad hoc environments and the distributed scheme in [11] makes use of cache tables which is similar to routing tables in mobile adhoc networks. In [12] W. Li proposed a content replacement strategy that aims to minimize energy consumption. To find which packets should be discarded, the solution exploits the knowledge of data access probabilities and distance from the closest provider. M. K. Denko [13] employs a variant of the last recently used (LRU) technique, which favors the storage of the most popular items instead of the uniform data distribution. In [14], the popularity of data is taken into account, along with its update rate, so that items that are more frequently updated are more likely to be discarded. Similarly, in [15], cache replacement is driven by several factors, including access probability, update frequency and retrieval delay. These algorithms address both cache replacement and consistency.

***D. Data Replication***

Many approaches have been proposed by various authors for data replication which is relevant to the data caching solution. T. Hara [16] proposed a solution for removing data replicas among neighbor nodes. D. Rubenstein [17] proposed a replication method which aims that every node close to a copy of the information and analyzes its convergence time. Finally, in [18] K. Chen presented a cross-layer approach to data replication in mobile ad hoc networks where node mobility information in the network layer helps to trigger the replication before network partitioning occurs.

**IV. CONCLUSION**

In ad hoc networks due to high mobility and lack of fixed infrastructure network disconnections occur frequently. Hence data accessibility in ad hoc networks is lower than in the fixed infrastructure networks. We address cooperative caching problem to improve data accessibility in adhoc networks. Proposed solution is based on the size of the cache in nodes. For large-sized caches, nodes take decision independent of each other whether to cache some data and how long.

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