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SELF-ADAPTING QUORUM-BASED NEIGHBOR DISCOVERY IN WIRELESS SENSOR NETWORKS

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ABSTRACT

Neighbor discovery is a critical first step in establishing communication in a wireless ad-hoc network. Existing quorum-based neighbor discovery algorithms only consider a pair of nodes and ensure that this pair can communicate at least once in a bounded interval. However, when the node density of a wireless network increases, collisions are more likely to happen, which makes these quorum-based algorithms inefficient in practice. We propose a novel self-adapting quorum-based neighbor discovery algorithm that can dynamically adjust its cycle pattern to decrease the impact of such collisions. We first assess the collision problem in wireless networks when using quorum-based neighbor discovery algorithms and then establish a theoretical framework to analyze the discovery delay when considering collision effects. Guided by these theoretical results, we design a self-adapting mechanism for cycle patterns in quorum-based algorithms. Simulation results show that our algorithm can achieve complete neighbor discovery in less time than existing quorum-based neighbor discovery algorithms.

KEYWORD

Protocols,Schedules, Wireless Sensor Networks, Heuristic algorithms,Delay,Adhoc Networks Analystical Models.

Introduction

Location awareness has become an asset in mobile systems, where a wide range of protocols and applications require knowledge of the position of the participating nodes. Geographic routing in spontaneous networks, data gathering in sensor networks, movement coordination among autonomous robotic nodes, location-specific services for handheld devices, and danger warning or traffic monitoring in vehicular networks are all examples of services that build on the availability of neighbour position information. The correctness of node locations is therefore an all important issue in mobile networks, and it becomes particularly challenging in the presence of adversaries aiming at harming the system. In these cases, we need solutions that let nodes correctly establish their location in spite of attacks feeding false location information, and verify the positions of their neighbors', so as to detect adversarial nodes announcing false locations. Now we focus on the latter aspect, hereinafter referred to as neighbor position discovery (NPD for short). Specifically, we deal with a mobile ad hoc network, where a pervasive infrastructure is not present, and the location data must be obtained through node to node communication. Such a scenario is of particular interest since it leaves the door open for adversarial nodes to misuse or disrupt the location-based services. For example, by advertising forged positions, adversaries could bias geographic routing or data gathering processes, attracting network traffic and then eavesdropping or discarding it. Similarly, counterfeit positions could grant adversaries unauthorized access to location dependent services, let vehicles forfeit road tolls, disrupt vehicular traffic or endanger passengers and drivers. In this context, the challenge is to perform, in absence of trusted nodes, a fully distributed, lightweight NPD procedure that enables each node to acquire the locations advertised by its neighbors, and assess their truthfulness.

LITERATURE REVIEW

A literature review is an account of what has been published on a topic by accredited scholars and researchers. Occasionally you will be asked to write one as a separate assignment, but more often it is part of the introduction to an essay, research report, or thesis. In writing the literature review, your purpose is to convey to your reader what knowledge and ideas have been established on a topic, and what their strengths and weaknesses are. As a piece of writing, the literature review must be defined by a guiding concept (e.g., your research objective, the problem or issue you are discussing or your argumentative thesis). It is not just a descriptive list of the material available, or a set of summaries. We begin with a study of the overall properties of the network. We show that the density of the network, which measures the amount of interconnection per person, follows the same unexpected pattern in both networks: rapid growth, decline, and then slow but steady growth. We postulate based on the timing of the events that the pattern is due to the activities of early Adopters who create significant linkages in their exploration of the system, followed by a period of rapid growth in which new members join more quickly than friendships can be established, settling finally into a period of ongoing organic growth in which both membership and linkage increases.

1. H. Cai and T. Wolf. On 2-way neighbor discovery in wireless networks with directional antennas.

Neighbor discovery is a crucial first step in configuring and managing a wireless network. Most existing studies on neighbor discovery are based on broadcast algorithms, where nodes send 1-way messages without getting response from their neighbors. However, when directional antennas are used, the ability to coordinate with a neighbor is crucial for later communication between nodes, which requires handshake-based (at least 2-way) protocols. In this paper, we provide a detailed analysis of neighbor discovery protocols with 2-way communication when using directional antennas. Based on this analysis, we present the design of a randomized 2-way neighbor discovery algorithm that uses a selective feedback. Our result shows that a node needs $\Theta(n^2/k)$ time to discover its n neighbors with k antenna sectors, which yields a significant performance improvement over pure randomized algorithms. We also extend our schemes to practical cases, where the number of neighbors is unknown, and show a factor of no more than 4/3 slowdown in performance

2. L. Chen, R. Fan, K. Bian, M. Gerla, T. Wang, and X. Li. On heterogeneous neighbor discovery in wireless sensor networks.

Neighbor discovery plays a crucial role in the formation of wireless sensor networks and mobile networks where the power of sensors (or mobile devices) is constrained. [2] proposed a secure hash message authentication code. A secure hash message authentication code to avoid certificate revocation list checking is proposed for vehicular ad hoc networks (VANETs). The group signature scheme is widely used in VANETs for secure communication, the existing systems based on group signature scheme provides verification delay in certificate revocation list checking. In order to overcome this delay this paper uses a Hash message authentication code (HMAC). In this paper, we propose two neighbor discovery protocols, called Hedis and Todis, that optimize the duty cycle granularity of quorum and co-primality based protocols respectively, by enabling the finest- grained control of heterogeneous duty cycles. We compare the two optimal protocols via analytical and simulation results, which show that although the optimal co-primality based protocol (Todis) is simpler in its design, the optimal quorum based protocol (Hedis) has a better performance since it has a lower relative error rate and smaller discovery delay, while still allowing the sensor nodes to wake up at a more infrequent rate.

3. G. Jakllari, W. Luo, and S. V. Krishnamurthy. An integrated neighbor discovery and MAC protocol for ad hoc networks using directional antennas.

Many MAC sub-layer protocols for supporting the usage of directional antennas in ad hoc networks have been proposed in literature. However, there remain two open issues that are yet to be resolved completely. First, in order to fully exploit the spatial diversity gains possible due to the use of directional antennas, it is essential to shift to the exclusive usage of directional antennas for the transmission and reception of all the MAC layer frames. This would facilitate maximal spatial reuse and will efface the phenomena of asymmetry in gain. Second, in the presence of mobility the MAC protocol should incorporate mechanisms by which a node can efficiently discover and track its neighbors. In this paper we propose PMAC, a new MAC protocol that addresses both the issues in an integrated way. [6] discussed because of various appealing focal points, agreeable correspondences have been broadly viewed as one of the promising systems to enhance throughput and scope execution in remote interchanges. The hand-off hub (RN) assumes a key part in helpful interchanges, and RN determination may considerably influence the execution pick up in a system with agreeable media get to control (MAC). PMAC incorporates an efficient mechanism for neighbor discovery, and a scheduling based medium sharing that allows for exclusive directional transmissions and receptions. We perform analysis and simulations to understand the performance of our scheme. We find that each node, on average, can achieve a per node utilization of about 80% in static and about 45% in mobile scenarios. In terms of throughput, our protocol is seen to outperform both the traditional IEEE 802.11 and previously proposed MAC protocols for use with directional antennas in ad hoc networks. [4] discussed that the activity related status data will be communicated consistently and shared among drivers through VANETs keeping in mind the end goal to enhance driving security and solace. Along these lines, Vehicular specially appointed systems (VANETs) require safeguarding and secure information correspondences.

EXISTING SYSTEM

In existing methodology, a fully distributed cooperative scheme for NPV, which enables a source node, to discover and verify the position of its communication neighbours. For clarity, here we summarize the principles of route discovery and position verification process. A source node, S can initiate the protocol at any time instant, by triggering the 4-step message exchange process [POLL, REPLY, REVEAL, and REPORT]. After completing the message exchange process, source node S has derives distance range of neighbour nodes to discover the shortest path to reach destination, after route discovery S runs several position verification tests in order to classify each candidate neighbor as either VERIFIED, FAULTY, UNVERFIABLE. [8] discussed that Helpful correspondence is developing as a standout amongst the most encouraging procedures in remote systems by reason of giving spatial differing qualities pick up. The transfer hub (RN) assumes a key part in agreeable correspondences, and RN choice may generously influence the execution pick up in a system with helpful media get to control (MAC).

DISADVANTAGES

- The node position verification is not suitable for dynamic environment,

• Since mobile nodes are in dynamic in nature,

• Each and every schedule the mobile nodes undergoes position verification test,

• Results in delay time of packet delivery ratio.

PROPOSED SYSTEM

In proposed system the NPV protocol is extended to dynamic source configuration routing protocol, which results in the mobile node verification instead of node position verification. The node verification achieved through hash function, which states that if source node wants to verify the neighbor nodes the source S generates a hash id through hash function H(n)= PUB_KEY/IDENTITY, the public key and id of source node generates hash id. In the same way the neighbor nodes generate the hash id, if the source node hash id and neighbor node hash id are same then the nodes are authenticated for data transmission through the minimum distance range discovered path to destination.

ADVANTAGES

• The proposed technique works in all kinds of environment and provides a secure data

• Transmission and also decreases the time delay, improves the PDR,

• Throughput rate in network performance.

CONCLUSION

Our analysis showed that our protocol is very robust to attacks by independent as well as colluding adversaries, even when they have perfect knowledge of the neighborhood of the verifier. Simulation results confirm that our solution is effective in identifying nodes advertising false positions, while keeping the chance of false positives low. Only an awesome occurrence of colluding adversaries in the neighborhood of the verifier, or the unlikely presence of fully collinear network topologies, can degrade the effectiveness of our Neighbor position discovery.

REFERENCES

[1] H. Cai and T. Wolf. On 2-way neighbor discovery in wireless networks with directional antennas. In *Proc. of IEEE INFOCOM*, pages 702–710, April 2015.

[2] Christo Ananth, M.Danya Priyadharshini, “A Secure Hash Message Authentication Code to avoid Certificate Revocation list Checking in Vehicular Adhoc networks”, International Journal of Applied Engineering Research (IJAER), Volume 10, Special Issue 2, 2015,(1250-1254).

[3] G. Jakllari, W. Luo, and S. V. Krishnamurthy. An integrated neighbor discovery and MAC protocol for ad hoc networks using directional antennas. IEEE Transactions on Wireless Communications, 6(3):1114– 1124, March 2007.

[4] Christo Ananth, Dr.S. Selvakani, K. Vasumathi, “An Efficient Privacy Preservation in Vehicular Communications Using EC-Based Chameleon Hashing”, Journal of Advanced Research in Dynamical and Control Systems, 15-Special Issue, December 2017,pp: 787-792.

[5] J.-R. Jiang, Y.-C. Tseng, C.-S. Hsu, and T.-H. Lai. Quorum-based asynchronous power-saving protocols for IEEE 802.11 ad hoc networks. Mob. Netw. Appl., 10(1-2):169–181, Feb. 2005.

[6] Christo Ananth, Dr. G. Arul Dalton, Dr.S.Selvakani, “An Efficient Cooperative Media Access Control Based Relay Node Selection In Wireless Networks”, International Journal of Pure and Applied

Mathematics, Volume 118, No. 5, 2018,(659-668).
[7] A. Kandhalu, K. Lakshmanan, and R. R. Rajkumar. U-connect: a lowlatency energy-efficient asynchronous neighbor discovery protocol. In Proc. of ACM/IEEE IPSN, pages 350–361, April 2010.

[8] Christo Ananth, Joy Winston.J., “SPLITTING ALGORITHM BASED RELAY NODE SELEC-TION IN WIRELESS NETWORKS”, Revista de la Facultad de Agronomía, Volume 34, No. 1, 2018,(162-169)..

[9] L. Li, J. Y. Halpern, P. Bahl, Y.-M. Wang, and R. Wattenhofer. A cone-based distributed topology-control algorithm for wireless multihop networks. IEEE/ACM Transactions on Networking, 13(1):147–159, February 2005.

[10] Y. Qiu, S. Li, X. Xu, and Z. Li. Talk more listen less: Energy-efficient neighbor discovery in wireless sensor networks. In Proc. of IEEE INFOCOM, pages 1–9, April 2016.