Volume 4, Issue 12, December 2014 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Collision Detection and Avoidance Using Modified Spin Protocol in Wireless Network

Mr. B. M. Rajesh
Assistant Professor,
Dept of Information Technology
Shri Nehru Maha Vidhyalaya CAS, India

Abstract: A wireless sensor network, which consists of an ad hoc group of small sensor nodes communicating with one another have a variety of applications such as traffic monitoring, emergency medical care, battle led surveillance and under-water surveillance. In such applications, it is often necessary to collect the data accumulated by each sensor node for processing. We call the operation of transmitting accumulated data from sensor nodes to the sinks data collection. In this paper, the problem and the schedule to quickly collect a large amount of data from sensor nodes to sinks were considered. Data need to be collected without merging. If the data is merged, then the operation is called data aggregation. It has been planned that a changed SPIN (M-SPIN) protocol victimization hop-count values of sensing element nodes for WSN. Here conjointly negotiation is finished before causation the particular knowledge. But in our theme, solely the nodes that are nearer to sink node sends REQ packets in response to ADV packet from the source node. So knowledge is disseminated to the sink or neighbor nodes towards the sink node. M-SPIN achieves energy savings by discarding packet transmission to the opposite direction of sink node.

Keywords: CSMA/CD, LEACH protocol, SPIN protocol

I. INTRODUCTION

Wireless Sensor Networks (WSN's) are attracting great interest in a number of application domains concerned with monitoring and control of physical phenomena, as they enable dense and undeterred deployments at low cost and with unprecedented flexibility. However, application development is still one of the main hurdles to a wide adoption of WSN technology. In current real-world WSN deployments, programming is typically carried out very close to the operating system, therefore requiring the programmer to focus on low-level system issues. This not only distracts the programmer from the application logic, but also requires a technical background rarely found among application domain experts[2][3]. The need for appropriate high-level programming efficiency has been long recognized and several solutions have been hitherto proposed, which differ along many dimensions. The survey of the state of the art in programming approaches for WSNs is done. The work begins by presenting taxonomy of WSN applications, to identify the fundamental requirements programming platforms deal with. Then, it introduced a taxonomy of WSN programming approaches that captures the fundamental differences among existing solutions, and constitutes the core contribution of this article. The presentation style relies on concrete examples and code snippets taken from programming platforms representative of the taxonomy dimensions being discussed. The taxonomy is used to provide an exhaustive classification of existing approaches.
Moreover, the existing approaches were also mapped back to the application requirements, therefore providing not only a complete view of the state of the art, but also useful insights for selecting the programming abstraction most appropriate to the application at hand. A wireless sensor network, which consists of an ad hoc group of small sensor nodes communicating with one another have a variety of applications such as traffic monitoring, emergency medical care, battle led surveillance and under-water surveillance. In such applications, it is often necessary to collect the data accumulated by each sensor node for processing. It calls the operation of transmitting accumulated data from sensor nodes to the sinksdata collection. The problem and the schedule to quickly collect a large amount of data from sensor nodes to sinks were considered. Data need to be collected without merging. If the data is merged, then the operation is called data aggregation. This is achieved by a protocol called Carrier Sense Multiple Access with Collision Avoidance[2][4]. The idea is to prevent collisions at the moment they are most likely to occur, i.e. when the bus is released. All clients are forced to wait for a random number of timeslots and then sense the medium again, before starting a transmission. If the medium is sensed to be busy, the client freezes its timer until it becomes free again. Thus, the chance of two clients starting to send simultaneously is reduced.

II. BACKGROUND AND MOTIVATIONS

2.1 ALOHA

Aloha[1][14] is based on the principle that if you have data to send, send it. If there is a collision then the protocol resends the data at a latter time. This leads to degraded channel utilization since multiple nodes may transmit at the same time. Slotted Aloha[17] is an extension of basic Aloha in which time is divided into discrete time slots. A node can only transmit at the beginning of these time slots. This helps in reducing collisions.

2.2 CSMA

Carrier Sense Multiple Access with Collision Detection. In CSMA, before transmitting, nodes listen for other traffic on the same shared medium. If they sense another node is transmitting, they withhold their transmission. Once the other node's transmission has finished, the waiting node may proceed to transmit. However, this still leaves a probability that multiple nodes may sense the channel idle and start transmitting simultaneously.

2.3 CSMA/CD

CSMA with Collision Detection (CD)[15] refers to the ability of the node to detect if and when a collision occurs. When this happens, the transmitting node immediately stops its transmission. It then calculates a random back off time t, after which it tries to re-transmit its frame. Since multiple nodes each choose a different t, this technique helps sort the problem of collisions. This protocol is used in 802.3 networks.

2.4 CSMA/CA

Carrier Sense Multiple Access (**CSMA**)[16] is a probabilisticMedia Access Control (MAC) protocol in which a node verifies the absence of other traffic before transmitting on a shared transmission medium, such as an electrical bus, or a band of the electromagnetic spectrum."**Carrier Sense**" describes the fact that a transmitter uses feedback from a receiver that detects a carrier wave before trying to send. That is, it tries to detect the presence of an encoded signal from another station before attempting to transmit. If a carrier is sensed, the station waits for the transmission in progress to finish before initiating its own transmission. "**Multiple Accesses**" describes the fact that multiple stations send and receive on the medium. Transmissions by one node are generally received by all other stations using the medium.

III. ARCHITECTURE AND DESIGN

It has been believed that any attempt to abort collisions in wireless links will need to conform to the following functional requirements.

(i) A wireless transmitter T cannot detect the collision while transmitting; the receiver R must get involved.
(ii) Receiver R will need to detect collision and convey it back before the packet is fully transmitted.
(iii) T needs at least an additional antenna for listening while transmitting.

IV. METHODOLOGY

LEACH:

LEACH is one of the first hierarchical routing Protocols used for wireless sensor networks to increase the life time of network[1]. LEACH performs self-organizing and re-clustering Functions for every round. Sensor nodes organize themselves into clusters in LEACH routing protocol. In every cluster one of the sensor node acts as cluster-head and remaining sensor nodes as member nodes of that cluster. Only cluster-head can directly communicate to sink and member nodes use cluster-head as intermediate router in case of communication to sink.

Cluster-head collects the data from all the nodes, aggregate the data and route all meaningful compress information to Sink. Because of these additional responsibilities Cluster-head dissipates more energy and if it remains cluster-head permanently it will die quickly as happened in case of static clustering. LEACH tackles this problem by randomized rotation of cluster-head to save the battery of individual node. In this ways LEACH maximize life time of network nodes and also reduce the energy dissipation by compressing the date before transmitting to cluster-head. LEACH routing protocol operations based on rounds, where each round normally consists of two phases.

SPIN PROTOCOL

SPIN could be a data-centric routing protocol. It fits below event driven data delivery model during which the nodes sense information and disseminate the info throughout the network by means that of negotiation. SPIN nodes use 3 kinds of messages for communication:

- ADV- once a node has new information to share; it will advertise this mistreatment ADV message containing data.
- REQ- Node sends associate degree REQ once it must receive actual information.
- Information- DATA message contains actual detector information.

The SPIN family of protocol is formed from four protocols, SPIN-PP, SPIN-BC, SPIN-RL, and SPIN-EC. These are presented in SPIN-PP utilized in network for point-to-point

Communication media and SPIN-BC utilized in broadcast communication media. SPIN-EC and SPIN-RL are the changed versions of the primary 2 protocols. SPIN-EC is associate degree energy protective version of SPIN-PP and SPIN-RL could be a reliable version of SPIN-BC. In SPIN-BC, nodes send their ADV message and every one nodes at intervals the transmission vary receive the message. Upon receiving associate degree ADV, each node

Checks whether or not it's already received or requested the advertised information. If not, it waits sure enough quantity of predefined time and sends a REQ message bent on the published address specifying the first publicized within the header of the message. On receiving a REQ message, solely the first publicized can respond and send the particular information to the requesting nodes.

The negotiation mechanism ensures elimination of redundant information. But it doesn't establish any path for information transmission and hence information delivery isn't warranted in SPIN. Another fascinating truth is that energy consumption not only depends on sensing the info however conjointly on process the sensed information and

transmission or receiving them to or from its neighbor nodes. Therefore if it's potential to regulate range of transmission and receipt of messages, a major quantity of Energy is saved. An event that happens within the WSN divides the whole network into two regions, A and B. detector nodes in region A are on the other facet within the network as compared with the sink node and sensor nodes in region B are on constant facet and nearer to the sink node. Detector nodes of region A will receive information from the event node; however, they'll unnecessarily waste their energy in receiving or transmission the info. So as to succeed in data to the sink node, information can need to travel a lot of hops if they are sent via the nodes in region A. Thus, once an occasion happens, it is perpetually fascinating that the info is distributed through the nodes in region B. this is able to save the energy spent for transmission of a piece of information from an occasion node to the sink node. However, such selective transmission isn't supported within the existing SPIN protocols.

Modified spin protocol:

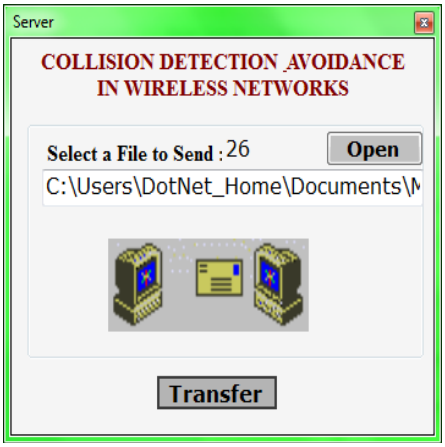
In few applications like alarm observation applications need fast and reliable responses. Suppose in fire warning system, fast response is required before any disaster occurs. During this case, it's fascinating that information should be disseminated towards the sink node terribly quickly. M-SPIN routing protocol is best approach for such form of applications than **SPIN.**

In planned protocol, ittend to add a replacement section referred to as Distance discovery to search out distance of every detector node within the network from the sink node in terms of hops. This suggests that nodes having higher worth of hop distance area unit far from the sink node. Alternative phases of M-SPIN area unit Negotiation and Data transmission. On the idea of hop distance, Negotiation is done for causation associate actual knowledge. Therefore, use of hop worth controls dissemination of knowledge within the network. Finally, data is transmitted to the sink node.

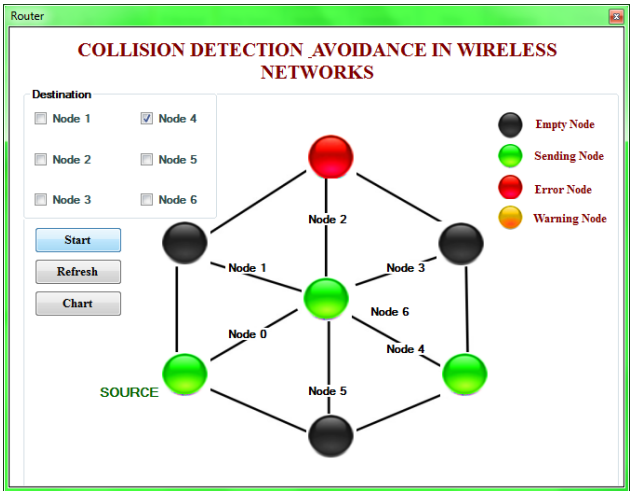
The Negotiation part is nearly like the SPIN-BC protocol. The supply node sends associate degree ADV message. Upon receiving associate degree ADV message, every neighbor node verifies whether it's already received or requested the publicized data. Not solely that, receiver node conjointly verifies whether or not it's nearer to the sink node or not as compared with the node that has sent the ADV message. This is often the most distinction between the negotiation part of SPIN_BC which of M-SPIN. If hop distance of the receiving node (own hop) is a smaller amount than the hop distance received by it as a part of the ADV message (rcev_hop),i.e. own hop < rcev_hop, then the receiving nodes send REQ message to the causation node for current information. The causation node then sends the particular information to the requesting node mistreatment information message. Figure five shows pseudo code of the Negotiation phase.

V. EXPERIMENTAL RESULTS

Server Sending Data



Router Detection avoided



VI. CONCLUSION AND FUTURE SCOPE

CSMA/CN to indicate that it's possible and useful to abort associate degree unsuccessful transmission with the aid of a collision notification from the receiver. The design is simple, whereas the extra hardware needs are bottom. many sides of CSMA/CN still want to be totally explored through intensive implementation and experimentation before it will be thought-about a viable different to CSMA/CA. All the same, it have a tendency to believe this work presents a preliminary nevertheless promising opening move in what might evolve into a replacement technology for future wireless networks.

The projected protocol outperforms CSMA/CA and, within the commonest eventualities, it even surpasses the theoretical boundary related to CSMA/CA networks that yield dynamic parameter adjustment. Ittend to show that it's possible to abort Associate in nursing unsuccessful transmission with the help of a collision notification from the receiver. CSMA/CN is a shot to approximate CSMA/CD in wireless networks. The study bestowed 1) illustrates the utility of random activity networks in representing each performance and liableness connected behaviors in a very single model and 2) provides sign cant insight into the perform ability of the 2 protocols studied. In relevance the modeling approach used, it absolutely was seen that random activity networks allow the illustration of a comparatively complicated fault model further as normal protocol operations, this can be necessary once doing perform ability evaluations of this kind. Additionally, the fault model was in-built a way within which there was minimal interaction between it and also the protocol models. Identical fault model may thus be ready to be accustomed investigate the perform ability of alternative protocols. In regard to the protocols themselves, the results of the study indicate that there are sign cant deference's within the behavior of the settled and non-deterministic collision-resolution schemes, that rely on each the oared work and rate at which transient faults occur. Within the fault free case, there's a definite region of oared workload within which every resolution theme performs best**.**

However one major downside is that few sensing element nodes could also be used many times and people nodes may dissipate energy might and should and will be destroyed prior alternative nodes within the network. In future it's going to be attainable to figure on this downside related to M-SPIN protocol and supply a better resolution for it.

REFERENCES

[1] M. Vutukuru, HariBalakrishnan, and K. Jamieson, "Cross-Layer Wireless Bit Rate Adaptation," in *ACM SIGCOMM*, 2009.

[2] S. Kumar, V.S. Raghavan, and J. Deng, "Medium Access Control protocols for ad hoc wireless networks: A survey," Elsevier Ad Hoc Networks, vol. 4(3), May 2006

[3] K. Lin, N. Kushman, and D. Katabi, "ZipTx: Harnessing Partial Packets in 802.11 Networks," in Proc. ACM Mobicom, 2008.

[4] B. Han, A. Schulman, F. Gringoli, N. Spring, B. Bhattacharjee, L. Nava, L. Ji, S. Lee, andR. Miller, "Maranello: Practical Partial Packet Recovery for 802.11," 2009.

[5] D. Halperin, T. Anderson, and D. Wetherall, "Taking the sting out of carrier sense: Interference cancellation for wireless lans," in ACM MOBICOM, 2008.

[6] Jun Peng et al, "A Wireless MAC Protocol with Collision Detection," IEEE Transactionson Mobile Computing, vol. 6(12), Dec 2007.

[7] S. Rayanchu, A. Mishra, D. Agrawal, S. Saha, and S. Banerjee, "Diagnosing Wireless Packet Losses in 802.11: Separating Collision from Weak Signal," in IEEE INFOCOM,2008.

[8] X.Wang,Y.Yu, and G.B.Giannakis.Design and analysis of cross-layer tree algorithms for wireless random access. IEEE Transactions on Wireless Communications,7(3): 909– 919,March2008

[9] A. Takagi, S. Yamada, and S. Sugawara, CSMA/CD with deterministic contention resolution," IEEE Journal on Selected Areas in Communications, vol. SAC-1, pp.877{884, Nov. 1983.

[10] T. Nute, "HCSMA - A nearly conflict-free hybrid CSMA protocol with high utilization,"in IEEE 1984 Computer Networking Symposium, (Los Angeles CA 90080), IEEE Computer Society, IEEE Computer Society Press, Dec. 1984.

[11] P. Gburzynski and P. Rudnicki, "A better-than-token protocol with bounded packet delaytime for Ethernet-type LAN's," in 1987 Simulation of Computer Networks, (Los Angeles CA 90080), IEEE Computer Society, IEEE Computer Society Press, Aug. 1987.

[12] G. Le Lann, "The 802.3D protocol: A variation on the IEEE 802.3 standard for real-time LAN's," tech. rep., INRIA-BP 105,F-78153 Le ChesnayCedex, France, Oct. 1987.

[13] G. Le Lann, "A deterministic 802.3 protocol for industrial local area networks," tech rep., INRIA-BP 105, F-78153 Le ChesnayCedex, France, 1987.

[14] L. Ciminiera, C. Demartini, and A. Valenzano, "Industrial IEEE 802.3 networks with short delivery times for urgent messages," IEEE Transactions on Industrial Electronics, vol. 35, pp. 18,25, Feb. 1988.

[15] J. I. Capetanakis, "Tree algorithms for packet broadcast channels," in IEEE Transactions on Information Theory, Vol IT-25, No. 5, Sep. 1979.35

[16] J. S. J. Chen and V. O. K. Li, "Reservation CSMA/CD: A multiple access protocol for LAN's," IEEE Journal on Selected Areas in Communications, vol. 7, pp. 202,210, Feb.1989.

[17] W. H. Sanders and K. H. Prodromides, "A comparison of collision resolution schemes forcarrier sense multiple access protocols," Technical Report CERL- TR-90-06, University of Arizona, Tucson, Arizona, July 1990.

[18] T. Williamson, "Designing microcontroller systems for electrically noisy environments," Tech. Rep. 231792-002, Intel - Application Notes, Santa Clara, CA, Nov. 1988.

[19] K. Jamieson and H. Balakrishnan, "PPR: Partial Packet Recovery for Wireless Networks," in ACM SIGCOMM, August 2007.

[20] M. Vutukuru et al, "Cross-Layer Wireless Bit Rate Adaptation," in SIGCOMM, 2009.

[21] K. Lin, N. Kushman, and D. Katabi, "ZipTx: Harnessing Partial Packets in 802.11 Networks," in Proc. ACM Mobicom, 2008.

[22] D. Halperin, T. Anderson, and D. Wetherall, "Taking the sting out of carrier sense: Interference cancellation for wireless lans," in MOBICOM, 2008.

[23] S. Gollakota and D. Katabi, "Zig-Zag Decoding: Combating Hidden Terminals in Wireless Networks,"in Proc. ACM Sigcomm, 2008.

[24] S. Kumar et al, "Medium Access Control protocols for ad hoc wireless networks: A survey," Elsevier Ad Hoc Networks, vol. 4(3), May 2006.

[25] Atheros, "802.11 WLAN Performance," .[8] Broadcom, "Wireless LAN Adapter User Guide.," .[9] S. Rayanchu et al, "Diagnosing Wireless Packet Losses in 802.11: Separating Collision from Weak Signal," in INFOCOM, 2008.

[26] Jun Peng et al, "A Wireless MAC Protocol with Collision Detection," IEEE Transactionson Mobile Computing, vol. 6(12), Dec 2007.

