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Implementing Enhanced AODV Using FLAP in Wireless Sensor Networks

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Abstract: *Wireless sensor networks (WSN), sometimes called wireless sensor and actuator networks (WSAN), are spatially distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, pressure etc. and to cooperatively pass their data through the network to a main location. AODV is a reactive protocol that has one section per destination. It uses RREQ & RREP to identify routes. It takes a long time to setup routes which reduces efficiency of the protocol. The amount of time required in handoffs can be reduced using FLAP protocol with AODV. Reducing Handoffs will help in increasing throughput and battery life of the network. This paper focuses on the enhanced AODV protocol with FLAP .Comparison of various protocols with enhanced protocol is shown through NS2 simulation by using parameters Throughput, Packet Delivery Ratio and Delay Time.*

Keywords: Wireless Sensor Network, AODV, FLAP, DSR.

1. Introduction

In computer science and telecommunications, wireless sensor networks are an active research area with numerous workshops and conferences arranged each year, for example IPSN and EWSN.The WSN is built of "nodes" – from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Each such sensor network node has typically several parts. The topology of the WSNs can vary from a simple star network to an advanced multi hop wireless mesh network.A WSN typically consists of a large number of low-cost [2], low-power, and multifunctional wireless sensor nodes, with sensing, wireless communications and computation capabilities. These sensor nodes communicate over short distance via a wireless medium and collaborate to accomplish a common task, for example, environment monitoring, military surveillance, and industrial process control. The basic philosophy behind WSNs is that, while the capability of each individual sensor node is limited, the aggregate power of the entire network is sufficient for the required mission.

A. WSN Protocols

1. Adhoc on Demand Distance Vector Routing Protocol (AODV)

Being fully a reactive routing protocol AODV [4] employs standard redirecting platforms, one access per location and series figures are used to establish whether routing data is up-to-date and to avoid redirecting loops. It can help in equally multicasting and unicasting both. AODV employs <RREQ, RREP> couple to obtain the route. The origin node transmitted the RREQ i.e. Path Demand information to their neighbors to obtain the path to destination. The RREQ meaning includes the origin and location handle, lifetime of information, routine amounts of resource and location and demand ID as special identification. Location Series Quantity is the newest routine quantity acquired previously by the origin for just about any way towards the location and Resource Collection Quantity is the existing collection quantity to be utilized in the way access going towards the foundation of the way demand .If any node from a listing of neighbors is location or understands the path to location, it may deliver RREP information to source.

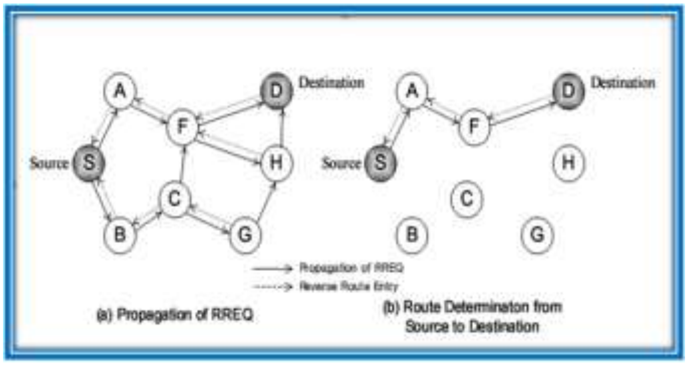

Figure 1: AODV Protocol [10]

2. Dynamic Source Routing Protocol (DSR)

The unique options that come with DSR [7] are: minimal system cost, number additional infrastructure for administration and the usage of resource routing. Resource redirecting signifies that the sender had whole understanding of the complete hop-by-hop option data to the destination. The method comprises both major elements of Option Finding and maintenance. It's applied in many other purposes and gives the outcome for performance of the warning nodes with different techniques. Generally channels are located in a way cache of every node. Whenever a node wants to connect to a location, first it checks for the way for that one location in the way cache. If sure, the packages are delivered with resource option header data to the destination. In one other event, if the option isn't offered by the option cache; then a node may start the option finding process to have the course first.

Figure 2: DSR Protocol [11]

3. Frame Layer Protocol (FLAP)

FLAP [8] is proposed in February 2014 being an effective and rapid certification protocol for WLAN. As the amount of WLAN permitted portable consumers raising everyday and 802.11i fails to offer as a result rapidly authorization to these consumers. Therefore there's a requirement of FLAP which could authenticate a brand new individual just with assistance from two communications. Wherever in 802.11i, EAPTLS requires 11 roundtrip communications .FLAP wasn't made to replace 802.11i, relatively. FLAP is found for the complement of the typical below some exceptional services.

2. Methodology

PROPOSED METHODOLOGY

FLAP provides a fast and convenient method of authentication which makes it faster to authenticate WSN/WLAN connections. AODV's handoffs can be reduced significantly using FLAP protocol. We will implement FLAP with AODV protocol for authentication of AODV and reduce time required for message handoffs in AODV. Use of 2 message authentication would increase throughput of messages and also increase overall network life by reducing communication time for single nodes. It is carried out in following steps:

Step1: Implement WSN protocols AODV, DSR and FLAP

Step2: Implement method using FLAP authentication

Step3: Enhance AODV using handoffs with FLAP

Step4: Compare Enhanced protocol with AODV, DSR and FLAP using Throughput, battery life, packet drops, end to end delay

Step5: Present result analysis

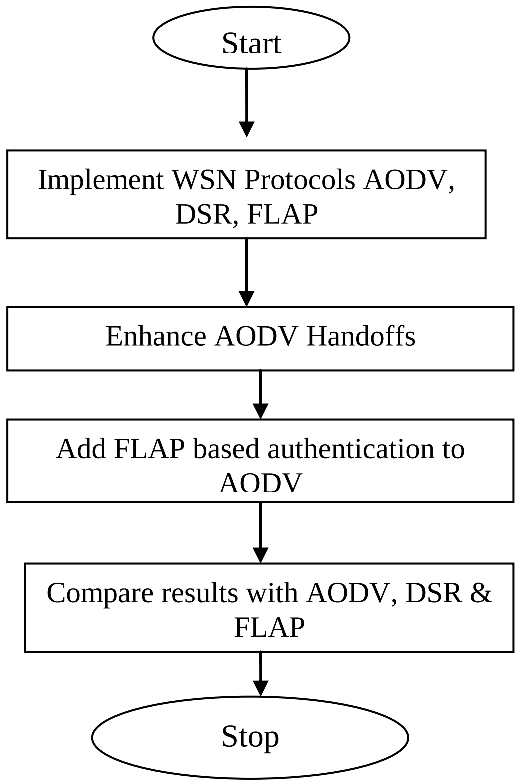

Figure 3: Flowchart of Proposed Methodology

3. Experimentation and Results

FLAP wasn't made to replace 802.11i, relatively FLAP is positioned for the complement with this common below some exceptional services. Therefore, a method was created allow FLAP |to master also, occur as well with typical 802.11i. The implementation algorithm for increased AODV (EFAODV) is identified before. We assess the outcome of EFAODV with the AODV project that which includes greater efficiency for obtaining the very the most effective way |in the event of big quantity of trails accessible through NS2 simulation [5]. The contrast} of equally standards tested on the basics} of high, medium and low level of transmission power of an access point and the outcome tells that the EFAODV has large efficiency at each level of transmission power than AODV. The main parameters for the implementation of EFAODV protocol are the transmission power as told earlier and the various simulation results shows that it gives better performance.

1. Enhanced AODV with FLAP (EFAODV)

Enhanced Protocol (EFAODV) reduces hand off delay. Originally WEP is planned by 802.11 Class. It typically gives two functionalities: authorization and privacy. But, several disadvantages have now been present in solitude} and authorization systems too. To solve the disadvantages of WEP, WPA is ratified by the Wi-Fi Alliance. A new better method 802.11i is also proposed for securing a WLAN network. But as the number of new stations increases, 802.11i becomes intolerable and mobile devices cannot take the full advantages of WLAN services. Thus we use FLAP for reducing this routing overhead and introduced EFAODV i.e enhanced AODV using FLAP which reduces hand off delay and improve the throughput of network .

Enhanced Protocol (EFAODV):

RREQ broadcast

1. Set Sequence_Req=1, EnergyReq =Es, Ireq=0
2. BroadCast to Neighbors

RREQ Handling:

1. Read Ireq
2. If Node X == Destination
    a. UPDATE route
    b. sendRREQ(node X, RREQ)
3. If Node X != Destination
    a. If Sequence_Req > Sequence_tb AND (EnergyReq > Energytb) AND Hop_Count_rq <Hop_Count_tb
        i. UPDATE, FORWARD RREQ
4. ELSE
    a. UPDATE RREQ: Sequence_tb=Sequence_Req, Hop_Count_tb = Hop_Count_Rq+1
5. UPDATE Route

Send RREP:

SendRREP(nodeX, RREQ)

1. SET Sequence_Resp=Sequence_Req, Hop_Count_Resp=0
2. BroadCast RREP to neighbors

RREP Handling:

1. ReceiveRREP(RREP,nodeX)
2. If nodeX == Source UPDATE route, DATA
    a. UPDATE PDT & NPL tables
    b. IF LinkBroke
        i. LocalRepair(node X, RREP)
    c. IF nodeX != Destination
        i. IF Sequence_Resp >Sequence_tb OR Sequence_Resp ==Sequence_tb AND Hop_Count_rp < Hop_Count_tb
            1. UPDATE, FORWARD RREP
3. ELSE
    a. FORWARD RREP, UPDATE RREP: Sequence_tb=Sequence_Resp, Hop_Count_tb = Hop_Count_Req+1
    b. UPDATE route, Sequence_tb = Sequence_Resp, Hop_Count_tb = How_Count_Rp

Local repair ()

1. If Err_Hop_Count <= INT(1/3 * Hop Count)
    a. routerHandoff(node X)
2. ELSE
3. RETURN

Router Handoff ()

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1. UPDATE HOFF_PACKET Pred, Handoff, Self address
2. UPDATE FLAP SEND
3. Broadcast HOFF_PACKET

The whole simulation process of enhanced protocol is shown in figure 4 and figure 5.

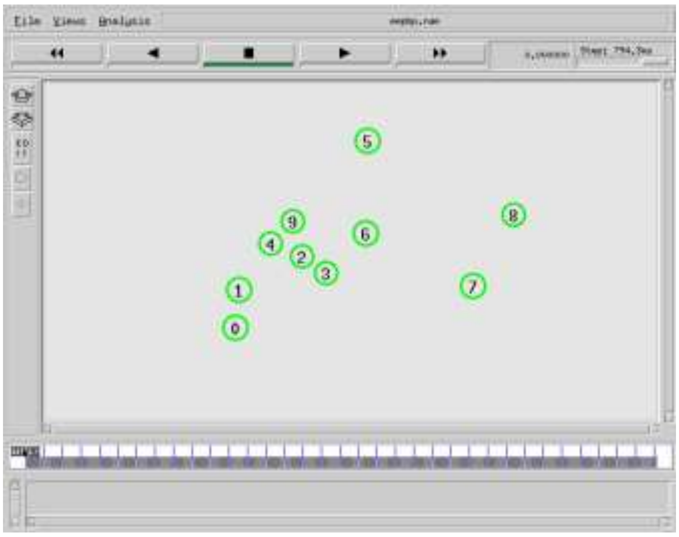

Figure 4: Initial state of Enhanced Protocol (EFAODV)

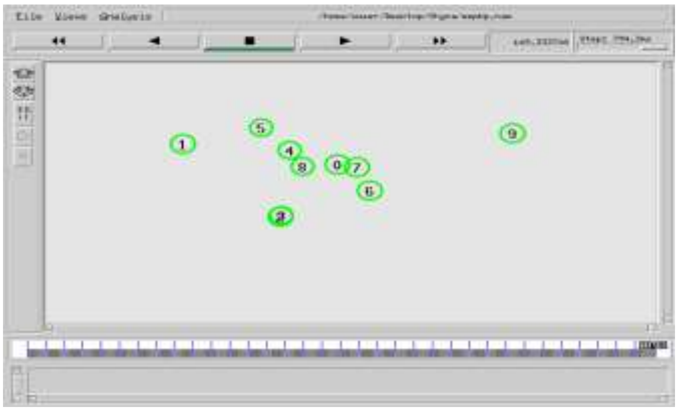

Figure 5: Final state of Enhanced Protocol (EFAODV)

4. Performance Analysis

This proposed method focuses on the enhanced AODV protocol with FLAP .Comparison of various protocols with enhanced protocol is shown through NS2 simulation by using parameters Throughput, Packet Delivery Ratio and Delay Time. Further the effect of the transmission power of Access Point on the performance of all protocols is also shown. Through simulation outcomes shows that the EFAODV is an effective protocol and give better results for both WLAN and WSNs.

1. Throughput

Throughput is just a way of measuring what quantity devices of information a process may move in certain way of measuring time. Through our analysis we came to know that Throughput of enhanced protocol is more as compared to other protocols. Comparison of throughput of three protocols w.r.t time is as shown in fig 6.

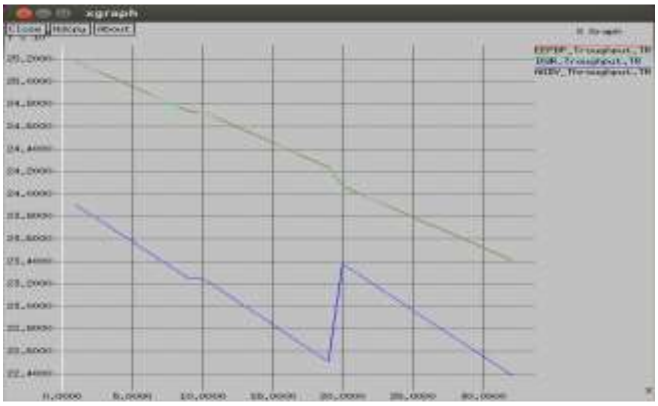

Figure 6: Throughput comparison of Three Protocols

Table 1: Simulated Values for throughput of three Protocols

Simulation Time	Throughput (AODV)	Throughput (DSR)	Throughput (EFAODV)
1	251.74	239.03	251.70
2	251.19	238.21	251.15
3	250.66	237.39	250.60
4	250.13	236.57	250.05
5	249.57	235.75	249.50
6	249.02	234.93	248.95
7	248.44	234.11	248.40
8	247.91	239.03	247.85
9	247.37	238.21	247.30
10	246.82	237.39	246.75
11	246.27	236.57	246.20
12	245.72	235.75	245.65
13	245.17	234.93	245.10
14	245.17	234.11	245.08
15	244.60	233.29	244.53
16	243.98	232.47	243.98
17	243.43	231.64	243.48
18	242.88	230.82	242.90
19	242.33	230.00	242.39
20	240.67	233.76	240.73
21	240.12	232.93	240.17
22	239.57	232.11	239.62
23	239.02	231.29	239.06
24	238.47	230.47	238.53
25	237.92	229.65	237.97

2. Delay Time

In computer networks, propagation delay or delay is the amount of time it takes for the head of the signal to travel from the sender to the receiver.

The hand of delay is the process of re-establishing a connection between nodes once the source and destination location has been changed.

Here the delay time of enhanced protocol is less as compared to other protocols. Comparison of delay time of three protocols w.r.t time is as shown in fig 7.

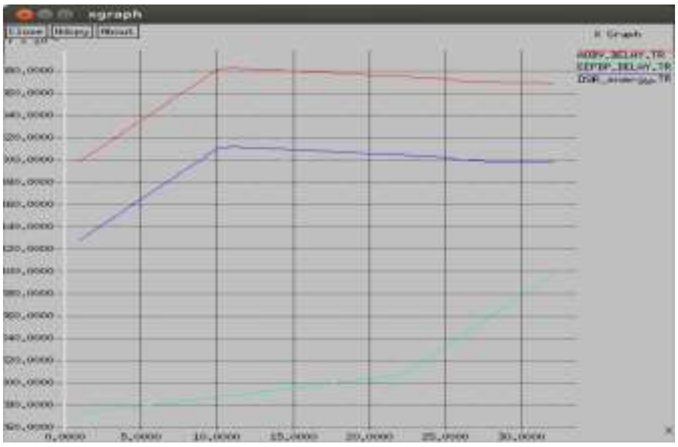

Figure 7: Comparison of delay time of three Protocols

Table 2: Simulated Values for delay time of three Protocols

Simulation Time	Delay Time (AODV)	Delay Time (DSR)	Delay Time (EFAODV)
1	0.000498	0.000428	0.000272
2	0.000508	0.000437	0.000274
3	0.000517	0.000446	0.000275
4	0.000526	0.000455	0.000277
5	0.000535	0.000464	0.000279
6	0.000544	0.000473	0.000280
7	0.000553	0.000482	0.000282
8	0.000562	0.000491	0.000284
9	0.000571	0.000500	0.000285
10	0.000581	0.000510	0.000287
11	0.000582	0.000512	0.000288
12	0.000582	0.000511	0.000290
13	0.000581	0.000510	0.000292
14	0.000580	0.000510	0.000293
15	0.000604	0.000533	0.000294
16	0.000579	0.000508	0.000296
17	0.000578	0.000507	0.000298
18	0.000578	0.000507	0.000300
19	0.000577	0.000506	0.000301
20	0.000576	0.000505	0.000303
21	0.000576	0.000505	0.000304
22	0.000575	0.000504	0.000306
23	0.000574	0.000503	0.000313
24	0.000574	0.000503	0.000323
25	0.000573	0.000502	0.000332

5. Conclusion

The WEP is planned by 802.11 Job Group.It usually offers two functionalities: verification and privacy. But, a several disadvantage have now been present in solitude and verification elements too. To eliminate the disadvantages of WEP, WPA is ratified by the Wi-Fi Alliance. A new better method 802.11i is also proposed for securing a WLAN network. But as the amount of new programs raises}, 802.11i becomes incredible and cellular devices can't get the total benefit of WLAN services. Thus we use FLAP in limiting the routing overhead and introduced EFAODV i.e enhanced AODV with FLAP which reduces hand off delay and improve the throughput of network .

So it can also overcome the load and delay time occurred due to the authentication process on Access Points. In WSN main focus is to make the network energy efficient, increase the packet delivery ratio and throughput. Enhanced protocol i.e AODV protocol with FLAP (EFAODV) in WSN can improve its performance.

References

1. https://en.wikipedia.org/wiki/Wireless_sensor_network
2. Emre Unsal , Mehmet Milli, , Yalçın Cebi . "low cost wireless sensor networks for environment monitoring". Published in The Online Journal of Science and Technology , Volume 6, Issue 2 , 2016.

3. John A. Stankovic . "Wireless Sensor Networks" . Published in 2006
4. Manpreet Kaur , Kamaljit Singh Saini , Simarpreet Kaur. "Performance Evaluation of FLAP in WSN " Published in 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun , India , 2015
5. Mamatha Bai B G , Dr. Sure sha. "evaluation of dsdv routing protocol in wsn using ns2 simulator". Published in International Journal of Research In Science & Engineering , e-ISSN: 2394-8299 Volume: 1 Special Issue: 2 p-ISSN: 2394-8280.
6. Manpreet Kaur , Kamaljit Singh Saini , Simarpreet Kaur. "Performance Evaluation of FLAP in WSN " Published in 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun , India , 2015
7. https://en.wikipedia.org/wiki/Dynamic_Source_Routing
8. Manpreet Kaur , Kamaljit Singh Saini , Simarpreet Kaur. "Performance Evaluation of FLAP in WSN " Published in 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun , India , 2015
9. https://en.wikipedia.org/wiki/Wireless_sensor_network
10. https://www.google.co.in/search?qaodv+image
11. https://www.google.co.in/search?q=dsr+protocol+in+wsn+images
12. Manpreet Kaur , Kamaljit Singh Saini , Simarpreet Kaur. "Performance Evaluation of FLAP in WSN " Published in 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun , India , 2015
13. Manmeet Kaur , Amandeep Kaur Virk ." Comparative Study of AODV, DSR and DSDV in Vehicular Ad-Hoc Networks" Published in International Journal of Advanced Research in Computer Science and Software Engineering, , 2015.
14. Yan Yu, Ramesh Govindan, Deborah Estrin ." Geographical and Energy Aware Routing: a recursive data dissemination protocol for wireless sensor networks" . 2001.
15. Arati Manjeshwar , Dharma P. Agrawal." TEEN: A Routing Protocol for Enhanced Efficiency in Wireless Sensor Networks". Published in IEEE , 2001
16. Ravi Kishore Kodali, Venkata Sai Kiran A., Shikha Bhandari and Lakshmi Boppana . "Energy Efficient m− level LEACH protocol"Published in *International Conference on Advances in Computing, Communications and Informatics (ICACCI) ,2015*
17. Chris Karlof , David Wagner **."** Secure routing in wireless sensor networks: attacks and countermeasures". Published in Elsevier,2003
18. K. Akkaya , M. Younis . "An energy-aware QoS routing protocol for wireless sensor networks" Published in IEEE , 2003
19. TA Yang . "WLAN Security: Simplifying Without Compromising " .2003
20. J .N. Al- Karaki , A. E. Kamal ." Routing techniques in wireless sensor networks: a survey" Published in IEEE , 2004
21. Sean ." WLAN Security: Simplifying Without Compromising" , 2003
22. Kemal Akkaya , Mohamed Younis **.** "A survey on routing protocols for wireless sensor networks " Published in Elsevier , 2003
23. Mikhail Afanasyev, Tsuwei Chen, Geoffrey M. Voelker . "Usage Patterns in an Urban WiFi Network " Published in IEEE explore , 2010.
24. Eugene Y. Vasserman , Nicholas Hopper **. "**Vampire attacks: Draining life from wireless ad-hoc sensor networks". Published in IEEE explore, 2013.
25. Sandhya k, Nagaraju Rayapati **."** Fast and Secure Initial Access Authentication Protocol for Wireless LANS". Published in American Journal of Engineering Research (AJER), 2014.