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Different Routing Protocols for Wireless Body Sensor Area Network

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Abstract—Locomotion produced by body movements in Wireless Body Area Networks (WBANs) affects the link-quality of intra-BAN and inter-BAN interacting units, that, in turn, changes the Quality-of-Service (QoS) of individual WBAN, that includes reliability, efficient data transmission and network throughput . Further, the variation in link quality In central of WBANs and Access Points (APs) makes the WBAN-equipped cold-blooded more resource-constrained in nature, which also varies the data dissemination delay. Therefore, to lessen the DDA of the network, WBANs send Cold-blooded' physiologic info to local servers using the proposed opportunistic transient connectivity establishment algorithm. Additionally, limb/body movements induce dynamic changes to the on-body network topology, which, in turn, increases the network management cost and decreases the life-time of the sensor nodes periodically. Simulation results show significant improvement in the network performance compared to the existing solutions.

Keywords :. Energy Efficient,Wireless Body Area Networks, NCDM,WNCDM

I. INTRODUCTION

Real-time electronic healthcare services are provided by WBAN to cold-blooded ,In emergency in a appropriate cost. Implantation of sensor are done on/in person body to sense physiologic info. Later sensing the physiologic info, sensed data are transferred to the Local processing Unit (LPU).

Subsequently, the aggregated data are transmitted by LPU to the local access points (APs), i.e., then, transmitted to the medical servers [1], [2]. The body with attached sensor nodes transmit the medical info to LPUs at range of 10 Kb/s to 10 Mb/s [3]. Also, there's a Restriction of energy consumption rate of sensor nodes, as the battery strength of the nodes are limited. To decrease energy absorption, one –hop star technology are used by the sensor nodes the sensor nodes[4]. Therefore, In WBAN dynamism increases due to environment obstacles, due to which network topology chages due to which there is again minimization of network QoS . Additionally, inter-node connectivity are affected by body movements ,there's a variation in WBAN nodes as function of time [5].Locomotion of WBAN and Motivation Due to body movements [6],the life time of body sensor nodes and the link qualities of intra-BAN and inter-BAN communication units degrade significantly, which increases the packet loss rate and decreases the life-time of the body sensor nodes. Further, the above also disrupts data dissemination.

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II. METHODLOGY

A. OPS

It's a opportunistic routing protocol that provides route to the packets ,when packets are travelling from source to destination

B. NCDM

NCDM Provides better performance than that of OPS, as it has used algorithm

C. WNCDM

III. THE PROPOSED PROTOCOL IS CALLED AS WEIGHT BASED N/W AND DISTRIBUTED MANAGEMENT (WNCDM) WHICH IS BASED ON RECENT WORK NCDM .

I ALGORITHM FOR OPTIMIZATION OF COST

1. At time t x_{ij}^{intra}
2. At time t X_{ij}^{inter} are evaluated
3. At time t $C_{x_{ij}}^{intra}$
4. At time t $C_{X_{ij}}^{inter}$ Calculated
5. **if**
6. $\xi_{decision}^{t} \geq \xi_{decision}^{t}$
7. **then**
8. connection
9. Update $T_{wait} = T_{low}$
10. **if** $C_{OC_{tot}}^{t} \geq C_{OC}^{th}$ **then**
11. Compute
12. $C_{DC_{tot}}^{t}$, $C_{inff_{tot}}^{t}$.
13. Compute
14. $C_{qos_{tot}}^{t}$, $C_{E_{tot}}^{t}$
15. **end if**
16. **if**
17. $C_{tot}^{t} \geq C_{tot}^{th}$
18. **then**
19. N/W management cost is established
20. $CM_{i,j}^{*}$.
21. **end if**
22. **end if**
23. Update
24. $T_{wait}^{*} = (T_{low} + 1)$.
25. Return when $T^{*} = T_{tot}$

IV. ALGORITHM FOR RDD

1. *S* It is related to route discovery
2. *S* searches one-hop beside nodes *n*
3. *S* transformation RREQ's to *n*
4. RREQ at each $I \epsilon n$ Upon receiving

   w1 = locomotion(I)

   w2 = r energy (I)
5. Calculate trust:

   $T^I = (w1 + w2)/2$
6. Point *node I* with highest value T^I with all existing n
7. Table which consists of routing info updated
8. If (I == D)
9. *I* trasferRREP to *S*
10. *S* begins to send data
11. Else
12. Repeat *S* = *I*
13. End If

V. RESULT AND DISCUSSION

OPS protocol is not performing well in comparison with NCDM and proposed WNCDM. The NCDM protocol includes the algorithms for energy and cost optimization for network management. delivers the second best performance. The NCDM performance is extended by the proposed WNCDM further improves by designing the weight based data dissemination algorithm. The WNCDM clearly achieved significant improvement in network QoS and energy efficiency performances. Below depicts the efficiency of WNCDM over the existing methods. Considering nodes from 50 to 350.Computed the results for 50 and 350 nodes.Also ploted the graph for 50 and 350 nodes.

1. Results of OPS with 50 Nodes
   Computations of Protocol
   Average Throughput[kbps] = 250.48 Start Time=10.00 Stop Time=30.00
   average energy consumed 0.0925008
   Generated Packets : 1813
   Received Packets : 1223
   Packet Delivery Ratio : 67.4573%
   Dropped Packets : 590
   Average Delay : 1.77711

2 .Results of NCDM with 50 Nodes
   Computations of Protocol
   Average Throughput[kbps] = 259.87 Start Time=10.00 Stop Time=30.00
   average energy consumed 0.0775008
   Generated Packets : 1813
   Received Packets : 1273
   Packet Delivery Ratio : 70.2151%
   Dropped Packets : 540
   Average Delay : 1.70731

3..Results of WNCDM with 50 Nodes
   Computations of Protocol
   Average Throughput[kbps] = 269.27
   Start Time=10.00 Stop Time=30.00
   average energy consumed 0.0705008
   Generated Packets : 1813
   Received Packets : 1323
   Packet Delivery Ratio : 72.973%
   Dropped Packets : 490
   Average Delay : 1.64279

4..Results of OPS with 350 Nodes
   Computations of Protocol
   Average Throughput[kbps] = 311.25 Start Time=10.00 Stop Time=29.99
   average energy consumed 0.187857
   Generated Packets : 1776
   Received Packets : 1515
   Packet Delivery Ratio : 85.3041%
   Dropped Packets : 261
   Average Delay : 0.553951

5.Results of NCDM with 350 Nodes
   Computations of Protocol
   Average Throughput[kbps] = 326.81
   StartTime=10.00 StopTime=29.99
   average energy consumed 0.172857
   Generated Packets : 1776
   Received Packets : 1565
   Packet Delivery Ratio : 88.1194%
   Dropped Packets : 211
   Average Delay : 0.536253

6.Results of WNCDM with 350 Nodes
   Computations of Protocol
   Average Throughput[kbps] = 342.37
   Start Time=10.00 Stop Time=29.99
   average energy consumed 0.165857
   Generated Packets : 1776
   Received Packets : 1615
   Packet Delivery Ratio : 90.9347%
   Dropped Packets : 161
   Average Delay : 0.519651

VI. ABBREVIATIONS AND ACRONYMS

ATP-Average Throughput
AEC-Average Energy Consumption
GP-Generated Packets
RP-Received Packets
PDR-Packet Delivery Ratio
DP-Dropped Packet
AP-Average Delay
OP-Opportunistic Protocol
NCDM-Network Communication Distributed Managemet
WNCDM-Weighted NCDM

A. Equations

The Locomotion which is weight dependet computed as:

$$w_j = 2 - S^j \quad \ldots (1)$$

Where S^j is the present act of node *j*. In this paper, we are considering highest motion of WBANs is 2 m/s. Highest t value of w_j, trust value of node *j*.

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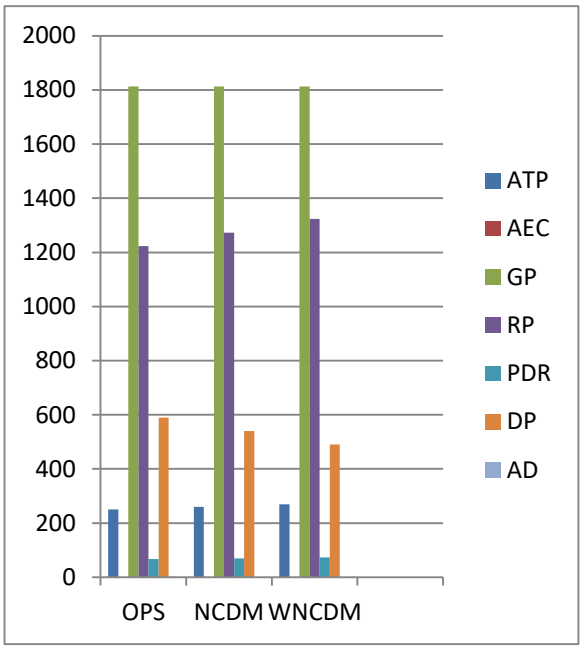

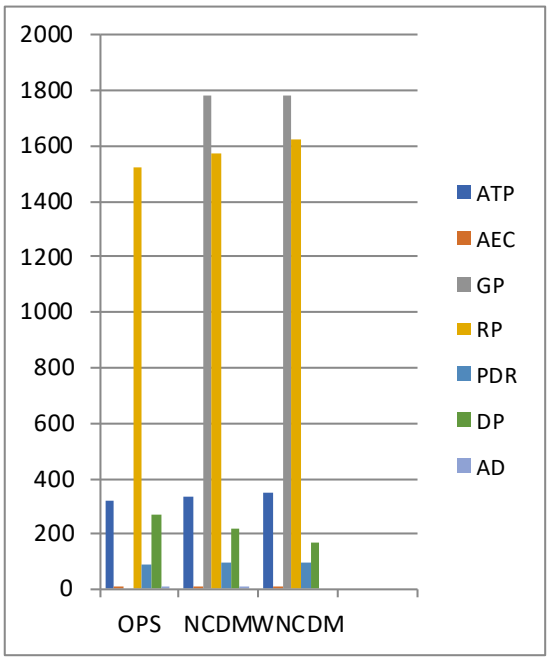

VII. CONCLUSION

This paper carries the design and evaluation of new opportunistic routing protocol for WBANs. The destination was to slow down the energy consumption and cost when performing the WBANs network management with acceptable QoS performance. The locomotion and energy constraints lead the unreliable communications in network. To overcome such problems, we designed weight based link establishment algorithm. WNCDM is performing good as compared to OPS and NCDM

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