Analysis of QOS in Wireless Sensor Network

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Abstract—**Wireless communication is day to day life part of common man. It is integral part of society as well. In wireless communication, wireless sensor network has immense importance due to its various advantages and applications. Especially its capability of artificial intelligence between sensor node communications enlightens its functionality. Wireless sensor network has its quality of service parameters by which its performance can be analyzed. These qualities of service parameters include delay distribution. This paper is intended to focus on advantages of drunken yard walk over traditional method of network architecture enabled communication in wireless sensor network. Drunken yard walk concept helps to improve source to destination delay as well as node to node delay in wireless sensor network.**

Index Terms—**QOS parameters; Source to destination delay; Node to node delay; Cross layer structure**; **WSN: Wireless sensor network.**

I. INTRODUCTION

Wireless networks are becoming drastically popular in communications, particularly for the allotment of mobile access to wired network services. For the same reason researchers are engaged in delivering the reliable data communication for wide and versatile applications over different wireless infrastructures. [1]IEEE 802.11 is backbone of wireless network. It has shown significant reliability, flexibility in wireless network. Independent of location and type of communication system mobile user is able to access wireless network system. But still IEEE 802.11 has limitations such as bandwidth problems, latency, information loss, End to End delay.

Moreover, the deployment of the Transmission Control Protocol (TCP) over IEEE 802.11 networks is constrained by the low reliability of the channel, node mobility, and long and variable Round Trip Times (RTTs).[2]

The traditional wireless sensor network follows TCP/IP & OSI network architecture & respective protocols to enable communication between source nodes to destination node as well as communication between individual nodes. Wireless sensor network fetching concentration of scientists due to its capability of artificial intelligence to take decision by its own in remote area without any interference of human being.
Though WSN is capable of taking decision by its own although it is characterized by some problems as well. To overcome these problems and to improve performance of wireless sensor network, Quality check is performed. This quality check is called as quality of service parameters.QOS parameter is used to analyze performance of WSN. We can say that QOS parameter is measure of performance quality of wireless sensor network.

QOS parameters include parameters like delay between Individual nodes, delay between source node and destination node. Cross talk, interference. In this paper we are showing and implementing drunken yard walk to improve delay in wireless sensor network.

Wireless sensor network is characterized by environmental effects. Generally wireless sensor network is used at remote area whose environment is not appropriate for human beings. These environmental effects cause random noise in wireless sensor network. Random noise cannot be determined by any mathematical expressions. In order to fix the random noise it is necessary to use probability theory in wireless sensor network. in traditional WSN probability theory is not used which causes increase in delay distribution.

One more problem related to traditional system is lack of communication in layered architecture. This problem also causes increased delay in wireless sensor network. In layered architecture each layer has been allotted with specific service. The lower layer provides services to upper layer. That means layers in network architecture are dependent on one or more other layers. This situation may cause bottleneck in network. Beyond bottleneck situation lack of communication between layers also troubles traditional network architecture. This one more problem also increases delay in wireless sensor network.

To overcome these problems in traditional system in this paper we are implementing probability theory as well as drunken yard walk concept. Probability theory and drunken yard walk will compensate random noise and lack of communication between layers.

Here drunken yard walk concept with cross-layer structure in network architecture, improves communication between the layers to improve delay distribution in wireless sensor network.

II. SYSTEM DESIGN

Time varying conditions in wireless sensor network degrades the quality of service parameters. Degradation of these QOS parameters is a challenging issue. This issue must be properly tackled by network researchers. To tackle this issue Mitola introduced rearrangement of stack parameters of protocol. This rearrangement is done with cognitive radio style. [3]addition to this concept one more innovation is also introduced that is nothing but cross-layer design.[4]Cognitive radio network is a earlier developed networking paradigm that combines cooperative frame-working, cognitive radio network concepts, and cross-layer design in order to provide real-time end-to-end delay distribution optimization of complex communication systems.

Figure.1 gives an idea about structure used and implemented to make easy communication in between the different layers. It is example of co-operative utilization of protocols between different layers. [5] This structure is fascinated by drunken yard walk concept to initiate communication in between different layers. Each protocol is embedded with small software assistance to share information in between different layers. The information got at the different protocol layers is sent to the cognitive plane implemented at the cognitive network node. As shown in

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figure the cognitive plane is used to perform decision processing and making as well as data analysis.

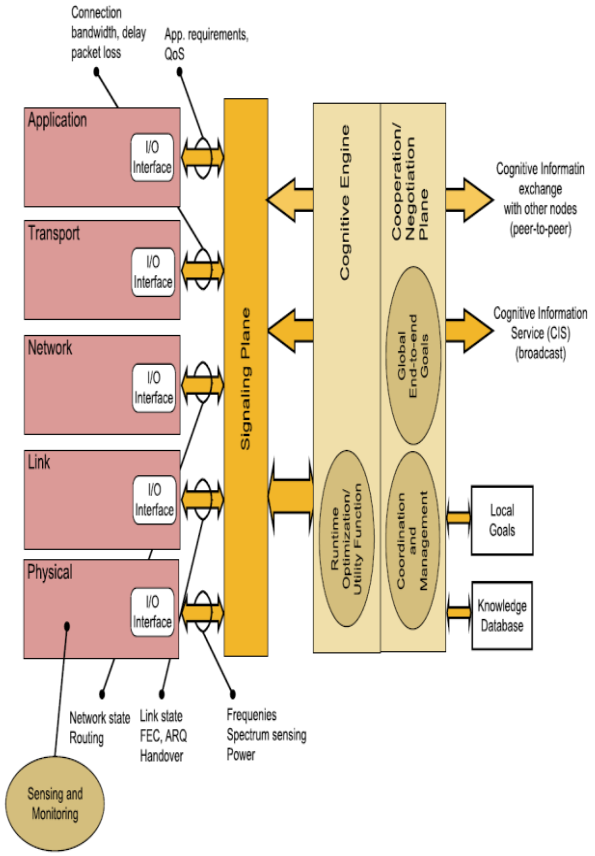

Figure.1: Cross layer design

The outcomes of data analysis are used as informative knowledge. This knowledge is stored in to local database.
Here cognitive engine finds efficient operational point. To find out efficient operational point, cognitive engine performs utilization of protocol stack parameters at individual node.

Operational points are set by considering all reports from individual nodes and running applications. Here cognitive adaptation algorithm has important role. Cognitive adaptation algorithm has cycles such as reading, data research, decision making and implementation.
The cognitive engine takes decision with the help of goals described by local database .ultimately to upgrade performance of protocol stack.

Most of them are provided by the demands and quality of service requirements of end user applications running at a particular cognitive node.
Keeping eye on end to end basis global optimization of goals is described. Global optimization of goals require effective co-operation between individual nodes working efficiently with cognitive engine.

Cognitive plane is directly connected to database of goals and knowledge. Ultimately cognitive plane enables rapid information trans-receiving. Depending on type of signal processing type and parameters, signaling plane enables efficient signal information processing. Signaling plane itself enables communication between protocol stack. The signaling plane also has immense role in communication between different network nodes. It allows exchanging information between different network interfaces.

One interface functions on a peer-to-peer type it permits information interaction between any two nodes of the network in a distributed type. cognitive information service work together with network segments. it has network broadcast channel. These network broadcast channels used to share information from different individual nodes. but cognitive information service is characterized by scalability factor. it is generally used with properly defined network such as Wi-Fi network.

To avoid sequential limitations it is necessary to implement interrupts and special call back functions. As well as information to be shared must be stacked in proper manner. The information must be filtered in a distributed way. This filtered and stacked information enables cognitive engine to work efficiently. All these work is carried out with the help of Negotiation and co-operation plane.

At every adjustment, such information is addressed back to cognitive nodes, hence they can manage their particular local databases and, as a result, their functioning.
Cognitive network architecture is characterized by scalability. This scalability can be compensated with the combination of distributed and centralized techniques at network and node level respectively.

The cooperative optimization frame provides a direction for network elements to adjust their configuration and protocol stack parameters to constantly adjust to varying network conditions. Complex algorithms together with shared information are used to setup efficient protocol parameters.

The future approach is based on the cooperative architecture .mainly relies on commands & feedback loop permitting them to parameter controlling internal to the protocol layers parameters. The basic idea is to allow every node to randomly choose slight variations of few parameters, verify them and utilize the information to know the best parameter setting for the operating context.

While working Cognitive plane has main challenge that is nothing but adaptation of protocol stack parameters to drive efficient operation point for wireless sensor network.
In our paper protocol parameter P is defined in terms of its default value *Pdef* and range of operation given by [*Pmin*, *Pmax*].protocol operation starts with parameter P, the cognitive mechanism starts searching for efficient P values.

After specific time interval cross layer design mechanism measures the quality parameter performance from value after that the mechanism selects the value of P that gives the top performance. At random number generator the P value is set as a mean to track normal distribution. The optimized P is from range [*Pmin*, *Pmax*]. Normal distribution provides probabilistic approach to find out highest frequency value. In other words optimized value of P. the figure.2 shown below describes the flow in cognitive window ensuring the improved quality of service parameters to cross-layer design. From flow F1 and F2 in cognitive window it is much clear that cross layer design approach gives optimal performance as compared to traditional approach. This result is outcome of combined approach. The approach consisting of probabilistic analysis, cognitive framework concept and cross-layer design. In results the outcomes are reflecting brightly due to improved communication between different layers and probabilistic analysis taken in to considerations. Results show improved delay between the individual nodes as well as different network nodes.

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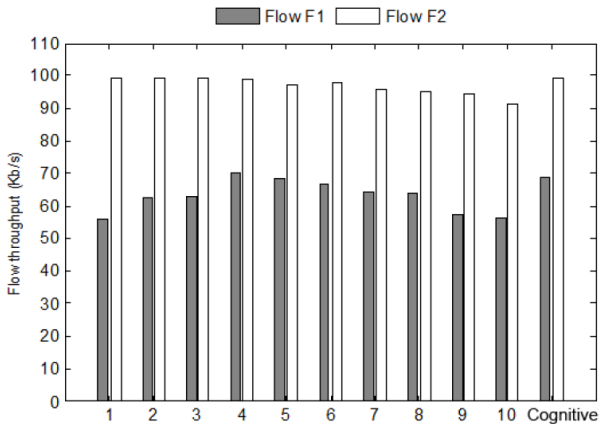

Figure.2: Cognitive window

III. TESTING AND RESULTS

Quality of service ensures the efficient working of wireless sensor network. This paper has been produced to implement small effort to analyze and improve end to end delay with our new technique. A drunken yard walk based on birth–death problem is used to model the communication process in a multi hop network. The new implementation has been verified with number of tests and possibilities. The results clarify that the proposed framework accurately models the distribution of the end-to-end delay and captures the heterogeneous effects of multi hop wireless sensor networks. The implementation of new technique overcomes the limitations of existing wireless sensor network.

S. N.	**Parameter**	**Packet**	**Existing Technique**	**New Technique**
1.	Average Delay(msec)	30	0.267	0.062
2.	End to End Delay(msec)	30	0.5112	0.11008
3.	Average Delay(msec)	80	0.9843	0.512
4.	End to End Delay(msec)	80	0.452	0.29870

Table .1: Results for comparison of delay

IV. CONCLUSION

Simulations with Network Simulator 2 for Cross layer Protocol shows

1) WSNS for CSMA/CA protocol and average delay between the two sensor nodes also End to End delay between networks is calculated.

2) WSNs with cross layer design are implemented and Respective end to end delay between the networks is calculated

3) Simulation results for Cross layer gives the minimum End to End delay as compared to CSMA/CA.

In some applications, the traffic generated for the physical event can be burst. For tractability, the burst traffic pattern is not considered in this project. So in future system can be implemented with burst traffic. As future work, to analyze the delay for more MAC protocols, such as BMAC [6], XMAC [7] using model.

Using this model it is possible to extend the model to capture more generic network topologies, and traffic types, such as periodic and burst traffics. Moreover, other network lifetime definitions will be investigated. Model can be extended to proposals in IEEE 802.11e to reduce these delays which allow a node to schedule a burst of packets once they gain channel access.

REFERENCES

[1] F.Granelli ,D.Kliazovich, “Cross layer designs in wlan systems”2008.
[2] F.Granelli ,D.Kliazovich, “Cross layer designs in wlan systems”2008.
[3] J. Mitola III, “Cognitive radio for flexible mobile multimedia”in 2001.
[4] L. A. DaSilva and A. B. MacKenzie, R. W. Thomas, D. H. Friend, “Cognitive networks: adaptation and learning to achieve end-to-end performance ”.
[5] http://en.wikipedia.org/wiki/Wireless_sensor_network.
[6] http://www.cygwin.com./
[7] M. C. Vuran ,Yunbo Wang and S.Goddard “Stochastic Analysis of Energy Consumption in Wireless Sensor Networks.”

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