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High Efficiency and Increased Lifetime in Body Area Network using Resource Allocation

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Abstract*: *The body area network is a main source for wireless communication in the field of medical electronics. It uses various resources such as channel, frequency, bandwidth etc. To make the communication faster and easier. Hence the data losses and delay are the main issues in the BAN, to address these issues many protocol and algorithm are proposed the issues are not completely addressed yet. Implementing line equation and frequency splitting algorithm and this algorithm is used to calculating distance between the nodes. BAN allows to utilize unused spectrum so we have to check that channel using channel estimation techniques. After channel estimation we can measured frequency range and bandwidth of that channel. In this system we are implemented best frequency generator or clock generator for generate various frequency based on the nodes distances. In our system we use the optimal methodology to address these problem, we obtain the maximum efficiency through our proposed system. source and destination first then the channel, bandwidth and frequency will be allocated as per the distance. If the distance increases the resources also increased and vice versa. So that far nodes will communicate with higher resources leads to minimized data loss and delay. Our system is simulated in network simulator 2 and obtain a result od 4~5 of increase in efficiency. We show our result in graphical representation.

Index Terms*: *Body Area Network (BAN), SNR ratio, Hidden Markov method, spectrum analysis.

I. INTRODUCTION

Body Area Network (BANs) plays an important role in todays world. It is been universally accepted by the people all over the world for the wireless communication in the field of medical electronics. This communication involves many environmental parameters in that spectrum utilization plays a vital role. This spectrum utilization actually disturbs the efficiency if it is not been properly maintained. Since here it is full of RF environment this spectrum sensing and sharing will make huge difference in the communication process. It helps in increasing the spectrum sensing enormous in order to increase the efficiency in wireless communication. It actually allows all users such as the primary, secondary users in spectrum sharing for communication. By allowing these users it is very easy to find out the range of each users who is consuming more and who is consuming less in the spectrum sharing.

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In-spite of this enormous spectrum sharing utilization the technology of BAN suffers from many risk factors. The main risk will be the use of frequency of the users in the covered area. This frequency parameter plays a vital role in here as the entire communication process is totally dependent on this parameter. If the frequency is found to be low there will be a loss in the user consuming the spectrum sharing. If the frequency is high no such loss takes place. So this parameter is always motivated here to maintain a good efficiency in the communication. In case of spectrum sensing and sharing the is a process called fusion is involved. The place where the fusion is carried out is called as the fusion centre. So before starting this fusion process analysis of the particle has to be done. Analysis is nothing but analyzing each and every corresponding users efficiency in the communication system. This will act as an backbone in the entire communication process as it will check on the system how the users activation process is going out without any interruption. Here a table is been maintained in order to store up all the information's of the users for reference. By this report only the process of sensing and spectrum sharing takes place. Here all the users have been taken into account. Their parameters such as energy, power, transmitting time, packet loss, delivery ratio, throughput all been taken into account and is been temporarily stored in the routing table. By the help of this table only the process of fusion takes place. The parameters are checked then and there from the routing table then where the parameters value is low the corresponding user is taken into account and it is compensated by the exact correct user. So when we do this step again and again the spectrum sensing and sharing of the users will be very good. This fusion centre process will have three different criteria's such as: (i) direct frequency hopping; (ii) indirect frequency hopping (iii) active state of users in the communication links. Location parameter also plays a vital role here. The location of RF emitting signal pole is always a challenging process before the communication tales place. They should be placed in a correct position so that the entire uses receive the signal in all possible ways without interruption. This location should be in a place where the maximum efficiency of each users is been achieved. If this location is correctly done there wont be any problem in the entire fusion process.

(a) Cooperative sensing (b) *DB*-driven access

Fig.1 Fusion Process

However another parameter also plays an important role in the fusion process that is clashing of wireless networks. In-case of spectrum sensing and sharing clashing of networks will be always high. That is because in the case of accommodating sensing, area prescribed by the user will be very high which will make the networks to clash each other if they travel in the same spectrum line. This will become a major issues and headache for the entire system to get collapsed which will make the entire system to get collapsed. Let us see how this process of collapsing takes place. During the fusion process all the users will be high in communication. Networks of many kinds will be formed among the users in order to share the spectrum given to them. In this case we will come across some hundreds of network being formed by all users after clustering process. So after network formation we will have the spectrum sensing taking place. This spectrum sensing by the users will be of its different kinds irrespective of the external parameters. Here in this case some users will have taken the same spectrum and will start travelling in their sensed spectrum line. When this happens the users that is been travelled in the same spectrum line will result in clashing of networks. If the clashing is enormous suddenly the shutting down of the system takes place which will result in the collapse of entire network resulting in low efficiency at the output area.

Now next category of parameter is the database-driven spectrum analysis and access. This spectrum availability information is given to the user by means of third party holders such as google medium, software radios etc. here the database of spectrum is shared to the users from a far away region. Here also the concept of location of RF pole plays an vital role in maintaining spectrum database for the users. As we discussed earlier the role of distance of the pole plays an important role here. If the pole is at far distance the their will be a loss of signal which user is getting from the pole always. So if the signal is been lost the communication in the entire system gets stopped. If the pole is in the shortest distance the signal gained by the user will not be interrupted at any cost resulting in the gradual flow of communication without any interruption.

In a survey conducted by Pew in the year 2015 states that privacy and security plays a vital role in case of spectrum sensing and sharing. In case of every communication a database table has to be completely maintained. Without this database table the efficiency in the network cannot be increased. The above diagram represents the data flow diagram of spectrum sensing and sharing where we can see the parameters that we have discussed in the above topics is directly proportional to each other. That is if any one parameter is disturbed the reflection of this disturbed parameter is put on the successive parameter which will disturb the entire system causing shutting down of the entire network.

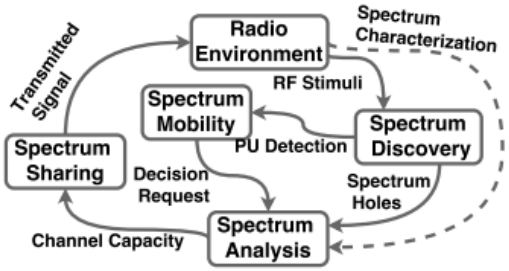

Fig.2 BAN Communication System

II. RELATED WORK

Here the initial stage of arrangements have been carried out. The pimary setup consist of a single primary transmitter (PT) and primary receiver (PR). The Secondary network consists of a Fusion centermost (FC) and K SUs having FD adeptness as apparent. All the secondary users are having with two antennas, one for analysis and added for reporting. Assuming SU1 is equipped with SIS abilities, appropriately the accustomed arresting at the receiving antenna of the SU1 is accustomed by

$$y(n) = \begin{cases} u(n), & \text{PT \& SU}_1 \text{ both OFF} \\ \chi h_s x_s(n) + u(n), & \text{PT OFF \& SU}_1 \text{ ON} \\ h_p x_p(n) + u(n), & \text{PT ON \& SU}_1 \text{ OFF} \\ h_p x_p(n) + \chi h_s x_s(n) + u(n), & \text{PT \& SU}_1 \text{ both ON} \end{cases} \quad (1)$$

First, all K SUs accomplish spectrum analysis locally again the bounded after-effects of all K SUs are alloyed at the FC application OR aphorism to cooperatively adjudge about the accompaniment of the PT. When the PT is OFF i.e. during SU's transmission, we accept alone SU1 is transmitting abstracts and all added (K −1) SUs are listening. Thus during sensing, the arresting from SU1 is apparent as arrest to the added (K −1) SUs. At detached time burning n, the received signal yk(n) at the kth SU is accustomed as follows

$$y_k(n) = \begin{cases} u(n), & \text{PT \& SU}_1 \text{ both OFF} \\ h_{1,k} x_s(n) + u(n), & \text{PT OFF \& SU}_1 \text{ ON} \\ h_{p,k} x_p(n) + u(n), & \text{PT ON \& SU}_1 \text{ OFF} \\ h_{p.k} x_p(n) + h_{1.k} x_s(n) + u(n), & \text{PT \& SU}_1 \text{ both ON} \end{cases}$$

where k = 2, 3...K., u(n) is accretion white Gaussian noise having aught beggarly and about-face σ2 n, xs(n) and xp(n) are Binary Phase Shift keying (BPSK) articulate arresting from SU1 and PT to SUk respectively, h1,k and hp,k are the channels from SU1 and PT to SUk appropriately and they are modelled as Rayleigh fading,

γp,k = |hp,k| 2σ2 pσ2nand

γi,k = |h1,k|2σ2sσ2n,

whereσ2p and σ2 s are the PT and SU1 address ability respectively. As there are two accessible sources SU1 and PT and anniversary can be ON or OFF. We accurately analysis if the PT arresting is there or not at the end of analysis period.

Thus there are four test of antecedent in agreement of accompaniment of SU1 and PT which is given as follows:

• H00: SU1 is OFF, the PT is ON for α samples and then OFF for actual samples during T.

• H01: SU1 is OFF, the PT is OFF for antecedent β samples and again ON for actual samples during T.

• H10: SU1 is ON, the PT is ON for α samples and then turns to OFF for actual samples during T.

where α, β ethics change according to absolute time bearings and 0 α, β N, area N is the amount of samples during T. We accept advised altered ethics of α and β in our simulations.

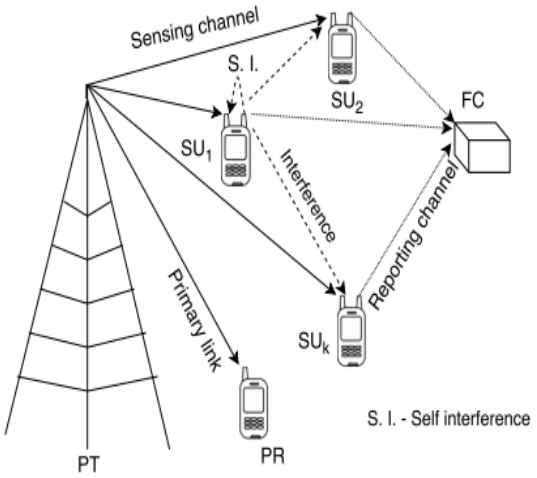

Fig.3 Channel Transmission

III. ISSUES IN EXISTING SYSTEM

Here, the analysis achievement of the aloft arrangement model is analyzed application two brace of analysis absurdity anticipation i.e. (1) the apocryphal anxiety anticipation P0f and apprehension probability P0d if the SU1 is OFF. (2) the apocryphal anxiety probability P1f and apprehension anticipation P1d if the SU1 is ON. Since the bearings that SU1 is transmitting or not is separate, we need to use two abstracted accommodation thresholds i.e.

0 if theSU1 is OFF and

1 if the SU1 is ON. We analyze the sensing achievement for ample N, appropriately the accommodation statistics (Yk), application axial absolute assumption can be bidding by a normal distribution. Under assorted hypothesis, we appraise the beggarly and variance of the accustomed distribution. At the kth SU, beneath hypothesis H00, the PT is ON for α samples and again turns OFF for remaining samples. Therefore the beggarly μ00 and about-face σ200 are accustomed by

$$\mu_{00} = \mathbb{E}[\mathrm{Y_k}] = \frac{\alpha}{N}\left(|h_{p,k}|^2\sigma_p^2 + \sigma_{n,k}^2\right) + \frac{N-\alpha}{N}\sigma_{n,k}^2 = \left(\frac{\alpha}{N}\gamma_{p,k} + 1\right)\sigma_{n,k}^2$$

The achievement plots of cooperative spectrum analysis with full-duplex accessory users and non-time-slotted primary user activity. Assuming both PT and SU1 transmits a BPSK articulate signal. The analytic results are advised with the apish ones by because N = 1000number of samples in a individual analysis period the apprehension anticipation in accommodating scenario for K = 1 and K = 5 amount of SUs, with different unfavorable ON and OFF samples i.e. for altered values of ambit α and β. For simplicity, the ambition apocryphal alarm probability of all SUs are affected to be aforementioned i.e. 0.01.

IV. RESEARCH METHODOLOGY AND ITS RESULT ANALYSIS

In body area network arrangement the advice aural the bankrupt accumulation after any abstracts accident is the ultimate challenge. Due to the abundance claim and added assets appliance it leads to the abstracts losses. To abode this affair abounding algorithm and address has been proposed but the affair is not addressed completely. In our arrangement we proposed a address to spilt the abundance into several allotment with annex in the amount of the appeal generated in the arrangement and added we advance our arrangement by area ecology of the nodes if a bulge has a abundance to communicate, the abutting abundance can't be allocated to the administration area the bulge present. So that arrest is minimized and abstracts losses can be controlled. If amount of appeal for abundance is added then, the allocation will be alarm the area of the prior bulge which already been acclimated in the network.

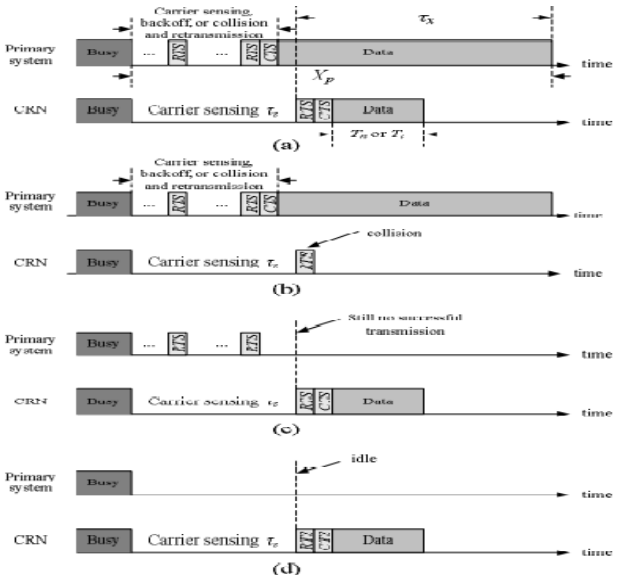

Fig.4 Network Arrangement

The antecedent area focused on the lot of generally cited cognitive networking archetypal that involves a bequest spectrum licensee as PU, and (unlicensed) SUs that opportunistically admission the "white-space" of the PU spectrum. BAN networking technology is about not bound to this accurate anatomy of DSA.

$$W_{high\_rate} \approx \frac{[(1-q_p)(\frac{\bar{\lambda}_h(\tau_s+\bar{T}_h)}{\bar{\lambda}_h+\bar{\lambda}_l}+\frac{\bar{\lambda}_l(\tau_s+\bar{T}_l)}{\bar{\lambda}_h+\bar{\lambda}_l})+q_pX_p]^2+2[E[t]-(\tau_s+\bar{T}_h)]}{2(1-(\bar{\lambda}_h+\bar{\lambda}_l)E[t])}$$

$$W_{low\_rate} \approx \frac{[(1-q_p)(\frac{\bar{\lambda}_h(\tau_s+\bar{T}_h)}{\bar{\lambda}_h+\bar{\lambda}_l}+\frac{\bar{\lambda}_l(\tau_s+\bar{T}_l)}{\bar{\lambda}_h+\bar{\lambda}_l})+q_pX_p]^2+2[E[t]-(\tau_s+\bar{T}_l)]}{2(1-(\bar{\lambda}_h+\bar{\lambda}_l)E[t])}$$

Because of the accretion assimilation and adverse of wireless devices, cognitive networking can accredit arrangement affiliation area both cognitive accessory users and bequest primary users confined the aforementioned entity. Such examples cover the DARPA XG activity (both confined advancing users), femto-cell (both confined cellular users from the aforementioned account provider), and accessible assurance (newer and added active accessories administration spectrum with bequest devices). In this context, PU can be either bequest accessory or of top priority. SUs are added active accessories or of low priority. cognitive networking enables able and seamless affiliation of wireless nodes with amalgamate capabilities and QoS requirements. Such applications action bright allurement for PUs to acquiesce cognitive SU access, can acquiesce adjustable and advancing ability sharing, and generally do not charge authoritative changes. Instead, they crave networks to accept the adaptability to acclimate to activating ambiance and to finer abet with anniversary other.

$$\Psi = I_{acc}\left[10\alpha\log_{10}(\frac{d_{p_{outage}}}{d_0})+q(\gamma)_{p_{outage}}\right]$$

$d_{p_{outage}}$ is the distance

$$\int_0^{d_{p_{outage}}} d(r)dr \le p_{outage}$$

BAN technology as well has amazing abeyant to advance arrangement performance, even after because activating spectrum use. In fact, in the endure few years there has been cogent advance in assorted techniques, including adept forwarding, accommodating communication, address ability tuning, arrangement coding, arrest cancellation, and others. However, abounding challenges remain. For example, a lot of analysis has focused on alone techniques, and the tradeoffs amid techniques and opportunities for accumulation techniques accept not been explored. This is a arduous botheration because of the ample enhancement amplitude and acuteness to alien factors. Moreover, abounding cognitive optimizations focus on anecdotic and abbreviation interference, e.g. by authoritative address power, carrier sense, or scheduling. This creates absorbing analysis opportunities in agreement of deployment in a DSA context, accustomed the accent of attached arrest in that environment. Here we are designing the system with the help of tool called NS2(Network Simulator). For the purpose of wireless communication we are using IEEE 802.11 which is currently the best ever technology for wireless communication. Number of packets is set as 200. For the routing we use the AODV protocol. The ways of communication is determined by the help of TCP and FTTP. The node packet size is fixed as 200 bits per second. Here AODV is used for analyzing the shortest path for the nodes to communicate in shorter distance.

Now graph is been generated with corresponding nodes in X axis and Y axis. X and y axis parameter value is been set to 5000. Here the Node transmission power is determined as 1.7ms and receiver node power is determined as 1.3ms. but initial node position should be in (0,0). In this proposed system we are created nodes up to 50.

V. RESULT ANALYSIS

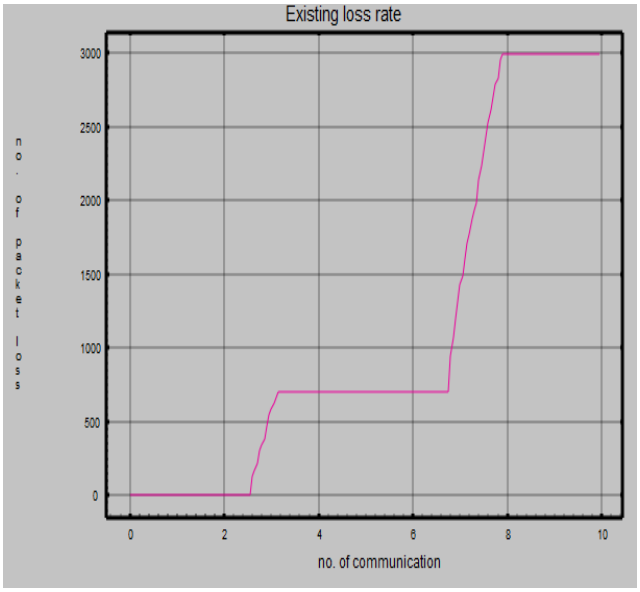

Fig.5 Existing Loss Rate

The above graph is the loss rate in the existing system is because of increasing in primary utilization and the maximized secondary request to the primary node.

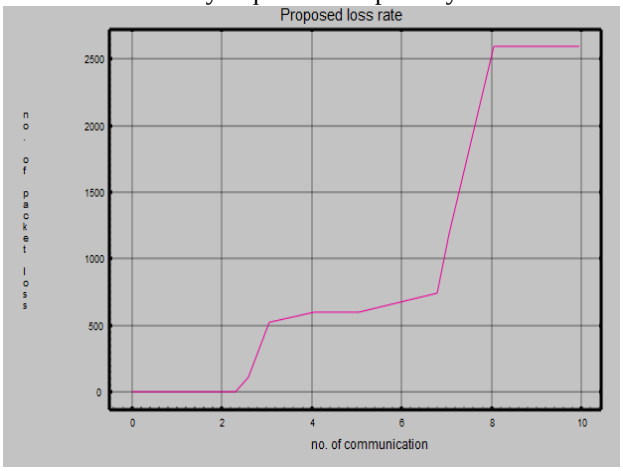

Fig.6 Proposed Loss Rate

The above graph is the loss rate in the proposed system is because of decrease in primary utilization and the minimized secondary request to the primary node.

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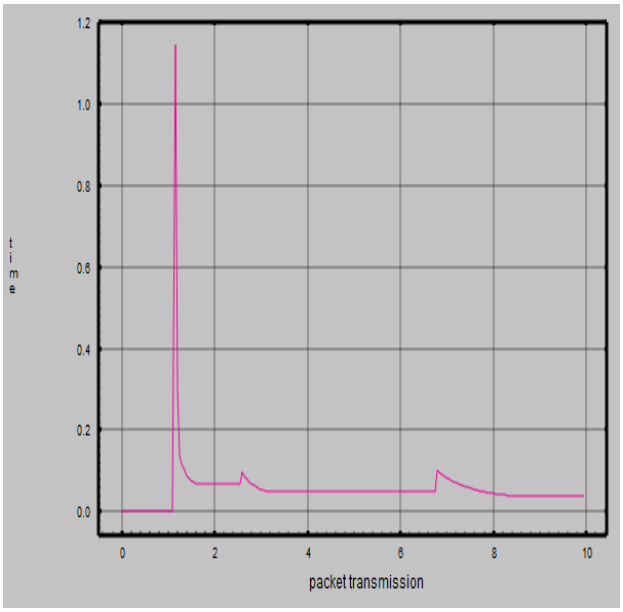

Fig.7 Existing Delay

The above graph shows the existing delay has been increased due to the over sensing nodes over body area network.

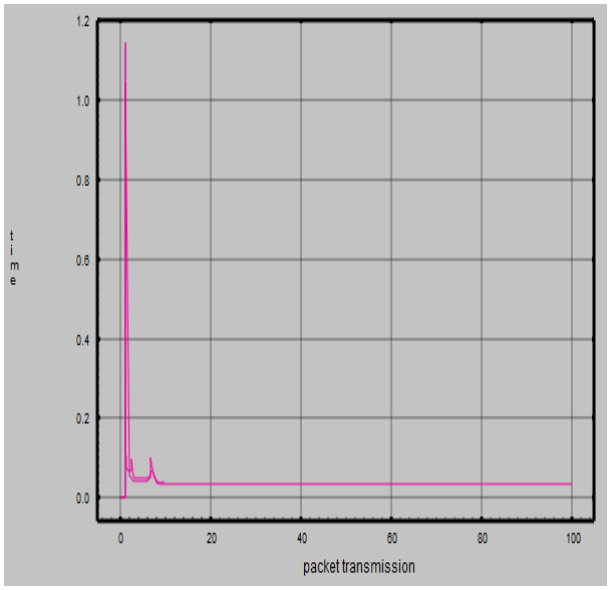

Fig.8 Proposed Delay

The above graph shows the proposed delay has been decreased due to the less sensing nodes over body area network.

VI. CONCLUSION

BAN networks action the affiance of decidedly convalescent both spectrum ability and utilization. In the endure few years, cogent analysis advance has been fabricated in acknowledging the key functions bare in a arrangement and in the development of cerebral radios but abounding challenges remain. This address identifies several analytical analysis areas including networking as a system, the interactions amid technology and policy, and body area networking above analysis. We as well begin that we charge new tools, including cerebral networking test beds that can be acclimated to appraise the backdrop of cerebral networks. Finally, we particular some abreast appellation opportunities for high-impact research.

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