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Scheduling and Queuing Strategies for Energy Efficient Routings in WMSNs

Ashok K Chikaraddi*
K L E Technological University, Hubli, Karnataka, 580031, India
Email: chikaraddi@kletech.ac.in
ORCID iD: https://orcid.org/0000-0002-4263-4891
*Corresponding Author

Meena S Maralappanavar
K L E Technological University, Hubli, Karnataka, 580031, India
Email: msm@kletech.ac.in
ORCID iD: https://orcid.org/0000-0003-0602-1462

Suvarna G Kanakaraddi
K L E Technological University Hubli, Karnataka, 580031, India
Email: suvarna_gk@kletech.ac.in
ORCID iD: https://orcid.org/0000-0002-5629-4883

Vishwanath Chikkareddi
BLDEA's V. P. Dr. P. G. Halakatti College of Engineering & Technology, Vijayapur, Karnataka, India
Email: vishwa.chikareddy@gmail.com
ORCID iD: https://orcid.org/0000-0002-8566-4337

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Abstract: The single-path transmission protocols, cause throughput degradation for multimedia applications, considering the limited bandwidth and energy constraint of multimedia sensor nodes. Congestion on the network is a result of the issue of transferring a large amount of data. For multimedia data with low reliability, single path routing necessitates real-time Quality of Service (QoS) parameters and large bandwidth congestions that arise in intermediate nodes due to low memory. Consequently, leading to queuing delays and packet loss. Each chosen path must independently fulfill the corresponding QoS criteria while building the multiple paths for a multimedia application. Finding multiple paths with low path costs and high reliability while achieving application-specific QoS parameters is the aim of the effort.

Index Terms: WMSN, MAC, TDMA, CSMA, Enhanced Equivalent Capacity, EQSR, Gaussian Bound, MPEG

1. Introduction

At present researchers extensively use Wireless Sensor Networks (WSNs) for many real world situations. Many times, application areas are constrained by the price and size of a single sensor node. Hence, the limitation of sensor node resources occurs. The bright side is the lower cost for hardware devices like Complementary Metal Oxide Semiconductor (CMOS) cameras and microphones has made recent iterations in Wireless Multimedia Sensor Networks (WMSNs). With sensor nodes on wireless channels, audio and video streams in WMSNs can be recorded and sent. WMSNs are more versatile than typical sensor nodes, although they still have fewer utilities. WMSN is used in many real-time applications, however, the volume of information and type for these applications results in sensor network scarcity. In applications with diverse traffic flows, a protocol with services to enable end-to-end communication is necessary. Based on the nature of traffic and its applications prioritized medium access is provided by Medium Access Control (MAC). The network congestion and failure in links are still principal qualities that pose challenges in providing QoS to WMSNs. This can be overcome by applying systematic packet scheduling which improves delivery quality over sensor networks in such conditions.

A new way to configure a multipath data transfer over WMSN is initiated here i.e. priority base multipath routings method. This method reorients the transmission of variable packets over variable paths. Thus highly rated quality packets will be delivered on the most popular routes after periodic checks on the path condition. WMSNs are able to sense a huge amount of multimedia data that requires additional bandwidth compared to WSNs. Hence, the usage of bandwidth in multimedia data transfer is a challenging issue in WMSN. The bandwidth requirements for integrated multimedia services and the transfer of real-time information have become important factors. So the effective traffic bandwidth and a bandwidth reliability calculation are necessary.

The multipath routing fails to supply the required Quality of Service (QoS) when there is a large volume of multimedia data and in real-time videos. Scheduling will therefore be a necessary supplementary method. To prevent frame losses and to achieve QoS for multimedia streaming, the function of scheduling is to provide each video frame the proper priority in conjunction with the other data. Nodes in a hierarchical system are used in the dynamic packet scheduling scheme which is virtually established. Except for the nodes located at the leaf node, each node has three preference queue options. The present work proposes the approach of the Gaussian bound to calculate the effective bandwidth using multimedia frame traffic.

In addition, it recommends a packet scheduling method for routing different sorts of packets across different network pathways. The perceived quality of service at the receiver end varies as a result of the various contents of the frame packets in the data stream. When distributing packets across various pathways, this technique takes the kind of packets into account. The solution has three preferences of scheduling: queue scheduling, packet scheduling, and path scheduling. The WMSN is a heterogeneous device of its sort that is made using temperature, audio, and video sensors. Performance is assessed using measures for jitter and packet delivery ratio. Fig. 1 depicts the structure for multimedia transmission through WMSN. Queue scheduling, packet scheduling, and path scheduling are three of its techniques.

It takes advantage of various cross-layer communications between various layers to detect issues with multimedia communication such as lost wireless connections, bandwidth restrictions, packet congestion, and battery storage. Whenever the channel status is received from the physical layer the encoding is constructed by the application layer. Following this, the implementation of the schedule happens to transport packets in various directions subject to the kind of packets. In the event of network congestion, queue scheduling is implemented to release unimportant packets.

2. Related Work

This section provides a summary of all related research on the subject that has been done by other researchers. One of the significant key challenges in WSN is bandwidth. Various mechanisms have been implemented to manage the ever- increasing traffic since the WSNs' available bandwidth is often insufficient to handle the diverse traffic. In this study, we have also restricted our bandwidth allocation studies to Time Division Multiple Access (TDMA) and Carrier Sense Multiple Access (CSMA) multiplexing methods. This research focuses on enhancing the multi-stack wireless sensor network's throughput or overall efficiency by maximizing bandwidth utilization. This seeks to increase throughput by giving packets a higher priority and channelizing them. The suggested technique reduces the time it takes for packets to move through the WSN. Additionally, it is shown that the proposed bandwidth method enhances a multi-traffic WSN's limitation. Despite being straightforward, the suggested approach shows to be successful in terms of improving the network's overall performance. The authors of [2] employ a paradigm based on probabilistic and component-based design concepts to address the problem of bandwidth reconfiguration and allocation. The authors examined the network's performance using an admission control manager for both dependability and energy conservation.

According to the authors of [3,12], a utility framework has been developed that works well for heterogeneous sensor networks that must handle rigid traffic while also offering effective rate management and a just way of resource allocation. Any sensor network can be handled by this framework while using a limited amount of energy.

Data with varying priorities or relevance are dealt with in [4,5, 6,7]. These approaches distinguish data provided by distinct sensing activities, allowing more sensitive data to take precedence. The authors of this research claim that weighted fairness can be used to operate numerous rate sensor networks successfully. Networks of wireless sensors are essential for monitoring applications. In recent years, the same network has been compelled to support a variety of applications with varying QoS requirements. There are a variety of cross-layer techniques available to meet these needs. multi-stack technique, which handles many pairs of MAC and network protocols [1,13], is one such strategy that is orthogonal to it.

In [9] proposed Transferring Radio Frequency(RF) energy in the form of designated UDP packets will occupy the downlink bandwidth of a Wi-Fi functioning data connection. As a result, a prioritized bandwidth resource allocation technique that is both energy-efficient and suitable for RF energy transfer and downlink data communication is provided. This method considers the RF energy transmitter's lowest energy usage as well as a reasonably quick downlink data speed when performing RF energy charging [10]. The energy consumption is at its lowest and the downlink information data rate is small. The production of wireless energy packets with low transmission power requires more bandwidth during this time. The bandwidth allocation approach was designed to achieve a balance between the downlink information data rate and overall energy usage. The choice was made with energy conservation in mind. The rate of information transfer downlink is still adequate (about 50 Mbps), allowing clients connected to a local Wi-Fi wireless network to have a pleasant network user experience.

3. Proposed Methodology

The following sub-sections discuss different queue scheduling methods such as queue preference scheduling, traffic- aware packet scheduling, and path scheduling.

3.1 Queue Preference Scheduling

Multi-path routing fails to provide the desired quality of multimedia data transmission when traffic volume is high. Thus, a better strategy is needed, like scheduling. The role it plays in providing individual independent multimedia preferences in relation to other data shown in Fig. 1. It eliminates frame losses while completing the QoS framework distribution [14].

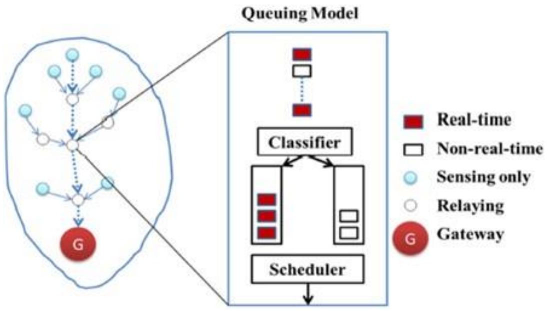

Fig. 1. Queue preference scheduling.

Sensor's message packets may originate from various popular sources with different traffic levels. Multimedia content in WMSNs generates many traffic classes which have different requirements from the networks. There is a classification of QoS requirements according to data of multimedia streaming and type of multimedia data as below: Real-time, loss-tolerant, multi-media streams are one type of multimedia streaming. Multimedia streams those are delay-tolerant, loss-tolerant, Real-time, loss-tolerant, and interactive multimedia material Data Real-time, loss-tolerant, and Data, Loss-intolerant, delay-tolerant data, Loss-intolerant, delay-tolerant Data-per-hop deadline-based queues are used in the queuing policy. Key First In First Out(FIFO) packet scheduling is used by every node. The per-hop deadline requirements are translated into N priority levels, as seen in Fig.2., Only a few traffic classes can be offered via polling contention period-based MAC. Any random packets are dropped using the pre-deadline missed policy.

Based on application and QoS requirements, taking into account the kind of data and packet content, multimedia traffic is divided into classes.

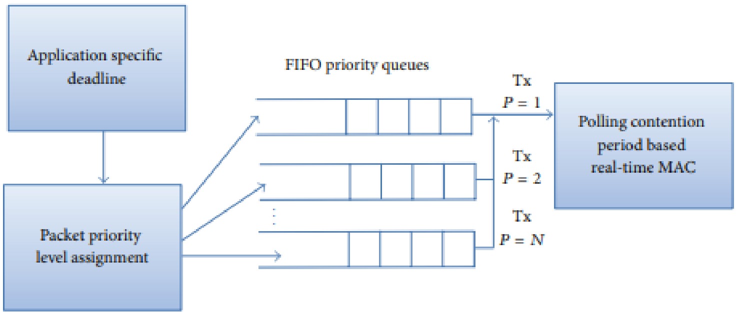

Fig. 2. Traffic classification using priority queues.

3.2 Traffic-Aware Packet Scheduling

This process builds a model of M/M/1 taking into account every node in a queue as they emerge along with the service time of much non-deterministic traffic. There can only be one server per node. The mean hold time of the queued packets' probability is expressed. The server's time utilization and waiting time are calculated as follows:

$$T_\mu = \frac{1}{T_s - T_a} - \frac{1}{T_s} \tag{1}$$

where, T_a is Arrival rate, T_s is service time level and T_μ Specify line capture time.

Total time usage of the server (T_u).

$$T_\mu = \frac{T_a}{T_s} \tag{2}$$

The expected quality for the perceived video is not achieved in multipath routing on a network with a lot of traffic as mentioned earlier. Therefore, another technique is needed. This additional strategy serves as a means of offering suitable preferences for each frame in connection to different data in order to prevent frame damages. Despite obtaining quality (QoS) in information streaming. Scheduling is necessary for intermediate nodes. This might enhance data transmission through WMSNs.

Fig.3 depicts the basic queue management for packets having frames. The Usual Frame, or I-frame is given precedence [14]. Frame B is followed by the P frame, which is the audio, The I-frame, is given precedence. Frame P which contains the audio is the next frame, followed by frame B, which contains the video, as determined by the packet preferences. I- Frames are used to transfer packets on almost all trusted routes.

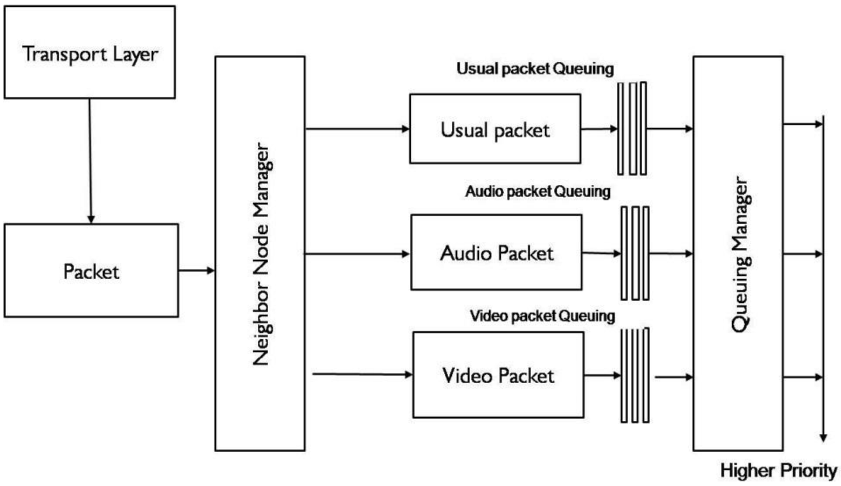

Fig. 3. Basic Packet management of Queuing.

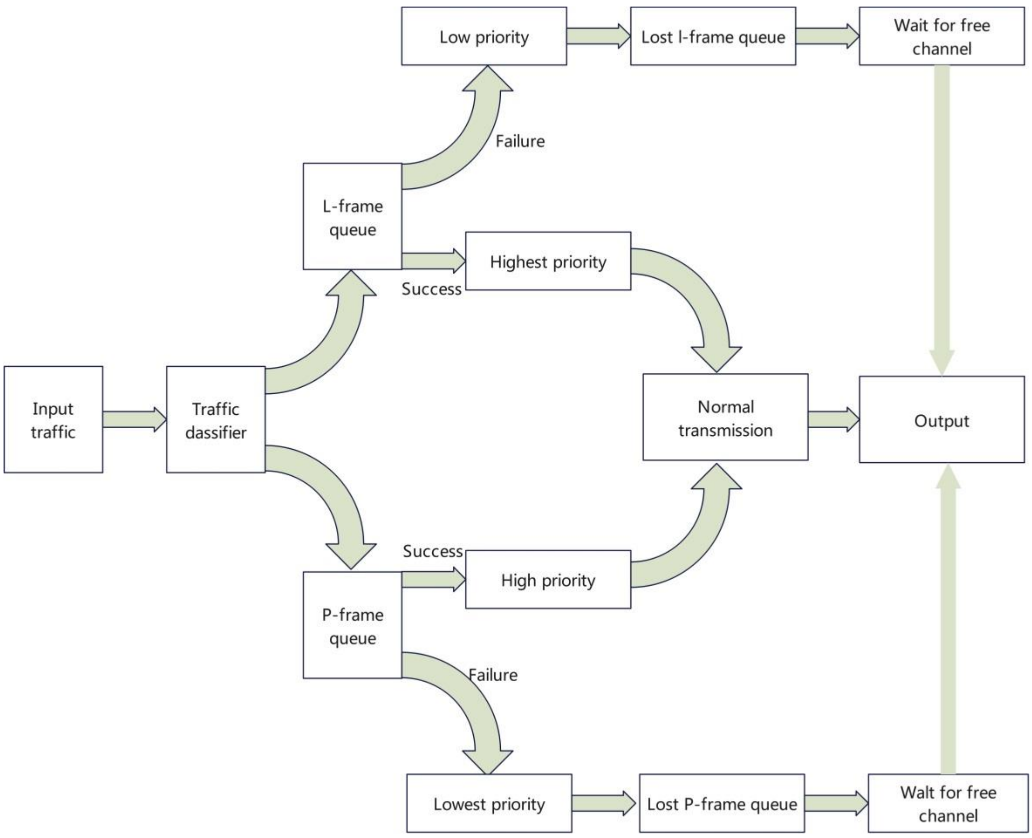

Fig. 4. Queue Scheduler.

Retransmission requirements differ based on the type of packet. Packets can be categorized using four priority levels, ranging from high to low, according to their level of significance. Priority is given to I-frame packets over P-frame packets, other packets, and lost I-frame packets for retransmission [18]. The low priority I-frame packets, lost P-frame packets for retransmission, etc. The packet transmission and storage process at a specific sensor node are depicted in Fig. 4.

The following algorithms are used for queue preference scheduling; Enqueuing packets in the cushion nodes is described in Algorithm 1. The queue planning system for each node is described in algorithm 2. And algorithm 3 shows the score calculation of the path.

The Enqueuing and dequeening mechanisms will be considered to ensure the size of the buffer. The flowchart of queuing policy is shown in Fig.5.,

Algorithm-1: across all nodes, receiving packet Enqueuing.

```
for across all nodes
if (total length of four lines) < (body length of buffer)
   Place the packets based on the type of packet in each queue   else drop packet
    end if end for
```

Algorithm-2: Queue Scheduling. for across all nodes

```
X: for by having video frames with three active queues perform RRS1
if three buffers do not have a packet
    Then from the fourth queue send one packet go to X
end if
  end for
```

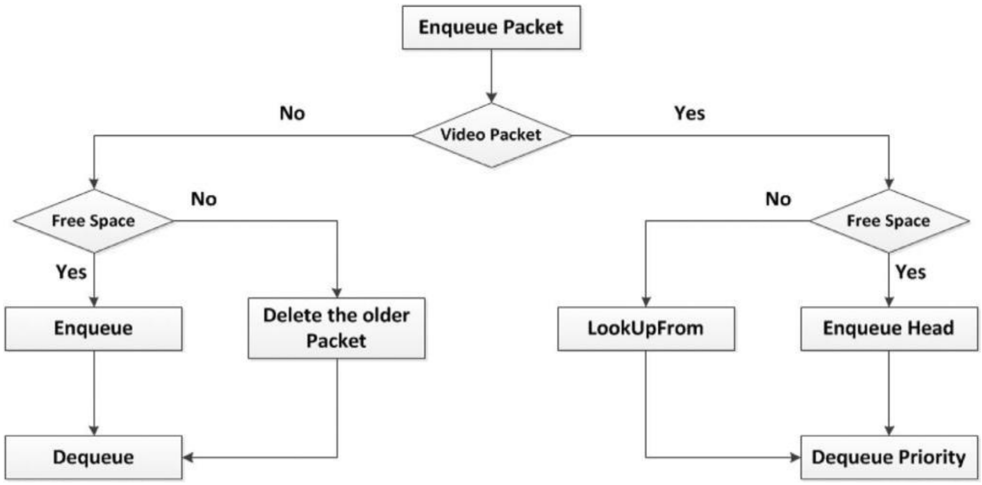

Fig. 5. Queuing policy.

3.3 Path Scheduling

The status of each path is to be necessarily known to identify the most reliable path. Every routing data is collected with the help of control packets. Accordingly, the paths score information is accessed to identify the highest score path which has the best transfer capacity for sending high-priority packets.

This work has proposed a process in which the most reliable path is easily achieved using metrics like energy, bandwidth, and delay. High-priority packets should be transmitted using the path with the highest score. As seen below, the path score is evaluated.

$$path\ score = \alpha WL + \beta WE + \gamma WQ + \lambda WH \tag{3}$$

where, $\alpha + \beta + \gamma + \lambda = 1$, $0 \leq path\ score \leq 1$

path score depends on the α, β, γ, and λ coefficients. Each coefficient affects the value of its related component. Coefficients are selected subject to these considerations.

W_E = Minimum residual energy in the path / E_0. W_Q= Minimum free buffer size in the path / B_0.

W_H = (1 + max hop count - hop count) / Max hop count

W_L = 1 number of packets that do not satisfy the requirement delay/number of received packets from each path. Path score computation steps are shown in Algorithm-3: The hop count is first calculated. The number of hops is determined by the network diameter. The buffer size is the total number of packets that are originally stored in the node buffer. Finally, the $E0$ and $B0$ will be the starting energy and buffer size of intermediate nodes. The free buffer size will be the number of packets deposited in the node buffer at each time.

Algorithm-3: Path Score Calculation and Path Sorting for every sink node
Compute path score based on the equation
Send path score to source node;
end for
for every video source node
paths are arranged according to their score
based on the packet and queue scheduling send every video frame to one priority path end for

The following equations compute the reliability of the path

$$R_{e2e} = 1 - \left(R_{e2e}X\left(1 - R_{path}[i]\right)\right) \tag{4}$$

$$E_{e2e} = E_{e2e} + E_{path}[i] \tag{5}$$

$$D_{e2e} = D_{e2e} + D_{path}[i] \tag{6}$$

where,
X - *Represents Buffer Size*
R_{e2e} - end-to-end reliability of the packets,
E_{e2e} - end-to-end energy consumption
D_{e2e}– end-to-end delay,
R_{path} – reliability, E_{path} – energy, and D_{path} – data,

Paths with link functionality among themselves and their neighbors' packets in terms of power (E_{e2e}) reliability (R_{e2e}), distance, sink, delay (D_{e2e}), and hop count is shown in equations. Metrics as per path are presented as (R_{path}); (E_{path}) and (D_{path}). All the end-to-end multipath routing assurance on used paths will be partitioned as end-to-end energy consumption (E_{e2e}), end-to-end reliability ($Re2e$), and end-delay (D_{e2e}).

3.4 Quality-aware and energy-efficient routing protocol (EQR)

The network life expectation is enhanced by using the energy-efficient and quality-aware (EQR) routing protocol. EQR harnesses residual energy and available existing buffer size. EQR increases the reliability factor by using the technique [19]. The functional diagram of EQR is depicted in Fig.6., EQR develops a queuing prototype, enabling EQR to monitor both RT and NRT traffic. In order to use the highly existing network resources, EQR discovers node-disjoint paths [12]. The initialization phase, primary path setup phase, and alternate path setup phase are the three divisions of the EQR path finding phase. Each node uses the connection cost function to determine the necessary next hop. Primary and alternative pathways are found during the path discovery phase. The addition of new values metrics to data packets updates the already established pathways.

The data packets are divided into equal-sized segments; the segmentation is carried out before data transmission. Further, before the scheduling process, the segments are queued for transmission.

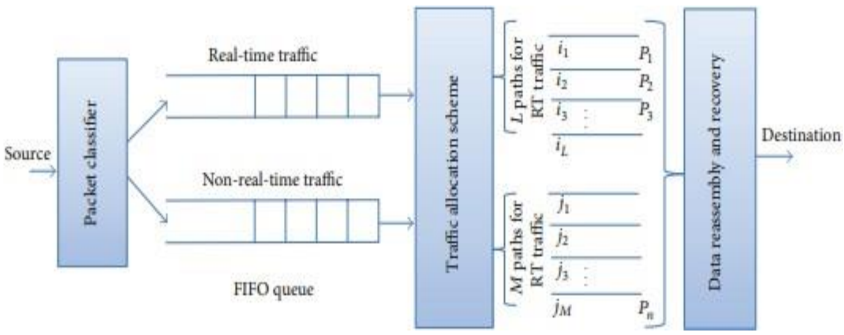

Fig. 6. Functional diagram of EQR.

3.5 Preference Assignment

With real-time applications, information transfer needs trusted communication paths from the location of the source to the sink node [15]. Hence the priorities of the packets need to be distributed in a flexible manner. In a network of different wireless categories of traffic, in applications, the sensors node produces different preferences with the popular values of the application. Consider SP_j^i represents the worth of the traffic class j administered in the sensor node Ni as depicted in the given formula: where,

$$DP_{j\ k}^{i} = \frac{\delta_1 * N_{hops}^{i\sin k} + SP_j^i}{\delta_2 * RD} \tag{7}$$

$N_{hops}^{i\sin k}$ traffic preference of the traffic class *j* in sensor node *Ni*
SP represents the number of hops from sensor node *Ni* to sink node
RD is the deadline remaining time.
δ_1 , δ_2 are the constants from 0 to 1.

3.6 Mathematical Modelling of Queuing and Scheduling in WMSN

This section describes the computation of enhanced equivalent capacity, 2-state Markov Modulated Poisson Process (MMPP). To calculate the effective bandwidth of multimedia frame traffic the Gaussian bound is considered in this research.

3.6.1 Enhanced equivalent capacity

When calculating the bandwidth for an on-off traffic source, equivalent capacity is used. Using an analogous capacity, an on-off traffic source's bandwidth is computed. The productive bandwidth of the total traffic depicted on Fig.7 is determined using the additional capacity. The mean, second and third central moments, lag1, and autocorrelation are needed to determine the bit rate of each traffic. The overall traffic's numerical volume is determined using this numerical feature. The total traffic is then tentatively estimated using the 2-state MMPP. The MMPP parameters are calculated using the anticipated numerical traffic. The state of MMPP's identical capacity is determined using an enhanced identical capacity formula.

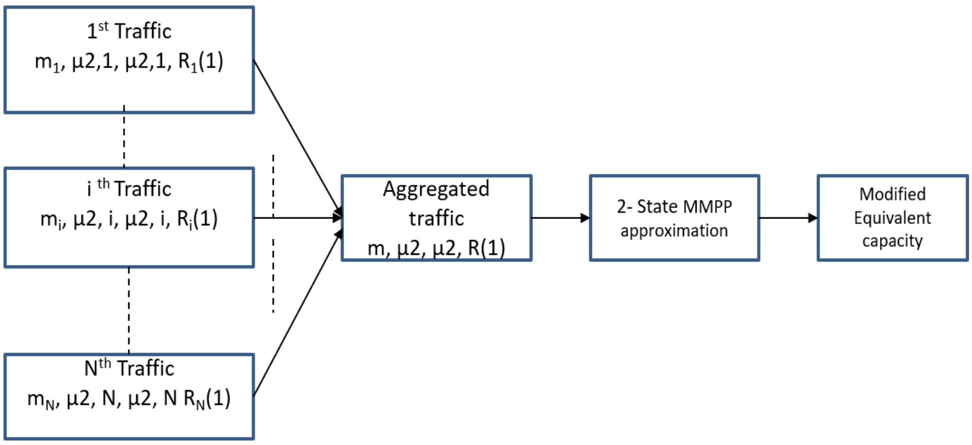

Fig. 7. Enhanced equivalent capacity model.

A 2-state MMPP joins and converts conjugated traffic to four parameters. The parameters of the two methods are correlated in the 2-state MMPP. The parameters of the 2-state MMPP are given by,

$$\tau_{high} = \ln\left(\frac{1}{R(1)}\right)(1+\eta)$$

$$\tau_{low} = \frac{\eta in\left(\frac{1}{R(1)}\right)}{(1+\eta)}$$

$$\lambda_{high} = m + \sqrt{\frac{\mu_2}{\eta}}$$

$$\lambda_{low} = m - \sqrt{\mu_2 \eta}$$

$$\text{Where } \eta = 1 + \frac{\delta}{2}\left(\delta - \sqrt{4+\delta^2}\right)$$

$$\text{and } \delta = \frac{\mu_3}{\mu^{3/2}}, \tau_{high}\ and\ \tau_{low} \tag{8}$$

high and low states' transition rates are shown by the formula. The states of λ high and λ low for the following arrival rates are shown by high and low, respectively. The value between the mean and highest bit rate is taken as the capacity value. Improve the corresponding capacity formula to determine the corresponding capacity of MMPP using the estimated 2-state MMPP features. Enhanced Equivalent Capacity C_m, is described as follows,

$$C_m = \left(\lambda_{high} - \lambda_{low}\right)\frac{y - X + \sqrt{(y-X)^2 + 4X\rho y}}{2y} + \lambda_{low} \tag{9}$$

Buffer size is shown as X and the constants y and ρ are calculated as,

$$y = ln\left(\frac{1}{\varepsilon}\right)(1-\rho)\left(\lambda_{high} - \lambda_{low}\right)/\tau_{high}$$
$$\rho = \tau_{low}/\left(\tau_{high} - \tau_{low}\right) \tag{10}$$

When extracting an enhanced equivalent capacity, an MMPP diagram is used as a biased on off-mode. Thus, the aforementioned approach yields a reliable estimate. Statistics of the computation's traffic in the aggregate combined traffic mathematical characteristics are given by four parameters as shown:

$$m = \sum_{i=1}^{N} m_i$$
$$\mu_2 = \sum_{i=1}^{N} \mu_{2,i}$$
$$\mu_3 = \sum_{i=1}^{N} \mu_{3,i}$$
$$R(1) = \sum_{i=1}^{N} \frac{\mu_{2,i}}{\mu_2} Ri(1) \tag{11}$$

The mean, second, and third central moments μ_2, μ_3, and lag1 autocorrelation $R(1)$, in that order, define the average bit rate of aggregated traffic. As a result, m_i, μ_2, μ_3, i, and $Ri(1)$, which stand for mean, second, third, and central moments as well as lag1 autocorrelations, are used to illustrate the bit rate of i^{th} traffic source. N.'s analysis of the variable comparable capacity indicates a variety of traffic sources. Mathematical characteristics of the conjugated traffic are assessed as per that of singular traffic. Further, turn off integrated traffic utilizing a 2-state MMPP. Finally check the industrious MMPP bandwidth by changing the identical capacity formula.

3.6.2 Gaussian Bound

The numerical limit for the bit rate of conglomerate traffic is called the Gaussian Bound. Product bandwidth C is defined as,

$$C = m + \alpha\sigma \tag{12}$$

The standard bit rate of joint traffic is shown by the standard deviation σ and α is given by,

$$\alpha = \sqrt{2ln\left(\frac{1}{\varepsilon}\right) - ln2\pi} \tag{13}$$

In this case, ε provides the probability of the desired buffer overflow. When buffer contents exceed the specified buffer size, buffer overflow is said to be likely.

3.7 Aggregation of MPEG Traffics

We set the initial positions of the high frame in order to set the initial positions of I frames concurrently and obtain the highest computed multiplexing gain. Fig.8 shows a block model for the study of asynchronously conjugated MPEG traffic. I, B, and P frames are segregated from the MPEG multimedia signal input.

Depending on the kind of frame and the combination in the sequence of the frames I, B, and P. From the combined I, B, and P traffics, calculate the mathematical features of the combined MPEG traffic. A model of asynchronously aggregated I-frame traffic is shown in Fig.9, The combination of I-frame traffic decreases bustiness in comparison to a single MPEG traffic instance. The I-frame traffic size of twelve frames apart is related to the combined I-frame traffic because the traffic created by the various traffic sources exists independently of one another and has a length of twelve frames.

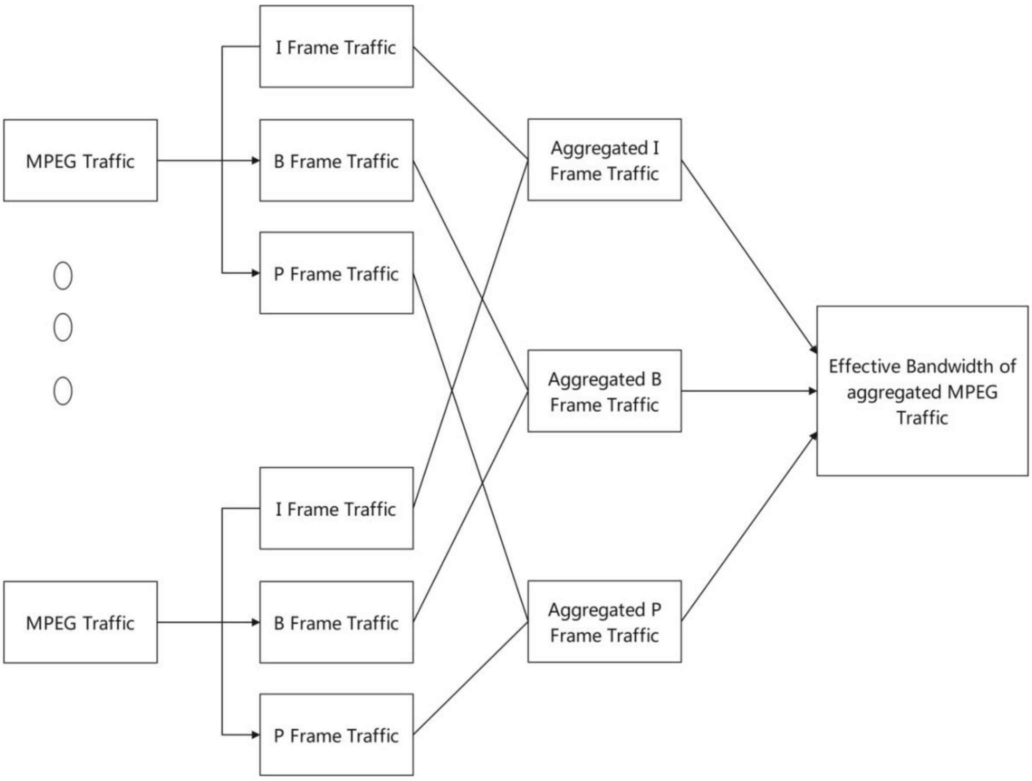

Fig. 8. Asynchronous aggregated MPEG traffic analysis block diagram.

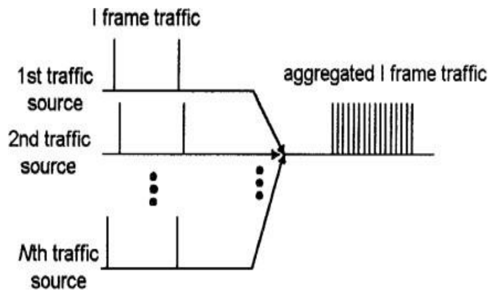

Fig. 9. Asynchronous aggregated diagram I frame traffic.

3.8 Calculation of Aggregated MPEG Traffic's Total Effective Bandwidth Using Modified Equivalent Capacity

Figure 10 displays a block representation of the suggested technique, to determine the bundled MPEG traffic's productive bandwidth. Because a combined I-frame traffic has the lowest independent relation, this work calculates the productive bandwidth of I-frame integrated traffic using the Gaussian bound. Also determines the productive bandwidth of separate B and P traffic with the matching volume.

The combined B traffic with the combined P traffic as it reflects the same characteristics of a significant decaying relationship across all frames. Next, calculate the productive bandwidth for the combined MPEG traffic, by integrating the Gaussian bound of the frame I combined traffic with the corresponding adjusted power of the independent B and P traffic combined. Mathematical features of integrated I-frame traffic are provided, assuming that I-frames are aligned,

$$m_{\sum FT} = \frac{N_{FT}}{N_{GOP}} \sum_{i=1}^{N} m_i{}^{FT} \tag{14}$$

$$\mu_{2,\sum FT} = \frac{N_{FT}}{N_{GOP}} \sum_{i=1}^{N} \mu_{2,i}{}^{FT} \tag{15}$$

$$\mu_{3,\sum FT} = \frac{N_{FT}}{N_{GOP}} \sum_{i=1}^{N} \mu_{3,i}{}^{FT} \quad (16)$$

where, FT shows a part of the three frames (I, B, and P) and N_{FT} shows the amount of FT frames in the Group of Picture (GOP). The Lag1 auto-related affiliate values for I-compound and P-linked traffic are very small because the sources of each traffic are independent of each other [11]. We obtain the compact traffic for frames B and P after performing computer simulations of the combined traffic for frames I, B, and P. By integrating the Gaussian component of the combined I-frame traffic with the corresponding fixed power of independent B and P traffic, the productive bandwidth of MPEG traffic is obtained. The joint B and P traffic's mathematical features are calculated as,

$$m \sum(B+P) = m \sum B + m \sum P$$

$$\mu_{2,} \sum(B+P) = \mu_2 \sum B + \mu_2 \sum P$$

$$\mu_{3,} \sum(B+P) = \mu_3 \sum B + \mu_3 \sum P$$

$$R_{\sum(B+P)}(1) = \frac{\left(\mu_{2,\sum B}\ R_{\sum B}(1) + \mu_{2,\sum P}\ R_{\sum P}(1)\right)}{\mu_2 \sum(B+P)} \quad (17)$$

where, subscripts $\sum CB$ and $\sum CP$ depict the conjugated B frame traffic and conjugated P frame traffic, in order. The subscript $\sum C(B+P)$ represents the joint B and P frame traffic. The total productive bandwidth C of the conjugated MPEG traffic is calculated by,

$$C = Cm, \sum(B+P) + C \sum I = Cm, \sum(B+P) + m \sum I + \alpha\sigma \sum I \quad (18)$$

where, $Cm, \sum(B+P)$ shows the modified corresponding capacity of the joint B and P frame traffic. Accordingly, $C \sum I$ depicts the Gaussian bound of the conjugated I frame traffic. $m \sum I$ and $\alpha\sigma \sum I$ shows the mean and standard deviation for the bit rate of the conjugated I frame traffic, in this order.

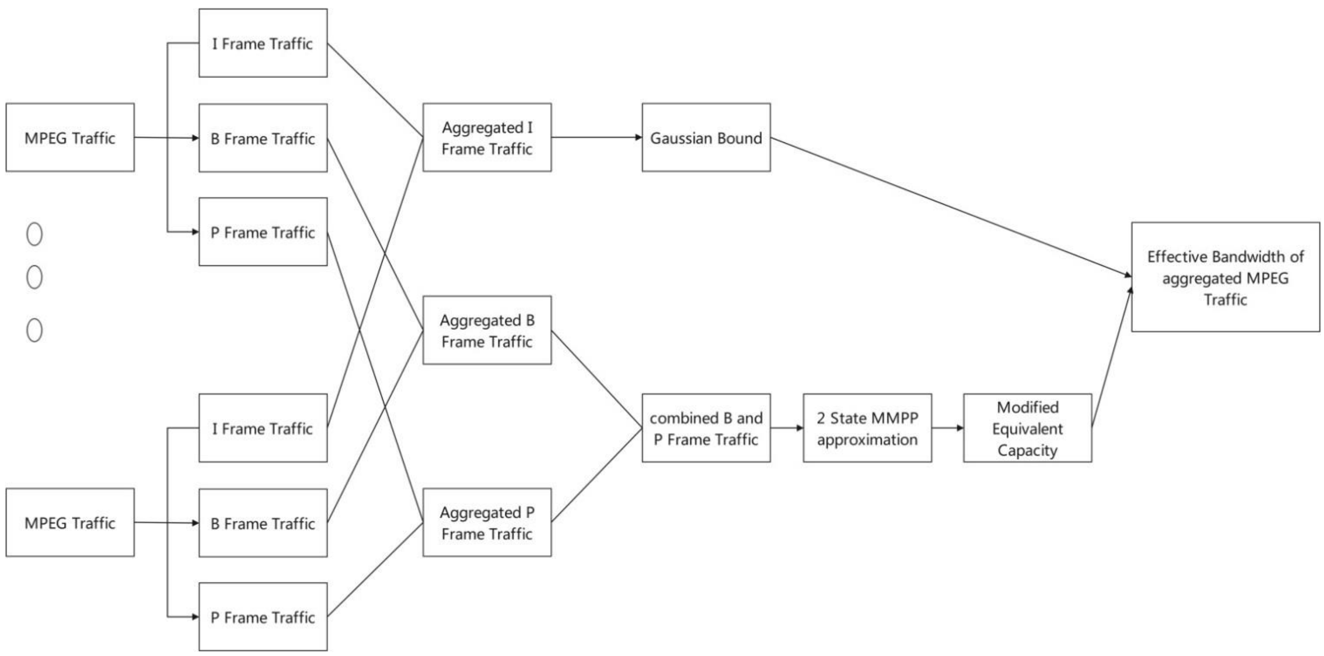

Fig. 10. A method for calculating the aggregated MPEG traffic's total effective bandwidth.

4. Result Analysis

This section deliberates the results obtained by the proposed model. The model is tested with different sets of Multimedia input data such as Text, Audio, and Video with different size files. This data is transmitted from the source node to the sink node across the Wireless Sensor Network involving a multichannel multi-priority queue. The algorithm is developed using NetBeans Application Framework using Java Language.

The following Fig.11., this represents the time taken for different sized input file sets, in this case, considering nine input file sets w.r.t X-axis. And with the Y-axis, the number of data packets and the time taken to transfer these files are represented. Y-axis left side indicates the time taken in a millisecond (MS), and the right side indicates the total size of the sets.

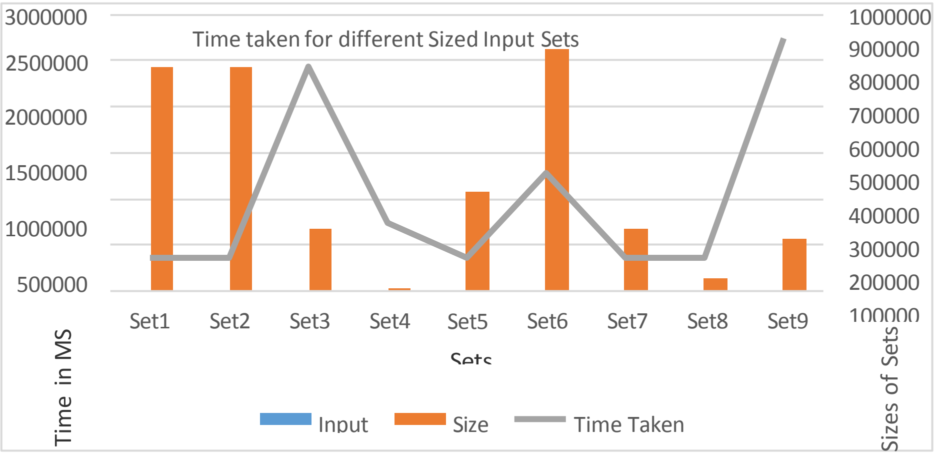

Fig. 11. Time taken for different sized Input Sets.

The following Fig.12 represents the time taken for different sized packets sent, received, and dropped information. The input of Set1 encompasses Text, Audio, and Video files of size 663.2, 163799, and 320741 bytes of data which are sent across WSN. After transmission, the number of packets received at the sink node is 630.04, 139229.15, and 240555.75bytes. During transmission, some of the packets are dropped from Text files, Audio files, and Video files. Dropped bytes from files are 33.16, 24569.85, and 80185.25 bytes respectively.

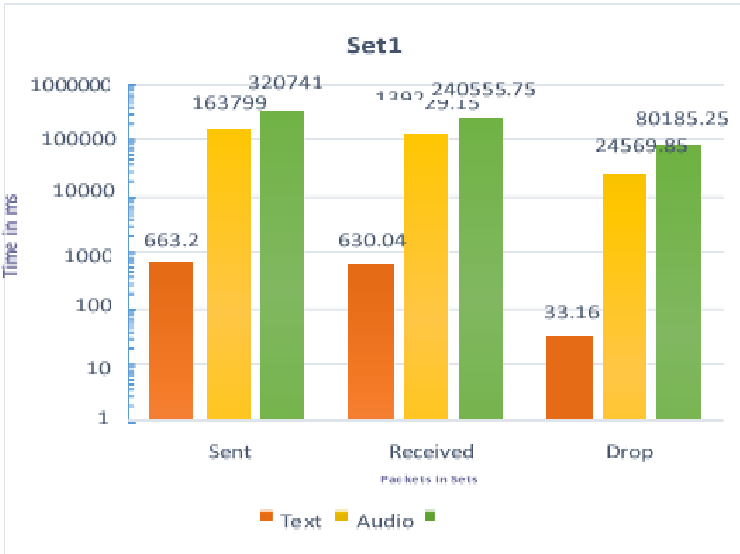

Fig. 12. Time taken for different sized packets Sent, Received, and Dropped from Set1.

The following is Fig.13., here only two inputs are considered Audio from Set2, and Video from Set3 respectively. These data sets are given as input to the model. Set2 contains two files with a total size of 25705 bytes. Set3 comprises three files with a total file size of 110153 bytes respectively. At the sink node, the received count of the data is 21849.25, and 82614.75 bytes. The amount of dropped packets is 3855.75, and 27538.25 bytes respectively.

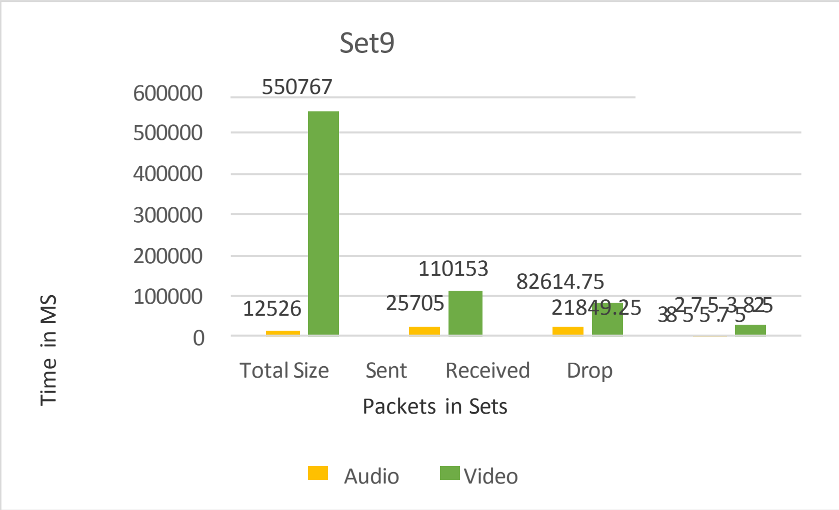

Fig. 13. Time taken for Selected audio from Set2, video from Set3.

The following Fig.14 represents the time taken for different sized packets sent, received, and dropped information. The input of Set3 encompasses Text, Audio, and Video files of sizes 663.2, 25698, and 110153 bytes of data which are sent across WSN. After transmission, the quantity of packets arrived at the sink node is 630.04, 21843.3, and 82614.75 bytes. During transmission, some of the packets are dropped from Text, Audio, and Video files. Dropped files for these are 33.16, 3854.7, and 27538.25 bytes.

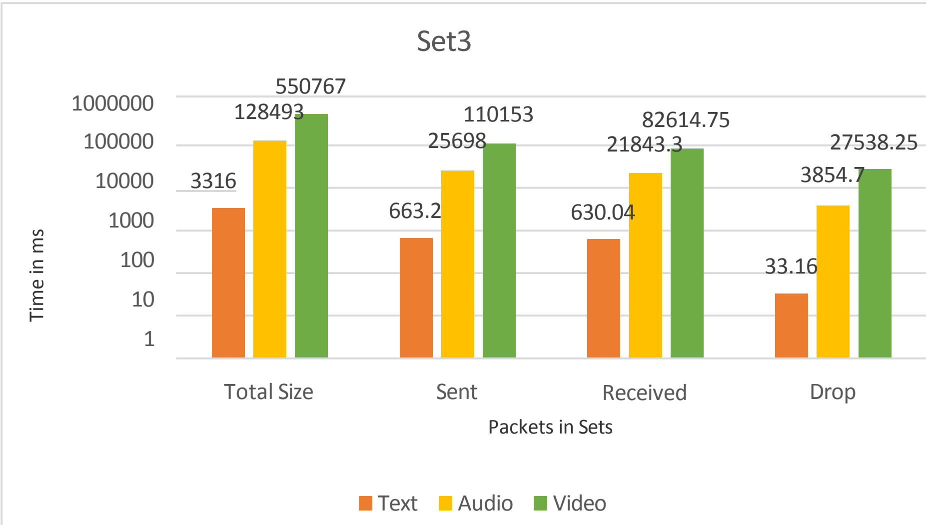

Fig. 14.Time taken for Text, Audio and video packets with total sized from Set3.

The Fig.15 represents the result obtained for Set4. Here only Text data files are considered from all the three Sets (Set1, Set2, and Set3). These files are aggregated and sent to the multichannel. The pie chart shows a total of 663.2 bytes of text data from all three Sets which are sent. At the receiver node, the number of packets reached is 630.04 and the drop packets count is 33.16 bytes.

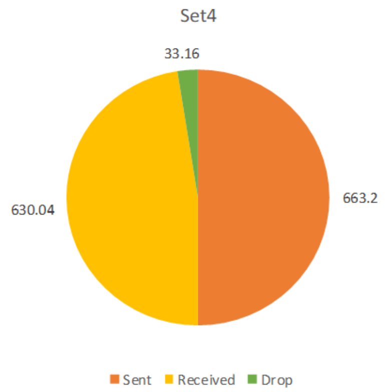

Fig. 15. Time taken for selected only text data from all 3 Sets (Set1, Set2, and Set3).

5. Conclusion

The effective bandwidth strategy is demonstrated in this work, which highlights the importance of planning and prolonging the lifespan of a network of sensor networks that are significant to the goal. The novel method considers models such as the package editing model used to separate different package frames, the flexible editing algorithm used for multimedia sensors, and the method editing model that discusses different editing algorithms. The integration of all these models improves performance. It also provides a high degree of intermediate shooting that influences the entire life of the network. In the proposed way, the nodes participate in critical planning that demonstrates improvements in the delivery of multimedia information. Obviously, with the importance of method and packaging, arranging high-quality packets to be transferred to a reliable, high-quality route is common. Control packets are transferred from the source area along the entire route to collect information throughout the route. Information on a network could alter over time. The NS2 / NS3 template for Multimedia Wireless Sensor Network Data should be used to continuously develop this method.

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Authors' Profiles

Ashok K Chikaraddi graduated B. E (CSE) M. Tech (CSE) and Ph.D. from V T U Belgaum. Presently working as Assistant Professor in Department of Computer Applications, K L E Technological University, Hubli. He also worked as Dy. COE in B V B C E T (Autonomous) and K L E Tech. He also worked as a Committee member of BOE, BOS, MPC. He has published papers in National and International Conferences / Journals in reputed indexing of Scopus, Web of Science, and Google Scholars. Also published two patents. Reviewed IEEE papers. He is a Life Member of Professional Organizations such as the Institute of Engineers (IE), and Indian Society for Technical Education (ISTE) also. He received ISTE- SRMC National level award in 2015 organized by AICTE-ISTE Chapter Chennai. Guided many Undergraduate and Postgraduate student projects. His areas of interest include Wireless Sensor Networks, Cyber Security, AI, and BIG data analytics.

Meena S Maralappanavar is completed a Ph.D. under V T U Belgaum and presently working as a Professor and Head School of Computer Science and Engineering, K L E Technological University Hubli, Karnataka, India. Areas of research include Image Processing, Computer Networking, and Machine Learning. Working with DST Project and Coordinator for the WiDS Stanford University Published papers in Scopus indexed Conferences and Journals in IEEE, Springer, and Elsevier publications. Four students have completed Ph.D. under her and two more are working under her, Guided many Undergraduate and Post Graduate Students Projects.

Suvarna G Kanakaraddi graduated B.E Computer Science and Engineering from Gulbarga University Gulbarga, M. Tech(CSE) and Ph.D. from VTU Belgaum. Presently working as Professor in School of Computer Science and Engineering, K L E Technological University, Hubli. Published papers in International conferences and Journals. Reviewed IEEE and Springer Conference papers. Attended workshops and training on Data science. Also published two patents. Her research area of interest includes AI, BDA and LP.

Vishwanath Chikkareddi is currently working as an Assistant Professor in Information Science and Engineering department of B.L.D.E.A' s V.P. Dr. P.G. Halakatti College of Engineering and Technology, Vijayapura. He is pursuing Ph.D. in VTU Belgaum in the area of Wireless Networks. He has 10+ years of experience in teaching and worked in prestigious engineering colleges like Veermata Jijabai Technological Institute (VJTI), Mumbai and D.Y. Patil Deemed to be University, Navi Mumbai. He has published several articles in reputed Journals and Conferences. He is also a Cisco Certified Network Analyst (CCNA) and associated with several Networking companies as a consultant.

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