



# INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact factor: 4.295

(Volume 4, Issue 6)

Available online at: [www.ijariit.com](http://www.ijariit.com)

## Bandwidth optimization using different algorithm techniques in wireless sensor networks

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### ABSTRACT

*The main aim of this bandwidth optimization is to transmit data packets from the sender to the receiver without any time delay and loss of packets. Using high bandwidth utilization we can send data to the users with low delay. In this paper, we discussed many algorithm techniques which can minimize the energy consumption, minimal time delay, avoiding un-usable bandwidth on the routing network, execution time. It makes a flexible network between users, avoid traffic rules and provide good network services between the peer to peer systems. The main purpose of this optimization is to provide a quality packet from sender to receiver and vice versa at the same time, like a video or audio data by initializing without loss of any IP address. It builds a large bandwidth to transmission of data from source to destination. And it reduces the unusable bandwidth. We used some logarithms to transfer the data in equal time and increase bandwidth as well as transmission of speed.*

**Keywords**— Bandwidth optimization, Execution time, Energy consumption, Time delay, Different algorithm techniques

### 1. INTRODUCTION

Wireless Sensor Networks (WSN) plays a vital role in communication through various technologies for the transmission of data from one end users through channel mediums. Bandwidth utilization is one of the factors that send data in bits/second and differs in speed by (kbps/Mbps) depending on the size of the data packets. In steering systems, web conventions help in transmission and accepting of information parcels through selectable optical transponder (SOT) which conveys different information streams in the meantime. Remote Sensor Networks comprise of a gathering of sensors hubs that utilization remote connects to perform circulated detecting errands. Sensor hubs join straightforward remote correspondence, negligible computational offices, and

detecting of the physical condition for an application-particular sensor arrange (1). Same time of the data through multiple nodes can cause a collision. In 1970's the simplest method is invented names as ALLOHA (pure & slotted). But this was failed due to increasing network size and data rate (2). ATM could be a packet switched, association bound transfer mode supported asynchronous time division multiplexing. ATM is taken into account to cut back the complexness of the network and improve the pliability of traffic performance. In ATM, info is shipped go into fixed-size cells. Every cell in ATM consists of fifty-three bytes. Out of those fifty-three bytes, five bytes are reserved for the header field and forty-eight bytes are reserved for knowledge field. ATM is Asynchronous because the repetition of cells sent by a private user might not essentially be periodic. ATM integrates the multiplexing and switch functions and permits communication between devices that operate at completely different speeds (3-4).

LARGESCALE net applications, like video streaming (Netflix), internet (Google), and social network (Facebook), give service too many immeasurable end-users. The big, and social network growing demand for those applications has intended service suppliers to deploy geographically distributed data centers for each responsibility and performance reasons. particularly, Netflix is exploitation the Amazon easy Storage service (s3) for storing all services (S3) for all storing video masters, that square measure additional transcoded to variety formats, and square measure then Distributed to Content Distribution Networks (CDNs), able to be served to end-users (5-7), To provide end-to-end Quality of Service (QoS), support is one among the key problems within the style of integrated wireless local area network and cellular networks. Several difficulties emerge once making supply an attempt to supply QOS solutions for integrated wireless local area network and cellular n networks thanks to the unbalanced capability of the two systems; problems raised by relinquishment between cells;

relinquishment between wireless access points; and relinquishment between wireless local area network and cells caused by user mobility; likewise because the unreliable communication of wireless media. to modify the economical use of the scarce resources provided by the cellular networks whereas additionally maintaining study guarantees, a generic-based QoS model has been planned [Wang et al., 2004] for the integrated cellular and wireless local area network. The quick development of web access and services like science video delivery and vocalization science is fast demand for broadband access. Whereas most of the broadband services around the world square measure delivered through the copper access network, optical access technology has been commercially obtainable for many years and is being deployed in great amount in some countries (8). The Passive Optical Network is one in all the foremost extensively deployed access networks because of its exclusive advantages, together with transparency against rate and signal format also a high knowledge rates and reliableness (9). The PON is kind of access network that supported optical fibre. It's designed to create out there unlimited information measure to the subscriber. Efficient reliability and Interval Discrepant Routing (ERIDR) formula optimizes un-usable information measure on the network and minimizes the information measure capability in keeping with the scale of knowledge packets transmitted. Modules encompass supply Peer (SP), Network Router (NR), Destination Peer (DP), and information measure Optimizer (BO). Supply peer selects the file from the angle directories, initializing every peer to more transmission and proving destination address for packet delivery. Network Router (NR) transmission knowledge through peer for negligible information measure utilization, less energy consumption and process faster for reducing time delay and increasing execution time. Destination Peer (DP). Receives the information packets from routers with efficiency. This paper discusses the main functions of the networks and algorithm in which we can optimize higher bandwidth and low delay for end users. Many algorithms are proposed but above discussed are the important and applicable for many users.

## 2. LITERATURE REVIEW

Susmi Routray (10) et al. proposed Dynamic Routing in ATM Networks using Genetic Algorithm & Tabu Search Approach the ATM model taken during this paper are as graph  $G(N, L)$   $N$  represents shift nodes and  $L$  represents physical link connecting every node (11-12). ATM may be a packet switched, affiliation oriented transfer mode supported asynchronous time division multiplexing. ATM is taken under consideration to cut back the complexity of the network and improve the pliability of traffic performance (13). ATM consists of fifty 3 bytes. Out of these fifty 3 bytes, 5 bytes are reserved for the header field and forty-eight bytes preserved for the data field. ATM is Asynchronous as a result of the comeback of cells sent by a personal user won't primarily be periodic. ATM integrates the multiplexing and alters functions and permits communication between devices that operate at all totally different speeds (14). GA (Genetic Algorithm) is likewise a non-customary based improving procedure which could be acclimated upgrade the ATM organize. GA tasks are commonly in short depicted as mystery composing, designing, Evaluation, duplicate, Crossover, Mutation, and Terminating condition. GA has been used in past investigations to streamline the ATM organize and what's more inside the mold of ATM arrange (15-16). The basic construct of Tabu Search is resolution combinatorial optimization downside. It quite unvaried search and is characterized by the employment of a versatile memory. Tabu search is essential, one resolution,

settled neighbourhood search technique that uses memory- a "Tabu list, to ban bound moves, even though they're rising. This makes Tabu search a world optimizer instead of an area optimizer. The parts of Tabu search formula square measure encryption, Initial resolution, Objective operate, Move operator, Definition of Neighbourhood, Structure of Tabu list(s), Aspiration criteria (optional), Termination criteria. Tabu search approach has been utilized in ATM networks to resolve the {planning the look} downside of the trunk cluster (TG) overlay in wide space ATM networks beneath responsibility constraints to confirm the booming rerouting of the S-PVCs and additionally within the S-PVC network planning however when in-depth literature survey we tend to accomplished not abundant analysis has taken place on Tabu search implementation for dynamic routing downside in ATM network (17-20). Here in the ATM network, we have implemented two algorithms. Among those two genetic algorithms is the best one in which we can solve the dynamic routing in ATM network. Experimental results showed that the tournament selection method gives an average cell delay of 6.61micro seconds. From this, we can achieve optimized bandwidth. By using this algorithm can't satisfy with the solving of network traffic, so we can go for another method.

Vidya Krishnamurthy (21) et al. proposed the Networks through Evolutionary Slot Assignment (ESA) which can increase the throughput of a large wireless mesh network having any centralized unit. In this algorithm, we have the sensor nodes which are independent of each other. To increase the information measure utilization and reduce collision in ad-hoc beaconless wireless a probabilistic learning based programming which supports Evolutionary Slot Assignment (ESA) is projected. Consider a beaconless IEEE 802.15.4 network with high information rates characteristic for ceaselessly watching applications as our main target. The nodes within the network aren't synchronized in time. The ESA algorithmic rule is enforced at the device node level and needs no central organizer or cluster head; doesn't have faith in beacons or four-four time reference and doesn't create assumptions on topology and property of the network. Network Simulator-2 (NS-2) with IEEE 802.15.4 medium access protocol [22] has been wont to simulate ESA, Social Security Administration, and RSA strategies. The simulation state of affairs consists of a beaconless network with one PAN organizer and thirty nodes placed every which way during a 50m-by-50m space with vary of every node restricted to 15m. The nodes don't seem to be synchronized in time and start-up every which way times. the ESA algorithmic programme was enforced at the SSCS (service specific convergences sublayer) that acts as associate degree interface between the mackintosh and is associate degree implementation specific module that gives access to the mackintosh primitives and permits for his or her modification for any specific application, every node is chosen to own Omni-directional antenna and therefore the most range of packets allowed within the interface queue was set to ten. The packets were transmitted victimization AODV routing protocol. In the ESA technique, the sensing element nodes, freelance of every alternative, adopt internal schedules to an approach pattern minimizing collisions and up information measure utilization. ESA technique makes no assumption of configuration routing, traffic from neighboring nodes, doesn't need a centralized computer hardware and doesn't produce planning traffic (23-25). ESA additionally doesn't have to understand the schedules of neighboring nodes and doesn't need a standard time marker or synchronizing beacons. Simulations were performed for 2 topologies, a star and a mesh network, and two completely different traffic eventualities, constant-bit rate traffic, and Poisson traffic. Networks

exploitation CSMA-CA medium access were compared with the static slot assignment, random slot assignment and also the biological process slot assignment algorithms. Simulation results show 200%–300% improvement in out-turn of projected ESA formula compared to pure CSMA-CA. In this algorithm, we can reduce the traffic of signals and it is helpful in overcoming the networking using CSMA-CA. This algorithm can reduce collisions. But it is not able to produce bandwidth utilization, so we go for an algorithm.

Pankhuri Dorga (33) et al. proposed the algorithm dynamic information measure allocation (DBA) model to effectively and fairly allot information measure between finish users. We tend to increase the information measure allocation model support QoS in an exceedingly differentiated services framework. Because of the bursty nature of local area network traffic, some worry may need less traffic to transmit whereas the different worry wants quite be minimum. For this reason, we tend to develop a model to supply information measure. This model is additionally higher to support differentiated services: an important demand for a converged broadband access network with heterogeneous traffic. The goal of information measure allocation is to effectively and expeditiously succeed honest planning of timeslots between worry in EPON

networks. The conferred work has been done on the analysis and improvement of the Passive Optical Network. A mathematical model is planned to realize the optimization of Bandwidth Allocation goal. Within the mathematical model variation of information, the measure is shown with totally different parameters. It shows that information measure increase with the rise of transmission speed. Information measure is improved up to 30%.

XIN GANG WANG (34) et al. discussed the WLAN and UMTS networks have completely different transmission Capacities, thus football play between the 2 systems makes the upkeep of a QoS affiliation terribly laborious. One must take into account the numerous distinction in transmission capability between the 2 systems, particularly once user football play takes place. The second constraint is that wireless local area network operates on a free belief band and includes a ton of uncontrollable interference (i.e. microwave), though some techniques like unfold spectrum area unit wont to cut back the interference. Such issues area unit on the far side engineering management and laborious QoS guarantee is incredibly troublesome or perhaps not possible to attain. To support QoS in packet switch networks there must be some mechanisms to manage network load, to stay it underneath a threshold, so the system can do a satisfactory

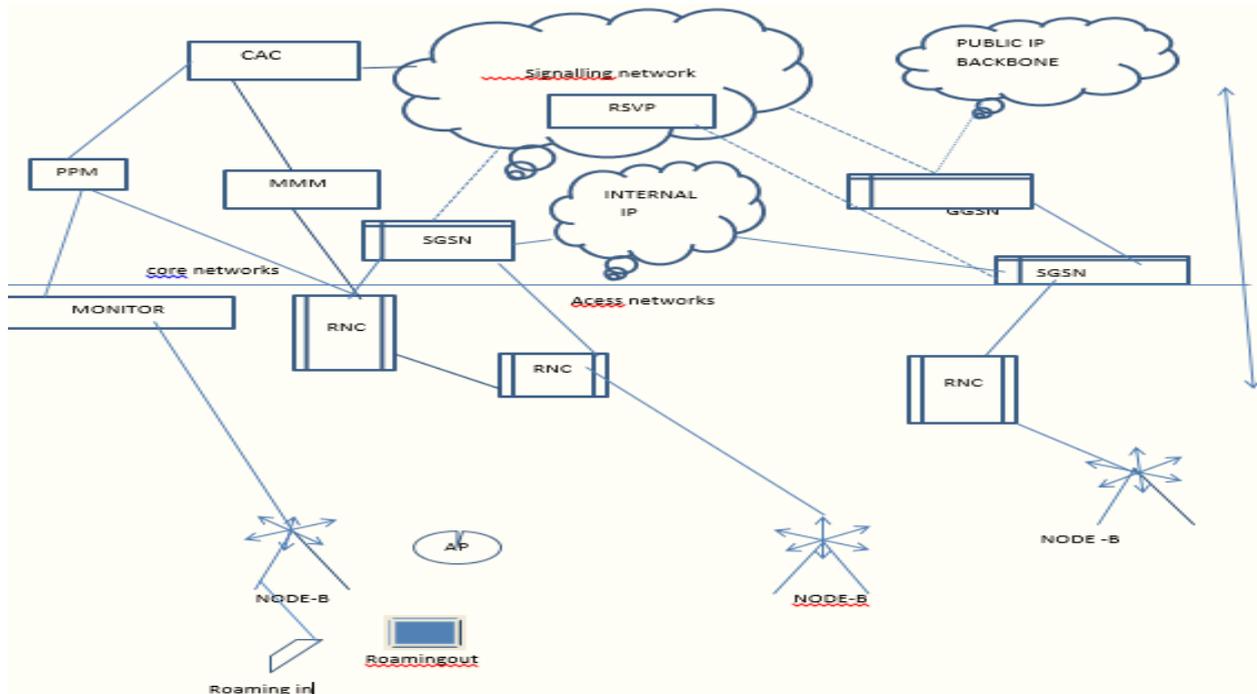


Fig. 1: QoS Frame Work

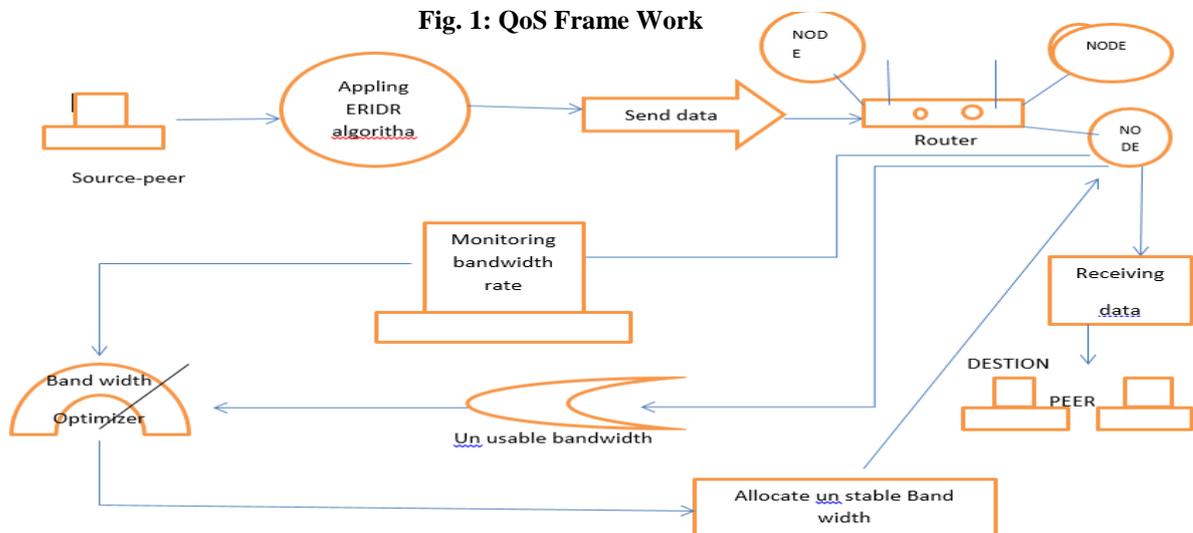


Fig. 2: ERIDR algorithm architecture diagram

performance. The third downside is that the possible QoS levels in wireless local area network and 3G cellular networks don't match one another. 3G cellular networks area unit alright designed with careful network coming up with and mature admission management algorithms. Therefore, the possible QoS level is comparatively high, while 802.11e wireless local area network works inside less controlled surroundings and it's troublesome to attain laborious QoS, though some sort of admission management [802.11e/D4.3, 2003] has been provided for HCF within the IEEE 802.11e commonplace. Even the EDCF (enhanced distributed coordination function) will solely give Differential of Service (DoS).

Sivashanmugam et al. (35) discussed the ERIDR (Efficient Reliability and Interval Discrepant Routing). The main objective of the ERIDR system improves the info responsibility and delay distinguished services (RDDs) at the same time, and an information measure optimizer allocates needed information measure for knowledge transmission of each peer at the same time to make sure information measure potency. Associate in Nursing Efficient reliability and Interval Discrepant Routing (ERIDR) formula is planned to scale back the quantity of un-usuable information measure of every peer. It establishes high information measure rate router to transmit knowledge at the same time from supply to destination (peer-to-peer) with none packet loss by initializing host science address for each peer. It enhances the outturn and minimizes the energy, delay and information measure utilization.

An Efficient Reliability and Interval Discrepant Routing (ERIDR) rule is reducing the number of un-usuable information measure of every peer. Four options area unit touching the peer-to-peer delay resembling transfer interval, the competition of the radio channel, queuing interval, and path length. Transfer interval is prescribed and is related to information measure. Competition of radio channel has especially supported the rivalry of MAC; a packet has got to contend for the channel access and stay up for content transfer till the channel is idle. Queuing delay may be an immense queue seriously takes the delay of transfer of the packets. Generally, the trail length has extra hops for packet transmission; the large potential delay can suffer. The physical constraint establishes the transfer interval, and also the waterproof influences the competition of radio channel. The ERIDR rule aims to attenuate the transfer interval, packet loss, information measure utilization, energy and improves the output. Think about the network with completely different high reliableness or delay content files. Let  $c$  be the symbol of varied applications. The most method of ERIDR rule at peer works as follows. First, if the queue at peer isn't empty, then information measure is computed for the packet at the pinnacle of the queue. Calculate the information measure and choose the following hop. ERIDR build up a possible field together with the information measure and queue length information to research the under-utilized methods. The packets with immense reliableness needs are forwarded to the following hop with lesser queue length. Each application assigned a packet size, and it describes the degree sensitivity to the delay. ERIDR describes the most Update Interval (MUI) and a Least Update Interval (LUI) among 2 sequent modify information. MUI is usually larger than LUI. The changed information ought to be transferred among Associate in Nursinging LUI and MUI a minimum of once. If no file is received from a neighbour through 2 MUIs intervals, within the neighbour are going to be measured dead, and ERIDR can recomputed the information measure and alternative connected values. The modified information is going to be transferred. If MUI timer expires the

time is going to pass on as a result of transferring the last changed information exceeds the MUI; a brand new modify information is going to be transferred straightaway irrespective of whether or not the information measure or queue length has modified. The queue length variation exceeds a precise threshold. If the queue length of a peer has varied compared with last palmy changed information and also the period exceeds the LUI as a result of the last modify information. If the information measure size of a peer has changed and also the period exceeds the LUI as a result of the last palmy modify information.

### 3. PROPOSED WORK

In this paper, we are going to conclude that which algorithm technique is best suitable for our current technology. Many algorithm techniques are implemented but different algorithms having certain different drawbacks. So in this paper, we conclude ERIDR is the updated algorithm in which we can optimize bandwidth up to some level. In future some other techniques are made to implement, we are also working on this bandwidth optimization.

### 4. FLOW CHART

The algorithms in flow chart manner can be given as

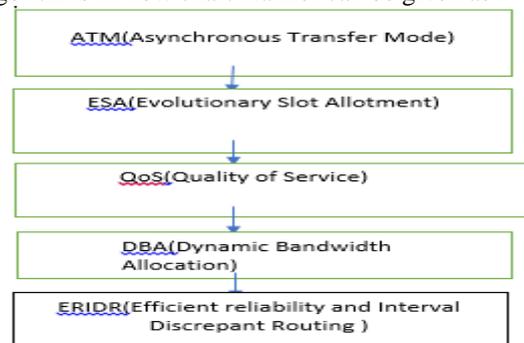


Fig. 3: Flow chart of the proposed work

### 5. RESULTS AND CONCLUSION

Here in this paper, many papers are discussed how bandwidth can be utilized using algorithm techniques. Bandwidth optimization is the one factor in which we can reduce average delay and loss of data packets.

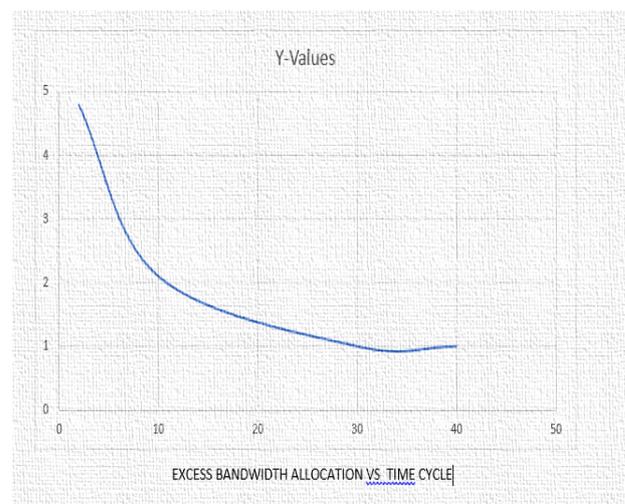


Fig. 4: Bandwidth allocation V/s cycle time

The above graph represents the variation of bandwidth with time cycle. It is evident from the response of cycle time that with the increase of time cycle the bandwidth initially takes a curve shape and then increases linearly. Among the different algorithm techniques, ERIDR is the best option in order to implement. It

consists of all other algorithm functions in which it reduces average delay and sends data without loss of packets. This technique is deployed in Intel i6 Core processor. The proposed algorithm is computed with the following constraints namely Average Delay, Execution Time, Throughput and Bandwidth Utilizations performance evaluation metrics.

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