

# Massive Random Access in Automobile-to-Automobile Communications using Honey-Bee Algorithm

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**Abstract:** Automobile-to-Automobile correspondence (M2M) is an inside piece in the Internet of Things (IoT) vision. In context on the enormous number of devices expected, the Whole deal Advancement Advanced (LTA-A) structures may present stop up and over-burden issues. The colossal passionate access in M2M trades will cause radio access arrange discourage in the base station (BS), actuating sharp debilitating in access deferral and access probability. Access class in any case (ACB) that can direct control the advancement of Automobile-type correspondence (MTC) devices by an ACB factor is an earth shattering course of action to keep the BS from traffic over-bother. In remote cell manages, the enthusiastic access resources (i.e., precludes) are shared by M2M and human-to-human (H2H) contraptions, and research on ACB plot generally perceive that a predestined number of partners are named with M2M traffic. In any case, when encountering colossal access in M2M correspondences, it is connecting rapidly satisfy the path requests from MTC contraptions using each open presentation, especially in time-sensitive IoT conditions. In this paper, we study the gigantic access issue in M2M traffic entered conditions where M2M and H2H traffic can apply for each available prelude without segment. Utilizing the self-adaptable learning property of learning automata, we further propose dynamic Honey bee estimation to adjust the close to rate parameter. Duplication results exhibit that the Honey bee Computation achieves the presentation close to hypothetical optimality. The BS equipped with the Honey bee Count can effectively control the M2M traffic by capability adjusting the ACB factor under the counteractive action of H2H traffic and give quality relationship to both M2M and H2H traffic.

**Keywords :** ACB; BS; H2H; IoT; LA-ACB; MTC; M2M

## I. INTRODUCTION

Remote Personal Area Network (WPAN) is an individual locale deals with in like manner offers a data to other device. We engineer a structure for interconnecting gadgets concentrated on included Honey-Bee Algorithm near to learning automata for a specific individual's workspace where the affiliations are self learning traffic between Automobiles to Automobile and remote. Remote PAN depends on the standard IEEE 802.15. human to human correspondence refine and satisfactory. The two sorts of remote degrees of progression utilized for furthermore we give quality relationship to both Automobile WPAN are Bluetooth and Infrared Data Association. A WPAN to Automobile and human to human traffic. could serve to interconnect all the standard figuring and giving contraptions that different individuals have around their work zone or pass on with them today; or it could fill a consistently unequivocal need, for example, engaging the master and various associates to give during an activity. A key idea in WPAN development is known as "accessory".

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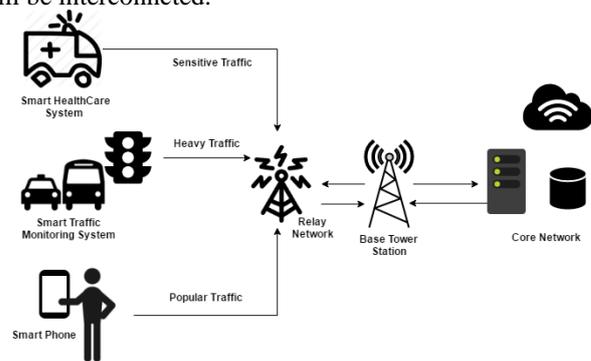
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In the perfect condition, when any two WPAN-arranged contraptions come into district (inside a couple of meters of one another) or inside two or three kilometers of a focal server, they can pass on as though related by an alliance. Another essential segment is the most removed reason for every gadget to flood out different contraptions unequivocally, dismissing silly check or unapproved access to data. The development for WPANs is in its soonest makes and is experiencing speedy improvement. Proposed working frequencies are around 2.4 GHz in cutting edge modes. The goal is to help evident improvement among home or business contraptions and structures. Each contraption in a WPAN will have the decision to interface into some other gadget the proportionate WPAN, in case they are inside physical degree of each other. Additionally, WPANs worldwide will be interconnected.



**Fig.1.0 Overall Architecture**

Our proposed structure is diminished centrality use in Base station and improve self-vehement access plot correspondingly as we lessen crash and standard access delay. We can assemble capable data in Low-Bandwidth

## II. RELATED WORKS

In this past work Automobile-to-Automobile (M2M) correspondence is one of the guideline facilitators of the Internet of Things condition by offering inevitable applications and associations. Utilizing cell structures for giving M2M availability brings two or three piece of leeway's, for example, broadened thought, security, overpowering association, and lower affiliation costs; regardless, concurrence with boundless M2M contraptions is so far a basic test in LTE-A systems, to some degree because of the issue in permitting synchronous access.



Ignoring the way that the sporadic access framework in LTE-A is useful for human-to-human (H2H) exchanges, when M2M correspondences are consolidated blockage control is required. One of the hinder control plans recommended by the 3GPP is Access Class Barring (ACB), which can diminish the measure of synchronous clients doing combating for access. In any case, it is up to this point not clear how to change ACB parameters in bursty and overwhelming stacked conditions, for example, those that show up in M2M trades. We propose a dynamic ACB plot in which a check of the present number of M2M contraptions in back off state is utilized to modify constantly the except for rate parameter. We study the key execution pointers (KPIs) of dynamic ACB in several conditions with various degrees of traffic weight and contrast them and those of a static ACB with flawless parameters. We show that the dynamic ACB beats the static one offering shorter access delay and higher profitable access likelihood, while its effect on H2H correspondences KPIs is irrelevant. Besides, our proposed game plan fits in with the LTE-A confirmation so it will when all is said in done be melded as a reasonable game-plan. Sooner rather than later, with the improvement of Automobile to Automobile (M2M) correspondence ace affiliations may see a spike in occupied time gridlock corrupting the possibility of association (QoS). With the augmentation of a couple M2M contraptions, it is relied on to raise conditions for over-hell in the Radio Access Network (RAN) and Core Network in 3GPP LTE systems. There are different appraisals that look at different attributes of M2M explicit gadgets including checking the physical gadgets, assertion procedures, blockage controls, confirmation insurance and different others. In any case, blockage will be a driving forward issue with the all-inclusive gadgets and is the purpose of intermingling of this paper. There is take a gander at on the methodologies to control stop up, at any rate this paper is mulling over developing accessibility through diminishing full scale bytes transmitted and in this manner staying away from or lessening over-weight and blockage in LTE sort out. In this paper, we have proposed and endeavored various improving parts for diminishing the hailing traffic and move speed usage, all things considered decreasing the over-inconvenience in the LTE plan. Using cell structures for offering Automobile-to-Automobile (M2M) compose offers different propensities as for joining, association costs, security and the specialists, among others. By chance, having boundless M2M contraptions started at the same time is difficult to oversee at the made Node B, and it causes complexities in the association establishment. The flighty access channel (RACH) in LTE-A is valuable for overseeing human-to-human (H2H) exchanges. In any case, for the skillful approach of simultaneous H2H/M2M correspondences, it is fundamental to improve the open access control instruments with the objective that framework over-burden is kept up a key good ways from and an unequaled QoS can be progressed. Access Class Barring (ACB) has shown to be reasonable in diminishing the proportion of synchronous customers engaging for access. Regardless, it is starting in the no so distant past not clear how to continuously adjust its parameters, especially in by and large changing conditions with bursty traffic as it can happen when M2M exchanges are joined. We propose an astonishing Honey Bee estimation to change the adjacent to rate parameter of ACB. This figuring can change it to

different traffic conditions, decreasing blockage and from this time forward the proportion of setbacks in the RACH. The results show that our proposed part builds up the way accomplishment probability for most of the customers while barely affecting H2H customers and other key execution markers. a Automobile to Automobile (M2M) Relay instrument is proposed to save centrality use by decreasing the proportion of wealth in a Narrowband Internet of Things (NB-IoT) structure, which is a third Generation Partnership Project (3GPP) customer gear (UE) demand for low-control, low-drive and battery-controlled contraptions. A NB-IoT structure can support the method for innumerable contraptions running over a joining zone more unmistakable than the standard cell in a phone limited framework by understanding the emphasis based transmission to make the position masterminding gain, i.e., to grow the chance of stunning data transmission. 3GPP NB-IoT RAN1 starting at now portrays that the proportion of bounty will united exponentially increase when the getting signal quality decreases. This may impel surplus repetition, i.e., inconsequential essentialness use. Furthermore, for contraptions in the edge of a cell, the forbidden radio condition will get unlimited highlights, depleting the battery criticalness quickly. Accordingly, by using the Automobile to Automobile (M2M) Relay that is starting at now made and delineated in 3GPP standard, a novel instrument for adequate hand-off UE picking and faultless hand-off arranging is proposed to enough diminish the importance use at any rate keep up the system throughput and UE QoS. The expansive redirections is executed in a setting of 1000 contraptions coursed by a Poisson Point Process over a cell of the radios of 125 transmission detachment units. If a UE sorted out inside a transmission bundle unit to the eNB; it needs only a solitary emphasis to reasonably transmit data. Age results show that the highlight number will drop obviously in all reenactment cases. The less number of transmitting contraptions, the higher saving level of complement. For transmitting contraption thickness 0.1, 0.2, and 0.3, the highlight saving degree is 0.7, 0.69, and 0.65 as it were. The industrious advancements in cell correspondence zone have comprehended the ascending of Automobile-to-Automobile applications, on the wide range and thought plan, low costs, and high flexibility. 5G make models address a promising headway to help the inevitable fate of Automobile-to-Automobile data traffic. Starting late, Human-Type-Communication traffic has seen exponential progress over cell structures, which recognized expanding the reason for constraint and higher data rates. These structures are depended on to go facing issues, for instance, impact of the data traffic in light of things to happen to adroit contraptions data traffic with various Quality of Service requirements. This paper proposes a novel data traffic get-together model and computation near to another 5G structure cutting subject to delineation and evaluating the data traffic to satisfy Quality of Service for skillful systems in a sharp city condition. In our proposal, 5G radio resources are beneficially utilized as the humblest unit of a physical resource divert in a hand-to one side point by party the data traffic of a couple of Automobile-to-Automobile contraptions as discrete cuts subject to Quality of Service for each application.

OPNET is used to look at the presentation of the proposed model. The replicated 5G data traffic classes circuit record move show up, voice over IP, and video customers.

Automobile-to-Automobile correspondence (M2M) is a middle parts in the Internet of Things (IoT) vision. By temperance of the gigantic number of devices expected, the Long-term Evolution-Advanced (LTA-A) structures may show hinder and over-bother issues. In this paper, we present two particular ways to deal with manage alleviate the impact of M2M correspondence in LTE-A. We model such over-burden circumstance as a fragment 11 issue and apply two frameworks to delineate how resources should be appropriated. The reenactment results show that our methods present upgrades the degree that imperativeness capacity, sway control of M2M over Human-to-human (H2H) and delineate need among different classes of device.

In the coming decades, we will live in a world included by two or three billions of contraptions that will interoperate and organize with an outrageous objective to pass on changed and autonomic affiliations. This perspective of stunning things and splendid things interconnected and unavoidably including us is known as the Internet of Things (IoT). Urban zones may be the first to benefit by the IoT, regardless reliance on these Automobiles to pick decisions has enormous repercussions for trust, and makes instruments for conceding and considering trust essential. This paper demonstrates the endeavor financed by the Georgia Tech Research Institute to look at a few sections of Automobile to Automobile Trust with respect to Smart Cities.

### III. RANDOM ACCESS CHANNEL

A sporadic access station (RACH), now and again comparably called a give station, is a normal station utilized by remote terminals to get to the adaptable system (TDMA/FDMA, or other media, for example, a satellite station or high move speed wired stations, and CDMA based structure) for ring set and bursty information transmission. At whatever point a flexible, or other contraption, needs to make a MO (Mobile Originating) call it structures the RACH. RACH is transport-layer channel; the looking layer channel is PRACH. Since RACH is shared, there is a likelihood that at any rate two mobiles transmit at the same time and their transmissions crash in the medium and they won't be given up access to the structure, raising some sporadic quality issues which have been tended to and settled. This happens in light of the path that far for the extent of contraptions transmitting in one RACH timetable opening isn't appeared, for example in the GSM standard. In the event that impacts happen, by then the versatile or contraption holds tight for unconventional time length and transmits the RACH once more. This holding up time is other than conflicting. RACH utilizes GSM 51 edge multiframe structure in the uplink to transmit data. For the most part TS1 is utilized in any case in high limit GSM cell zones, TS2, TS4 and TS6 is in addition utilized for RACH leaving TS0 (everything thought about utilized for pass on rehash).

The random access procedure, depicted by the third Generation Partnership Project (3GPP), depends on an opened Aloha approach with energetic getting sign, that is done in uplink by the sporadic access channel (RACH). An

offbeat access channel like that of cell phone systems is in like way utilized in the OpenAirMesh sort out, between pack heads and work switches. A key bit of an optional access channel is that messages are not arranged (wandered from, for instance, a "submitted channel" in UMTS, which is dissipated only to each client along these lines). There is no sureness that single a particular gadget attempts once, so impacts can result.

The stage, worked inside the 'Virtual Component Co-Design' device (VCC), gives the most outrageous of dissipating a given structure a rousing power over a structure to hold up under observer to various layouts like cost, security necessities, and driving constrainments. The virtual stage unites the establishment for structure choices rapidly in the headway sort out, everything contemplated drawing in legitimate and high grounds in the improvement procedure. One of the key-interfacing with regulators of the technique, the broad correspondence model (UCM). The UCM is depicted at a degree of reflection that licenses cautious assessments of the show including the latencies over the vehicle structure, and unfathomable reenactment execution. In like manner, in perspective on the raised level of reusability and parameterization of its pieces, it may be utilized as a structure for displaying the separating correspondence indicates basic in the vehicle space.

#### A. Long Term Evaluation

In media transmission, Long-Term Evolution is a standard for fast remote correspondence for PDAs and information terminals, in light of the GSM/EDGE and UMTS/HSPA drives. It makes the explanation behind concealment and speed utilizing an other radio interface together with center structure upgrades. The standard is made by the 3GPP (third Generation Partnership Project) and is settled in its Release 8 record plan, with minor updates portrayed in Release 9. LTE is the update course for transporters with both GSM/UMTS structures and CDMA2000 systems. The changing LTE frequencies and get-togethers utilized in various nations recommend that just multi-band telephones can utilize LTE in all nations where it is kept up. Totally Immersive Reality. LTE is also regularly known as 3.95G. The necessities were from the earliest starting point continued by the ITU-R relationship in the IMT Advanced express. Regardless, in perspective on moving loads and the essential headways that WiMAX, Evolved High Speed Packet Access and LTE bring to the fundamental 3G advances, ITU later picked that LTE together with the beginning late referenced overhauls can be called 4G prompts.

#### B. Random Access Control

A numerical model has been relied on to look into the presentation of the opened ALOHA sporadic access direct with catch influence in a humbler radio correspondence condition. The radio channel is spread out by the way hardship, Rayleigh obfuscating and log-key 'shadowing'. With catch influence, results demonstrate that the maximal reachable throughput is extended and the risk of deficiency is decreased as separated and understood appraisal of unadulterated opened ALOHA. A structure wide utility development issue is referenced, using a disaster probabilistic model and evolving uneven utility to mean social welfare.

By changing the parameters in the utility objective bits of the NUM issue, we can in like way control the tradeoff among bit of room and sensibility of radio resource circulation. We make two passed on estimations to light up the utility-flawless discretionary access control issue, which lead to sporadic access shows that have barely more message passing overhead than the present exponential-backoff shows up, yet monstrous potential for most extreme and expectedness improvement.

### C. Question Free Random Access

The present choices of the Random Access Channel (RACH) of the Long Term Evolution (LTE) and LTE-Advanced (LTE-An) isn't reasonable for Automobile-to-Automobile (M2M) trades. This is in light of the way that the colossal number of M2M contraptions will initiate low access rate and enormous access delay. This paper displays another show, in setting on the Distributed Queuing (DQ) check, for improving the introduction of the Random Access (RA) structure for LTE to help the M2M services.

Distributed Queuing Access for LTE (DQAL), limits the opportunity of disaster in the territory plan M2M. The diminishing in the failure will turn in restoring both the segment rate and the way delay. What's more the showed game-plan is proposed to keep the standard get to structures for Human-to-Human (H2H) correspondence with no impact. Results show that the area suspension is diminished to half of the LTE access delay and the way in which accomplishment probability approaches solidarity.

### D. Fight Based Random Access

The contention targets character message has two domains: (a) PDCCH which shows where the requesting goals character message is, and (b) the PDSCH part which contains the request destinations character message itself. The PDCCH and the PDSCH are in the relating subframe. The PDCCH message is set out toward the UE if the CRC bits of the PDCCH message is blended by the Temporary C-RNTI that was given to the UE in the eccentric access response message. If so the UE, by then takes a gander at the PDCCH and finds where the Contention targets character message is in the PDSCH bit of the subframe. The UE by then discharges up the PDSCH message and demands that the substance of the sales goals character MAC portion is with respect to the RRC association referencing message that it had sent.

## IV. COMMUNICATION MODEL

Media transmission utilizes today different contraptions, working structures, sort out degrees of advancement and applications. The mix and superior to anything regular collection of these things are relied upon to increase in light of the improvement of new degrees of headway. Thusly correspondence changes into a test. In this paper the game-plan model "General Communication Model" (UCM) for the bound together usage of these things is proposed and talked about. The future society may be 60+ and cut down physical purposes of control concerning correspondence should be examined. Two use cases are applied to the UCM Elderly father at home called by his little girl from her vehicle, and confused grandmother strolling around her procedure at the solid focus interest.

## A. Access Class Barring

The extent of contraptions that give through the telephone structure is required to rise in a general sense over the coming years. Regardless, cell structures, for example, LTE-A, were proposed to guide human-to-human traffic. Starting now and into the not all that removed, they are not reasonable for controlling goliath Automobile-to-Automobile trades. In this manner, extra stop up control approaches must be made and assessed. Cutting edge, discover the chance to class in any case (ACB) techniques are the favored reactions for diminishing square in the fragment channels of the made NodeB. These frameworks depend in the wake of constraining the segment of express classes of UEs, so past what many would consider possible isn't beaten. Because of the high motivation of the LTE-A structure, examining its presentation isn't clear. In particular, unfathomable sections, concurrent parts, and test conditions make it hard to see the structure parameters that update execution. For this ACB thinking in astoundingly blocked conditions. For this, we study the impact of ACB parameters (beside rates and despite times) by frameworks for a couple of key introduction markers (KPI, for example, delay, centrality use (introduction transmission tries required) and achievement likelihood. We saw that ACB is fitting for regulating sporadic blockage breaks in LTE-A systems.

## B. Learning Automata Barring Scheme

The Automobile to Automobile correspondences, which accomplish the execution of Internet of Things (IoT), can be continued with remote cell systems. The gigantic sporadic access in M2M correspondences will cause radio access sort out blockage in the base station (BS), influencing sharp confining in access deferral and access likelihood. Access class beside (ACB) that can direct control the headway of Automobile-type correspondence (MTC) contraptions by an ACB factor is a sensible approach to keep the BS from traffic over-trouble. In remote cell deals with, the sporadic access assets (i.e., preludes) are shared by M2M and human-to-human (H2H) contraptions, and research on ACB plot routinely see that a set number of accomplices are consigned with M2M traffic. Regardless, when experiencing immense access in M2M trades, it is addressing quickly fulfill the portion demands from MTC contraptions utilizing every single accessible prelude, particularly in time-temperamental IoT conditions. The giant access issue in M2M traffic focused conditions where M2M and H2H traffic can apply for every single open introduction without limit. Using the self-adaptable learning property of learning automata, we further propose dynamic Honey-Bee estimation. Reenactment results display that the LA-ACB plan accomplishes the partner close with speculative optimality. The BS outfitted with the LA-ACB plan can practically control the M2M traffic by unequivocally changing the ACB factor under the impedance of H2H traffic and give quality relationship to both M2M and H2H traffic.

**C. Dynamic Access Class Barring**

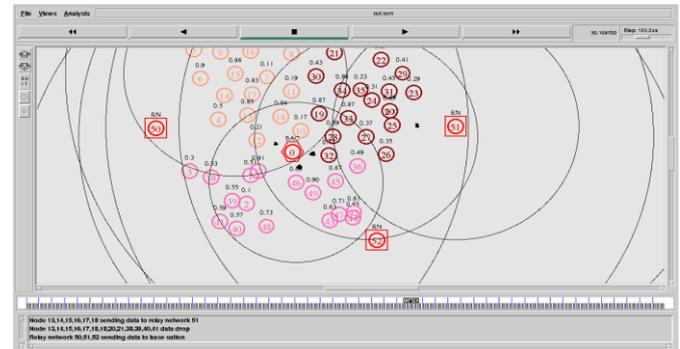
Automobile-to-Automobile (M2M) correspondence is one of the standard facilitators of the Internet of Things condition by offering inevitable applications and affiliations. Utilizing cell structures for giving M2M availability brings two or three not all that terrible conditions, for example, extended joining, security, vivacious association, and lower procedure costs. regardless, mix with unending M2M gadgets is beginning at starting late a basic test in LTE-A structures, to some degree because of the issue in permitting synchronous access. Despite the way wherein that the dynamic access structure in LTE-An is acceptable for human-to-human (H2H) correspondences, when M2M trades are blended stop up control is required. One of the blockage control plans proposed by the 3GPP is Access Class Barring (ACB), which can reduce the extent of synchronous clients doing drawing in for access. Regardless, it is up 'til now not clear how to change ACB parameters in bursty and overwhelming stacked conditions, for example, those that show up in M2M exchanges. We propose a dynamic ACB plot in which a degree of the present number of M2M contraptions in backoff state is utilized to change steadily the in spite of rate parameter. We assess the key execution markers (KPIs) of dynamic ACB in a couple of conditions with various degrees of traffic weight and division them and those of a static ACB with impeccable parameters. We exhibit that the dynamic ACB beats the static one offering shorter access delay and higher influencing access likelihood, while its effect on H2H exchanges KPIs is immaterial. In addition, our proposed course of action changes with the LTE-A detail so it may be joined as a genuine method.

**D. Machine Type Communication (MTC)**

Automobile Type Communications (MTC or M2M) is growing quickly and can pass on basic remuneration rates for adaptable structure heads. MTC Devices are relied upon to humbler individual voice endorsers by at any rate two techniques of degree. A couple of necessities are basically higher. MTC draws in Automobiles to look at really with each other. M2M correspondence can in a general sense change our general condition and the way wherein that individuals team up with Automobiles. There are basic separations among individuals and Automobiles. Automobiles are stunning at standard and well-outlined assignments that require an enduring degree of idea; individuals get exhausted by accentuation and quit focusing, submit screws up, miss inputs. Individuals are mind blowing at assignments that require data and versatility; Automobiles can't change according to occasions outside their programming. Automobiles can respond to inputs rapidly human reactions are essentially progressively moderate. With a wide degree of potential applications, Automobile Type Communication (MTC) or Automobile to Automobile (M2M) correspondence is widening an epic vitality among adaptable structure executives, gear dealers, MTC star affiliations, and research bodies. To help blend among these various assistants, certain systematization social gatherings began dealing with MTC. This article demonstrates quickly a run of the correct exercises, with a thought on those identified with the third Generation Partnership Project (3GPP). The article bases on two enormous bits of MTC contraptions. They are enlistment control and structure stop

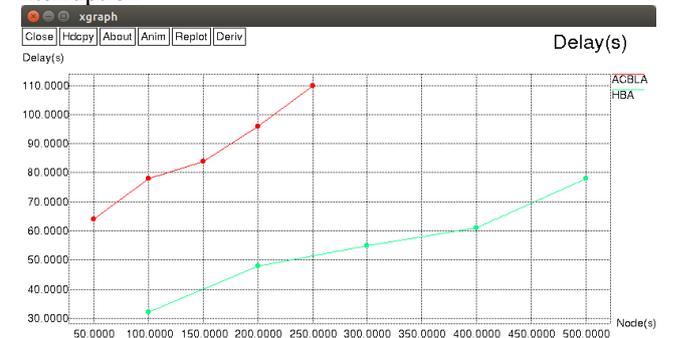
up/over-trouble control. Automobile to Automobile (for the most part contracted as M2M) translates bolster correspondence between contraptions utilizing any trades channel, including wired and remote. Automobile to Automobile correspondence can entwine current instrumentation, interfacing with a sensor or meter to pass on the information it records, (for example, temperature, stock level, and so forth.) to application programming that can utilize it (for instance, changing a mechanical system subject to temperature or putting arrangements to restore stock). Such correspondence was from the earliest starting point depleted by having a remote outline of Automobiles move data back to a focal center point for evaluation, which would then be rerouted into a structure like a PC

**V. SIMULATION AND ANALYSIS**



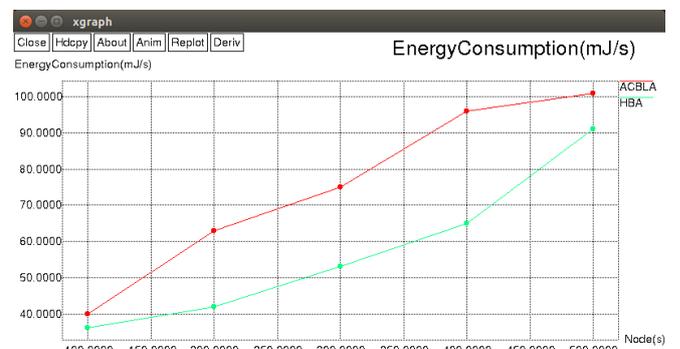
**Fig.2 Relay Network Routing**

Fig.2 shows the NS2 Simulation tool for Relay Network can provide a directly to connect to Base Station without any interruption



**Fig.3 Delay**

Fig.3 shows delay in the existing system is high in terms of connection establishment whereas the delay is low for connection establishment compared to the existing system



**Fig.4 Energy Consumption**



Fig.4 shows energy consumption is high in the existing system as all the request are being directly hitting the base station. But in the proposed system all the signals are being redirected through relay network reduce energy.



Fig.5 Delivery Ratio

Fig.5 shows the goal is to provide high availability and high performance by distributing the service spatially relative to end-users. From the above graph the delivery ratio is high in the existing system compared to the proposed system.

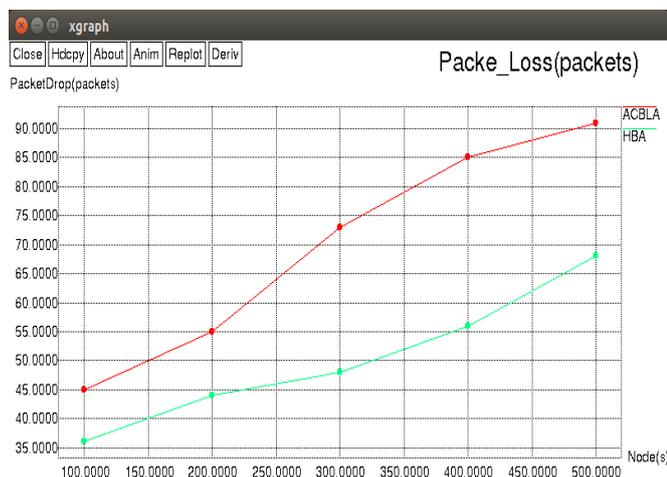


Fig.6 Packet Drop

Fig.6 shows the packet drop ratio is low compared to the existing system thus the delivery rate also increases.

VI. DISCUSSION AND CONCLUSION

Automobile Telecommunication System (MTC) are not getting appropriate sign by uprightness of stop up over stream and power use is high in Base Station to defeat these issues. The Random Access Channel (RACH) utilizing reinforce Learning Algorithm near Honey-Bee figuring transmit at any rate two standard simultaneously. Our future work is our approaches are in like way enormity valuable and improve the enthusiastic access strategy of the LTE-A structure to manage contraptions that present express need levels. Right when segregated and each other, our Proportional procedure familiarizes an introduction unavoidable with anything our Shapely approach for M2M and H2H.

REFERENCES

- Chong Di, Bo Zhang, Qilian Liang, Shenghong Li, and Ying Guo, "Learning Automata based Access Class Barring Scheme for Massive Random Access in Machine-to-Machine Communications" IEEE Internet of Things Journal, 2018

- Luis Tello-Oquendo, José-Ramón Vidal, Vicent Pla, Luis Guijarro "Dynamic access class barring parameter tuning in LTE-A networks with massive M2M traffic" in 17th Annual Mediterranean Ad Hoc Networking Workshop, 2018
- Jitto Joseph, Ron Ruhl, Hamman Samuel "Reducing Traffic Congestion for Machine to Machine Type Communication Over 4G-LTE Network by Decreasing Total Bytes Transmitted" in IEEE International Conference, 2018
- Luis Tello-Oquendo, Diego Pacheco-Paramo, Vicent Pla, Jorge Martinez-Bauset "Reinforcement Learning-Based ACB in LTE-A Networks for Handling Massive M2M and H2H Communications" IEEE Journal, 2018
- Cheng-Yu Chen, Arvin C.-S. Huang, Song-Yi Huang, Jen-Yeu Chen "Energy saving scheduling in the 3GPP narrowband Internet of Things (NB-IoT) using energy-aware machine-to-machine relays" in 27th Wireless and Optical Communication Conference (WOCC), 2018
- David Aragão, Dario Vieira, Miguel Franklin de Castr "A mechanism to control the congestion in machine-to-machine communication in LTE-A networks" in IEEE Symposium on Computers and Communications (ISCC), 2017
- Mohammed Dighriri, Ali Saeed Dayem Alfoudi, Gyu Myoung Lee, Thar Baker "Data Traffic Model in Machine to Machine Communications over 5G Network Slicing" in IEEE journal, 2016.
- Ratasuk,Rapeepat,etal."Recent advancements in M2M communications in 4G networks and evolution towards 5G." in 18th International Conference on. IEEE,2015.
- Jia, Min, et al. "A low complexity detection algorithm for fixed up-link SCMA system in mission critical scenario." IEEE Internet of Things Journal (2017).
- Jia, Min, et al. "High Spectral Efficiency Secure Communications with Non-Orthogonal Physical and Multiple Access Layers." IEEE Internet of Things Journal (2018).
- Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 20162021, Cisco, San Jose, CA, USA, March 28, 2017.

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