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ENHANCED ROLE- BASED HANDOVER CONTROL ALGORITHM FOR EFFICIENT MULTIMEDIA DATA COMMUNICATION PERFORMANCE IN VEHICULAR NETWORK

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ABSTRACT: Designed by VANETS, it provides a framework for implementing a forward road traffic monitoring system to reduce traffic congestion. To improve VANET applications, users must provide VANETs safe and comfortable environmental performance, and the network must support the quality of Service (QoS). Delay and packet loss are the two main indicators of a significant increase in QoS due to network congestion. It focuses on the design and analysis of important properties of VANETS, flow control, and can be monitored by the techniques as mentioned earlier. However, some criteria are well defined if the vehicle or infrastructure is driving the handover. An effective handover strategy implies connectivity, continuity, reliability, and fast handover, ensuring improved service quality. It realizes the ability to use the Enhanced Role-Based Handover Control Algorithm (ERBHC) encryption method to provide the ability to watch video files in an authoritative cloud storage system. ERBHC implements a traffic monitoring system, congestion control, handover mechanism, and secure communication through advanced technology. At this point, traffic monitoring and congestion control are achieved by various sensors in VANETS. The mobile node with limited resources then triggers the vertical handover process. Optimized network selection and implementation of complex algorithms can result in power loss. It is not possible to provide a low power optimized network option by implementing a simple algorithm. Finally, ERBHC is more reliable in the car, leveraging the cloud network's privacy and secure communication infrastructure.

Keywords: *Quality of Service (QoS), Enhanced Role-Based Handover Control Algorithm (ERBHC), Vehicular Ad-hoc Network, Cryptography Approach.*

1. INTRODUCTION

Over the modern annual growth rate, VANETS offers it with ideal protection and rich tourist comfort. However, the protection issue may appear to be an ad hoc network or a specific VANETS requesting situation involving standards. The latest developments in this research improve the security of the architecture and system technology therefor. It is also equipped with suggestions for its protection issues, summarizing the main results. Security VANETS says human life is constantly threatened, and the most important security concerns in traditional networks include confidentiality,

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availability, and maximum security, with integrity. An attacker cannot delete vital statistics in a way that neither has changed. However, VANETS Security proposes the ability to determine the use of pressure obligations while still maintaining driving privacy. Information about the vehicle and driver in the message change is important safe and is overdue to be replaced in excess. The timing can be motivated to have disastrous consequences, such as vehicle collision.

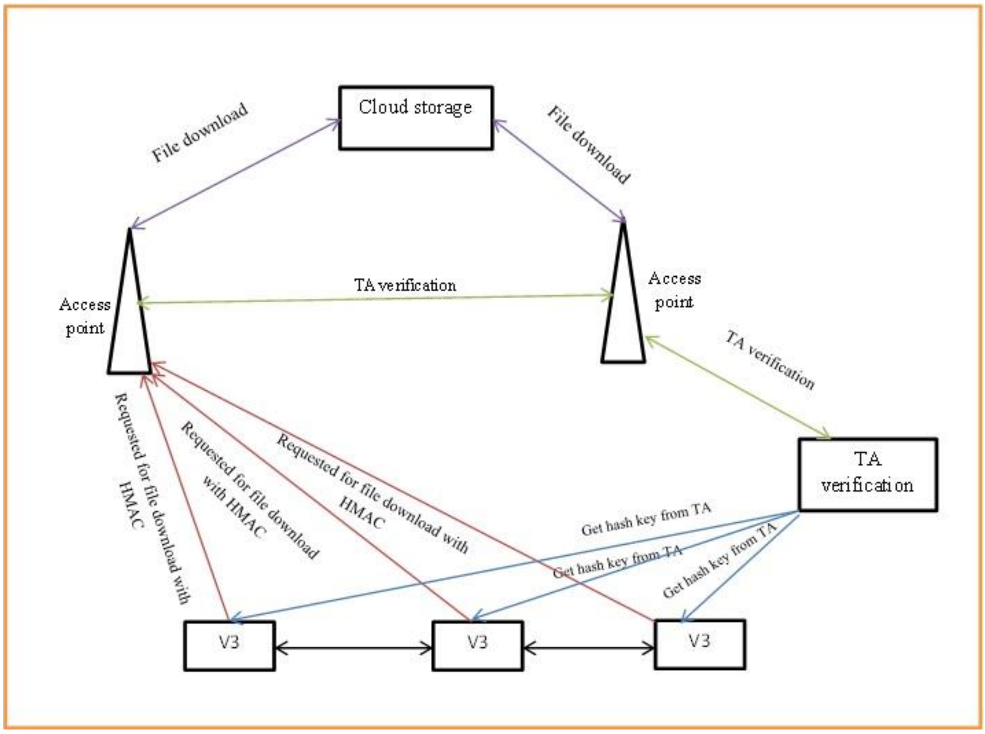

Figure 1 VANET based Cloud Storage System [30]

Connecting a car allows you to connect to the cloud and add your information to sensor readings, website visitor records, etc. For unique car downloads, this may be followed. This allows anonymous sharing of records between customers and keeps them secure. As the cloud has announced that website traffic, channel conditions, accidents, and weather conditions are according to vehicle sensor statistics, the application server in the data mixes the fact that it comes from the vehicle can assemble facts. It primarily improves the reliability of the information by filtering biased or false records based on the client's amount of data.

The deployment of the complete safety tool VANETS is very difficult in exercise. Protection against VANETS violations is often essential to shock. Besides, the individual in-vehicle networks are now generally very dynamic, arriving and deviating from the motor and short connection intervals. The use of Wi-Fi media, in addition to its dynamics and excessive liquidity, allows for maximum open, broadcast-enabled Wi-Fi communication in VANETs vulnerable to attack. VANETS password attacks have been categorized later. In addition to the well-known network protection issues, certain security requirements drive a rise in VANET's exact characteristics, including excessive mobility, dynamic topologies, and general disconnects during fast connections. In addition to controlling certificates, these unique features perform security issues, such as forming, detecting, and protecting the actual institution of the feature. Art Responses Recent works can be sourced in the next section, primarily based on the nature of protection.

2. RELATED WORK

However, VANET is difficult for video data transfer because it is a hostile environment for any type of vehicle network data transfer, especially video transmission (massive data packet loss, node movement, and so on). Therefore, researchers are also focusing on improving and integrating video communication. Unfortunately, video transmission [1] performance evaluation is not an easy task. In-vehicle networks are an urgent challenge in providing high-quality video streaming road safety and infotainment services. To provide a high quality video stream, Forward Error Correction (FEC) is one of the most popular ways to ensure video quality by creating fake packet streams. However, some factors, such as limited wireless network resources, can cause FEC problems with streaming video data [2], which is highly energetic.

Packets for copied data may also be more than network eligible. Therefore, in this study, the transmission mechanism is used to protect the transmission [3]. The main problem with the redirect technique is the delay. A multidirectional solution [4] is the controversial value of interference based on a generalized algorithm to minimize transmission rates and acceptable delay results. A fraudulent trading partner can waste valuable bandwidth [5] not only if frequent communication interruptions occur, but also the transmission of deceptive video clips. However, power outages' challenging mobility characteristics during communication video services in VANET have been deployed in packet-loss vehicle networks [6].

However, there are several issues [7], such as data packet delay or packet loss, most of which need to be addressed. Due to the VANET specific environment, the website was developed by traditional protocols such as the Real-Time Transfer Protocol (RTP), which is difficult to apply. Date [8] Research work offers several new protocols to solve this problem. In non-emergency times, various multimedia applications can be used and streaming mobile cars aimed to improve the quality of downloaded videos. During the streaming of the video stream, vehicle video [9] may be switched from one RSU to another, affecting cognitive quality.

5G Mobile Specification is expected to meet the additional requirements for extra delay and reliability and accommodate the proliferation of mobile information traffic, supporting a variety of high-speed applications and services. SDN implementations are gaining momentum, and, administratively, they are still full of [10] scalability and performance issues due to detailed networks. Downstream Completion Time: Instead, switch buffers are needed for subsequent enhanced power applications to provide more reliable packet delivery than what is provided by Electronic Packet Switch (EPS) networks. They were expected to be a 5G network. Higher throughput sub-degrees reduce the chance of losing the number of packets running on the opposite end using each packet's end-to-end deadline and the EPS network [11].

The excellent performance facilitates asymptotic behavior to prove and prove the development of hundreds of networks [12] in collaboration. The optimization solution is a value factor, a centralized or distributed deployment, embodies each information center, and is also a compromise between good network load value and cost of information center resource. Best multi-purpose model of economic experts to achieve the balance between network and information center [13].

This relationship is linear to standard mobile phone networks, so small virtual cells significantly increase network capacity. Also, it seems that the best virtual small cell density for users is the price of direct macrocell connections and small cell macrocell relay links, anytime, anywhere, anywhere [14]. A riot was also a term, and we looked at specific combinations of streams and data streams. For a given topology, its elimination of variability can provide programming techniques using specific LAN speeds combined with a planned scheduling comb [15].

Pre-licensed Transportation [5th Generation (5G)] Cloud Radio Access Network Transmission (C-RAN) The design of next-generation electronic networks requires high capacity and minimal overhead long-distance networks. The analytical community specializes in Ethernet-based packet-switch networks [16] as investment objectives may apply to mathematical multiplication gains, infrastructure restructuring, and ultimately price reductions.

Rapid mobile data systems require a rising framework of technical prominence and goodness combined with improvements in the field and quality of multi-level transportation services. Therefore, in that case, VANETS has witnessed [17] actively witnessing much attention to the latest developments in telecommunications. So many intelligent transportation systems (ITS) in recent years because they can reduce traffic accidents and congestion and provide passengers with primary and useful information In addition to that, this is why it is there. However, once the design of these standards has significant machine sorting communication response parsing [18].

Main course management mechanism of dynamic cluster-based physical examination action, to ensure dynamic clustering work under the changing, in the long run, take account of vehicle quality and implementation rules of the clustering algorithm, sporadic The road conditions are planned. But the method of determining this era is still controversial and can add to the computational burden of cluster heads. With SDN, the management logic can be a hierarchical network structure, as it is far from the underlying infrastructure to control the controllers in layers [19-20].

The coordinator is implemented with a higher level of software-defined network (SDN) management design than the world's domain controllers. The controller and resource essence between them also play an important role in the background system [21]. Attempts to support computer information and domestic loose 5G wireless hotspots to make networks own beneficial resources available. It often seems limited to co-operative caches and various constraints on limited storage capacity, content, placement, and distribution of content quality [22].

However, human activity trends and cluster habits were not considered the ancient user's quality model [23]. As a keyword, user suspension, user arrival, and the opportunity to leave a contribution are derived in the 5G small cell network [24], which is very hot to evaluate the quality of user performance. Fifth-generation wireless communication systems have become an important framework to meet the needs of various network application pieces in different application scenarios. Spread infrastructure network multiple logic private networks are divided, and the wireless network supports various services. However, this is an end-to-end tablet that is very rapidly deployed [25] at the heart of a multi-domain wireless network infrastructure.

However, in many cases, it is tracked that the attacks are manufactured by positioning controllers in distributed denial of service networks or (DDoS) attack methods in VANETs, protected from vehicles, different types, such as [26-27]. Although there is no information or control plane overloaded or delayed at the management layer, SDN and mixed supports in 5G configurations are topics implementing security services in VANET networks. This system effectively meets the VANET requirements for low latency and good response [28-29].

This section describes video broadcasting based on various methods defined: Broadcast Storm Avoidance Mechanism (BSAM), Vehicle position Prediction Algorithm (VPPA), Weight Constrained Shortest Path Problem (WCSPP) defines. But these methods are not well known for video broadcasting communication in VANET. So the Enhanced Role-Based Handover Control Algorithm (ERBHC) will be used to implement the broadcasting communication.

3. MATERIALS AND METHODS

In recommending ERBHC for protecting and sharing video content, a specific group is based on cloud-based automotive system people and their role in password schemes. It must implement a role-based access control mechanism for accessing videos stored on cloud platforms. A vehicle equipped with a computer device becomes a mobile terminal, and the network becomes a vehicle ad hoc network (VANET). Streaming video content is sent to the Internet in an abbreviated form for viewing by real-time viewers and vehicles.

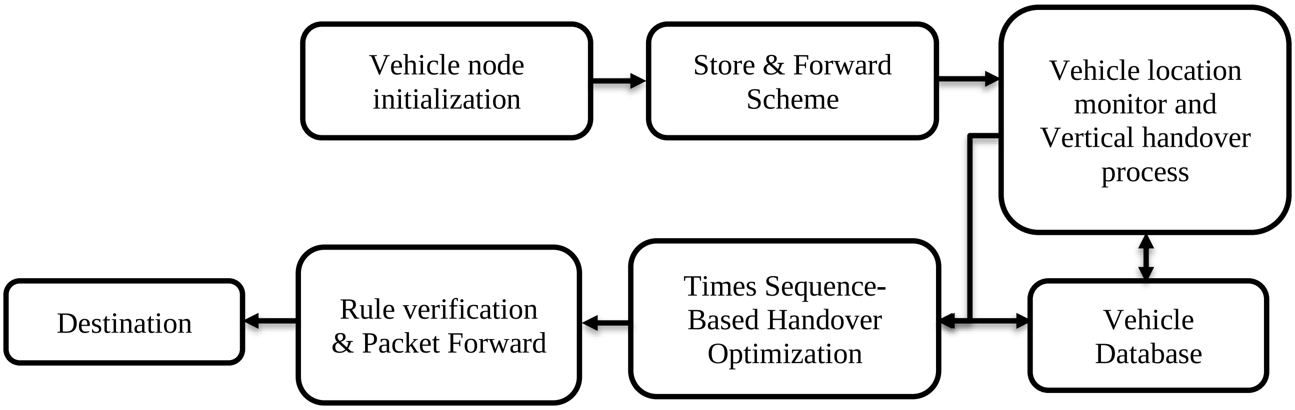

Figure 2 Proposed System Block Diagram

This vehicle is equipped with ample internal storage. Therefore, the VANETS node is powerful and transfers continuous video data to other vehicles and roadside receivers. VANETS uses a hybrid framework that includes both infrastructure and temporary structures. It is a temporary Vehicle-to-Vehicle (V2V) communication and Vehicle-to-Infrastructure (V2I) access point (roadside device). These roadside units (base stations) are then connected to the Internet and provide the vehicle's necessary services. The success of VANETS depends on the availability of a sufficient number of vehicles with roadside infrastructure and wireless communication equipment.

3.1 Store-and-Forward (SF) Scheme

Two network measurements, large packet delay, and packet loss affect the video quality of the recipient. In streaming video, video frames are broken into many small data packets and sent to the network. If a disproportionate percentage of lost packets is combined with error correction, the receiver will not recover the frame. The decoder will also discard it at the receiver and if the arrival time of the packet exceeds the reproduction period of the corresponding frame. Therefore, delay and packet loss may cause video distortion. The vehicle's high dynamics can explain the challenges of VANETS video streaming. High speeds and limited vehicle safety often lead to connection breakdowns and even network partitions. This is the amount of delay it takes for the car to catch up with other cars in advance and reconnect to the network and day of day. In the catch-up phase, the technology employs a method of buffering Store-And-Forward (SF) data packets and sending them at the next opportunity. Streaming applications generate many data packets, so it may also be a relay vehicle that can cause severe packet loss and link buffer overflow.

Encryption for Video Broadcasting

Input: Parameters from the message (m, d, m, n), Public Key P,

Raw Text m Output: Encrypted textual content ($content_1, content_2$) begin

Represent the message m as a point P in N(R_p).
Select okay ∈P[1,n−1].
Calculate $content_1$=m_p.
Calculate $content_2$= m_p + n
Return ($content_1, content_2$) end.

Decryption for the video Broadcasting

Input: Parameters from the encrypt message(m, d, m, n), Private key d, Encrypted textual content ($content_1, content_2$)

Output: Raw Text m begin

Calculate m = $content_2$- d_{m^2}dC1 and extract m from M.

Return (m) end.

End

In order to protect the fact of eavesdropping (video), the node should let both parties share the mystery or exchange the public key in the contract. As a result, the conversion of encryption keys for ad hoc networks, which translates very quickly, can be resolved as a result of whether it is attractive given the secret of pre-negotiation. Among the proposed technologies, one of the heterogeneous implementations is based mainly on the encryption method used to protect the video recording reporting service when tourists are filming. Public and Private Keys: This technique uses two keys. The public key is publicly available, and in very simple messaging, the sender uses the recipient's public key to encrypt the message. Privacy is used to encrypt the recovered message.

3.2 Vertical Handover Process Based on ERBHC

The vertical handover process is based on some procedure steps. These procedure steps are given below:

Step1: Discovery of Network

This part should accumulate the software layer, fact hyperlinks, and social delivery layer together by the facts from different layers. These layers provide facts along with RSS, bandwidth, ultrafast, throughput, user potential, and networks. This record is processed and used to make handover selections during high-quality selections of the ERBHC algorithm if the network is deployed.

Step2: Handover Triggering and Decisions

The handover decision is to decide this mechanism if you want to keep cellular equipment and modern radio to access the community or switch to all other networks for everyone. Switch selection depends on different metrics collected during the switch discovery phase. Handover can be described primarily based on the transmitted symbols from the target neighbor BS over the serving BS through a given threshold from modern times. This part makes relevant choices when switching. In this area, the choice of the target radio access network is based on several criteria.

Handover Execution

Its basic function is to get the right to enter the broadcast through the association of the target and the mobile wireless terminal and realize the vehicle is switching optimization system. This degree of switching also includes authorization and ongoing transfer of user statistics during active sessions. This is the last segment of a switching system where modern consulting is being transferred to a brand new access network to really run the area.

Input : The number of mobile nodes

Output: Effective handover

Begin()

Deploy vehicle ad-hoc network with a limited number of RSUs and vehicles

Root node selection

for (i=0;i==N;i++)

if (Range(N(i)>Range(N(i+1))

N(i)=root NodeEnd

Source select Destination Node(i)

If(Root node==Node(i))

Source select root node for communication

Else

Source sends a request to another root node.

When a handover occurs, users can choose heterogeneous networks with their preferences and network performance parameters. User choice can be beneficial to the network, consumer application necessities (real-time, non-real-time), service type (voice, data statistics, video), quality of service. It will be a fixed technology network traffic. An effective way to increase the user's preference for wireless environments such as reporters), can also optimize the vehicle in next-generation technology wireless network can consider switching.

Times Sequence-Based Handover Optimization

Time series runs with lower network partitions along with higher consistency requests and use different mechanisms for calculations.

Input: compute a node, Neighbor Partition NP

Output: Routine RE

Step 1: Start

Step 2: Select a node

Step 3: network partition neighbor PN

Step 4: Start PN Timer NP

Step 5: While H-Timer is running

Receive Reply Partitioning RP.

Remove Node details and location details.

Update Neighbor table NT for every entry

$$NP\ (i) = PN\ \{NODE - Id, P, Q\} \quad \|$$

End

Step 6: Stop

Where,

P-source,

Q-destination

PN –Partition Node

ID-Identify node

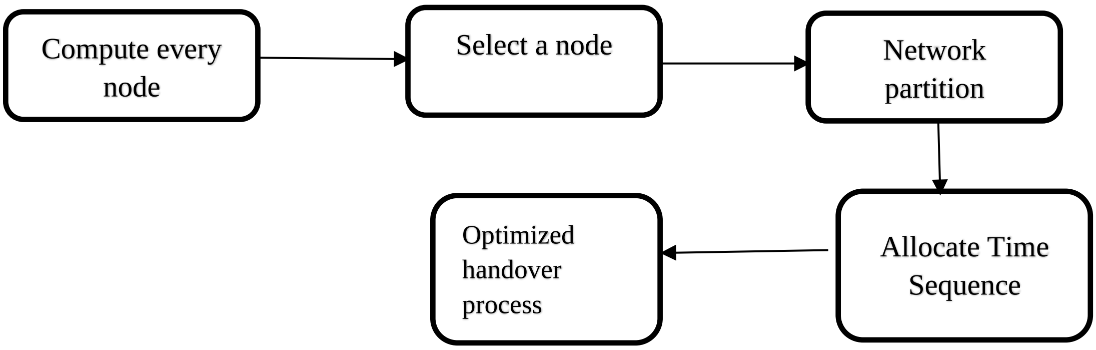

Figure 3 Times Sequence-Based Handover Optimization

The device calculates the time series as the time required for the item among the time changes in the influence rise and the time of its last notification.

4. RESULTS AND DISCUSSION

The basic network is formed in the sensor implementation of the VANET framework. The network can be formed to monitor traffic without any congestion or problems. These nodes are formed and considered as vehicle nodes, base stations, and others. In portability proof, the development of one center to another region is authorized from an area that can use the Tool Command Language (TCL) content slogan target.

Table 1 Simulation Parameters

Parameters	Value
Data rate	2 Mbps
Application Type	Constant bit rate (CBR
CBR interval	1.0 (second)
Simulation Time	350 s
Simulator	NS-2
Data Speed	20 m/s
Total energy	500joule
Number of Vehicles	4

Table 1 describes the resources needed in this proposed system. This section compares the existing Broadcast Storm Avoidance Mechanism (BSAM), Vehicle position Prediction Algorithm (VPPA), Weight Constrained Shortest Path Problem (WCSPP), and the Enhanced Role-Based Handover Control Algorithm (ERBHC).

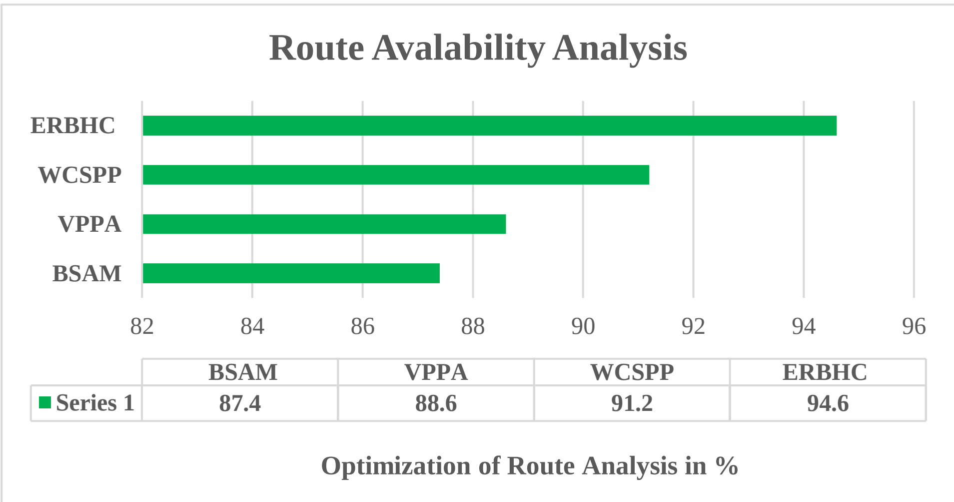

Figure 4 Optimization of Route Analysis

Figure 4 shows a comparison with the proposed and existing method. The existing methods BSAM in 87.4%, VPPA in 88.6%, WCSPP in 91.2%, and the proposed method ERBHC with 94.6%.

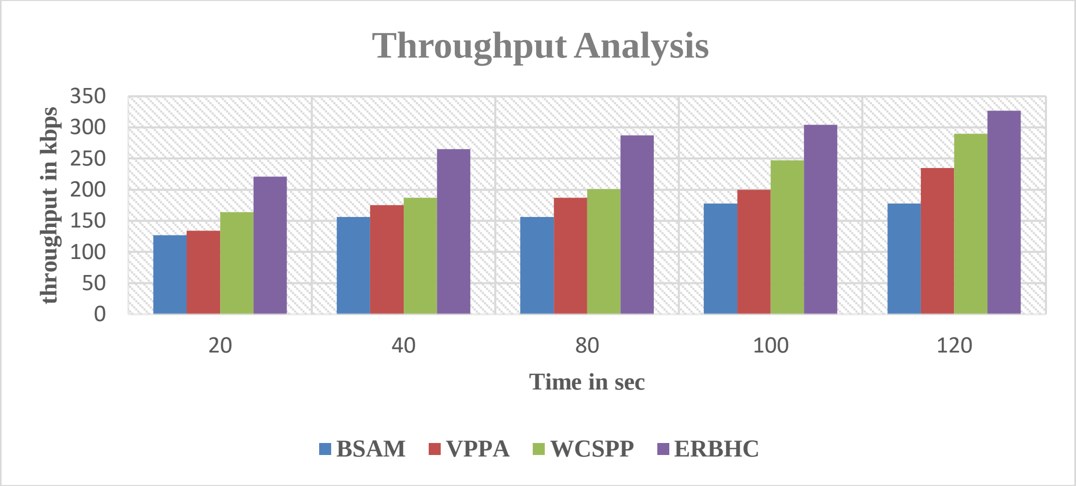

Figure 5 Throughput Performance

Figure 5 describes the graph show the throughput performance between the proposed and existing methods. Based on the existing algorithms (BSAM in 178 in kbps, VPPA in 235 with kbps, WCSPP in 290 with kbps, ERBHC in 327 with kbps), a small number of packets are transferred over a more extended period, and more packets in the ERBHC are transferred over a longer period.

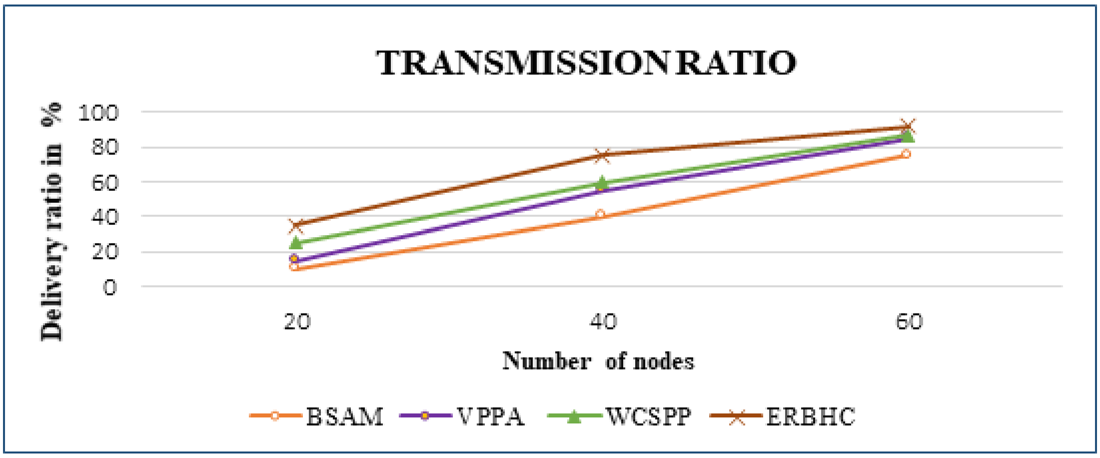

Figure 6 Transmission Ratio

The transmission ratio is used to estimate the quality of the network. It defines the ratio between the target receiving packets and the source generated packets. This can be achieved using the awk script that creates the trace file and the result.

$$TR = \text{Received packets} / \text{Generated packets} * 100$$

Figure 6 describes the transmission ratio in the percentage between the proposed and existing systems, that the comparison of prevention methods in terms of Transmission Ratio. When there are 60 nodes, the PDR of ERBHC is compared to BSAM in 75%, VPPA in 85%, WCSPP in 87%, and ERBHC in 92% with a transmission ratio value 95%.

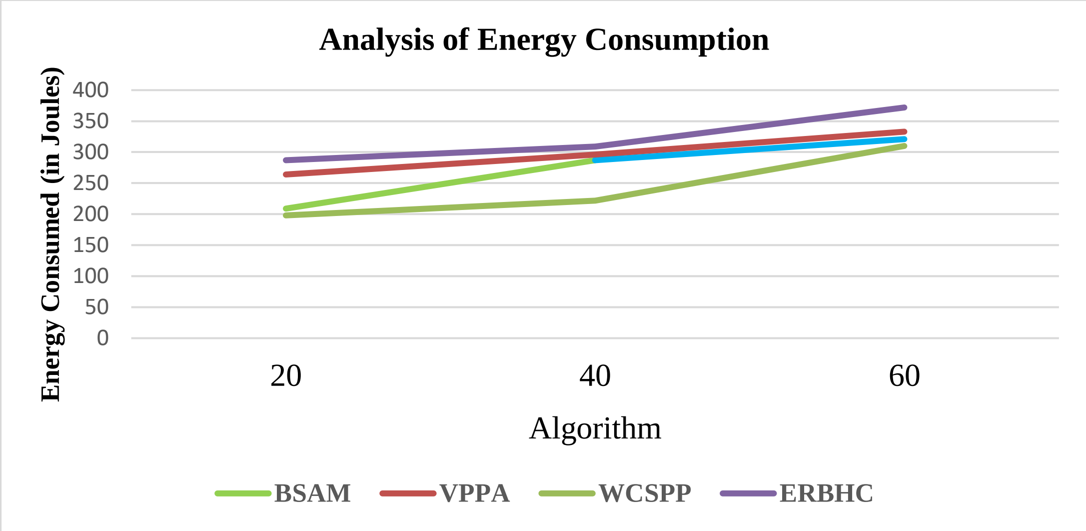

Figure 7 Energy Consumption

Energy Consumption figure 7 illustrates the clearly understood planned method of consumption. When the number of nodes is high, the transmitting energy is high. In this research work, the total energy consumption is to reduce the total energy. Energy consumption can be used to calculate the efficiency of the system to reduce energy when sensing the data.

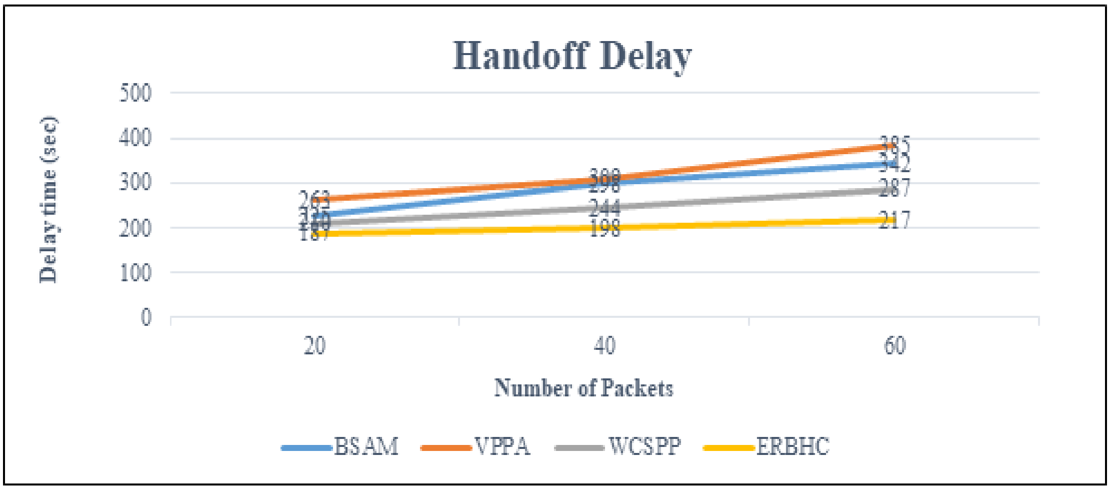

Figure 8 Analysis of Handover Delay

It is proposed that the vertical handover is based on the ERBHC method to provide a reduction in the number of data packet transmission delay times. It is clear from figure 8 that the proposed vertical handover can be calculated for 50 nodes and compared with the proposed system. The handover delay shows the delay time for BSAM with 342 sec, VPPA with 385 sec, WCSPP with 287 sec, and ERBHC with 217 sec.

5. CONCLUSION

ERBHC dynamic transmission range and rate are message type’s at all reasonable times. This strategy consists of two parts, which include congestion detection and congestion control components. The congestion detector measures the usage level of the channel and compares it with a predetermined threshold. If the channel usage level exceeds the threshold, then congestion occurs in the network. In the congestion control device, the transmission distance and speed are adjusted. Multi-target traffic monitoring and secure broadcast are used for secure video transmission without any congestion and implement an improved switching mechanism. The objective function of this research activity is the minimum delay. It is an NP problem to get a reasonable value for speed due to transmission range and high computational overhead. ERBHC's research area of privacy in video reporting services can provide evidence of cryptographic verification in digital video reporting services in vehicle-to-vehicle communications. Deploy VANETS Security's state-of-the-art facility security infrastructure to secure video and reporting systems. The proposed ERBHC analyze the optimization of route analysis value is 94.6%, throughput performance is 327 with kbps, transmission ratio is 95%,energy consumption is 372 joules, handover delay is 217 sec.

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