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Cloud & Distributed

Energy Efficient Ad-[illegible]

Algorithm for Data Security

Highlights

Routing Protocol for MANETs

On-demand Distance Vector

Discovering Thoughts, Inventing Future

VOLUME 14 ISSUE 3 VERSION 1.0

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An Enhanced CBC Algorithm for Data Security in the Cloud

By Venkat Sampath Raja Gogineni & K. Raghava Rao
K L University, India

Abstract- Recent times, Storing data over the cloud has become more common for the reason that the data could be accessed globally .The data being stored on the cloud could involve confidential data, that needs security. The confidential data that is stored on the cloud through the database could be anything like username, email, password etc. This paper presents the idea/implementation of an Enhanced CBC algorithm on the cloud data. Through this cryptography technique the confidential data can be secured and authenticated.

Keywords: cloud security, encryption technique, modified CBC, database security, rail fence.

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An Enhanced CBC Algorithm for Data Security in the Cloud

Venkat Sampath Raja Gogineni [α] & K. Raghava Rao [σ]

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Keywords: cloud security, encryption technique, modified CBC, database security, rail fence.

I. Introduction

Cloud data, is the data that is to be stored over the network, the data that is corresponding to the client which could involve confidential details that needs to be secured. This data which is stored over the network is widely utilized for various useful aspects and needs to be sheltered from non-authenticated people.

When it comes to securing content of data, that could involve sensitive data such as usernames, passwords etc. There could be two types, one being restriction of access to the cloud and the other being the security of the data in the cloud. Though there are advancements in the firewall activities restricting the control of non-authenticated users, there are still the chances of hacking. So, securing data over the cloud is the other option , which involves the act of cryptography, with the best secured cryptographic algorithm the chances of securing data also gets impregnable.

II. Related Works

The Encryption algorithm that is used on the cloud data is stimulated using Verilog HDL and implemented on a web form that accepts client information to be stored over an external server (wamp server) through a servlet code consisting of an encryption algorithm, the values are thus stored in an encrypted form.

This Encryption algorithm which is a quite advancement or a modified CBC, is implemented on a string, where each character (8 bits) of a string is converted into binary format, on which the encryption algorithm mainly subsuming XOR and reverse operations is implemented. Unlike any other encryption algorithm in this one, the encryption key is generated from the text to be encrypted, which is also an 8-bit value. The first character binary value is XOR with the last character 8 bit binary value and thereby the result is XOR with the reversed binary bits of the middle character from the plain text to be encrypted, thereby generating a key of 8 bits. The key that is generated is again encrypted using rail fence technique and stored in the certain indexed position of the encrypted text.

Figure 1 : Register page

The above figure represents the html page that includes registration details of the client, the details are thus processed through the servlet code, which includes encryption algorithm, the text is encrypted and stored over the cloud (wamp server).

Author α σ: Dept. of Electronics and Computers. K L University, Guntur, AP. e-mails: sampath.gogineni@gmail.com, raghavarao@ kluniversity .in.

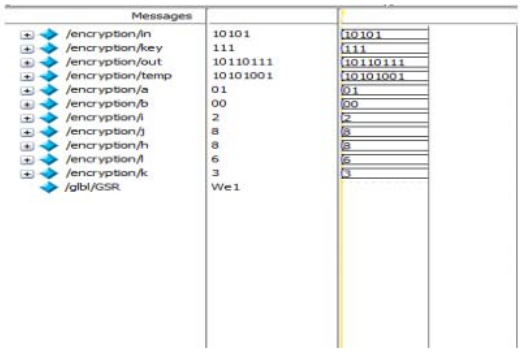

Figure 2 : Encryption Algorithm stimulation (CBC)

The algorithm is coded in Verilog HDL (Xilinx) and stimulated in Altera Modelsim. The stimulation represents the binary processing of a single character from the plain text in the encryption algorithm. With the represented input of 8 binary bits (temp variable in the above stimulation), through a generalized key of 8 bits (11111111), the encrypted binary output is calculated (out variable in the above stimulation), at the stage of implementation the binary output is converted into the character.

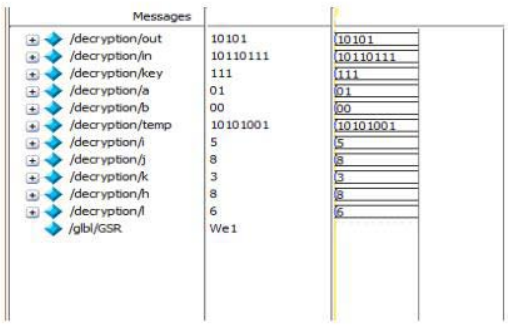

Figure 3 : Decryption Algorithm stimulation (CBC)

The above stimulation is for the decrypted 8 bit binary stature, where the encrypted output is given as the input (in variable in the above stimulation) through the same key used in the encryption, the plain text is thus obtained (temp in the above stimulation), Finally when it comes to implementation the binary output is converted in the form of a character.

The key that is used in this encryption algorithm is actually derived from the plain text, which is encrypted with the Rail fence encryption technique with the key value of 3 which is then added at a certain position in the encrypted text.

Figure 4 : Encryption Algorithm stimulation of key (Rail Fence)

The stimulation of Fig.4 represents the encrypted 8 bit binary stature of the key, with a series of different combination of rails. For the given input of 8 bits ("in" variable in the above stimulation), the encryption algorithm is applied and the encrypted output is calculated ("out" variable in the above stimulation). The 8 bit binary of the key is converted into a character and is embedded with the encrypted cipher text.

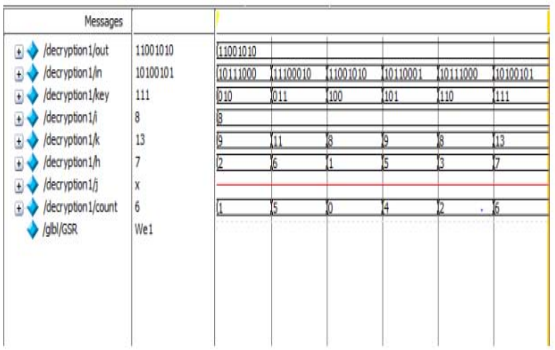

Figure 5 : Decryption Algorithm stimulation of key (Rail Fence)

The stimulation shown above represents the decryption of the key that is embedded at a certain position in the cipher text encrypted message, where the encrypted key output that is converted from string to binary is given as the input ("in" variable in the above stimulation) with the decryption of Rail fence algorithm original key is obtained ("out" in the above stimulation), To be implemented the 8 bit binary value is converted into a character.

III. Methodology

a) Cipher Blocking Chain (CBC)

CBC algorithm is the operation on the block of binary bits with a key. Each block of plain text is XOR

with the cipher block of previous one before encryption. Key is used to make the cipher blocks unique [1].

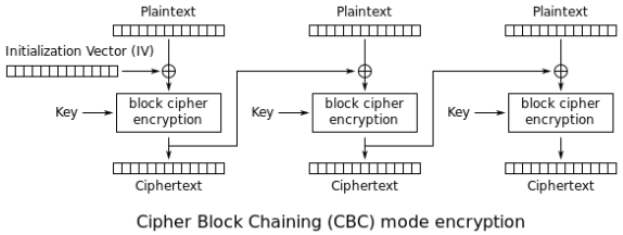

Figure 6 : CBC Encryption

Encryption technique in CBC is a serialized process, where the encryption undergoes process only if the previous block of message is encrypted.

Formula for Encryption Algorithm

$$C_i = E_K(P_i \oplus C_{i-1}), C_0 = IV$$

In this encryption algorithm each character is divided into 8 bit binary format, which is further divided into 4 blocks of two binary bits. The first block is reversed and XOR with the first block of key, the remaining blocks of data is XOR with the cipher of the first block, reversed, and then the result is stored and XOR with the key making the remaining 3 cipher blocks. Finally the 8 bit cipher represents single encrypted character. Similarly this is repeated on the remaining characters.

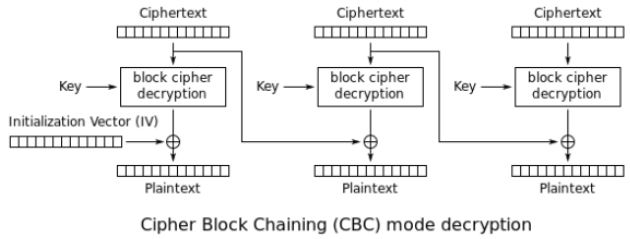

Figure 7 : CBC Decryption

Formula for Decryption Algorithm

$$P_i = D_K(C_i) \oplus C_{i-1}, C_0 = IV.$$

Decryption is the parallelized process,, that undergoes in a parallel fashion, Each block comprises of 2 binary bits. Altogether a total of 8 bits , with four blocks .The first block of the cipher text is XOR with the first block of the key, which is then reversed deriving the first block of the original message and for the remaining blocks the current block of the cipher is XOR with the key, which is then reversed and again XOR with cipher of the previous block, thereby making the original plain text of the remaining blocks , Which represents the plaintext of a single character and when repeated on the series of multiple characters the entire original string will be attained.

Clearly a confidential and secured key is required for this cryptography technique. For the key to be generated , in this method there is a specific process where the 8 bit binary number of the first character is XOR with the binary number of the last character , thereby the result of these two is XOR with the reverse of the middle character . The key is then formulated and it is encrypted using Rail fence technique, and stored in the specific index of the text that is encrypted.

b) Rail Fence

Rail fence technique is the diagonal representation of the elements present, and thereby appending the elements serially. The key represents the length of the diagonal.

For example,

Plain text: 101001110

Encrypted text: 100001111

No: of Rails (key):3

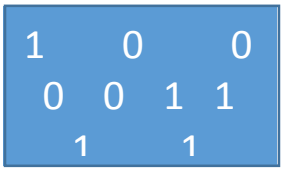

Figure 8 : Example of Rail Fence Technique

Clearly from the above figure, the length of the diagonal represents the no: of rails (key) and the plain text is diagonally arranged serially, and when the text is read in a serialized pattern, the encryption is done. The encrypted key of 8 bits is then embedded with the encrypted string (series of characters) at a certain position which is calculated as the (length of the string)/2 and then stored over the cloud.

Decryption is the reverse process of encryption, the key that is embedded at the (length of the string)/2 is identified and then decryption of Rail Fence technique is applied and finally the key for decryption is available.

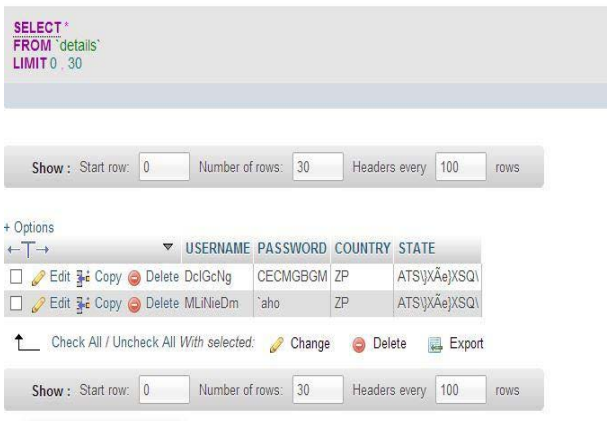

Figure 9 : Database in Encrypted form

After the client registers his information over the form a servlet which is embedded to the form will be provoked and the code of the algorithm stated written in java will be coded through the servlet.

Finally the encrypted text is stored over the cloud, rather than the plain text, that is clearly represented in the Fig 3. Similarly Decryption is the reverse process which is a parallelized one.

IV. Conclusion

The sensitive details of the user when registered will be encrypted using the encryption algorithm processed through the servlets and finally stored over the cloud, the key that is used in this encryption process is generated automatically from the plain text, while the original text is obtained by decryption (which is the reverse process of encryption).

V. Future Work

The user at this extant is restricted from the third party accessing information , while in the future users text files, images , videos etc. will be protected over the cloud network through the cryptography techniques so that the authenticated users could only access the information thereby restricting it to the third party users.

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Data Leakage Detection using Cloud Computing

By Sandilya Pemmaraju, V. Sushma & Dr. K. V. Daya.Sagar
K L University, India

Abstract- Today the present world mostly depends on exchange of information i.e. transfer of data from one person to another person which is also known as distributary system. The data is sent from the distributor to the user are confidential so the data is distributed only between the distributor and the trusted third parties. The data sent by the distributor must be secured, confidential and must not be reproduced as the data shared with the trusted third parties are confidential and highly important. In some occasions the data distributed by the distributor are copied by different agents who cause a huge damage to the institute and this process of losing the data is known as data leakage. The data leakage must be detected in the early stage in order to protect the data form being open source. This project deals with protecting the data from being out sourcing by giving a special inscription to the sensitive data so that it cannot be reproduced.

GJCST-B Classification: C.2.4

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I. Introduction

Every company focus on security issues of securing the data from different third parties form being out sourced. Every company follows a different strategy which does not match with any other company. The employees are also trained in order to maintain the secrecy of the data and maintain the basic structure of the company. The security must be beyond the employees' knowledge so that the employee has no idea of cracking it by covering logical and physical security.

Information security is frequently subjected to metaphors. The information security must be targeted at global level by not letting the user know the problematic issues faced by the security department and also the logical security i.e. the sensitive data, applications and also the operating system used in a particular institute. The security must also be extended to telecommunication department of the institute so that they have a network security also.

There is no particular period of data leakage it may happen at any time. Data leakage only depends on the importance of the information distributed by the distributor. The information distributed is considered as sensitive data when it consists of information about the client, budget, code and any design specification. If the leakage occurs it leaves the institute in unprotected state. This data leakage puts the institute in ambiguity which results in the downgrade of the business and ultimately failure of the company.

The agents who get their hands on the sensitive data are also known as cyber criminals. Data leakage is done for their own profits which results in loss of the company. To overcome this problem we tried a new idea of adding fake objects to the distributary data to find the agent who are misusing the data and take certain actions. The information consists of one constrains and one fake object to meet the requirements of the security.

II. Water Marking the Information

Water marking is a type of security technique which deals with the idea of embedding a particular code or encryption on the information that is to be distributed. The information can be image or a video or any official file. This encryption helps the company to claim the ownership on any particular data.

Water marking is a technique where a bit pattern is added to the data at a particular position on the tuples and subset of the data. The tuple and subset and their attributes are algorithmically coded in such a way that they are controlled by a key which can be accessed only by the owner

We don't need to have the access to the original data or the pattern of watermark to detect the watermark. The watermark can be detected from a small subset of data which consists of a small portion of water mark. The watermarking is installed into the file by using watermarking software which feds the information with small errors. The combination of those small error forms into a watermark which does not have any significant meaning and they cannot be destroyed by the external source.

While coming to the digital data i.e. images, videos and documents can easily be leaked and can go vital on the web and this can be efficiently tackled by using watermarking as a proof of ownership by using a signature.

III. Need for Data Allocation

The process of allowing one company to access the data of another company is known as information system and it is very essential for companies

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and must be preserved with high security. Security issues generally consists of monitoring the software and materials provided by the institute are only used in the institute and also provide data privacy and maintain the relation between gathering and disclosing of data with all legal and political issues.

The data is open only when the organization sends secure information to untrusted third party unintentionally considering it as a trusty third party. The distributor later discovers that some set of objects are sent to a new location and the data is being leaked and now the goal is to locate the agent and oppose the agent from accessing the data. We must not only stop the access to the data but also check whether the agent is a leaker or not.

The distributor sends the data to the agent using data allocation strategies to increase the possibility of finding the agent by adding fake objects to the information distributed. If any person receiving the data leaks the data then the distributor will find the agent by the help of numbers of fake objects released out and the distributor waits until he gets enough evidence and finally conform the agent and closes the business with him or takes any legal action on the agent.

IV. Cloud Computing Introduction

The interconnection of large number of system virtual is known as cloud. The interconnected systems may be private or public and the data stored in it can also be differentiated into private and public access. For example one drive powered by Microsoft is one of the examples of cloud computing. In one drive every user is given with certain user id and password and can access the data in the cloud from anywhere by just connecting to internet and using their unique user id and password.

The cloud computing gives access to a wide access throughout the world. Any person with an authorised id can access the information of the organization from any part of the world from any computer through internet. The infrastructure of cloud does not contain any physical data all the data stored by the user is stored virtually by using cloud server which are maintained by using HTML and XML code.

According to Google there are six properties of cloud computing, they are

- User-centric: When a person access the cloud whatever information stored in the cloud can be accesses by him and the information stored by him can be accessed by others if the user gives permission
- Task-centric: It shares the documents files and folders stored in the cloud only to the authorised persons i.e. to the person with whom the admin shared his rites.
- Powerful: It can connect hundreds of system at a single time and can give access to a single file to many systems which cannot be done by any sharing device.
- Accessible: User can easily access the data stored in the cloud by simply accessing his user id from any system which makes it more flexible.
- Intelligent: With all the different data stored in the cloud it easily does the mining activity and displays the result when the user searches.
- Programmable: The task handled by the cloud must be automated

V. Related Work

Reference Paper 1: Rights Protection is provided for Relational Data

This paper deals with the idea of creating bit patterns on the file at certain location and all the bit patterns combined and make a watermark. The bits entered are set of numbers which provide right protection to the data that is present in the data base.

This paper also deals with the development of watermark detection application which reads the algorithms of the bit pattern by locating the markings and retrieves the original data at the client side.

The main failure in this model is that it only deals with the numerical encoding of the data and does not detect the nonnumeric data in the database

Reference paper 2: Watermarking Technique for Multimedia Data

This paper was developed on the technique of watermarking the data using multi-media watermarking technology to prevent the digital content going vital on net by disabling the copy facility.

Encryption of the data has its own limitation from protecting the information. If the rights are decrypted then the data cannot be protected from illegally replicating the digital content.

But this encryption problem is overcome by sung digital watermark which is embedded on the host data and cannot be removed and it includes the copyrights, data protection and monitoring and tracking.

Reference Paper 3: Achieving K-Anonymity Privacy Protection

This paper deals with generalization and suppression techniques to protect the data from leakage using K-anonymity privacy protection. Where every part of the data is divided into k different subsets and every subset is linked with specific set of details and the final data is obtained at the external source.

This technique is a failure as it lacks in clear description on how the data is being secured and what happens to the data if they are not systematically liked to one another

VI. Conclusion

The data leakage detection in information system is obtained by following basic strategies like watermarking on different information. This data leakage issue can be handled in multiple ways which must be studied later.

When the information is watermarked it secures the data from being open source and helps to find out the cybercriminal by using the fake objects placed at different positions of information that is to be sent.

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Energy Efficient Ad-hoc on-Demand Distance Vector Routing Protocol for MANETs'

By N. Papanna, Dr. A. Rama Mohan Reddy & Dr. M. Seetha
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Abstract- A group of wireless devices forms a self-configured MANET. The Mobile Nodes make communication over the wireless links without any prefixed administration. The nodes in ad-hoc networks are battery operated and have limited energy resources. This makes energy efficiency a key concern in ensuring system durability. This paper suggests an Energy Efficient AODV to the MANET. It illustrates the energy conservation technique to improve the routing protocol efficiency. The energy conservation is attained in the MAC layer. It deals with the proposed energy conservation scheme. It explains the relation of routing overhead and energy conservation and it deals with the routing overhead reduction. It calculates the available and required energy of communication node and it evaluates the conserved energy level. It simulates the consuming energy in EE-AODV and, it compares the simulation result with AODV protocol.

Keywords: *energy conservation, overhead reduction, AODV, mobility pattern, traffic pattern.*

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Energy Efficient Ad-hoc on-Demand Distance Vector Routing Protocol for MANETs'

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Abstract- A group of wireless devices forms a self-configured MANET. The Mobile Nodes make communication over the wireless links without any prefixed administration. The nodes in ad-hoc networks are battery operated and have limited energy resources. This makes energy efficiency a key concern in ensuring system durability. This paper suggests an Energy Efficient AODV to the MANET. It illustrates the energy conservation technique to improve the routing protocol efficiency. The energy conservation is attained in the MAC layer. It deals with the proposed energy conservation scheme. It explains the relation of routing overhead and energy conservation and it deals with the routing overhead reduction. It calculates the available and required energy of communication node and it evaluates the conserved energy level. It simulates the consuming energy in EE-AODV and, it compares the simulation result with AODV protocol.

Keywords: energy conservation, overhead reduction, AODV, mobility pattern, traffic pattern.

I. Introduction

The nodes in ad-hoc networks are battery operated and have limited energy resources. This makes energy efficiency a key concern in ensuring system longevity. Further, studies have shown that the communication subsystems consume a large fraction of total energy and therefore, solutions for energy efficient communication are of great interest. Moreover, under some circumstances, MANET has to be deployed in remote or hostile areas [1] [2]. This makes it impossible to replace or recharge the batteries. Therefore, it is desirable to keep the energy-dissipation level as low as possible to avoid frequent battery replacement. Energy conservation has posed a big challenge due to MANETs' nature of distributed control, constantly changed network topology and the fact that mobile nodes in MANETs usually are hand-held devices[3][17].

In mobile ad hoc networks, energy efficiency is more important than other wireless networks. Due to the absence of an infrastructure, mobile nodes in ad hoc network must act as a router. Since a MANET is a 'cooperative' network, the nodes join in the process of forwarding packets [4]. Therefore, traffic loads on nodes are heavier than in other wireless networks with fixed access points or base stations. A communication- related energy consumption function is needed to design a system to limit unnecessary power consumption [5][14]. Energy efficiency design issue must consider the trade-offs between different network performance criteria. For example, routing protocols usually try to find a shortest path from a source to a destination. It is likely that some nodes which are on so called 'key positions' will over-serve the network and their energy will be drained quickly, and thus causes the network to 'break'. To avoid this, the energy-efficient design should balance traffic load among nodes such that low- power nodes can be idle while traffic is routed through other nodes [6][13].

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II. Energy Management

One of the basic characteristics of MANET is the multi-hop connection, in which the Mobile Nodes cooperate to relay traffic to the distant Destination Node. Hence, the Mobile Nodes in MANET serve not only as hosts, but also as routers. The multi-hop connection can also increase the network capacity and decrease the energy nodes to fulfill the multi-hop transmission. Basically, the routing protocol chooses the best route between the source and Destination Node in the network topology and strictly limited resources [7] [12] [16]. However, the single path routing is not the best solution. The Multi-Path AODV protocol is then introduced, which provides redundant and alternative routes to assure successful data packet transmission. At the same time, it does not reduce the key relay nodes' power consumption and the energy exhaustion is alleviated in the network partitioning problem. However, due to the frequently changing network topology and limited resources of energy and wireless bandwidth, routing in MANET is an extremely challenging. Hence, the EE-AODV is proposed.

III. Related Work

For conserving energy, many energy-efficient routing protocols have been proposed [8], [9], [10]. These protocols can be generally classified into two categories: Minimum Energy routing protocols [3], [4], [5] and Maximum Network Lifetime routing protocols [9]. Minimum Energy routing protocols search for the most energy-efficient path from the source to the destination, while Maximum Network Lifetime routing protocols

attempt to balance the remaining battery-power at each node when searching for the energy-efficient path. Since Minimum Energy routing scheme is also an important part in most recent Maximum Network Lifetime routing protocols such as Conditional Max-Min Battery Capacity Routing (CMMBCR) [9] and Conditional Maximum Residual Packet Capacity (CMRPC) routing [10], we will focus on developing more efficient Minimum Energy routing protocols in this research work.

Li and Wan [20] described a distributed protocol to construct a minimum power topology and developed an algorithm which directly finds a path whose length is within a constant factor of the shortest path. The length of the path is measured in term of energy consumption. This proposed algorithm used only local information. A topology based on minimum spanning tree, called localized minimum spanning tree (LMST) was proposed by Li et al. [21]. It is a localized distributed protocol with the following properties: (1) the protocol generates a strongly connected communication graph; (2) the degree of any node is at most six, and (3) the topology can be made symmetric by removing asymmetric links without impairing connectivity.

An energy efficient dynamic path is maintained to send data from source to destination for MANET is proposed in Sheu, Tu, and Hsu [22]. Due to mobility existing paths may not be energy efficient. So, each node in a data path dynamically updates the path by adjusting its transmission power. Each node in the networks determines its power for data transmission and control packets transmission according to the received beacon messages from its neighbors. In dynamic path optimization technique protocols dynamically select energy efficient path as per the requirement of dynamic topological changes in the network [23][15.

Localized Energy Aware Routing (LEAR) Protocol is based on DSR but modifies the route discovery procedure for balanced energy consumption. In LEAR, a node determines whether to forward the route-request message or not depending on its residual battery power (Er). Conditional max-min battery capacity routing (CMMBCR) Protocol uses the concept of a threshold to maximize the lifetime of each node and to use the battery fairly [6].

IV. Materials and Methods

a) Energy Efficient Ad-Hoc On-Demand Routing Protocol

The Energy management issues are very important in the context of MANET. The node energy needs to be optimally utilized so that the nodes can perform their functionality satisfactorily. MANETs are energy constrained as most Ad-Hoc nodes to day operate with limited battery power [11]. So, it is important to minimize energy consumption of the entire network in order to maximize the life time of the network. Hence, a new on-demand routing protocol (EE-AODV) is proposed. As per the method, the EE-AODV selects a route at any time based on the minimum energy availability of the routes and the energy consumption per packet of the route at that time.

i. *Selection of Minimum Energy Node*

The energy efficiency is attained through the energy conservation and the routing overhead reduction in network. A new power-aware routing protocol is suggested to balance the traffic load using distributed energy control. Since, it aids to increase the battery lifetime of the nodes. Hence, the overall useful life of the MANET is increased. These protocols are based on the conventional AODV. Congested node is able to serve the flows at a higher rate, and then sources are automatically able to send packets at a higher rate. These EE-AODV extensions increase the network survivability and lead to a longer battery life of the terminals. They achieve the balanced energy consumption with minimum routing overhead.

ii. *Calculation of Node Energy Level*

The main objective is to balance energy consumption among all participating nodes. In this approach, each mobile node relies on local information about the remaining battery level. It aids to decide whether to participate in the selection process of a routing path or not. An energy-hungry node can conserve its battery power through the activation of sleeping during the idle time. The available energy level and the required transmit power level of a node are taken into account while making routing decision. The subtraction of current available energy levels and the required transmit power levels of nodes indicate how likely these nodes are depletes battery energy. In order to do that a Source Node finds a minimum energy route at a time t such that the following cost function is maximized.

$$C(E, t) = \max \{Erem\} \quad (1)$$

$$Erem = Eavailable(t) - Erequired(t) \quad (2)$$

Where, Erem is the remaining energy of node, Eavailable(t) is the available energy of node, Erequired(t) is the required transmit power of a packet at node. The energy required in sending a data packet of size D bytes over a given link can be modeled as:

$$E(D) = K1\ D + K2 \quad (3)$$

$$K1 = (Pt\ Packet + P\ back) \times 8/BR \quad (4)$$

$$K2 = ((Pt\ MAC\ DMAC + Pt\ packet\ D\ header) \times 8/BR) + E\ back \quad (5)$$

Where, Pback and E back are the background power and energy used up in sending the data packet, Pt MAC is the power at which the MAC packets are transmitted, DMAC is the size of the MAC packets in

bytes, D header is the size of the trailer and the header of the data packet, Pt packet is the power at which the data packet is transmitted and BR is the transmission bit rate. Typical values of K1 and K2 in 802.11 MAC environments at 2Mbps bit rate are 4μs per bytes and 42μs respectively.

iii. *Algorithm For Overhead Reduction*

Step 1: Source broadcasts RREQ packets are forwarded to its neighbor nodes within the coverage area

Step 2: The neighboring nodes re-broadcast the RREQ packet

Step 3: Destination forwards the RREP packet only to the first received RREQ packet

Step 4: Source address, destination address and previous node addresses are stored during RREP packet

Step 5: The data packet contains only source & destination addresses in its header.

Step 6: When the data packet travels from source to destination, through intermediate nodes, for re-broadcasting of data packet, the node verifies source and destination addresses in its cache. If it is present, the data packets are forwarded, otherwise it is rejected.

Step 7: After re-broadcasting the data packet, acknowledgement are sent to the previous node

In AODV, each mobile node has no choice and must forward packets for other nodes. In EE-AODV, the Source Node forwards the packet to the Destination Node. During this process, the Source Node forwards a RREQ packet to the intermediate nodes. The intermediate nodes initially in the sleeping state, awakens when the RREQ packet arrives and it forwards to the next node and again it is going to the sleep node.

In EE-AODV algorithm, the intermediate nodes are sleeping during idle time and the only antenna of the nodes consumes power. All other parts of the nodes are in the doze mode. So, whenever a packet is arrived at the intermediate node, the node awakens and it transfers the packet to the next node according to the AODV algorithm and then again goes to the sleep mode. So using this way, the intermediate nodes consumes its energy.

V. Performance Evaluation

The performances of the proposed algorithms are evaluated using ns2 simulator. The traffic pattern and the metrics are described which are used for the experiments. The scenarios can also be exported for the network simulators ns-3, GloMoSim/QualNet, COOJA, MiXiM, and ONE.

Table 4.1 : List of Simulation parameters

Parameter	Value
Simulator	Ns2 - 2.26
Number of nodes	30 , 50, 100
Simulation Time	20 min
Packet Interval	0.01 sec
Simulation Landscape	1000 x 1000
Traffic Size	CBR
Packet Size	1000 bytes
Queue Length	50
Initial Energy	10 Joules
Node Transmission range	250 m
Initial Energy	100 Joules
rxPower	0.3 W
txPower	0.6 W
Antenna Type	Omni directional
Mobility Models	Random-waypoint (030m/s)
Routing Protocol	AODV
MAC Protocol	IEEE 802.11
Background Data Traffic	CBR

a) *Simulation Environment*

The size of environment is 500 x 500 m2, and every node moves at random as well as its position. Radio transmission range of node is 250 m and its way of wireless communication is free space. In addition, MAC protocol is set to 802.11. The number of nodes is variable for different measurement, which is illustrated specially.

b) *Mobility Pattern*

The mobile movement is set as per random way point model. In the node mobility, the Mobile Nodes selects the random way point to move, and a node stay its location for a pause time before the next move. The simulation is varied under different size and mobility model. The varied pause time of Mobile Nodes is 600 and 300 seconds and node velocity is 0-25 m/s.

c) *Traffic Pattern*

The data traffic is generated using CBR. The number of source and destination pairs is varied. The battery capacity for each node is five units.

d) *Simulation Metrics*

i. *Packet Delivery Fraction (PDF):*

It is the ratios of total number of packets successfully received at the Destination Nodes to the number of packets are forwarded from the Source Nodes throughout the simulation.

$$PDR = \frac{\text{Number of Received Packets}}{\text{Number of Sent Packets}}$$

PDF estimate gives us an idea of how successful the protocol is in delivering packets to the application layer. A high value of PDF indicates that most of the packets are being delivered to the higher layers and is a good indicator of the protocol performance.

ii. *Average End to end delay of data packets:*

$$AED = \sum_{i=0}^{n} \frac{(\text{Time of packet Recived} - \text{Time of Packet Sent})}{\text{Total Number of Packets Received}}$$

The AED is defined as the average time from the beginning of a packet transmission at a Source Node until the packet is delivered to a destination. The data packets buffering during the route discovery, queuing at the interface queue, retransmission delays at the MAC, and propagation and transfer times are included in the data delay. Calculate the send(S) time (t) and receive (R) time (T) and average it.

e) Simulation Results

The Simulation results are illustrated in the aspects of packet delivery fraction and End-to-End delay. The effect on PDF and AED is described.

f) Effect on packet delivery ratio

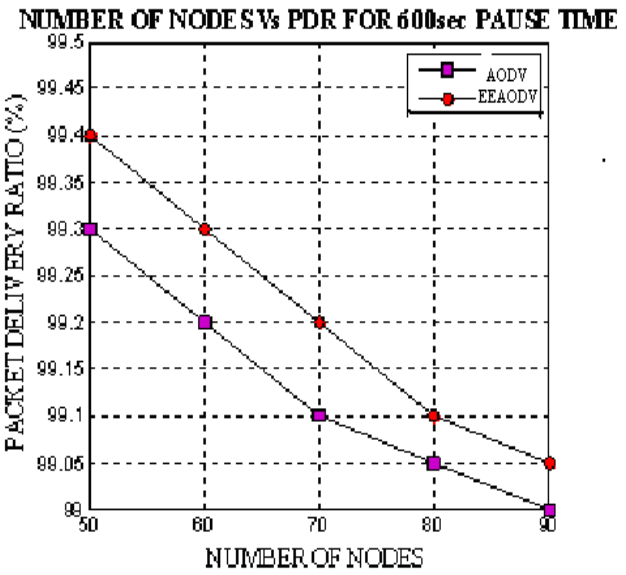

Figure 1 : Packet Delivery Ratio Vs Number of Nodes (Pause Time=600s)

The graph Figure 1 and 2 describes the packet delivery ratio for EE-AODV and AODV is analyzed. From the graph, the EE-AODV packet delivery ratio is higher than the AODV. This is because the AODV is not maintaining the alternative route to the communication path. It rediscovers a route to the destination, when the communication path is failed to transmit the data packets.

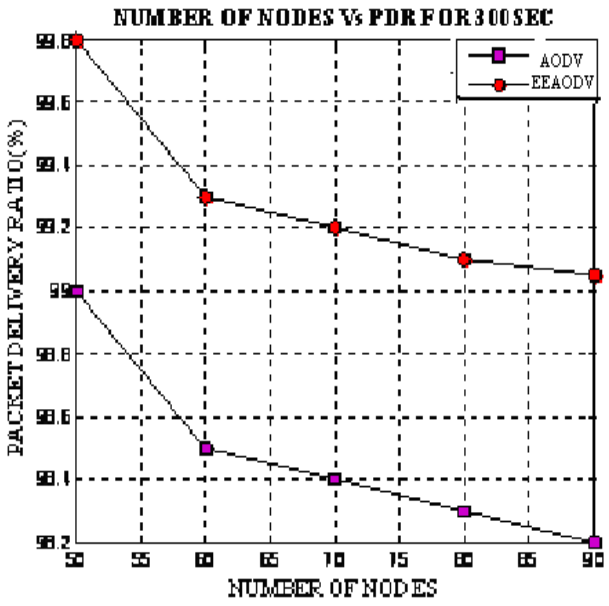

Figure 2 : Packet Delivery Ratio Vs Number of Nodes (Pause Time=300s)

The Packet Delivery Ratio is the ratio of the number of packets received at the destination to the number of packets transmitted from the source. Packet Delivery Ratio reduces as the pause time decreases from 600 seconds to 300 seconds. It is due to the mobility of the network and the probability of link failures increases as the pause time decreases. It is observed that the EE-AODV maintains a better Packet delivery Ratio than the existing AODV. Since, the EE-AODV preemptively selects the alternative path to the communication route. Hence, the communication does not interrupt. It improves the packet delivery ratio under a network with highly dynamic network. From the simulation results, the packet delivery ratio for AODV is 99.3% over the 600 sec pause time, and the 300 sec pause time, it is 98%. The packet delivery ratio for EE-AODV is 99.4% over the 600 sec pause time, and the 300 sec pause time, it is 99.8%.

g) Effect on End-to-End delay

The Figure 3 and 4 describes the packet delivery delay for AODV and EE-AODV. The delay time is high for AODV. Since, it consumes more time to rediscover the routes when the communication path is failed to transmit the data packets. The increased number of nodes also increase the data delivery delay. The End-to-End delay is the time of the transmitted data packet takes to reach destination from the source. As the number of nodes increases, the complexity of the

network increases and hence the End-to-End delay increases. As the pause time decreases, the mobility increases, which increases the probability of link failures and hence the End-to-End delay increases.

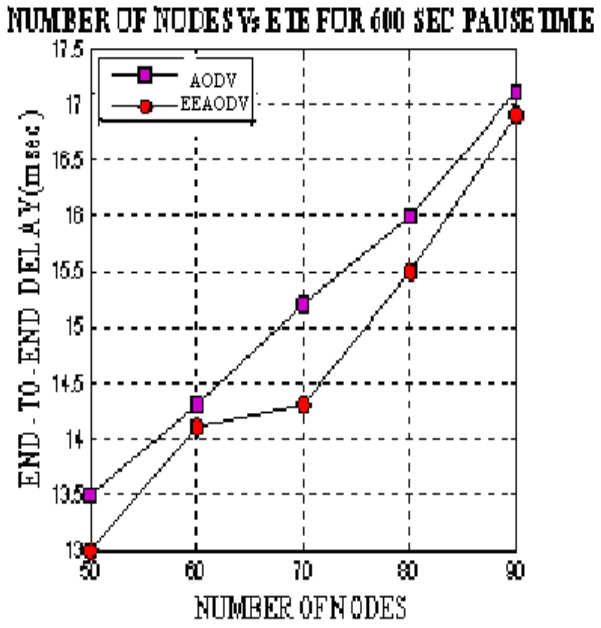

Figure 3 : Delay Vs Number of Nodes (Pause Time=600s)

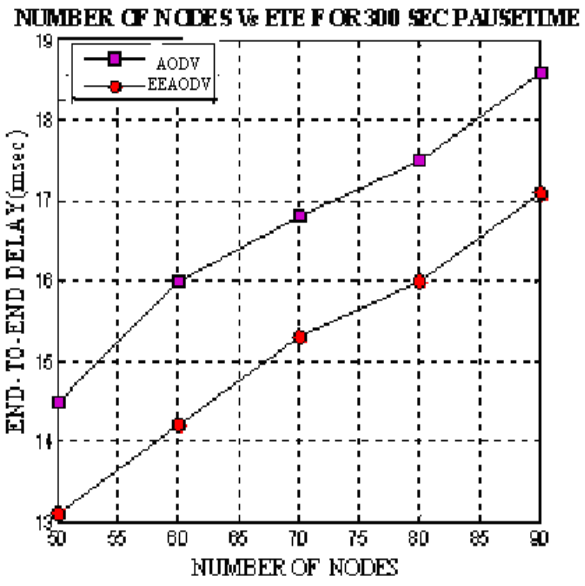

Figure 4 : Delay Vs Number of Nodes (Pause Time=300s)

In EE-AODV, the data packets are delivered using alternative route when the primary path is fail. However, the link failure of alternative routes incurs the data delay but, it is less than the packet delay of AODV. From the simulation results, it has been observed that the End-to-End delay for AODV is 13.5 ms over the 600 sec pause time, and the 300 sec pause time, it is 14.5 ms. The End-to-End delay for EE-AODV is 13.0 ms over the 600 sec pause time, and the 300 sec pause time, it is 13.1 ms.

VI. Conclusion

This paper clearly explained the performance of EE-AODV Protocol. Initially, the energy management and the performance of EE-AODV protocol are described. It clearly explained the minimum energy node selection procedure for EE-AODV. It successfully calculated the node energy level in the selected communication path. It explained the relation between the energy conservation and the routing overhead and also it explained the routing overhead reduction algorithm. It aided to conserve the node energy. This paper simulated the comparative performance of EE-AODV and AODV. It clearly explained the energy efficient performance of EE-AODV is better than the existing AODV.

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Note :

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- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
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"

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1. General,

2. Ethical Guidelines,

3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

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Key points to remember:

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Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

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- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

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Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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