CHAPTER 6

RESULTS AND DISCUSSIONS

The proposed method developed a MANET using NS2 simulator by using various parameters. The below Table 6.1 illustrates different parameters used for establishment of MANET.

Table 6.1: Parameters used

<table>
<thead>
<tr>
<th>Parameters Used</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulation Used</td>
<td>Ns-2.34</td>
</tr>
<tr>
<td>Topology Area</td>
<td>1200 X 1200</td>
</tr>
<tr>
<td>No. of. Nodes</td>
<td>25</td>
</tr>
<tr>
<td>Max. No. of. Connections</td>
<td>30</td>
</tr>
<tr>
<td>Simulation Time</td>
<td>200</td>
</tr>
<tr>
<td>Speed</td>
<td>10-20 m/sec</td>
</tr>
<tr>
<td>Communication Link Capacity</td>
<td>10 Mbps</td>
</tr>
<tr>
<td>Traffic Intensity</td>
<td>45.85, 95, 180</td>
</tr>
<tr>
<td>Routing Protocol</td>
<td>AODV</td>
</tr>
</tbody>
</table>

The creation of nodes in MANET is explained in the Figure 6.1 which shows a MANET group which can involve in communication. In Figure 6.1 Node 0 is the PKG which generates keys, source node is Node 1 that can send data and Destination node is Node 13 which receives the data.
After creating MANET then to start communication, keys are required by nodes in MANET to perform encryption and decryption of data. The below Figure 6.2 depicts the key distribution among nodes.
Throughput, Packet Delivery Count (PDC) and Packet Drop Ratio (PDR) are considered as the main parameters which will impact the entire network performance.

PDC and PDR are used to identify the quantity of packets delivered and quantity of packets dropped which helps to reduce the packet drop ratio. IAODV method is introduced in the proposed work to improve the network throughput.

To calculate the PDR, PDC and Throughput the following formulas are used.

- \[ \text{PDR} = \left( \frac{Nr}{Nf} \right) \times 100 \]
  
  Where, \( Nf \) = No. of packets forwarded to the destination
  \( Nr \) = No. of packets received at the destination

- \[ \text{PDC} = \text{No. of packets generated} - \text{PDR} \]

- Throughput = Number of Packets sent / time

The proposed IAODV algorithm will reduce the packet drop ratio which is shown in Figure 6.3. The Figure 6.3 illustrates clearly that proposed method exhibits enhanced performance when compared to traditional methods.
Figure 6.3: Packet Drop Ratio between IAODV, DSR, MDSR and AODV

The above Figure 6.3 represents that the packet drop ratio has been significantly reduced when compared with the existing methods, as malicious nodes are not participated in the routing process.

The proposed Master-Slave method is introduced for key generation and key distribution. When communication is initiated, a node in a MANET is considered as PKG and considers two nodes as its slaves. Because of dynamic nature, if PKG moves away from the MANET then one of its slave act as PKG and makes other two nodes as slave nodes. The process of Master-Slave method is depicted in below Figure 6.4.
The Figure 6.5 illustrates the throughput comparison among proposed IAODV method and existing AODV method. The proposed method performance is observed better than the existing methods.

The proposed method calculates packet delivery ratio which identifies the amount of packets successfully sent to destination. And
also calculates packet drop ratio which calculates amount of packets lost and finally calculates throughput. The proposed methods are exhibiting better performance than existing methods.

Subsequently, when using secured route, the packets successfully delivered is increased. Figure 6.6 illustrates packet delivery rate of existing and proposed methods.

![Packet Delivery Ratio](image)

**Figure 6.6: Packet Delivery Ratio**

In this way the outcomes which are discussed above, demonstrate that 2ACK method provides more security and less packet drops when compared with different methods by calculating packet drop ratio, packet delivery rate and throughput. In the existing method 69% of packet delivery ratio only was achieved, whereas in proposed method 81% of packet delivery ratio is achieved.
The above Figure 6.7 describes about the procedure for creating MANET and performing multi mode routing algorithm based on nodes available in MANET. If nodes involved in communication are greater than three then PKG is used. Otherwise, End-to-End cryptography procedure is performed if nodes involved in communication in the MANET are limited to two.

An IAODV routing method is introduced where routing is done only between trusted nodes. The Figure 6.8 illustrates the routing in IAODV.
Figure 6.8: Routing in IAODV

Here in the Figure 6.8 the green colored nodes are trusted nodes and red colored node is the PKG and blue colored nodes are its slaves. Trusted nodes are recognized using the PKG and routing will be done only among them thus increasing the security levels of the network.
Figure 6.9: Throughput Calculation of Existing Method

The Figure 6.9 represents the total number of packets created and packets that are delivered successfully to destination. The packets dropped are also calculated. The overall packet delivery ratio is calculated using the formula

\[
\text{Packets Delivery Ratio} = \left( \frac{\text{Number of packets delivered}}{\text{Total number of packets}} \right) \times 100.
\]

\[
= \left( \frac{28385}{41399} \right) \times 100.
\]

\[= 69\%.
\]

The Existing method achieves 69\% of packet delivery ratio
Figure 6.10: Throughput Calculation of the Proposed Method

The Figure 6.10 represents the total number of packets created and packets that are delivered successfully to destination. The packets dropped are also calculated. The overall packet delivery ratio is calculated using the formula

\[
\text{Packets Delivery Ratio} = \frac{\text{Number of packets delivered}}{\text{Total number of packets}} \times 100.
\]

\[
= \frac{33391}{41399} \times 100.
\]

\[
= 81\%.
\]
The proposed method achieves 81% of packet delivery ratio that increases the performance of the system. As maximum quantity of packets are delivered to the destination, the security levels of the route and the nodes behavior during communication is considerably more efficient when compared to traditional methods.