variants, with only 33.33% packets lost, representing a minimal percentage. In contrast, TCP Reno has the highest packet loss percentage, with 36.50% packets lost. TCP Westwood NR falls in between, with a packet loss percentage of 35.59% packets. Thus, TCP Westwood shows the lowest packet loss percentage among the tested TCP variants

Table VII Throughput Of Topology 2

Types Of TCP	Westwood	Westwood NR	Reno
Throughput	45396.09 bits/sec	29765.16 bits/sec	23397.93 bits/sec

In Table VII. Throughput in Topology 2 above indicates that TCP Westwood outperforms other TCP variants in terms of data transmission speed, with a throughput of 45396.09 bits/sec. In comparison, TCP Westwood NR achieves a throughput of 29765.16 bits/sec, while TCP Reno has a throughput of 23397.93 bits/sec. This makes TCP Reno the one with the slowest throughput among the other two TCP variants.

Table VIII Total Delay Of Topology 2

Types Of TCP	Westwood	Westwood NR	Reno
Total Delay	1.527140 seconds	2.204676 seconds	3.900570 seconds

In Table VIII. The total delay in Topology 2 above illustrates the time it takes for data to transfer from one point to another. TCP Westwood exhibits the shortest delay, at 1.527140 seconds.TCP Westwood NR experiences a delay of 2.204676 seconds, indicating that it is slower than TCP Westwood In contrast, TCP Reno has the longest delay, with a duration of 3.900570 seconds.

V. CONCLUSION

In conclusion, this study demonstrates that TCP Westwood outperforms TCP Westwood NR and TCP Reno in the context of Wireless Sensor Networks (WSNs) used for building structure condition monitoring. Through the use of NS-2 simulation, the results reveal that TCP Westwood provides significantly more stable throughput, lower delay, and reduced packet loss, indicating its superior ability to maintain high-quality data transmission under congested network conditions. This performance is critical in real-time monitoring systems where continuous, reliable data flow is essential for the accurate assessment of structural integrity. The adaptive bandwidth estimation mechanism of TCP Westwood plays a pivotal role in its ability to mitigate congestion and prevent packet loss, making it a more effective choice for WSNs in building structure monitoring compared to other TCP variants. These findings suggest that TCP Westwood offers a more robust and efficient solution for ensuring the reliability and accuracy of data in dynamic and congestion-prone network environments.

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