











methods such as CSPO-FANET and OSNP-FANET. The proposed approach achieves low delay and overhead so that it leaves the path to transmit more number of data in all the transmission and that reflects in the raise of the throughput.

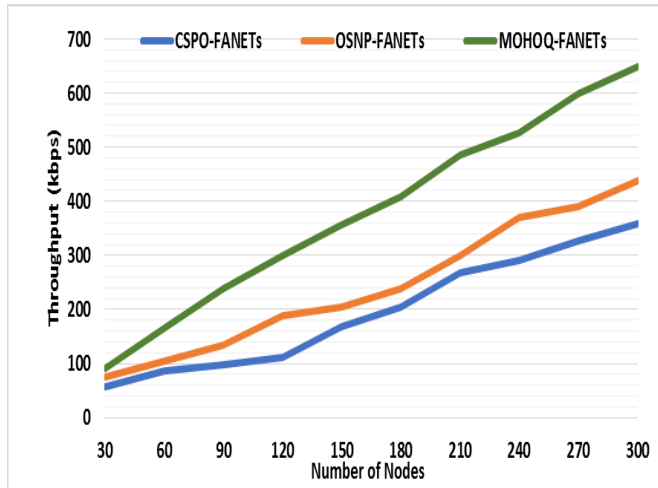


Figure 5. Network Throughput

### 5. Results and Discussion

As measured by the ratio of packet delivery, host to host latency, routing overhead, and network performance, solutions including CSPO-FANET, OSNP-FANET, and the proposed MOHOQ-FANET methodology are addressed in this section. The ultimate results of various procedures are displayed in Table 2.

TABLE 2. Results Analysis and Measurements

Parameters / Methods	CSPO-FANET	OSNP-FANET	MOHOQ-FANET
Delivery Ratio	85%	91%	98%
End to End Delay	142ms	102ms	86ms
Routing Overhead	796 packets	624 packets	286 packets
Network Throughput	358 Kbps	438 Kbps	648 Kbps

The ratio of the packet delivery is completed with the aid of using the proposed MOHOQ-FANET method is 98% whilst in comparison with the previous strategies such CSPO-FANET and OSNP-FANET it reaches as much as 85% and 91% respectively. So, the illustrated of packet delivery ratio MOHOQ-FANET method is 7% better than OSNP-FANET and 13% better than CSPO-FANET. The host to host delay proposed via way of means of the proposed MOHOQ-FANET approach is 86ms in which as for the sooner techniques such OSNP-FANET and CSPO-FANET it reaches as much as 102ms and 142ms respectively. So, the host to host delay of the proposed MOHOQ-FANET approach is 16ms less than OSNP-FANET and 56ms less than CSPO-FANET. The MOHOQ-FANET approach's anticipated routing overhead is 286 packets, compared to the preceding

OSNP-FANET and CSPO-FANET approaches' proposed routing overheads of up to 796 and 624 packets, respectively. So, the routing overhead of the proposed MOHOQ-FANET approach is 338 packets lower than OSNP-FANET and 510 packets lower than CSPO-FANET. The throughput executed with the aid of using the proposed MOHOQ-FANET technique is 648 Kbps in which as for the sooner techniques such as OSNP-FANET and CSPO-FANET it reaches up to 438 Kbps and 358 Kbps respectively. So, the throughput of the proposed MOHOQ-FANET approach is 210 Kbps better than OSNP-FANET and 290 Kbps better than CSPO-FANET. It is clear from the computation of these parameters that the hybrid technique for optimization, which combines RAODV, ACO, and PSO optimization, helped the suggested MOHOQ-FANET approach attain the overall best performance.

### CONCLUSION

In this paper the Flying Ad-hoc Network (FANET) are combined with multiple Unmanned Aerial Vehicles (UAVs) to achieve effective communication. Currently the FANETs consist of huge number of UAVs so that it becomes indispensable to provide routing and optimization for FANETs. Hence Multi-Objective Hybrid Optimization for Quality of Service (QoS) Assisted Flying Ad-Hoc Network (MOHOQ-FANET) approach is proposed. The main segments which are present in this approach are ACO based AODV routing in FANETs, ACO based Initial Path Selection and PSO based Optimal Path Section. Through this method UAVs are highly optimized that greatly increased the packets success ratio and throughput achievement in FANETs. The simulation is carried out in NS2 and the parameters such as packet delivery ratio, end to end delay, routing overhead and network throughput as well as it is compared with the earlier researches such as CSPO-FANET and OSNP-FANET. From the results it is proven that When compared to earlier techniques, the proposed MOHOQ-FANET achieves 7% to 13% higher packet delivery ratio, 16ms to 56ms less host to host delay, 338 packets to 510 packets less routing overhead, and 210 Kbps to 290 Kbps higher throughput. The idea of a cluster is utilized to integrate FANETs in the future to achieve improved energy efficiency.

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