Group-3: Homework Assignment 3 Report

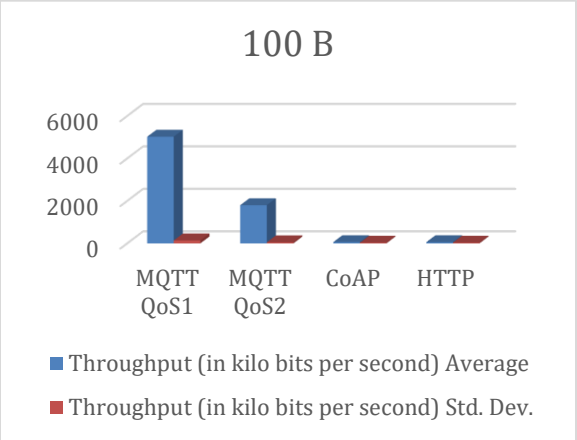
Team Members: Anjali Dogiparthi 25% of contribution,
Rohan Mehta 25% of contribution,
Sandesh Jain 25% of contribution,
Shardul Ladekar 25% of contribution

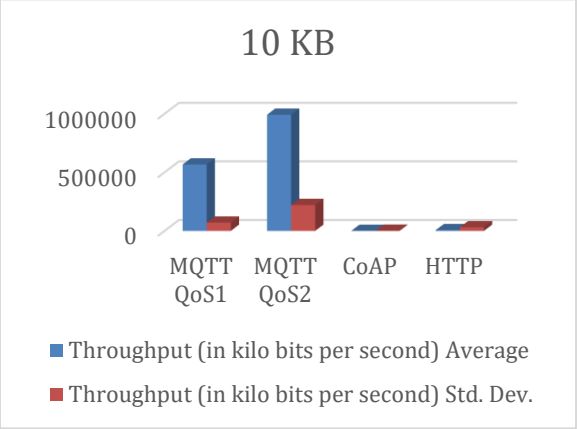
Team Member Contribution and Sub-Tasks

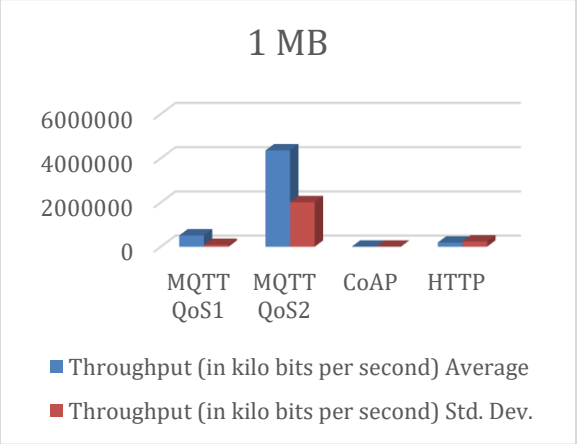
Sub-Tasks	Anjali	Rohan	Sandesh	Shardul
Research on MQTTQoS1, QoS2, CoAP and HTTP protocols	●	●	●	●
Development - MQTT QoS1		●	●	
Test - MQTT QoS1		●	●	
Development - MQTT QoS2		●	●	
Test - MQTT QoS2		●	●	
Development - CoAP	●	●	●	●
Test - CoAP	●	●	●	●
Development - HTTP	●			●
Test - HTTP	●			●
Create project report	●			●

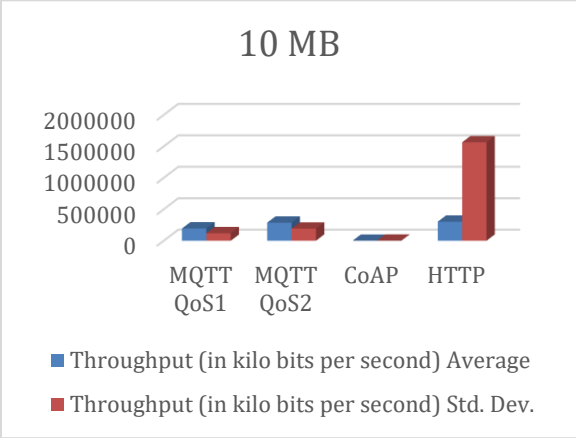
Observations from Experiments

Throughput (in kilobits per second)



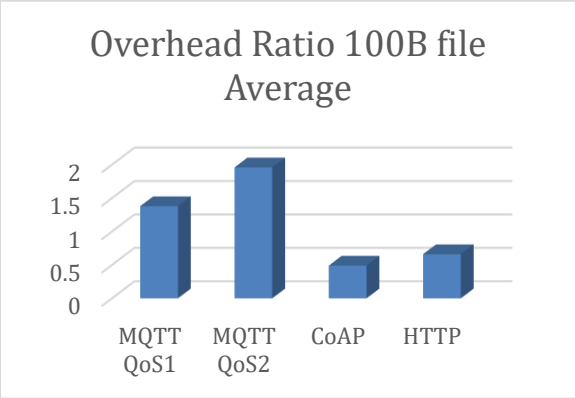


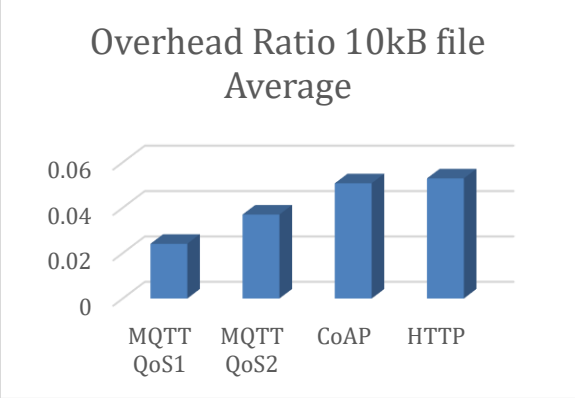


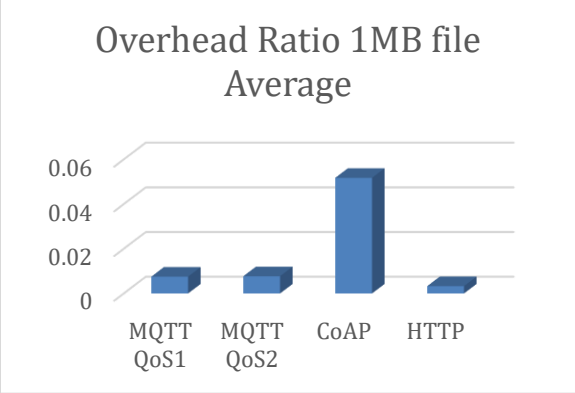


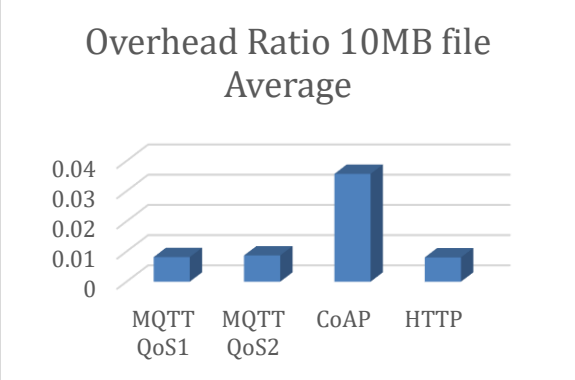
Based on the throughput data for file transfers of different sizes via MQTT, CoAP, and HTTP, key observations emerge. For small files, MQTT with QoS1 leads with a throughput of approximately 5020.89 Kbps, while QoS2 follows at 1796.27 Kbps. CoAP and HTTP lag significantly, averaging around 56.74 Kbps and 55.58 Kbps, respectively. As file sizes grow, MQTT QoS2 consistently achieves the highest throughput, surpassing 991778.16 Kbps for 10KB files and 4355593.4 Kbps for 1MB files. HTTP also delivers competitive performance for larger files, offering 6480.88 Kbps for 10KB and 188686.2 Kbps for 1MB. CoAP trails behind, with its best throughput at 534.25 Kbps for 10KB files. For 10MB files, MQTT QoS2 retains its lead at 288434.45 Kbps, closely followed by HTTP at 303299.57 Kbps, while MQTT QoS1 provides 195606.49 Kbps, and CoAP lags at 258.23 Kbps. In summary, MQTT, particularly QoS2, offers the highest throughput for file transfers, especially for larger files, while CoAP consistently exhibits the lowest throughput. The choice of protocol should be based on file size, desired throughput, and application-specific needs.

Total application layer data transferred from sender to receiver (including header content) per file divided by the file size.









The provided data highlights the efficiency of MQTT, CoAP, and HTTP protocols when transferring files of different sizes, based on the ratio of application layer data (including headers) to file size. For small files (100B and 10KB), MQTT QoS2 demonstrates exceptional efficiency with ratios of 1.96 and 0.037012, respectively, indicating minimal overhead. MQTT QoS1 follows closely, also performing well. CoAP and HTTP show higher ratios, suggesting more data overhead, with HTTP being the least efficient. With larger files (1MB and 10MB), MQTT (both QoS1 and QoS2) maintains its efficiency with low ratios. CoAP remains less efficient than MQTT, and HTTP consistently adds more overhead data, particularly for smaller file.

In conclusion, the choice of protocol depends on the specific requirements of the application. MQTT excels in scenarios involving small payloads, real-time data, scalability, and resource-constrained devices. HTTP is preferred for larger file transfers and web content delivery, where robustness and reliability are paramount. CoAP falls in between, offering lightweight characteristics but may be more suitable for certain IoT applications than others. Ultimately, careful consideration of the trade-offs in terms of payload size, latency, energy consumption, and scalability are essential when selecting the appropriate protocol.