



## Development of MQTT/MAVLink Connector for UAS Ground Stations

### Client Overview

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CrowdPlat completed an ambitious project aimed at enhancing Unmanned Aircraft System (UAS) operations through the development of a software tool that bridges MAVLink-based ground control stations with MQTT brokers. This project was designed to facilitate real-time data exchange and command/control operations between drones and ground stations, leveraging Internet of Things (IoT) architectures for advanced data visualization and analytics.

### Project Synopsis

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The MQTT/MAVLink connector serves as a critical tool for connecting UAS ground stations to an MQTT broker, allowing for the seamless sharing of real-time aircraft state data, control commands, and facilitating data visualization through platforms like Grafana. Developed as a MAVProxy module using Python and the paho-mqtt library, this connector adheres strictly to NASA's approved software libraries and frameworks, ensuring high standards of reliability and security.

### Background

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The need for a robust software connector arose from the increasing demand for efficient and reliable real-time data exchange between drones and ground control stations. The project aimed to leverage MQTT's lightweight messaging protocol to facilitate IoT-based data dashboards, enhancing UAS operational awareness and control capabilities.

## Implementation

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CrowdPlat's approach involved a detailed analysis of the project requirements, followed by the development of a comprehensive project plan. The team engaged closely with government stakeholders to refine goals and ensure the project's success. The MQTT/MAVLink connector was developed with the following key features:

- Development as a MAVProxy module for seamless integration with existing UAS infrastructure.
- Utilization of the Python programming language and the paho-mqtt library for robust and reliable performance.
- Definition of logical MQTT topics for efficient data storage and Node-RED compatibility. Support for bi-directional MAVLink communication for comprehensive command and control functionality.

## Challenges and Solutions

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One of the major challenges faced during the project was ensuring the connector's compatibility with various MAVLink endpoints and the MQTT broker. Through iterative testing and close coordination with the community, CrowdPlat successfully addressed these challenges, delivering a highly functional and reliable module.

## Results

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The MQTT/MAVLink connector has significantly enhanced the capabilities of UAS operations by enabling:

- Real-time sharing of drone data among ground control stations.
- Advanced data visualization and analytics for improved operational decision-making.
- Efficient commanding and controlling of UAS from connected ground control stations.
- Enhanced PC to drone communication, streamlining the interaction between operators and unmanned systems for more responsive and effective control.

## Conclusion

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CrowdPlat's successful delivery of the MQTT/MAVLink connector marks a significant advancement in UAS technology. By leveraging the power of MQTT and MAVLink, this project has set a new standard for real-time data exchange and control in unmanned aircraft operations. The project not only met the specified requirements but also provided a robust framework for future enhancements, demonstrating CrowdPlat's commitment to innovation and excellence in software development for government and aerospace applications.