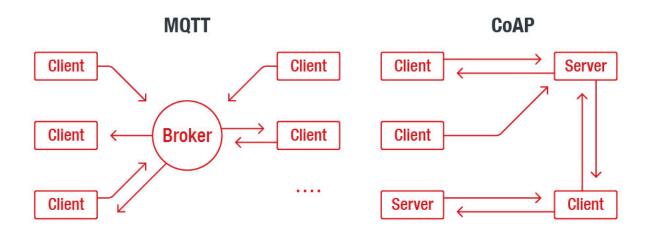
Practical - 2

Aim -Basics of Network (CoAP, MQTT) and Cloud (ThingSpeak)

Theory -



This practical introduces students to key communication protocols used in IoT—CoAP and MQTT—alongside an introduction to ThingSpeak, a cloud platform for IoT data visualization. IoT devices often operate in constrained environments, requiring lightweight protocols for efficient data transfer. CoAP and MQTT are designed for such scenarios, ensuring minimal bandwidth usage and low latency.

Students learn how to structure sensor data, send it using CoAP/MQTT, and visualize it using cloud dashboards. ThingSpeak enables data logging, analysis, and visualization using MATLAB integration, making it ideal for real-time IoT applications. This hands-on session bridges the gap between edge computing and cloud-based data services.

Key Points:

- **CoAP (Constrained Application Protocol)** uses UDP and follows a request/response model, similar to HTTP.
- MQTT (Message Queuing Telemetry Transport) uses a publish-subscribe model over TCP, making it ideal for sensor data transmission.
- MQTT supports broker-client communication, typically using brokers like Mosquitto.

- Students learn how to **send data to a broker** and **subscribe to topics** using MQTT libraries in Python.
- ThingSpeak is a cloud platform that supports data collection via HTTP GET/POST and MQTT.
- It allows students to create channels, visualize data, and perform cloud-side processing using MATLAB.
- Practical demonstrates how IoT devices communicate with the cloud in real time.
- Learners implement real-world IoT scenarios, like temperature monitoring or motion detection.
- Helps understand data flow from sensor \rightarrow microcontroller \rightarrow protocol \rightarrow cloud platform.
- Introduces important concepts in IoT networking and cloud integration.