IoT Protocol Stack and IoT Application layer protocol - CoAP

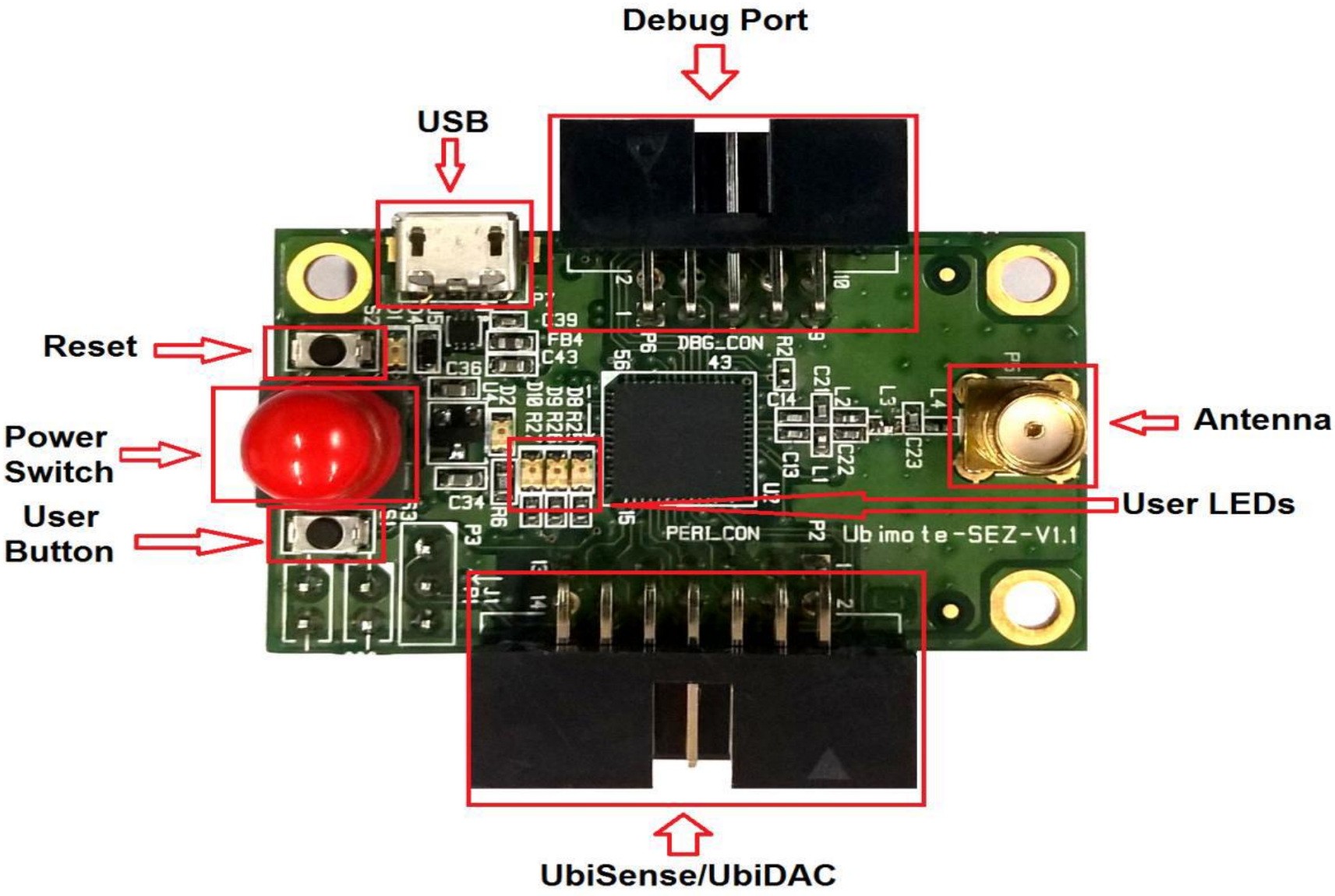
Typical IoT stack for IEEE 802.15.4 Motes

Application	CoAP MQTT Websockets HTTP
Transport	TCP UDP
Network, Routing	IPv4 IPv6 RPL
Adaptation	6loWPAN
MAC	CSMA/CA
Duty Cycle	ContikiMAC
Radio	802.15.4

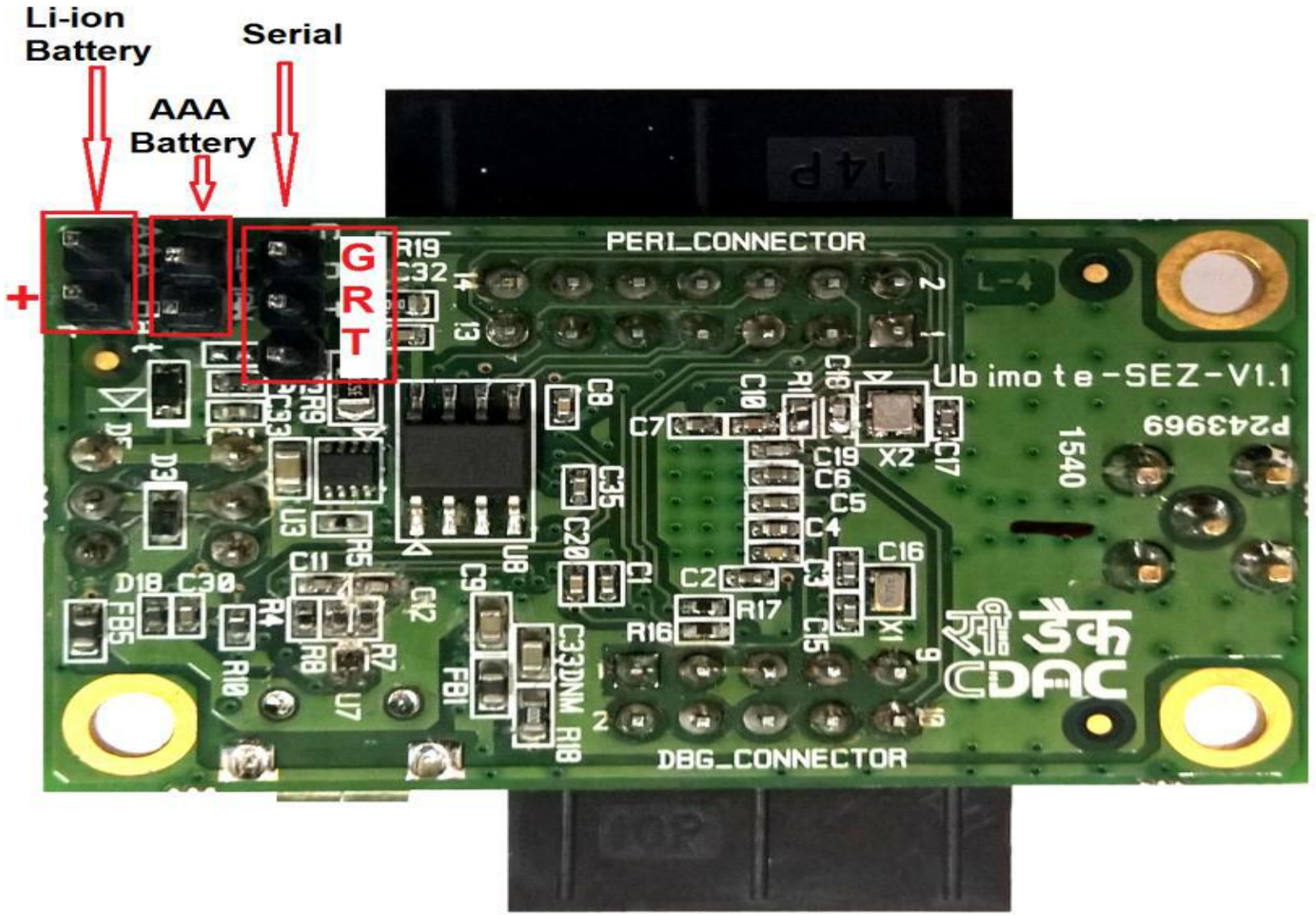
Ubimote

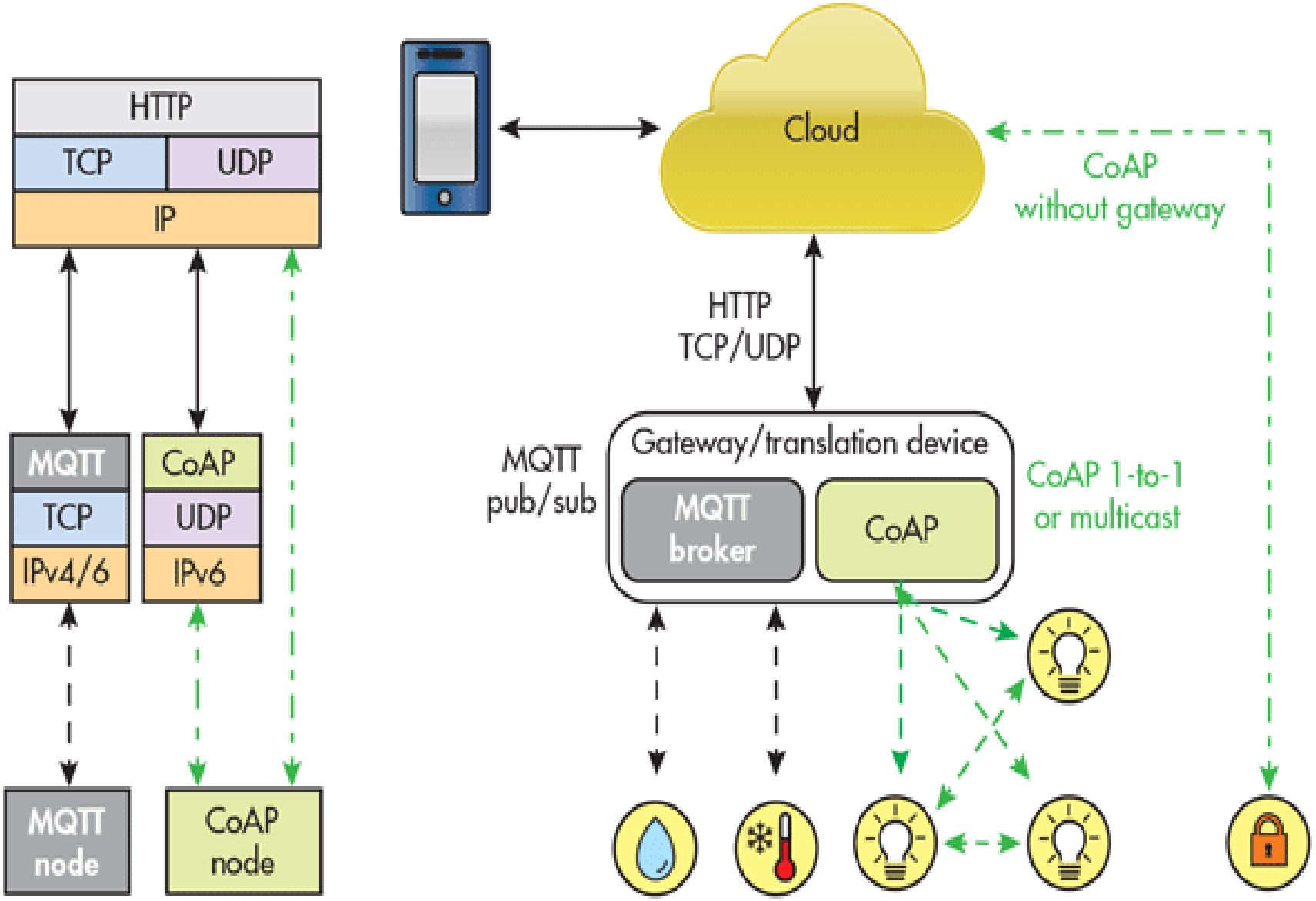
- TI CC2538, an ARM CortexM3 with 32 KB on-chip RAM and 512 KB on-chip flash with a robust IEEE 802.15.4 radio.
- SMA connector for interfacing 2.4 GHz SMA antenna
- 8Mbit Serial Flash memory for additional storage.
- Sensor Connector for interfacing UbiSense/UbiDAC
- JTAG Connector for programming and debugging
- USB interface for peripheral functionality.
- Power through USB Connector, Li-Po Battery
- Li-Po Battery charger

Ubimote - Components



Ubimote - Components





http://www.electronicdesign.com/iot/mqtt-and-coap-underlying-protocols-iot

CoAP

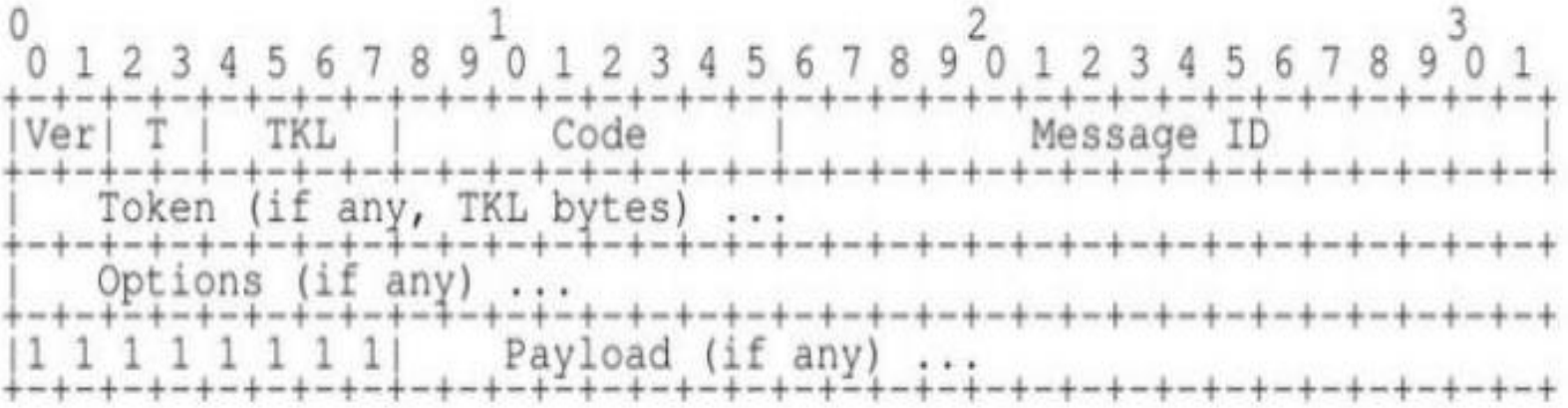
CoAP

RFC 7252 Constrained Application Protocol

"The Constrained Application Protocol (CoAP) is a specialized web transfer protocol for use with constrained nodes and constrained networks in the **Internet of Things.**
The protocol is designed for machine-to-machine (M2M) applications such as smart energy and building automation."

- UDP-*reliable* (confirmable), SMS supported
- CoRE *Link-format* (GET */.well known/core*)
- Client/Server
- IANA Registered (error codes, content format)
- Resource Discovery and asynchronous subscription
- Four-bytes compact header
- Multicast and one-to-one supported
- HTTP verbs GET, PUT, POST, DELETE
- HTTP-like header (*Options*)
- URI (Uniform Resource Identifier)

http://coap.technology/
https://tools.ietf.org/html/rfc7252



Ver - Version (1)

T - Message Type (Confirmable, Non-Confirmable, Acknowledgement, Reset)

TKL- Token Length, if any, the number of Token bytes after this header

Code - Request Method (1-10) or Response Code (40-255)

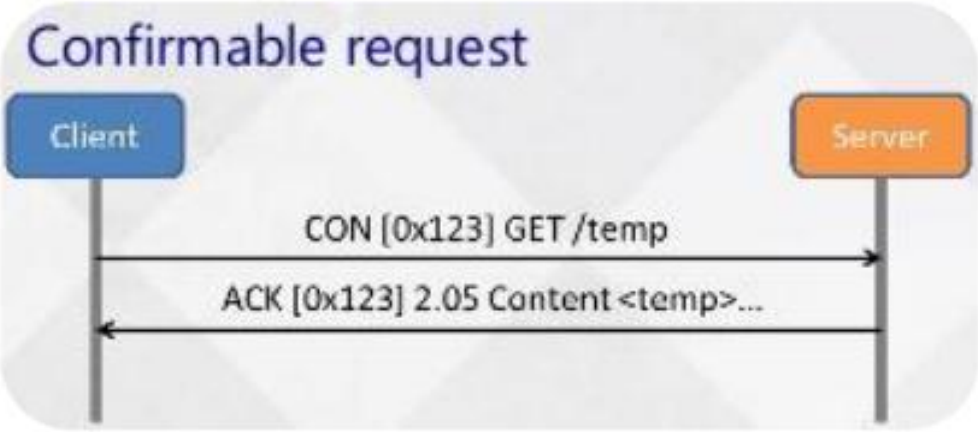
Message ID - 16-bit identifier for matching responses

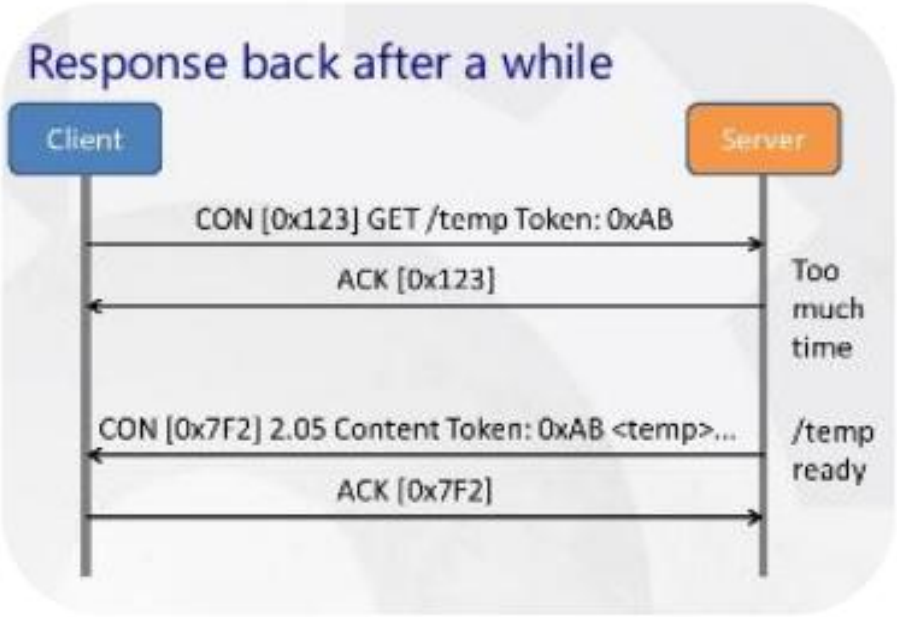
Token - Optional response matching token

http://www.slideshare.net/zdshelby/coap-tutorial

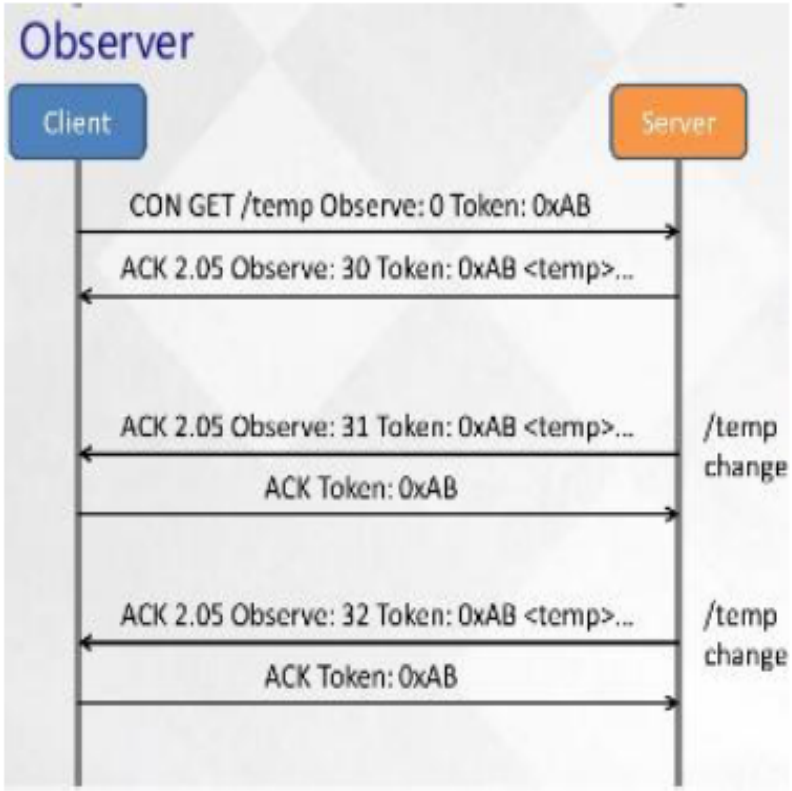
CoAP URI

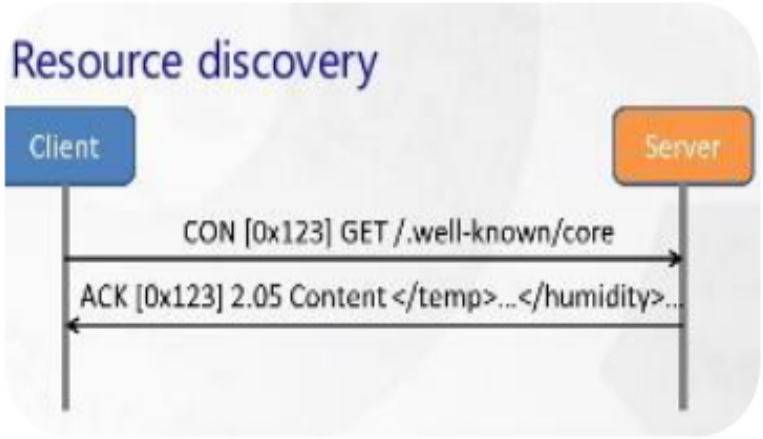
coap://[aaaa::c30c:0:0:1234]:5683/actuators/leds?color=b





http://www.slideshare.net/paolopat/mqtt-iot-protocols-comparison





http://www.slideshare.net/paolopat/mqtt-iot-protocols-comparison

Only on Firefox: install the following plug-in:

https://addons.mozilla.org/en-US/firefox/addon/copper-270430/
http://people.inf.ethz.ch/mkovatsc/copper.php

CoAP server for resource discovery – an Implementation Snapshot