

CoAP: Constrained Application Protocol

- A web transfer protocol for machine-to-machine communication
- Internet-of-Things (IoT)
 - 8-bit microcontrollers
 - IPv6 over Low-Power Wireless Personal Area Networks (6LoWPAN)
- Defined in RFC 7252 by Internet Engineering Task Force (IETF)

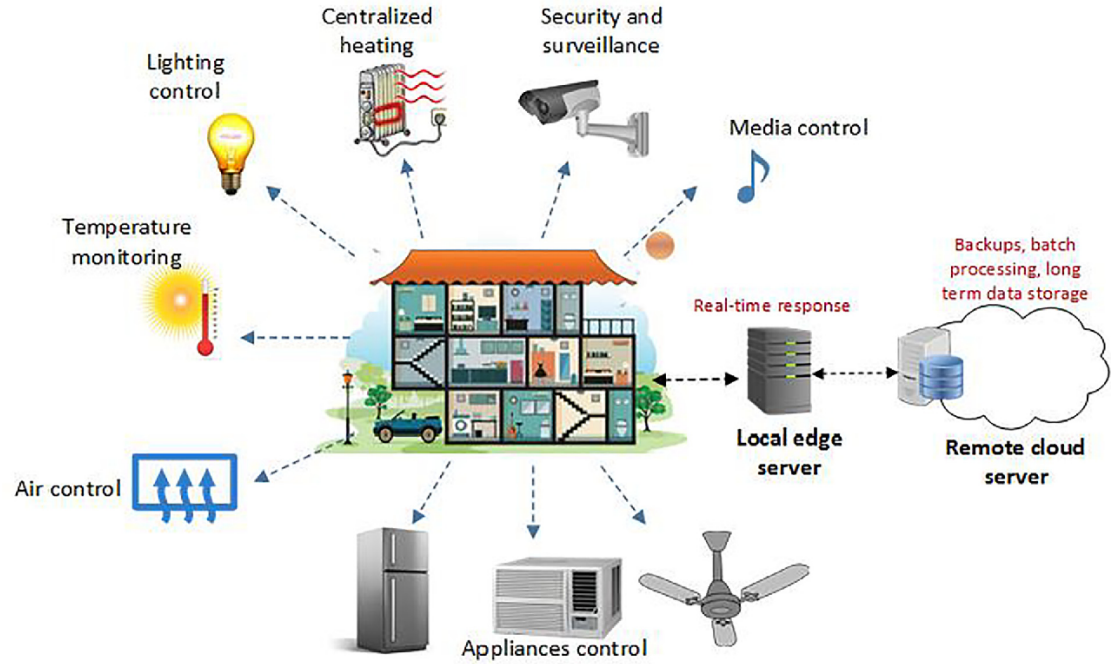
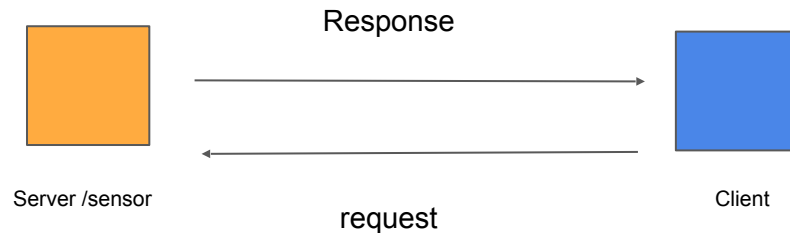


Fig. 8 Smart home using edge computing

Features

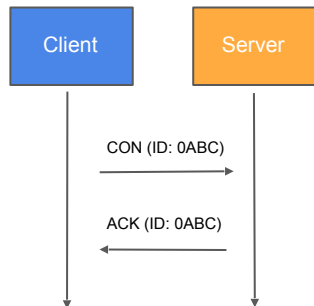
- Constrained RESTful Environment (CoRE): Low header overhead
- Request-Response interaction model
- UDP based
- URI and Content-type support.
- Built in discovery of services and resources
- Asynchronous message exchange
- Proxy and caching capabilities
- Security binding to Datagram Transport Layer Security (DTLS)



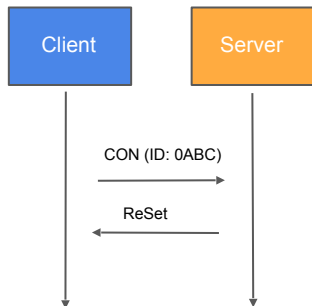
CoAP messages

URL: "coap:" "/" host [":" port] path ["?" query]

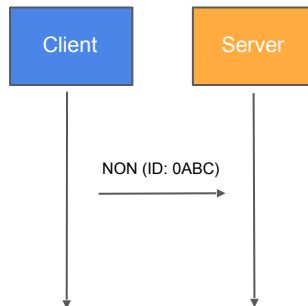
Confirmable (CON -0) with
Acknowledgement ACK (2)



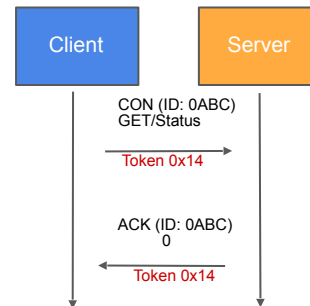
Reset (ReSet -3)



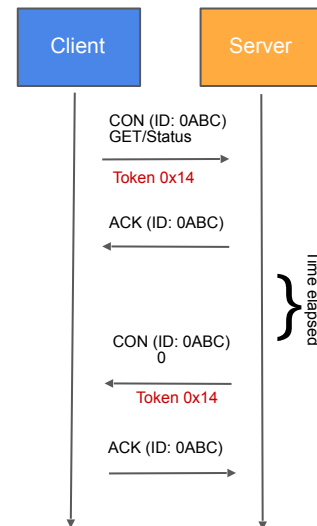
Non Confirmable (NON -1)



Piggy-backed response



Separate response



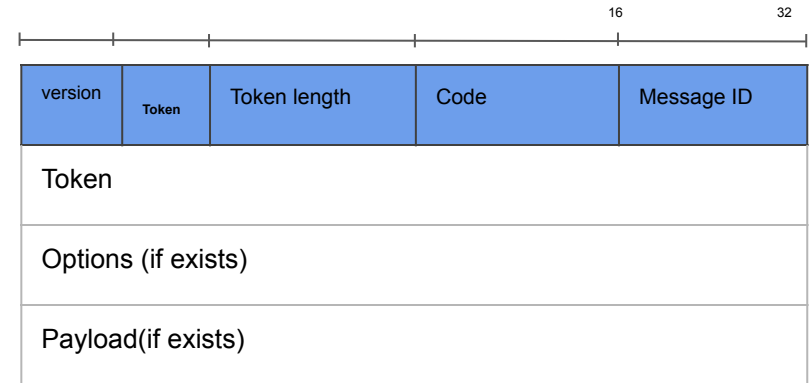
Message architecture

HTTP

- Based on TCP
- Does not support multicast
- Uses client server architecture
- Large overhead (40 to 60 bytes)
- Requires more resources

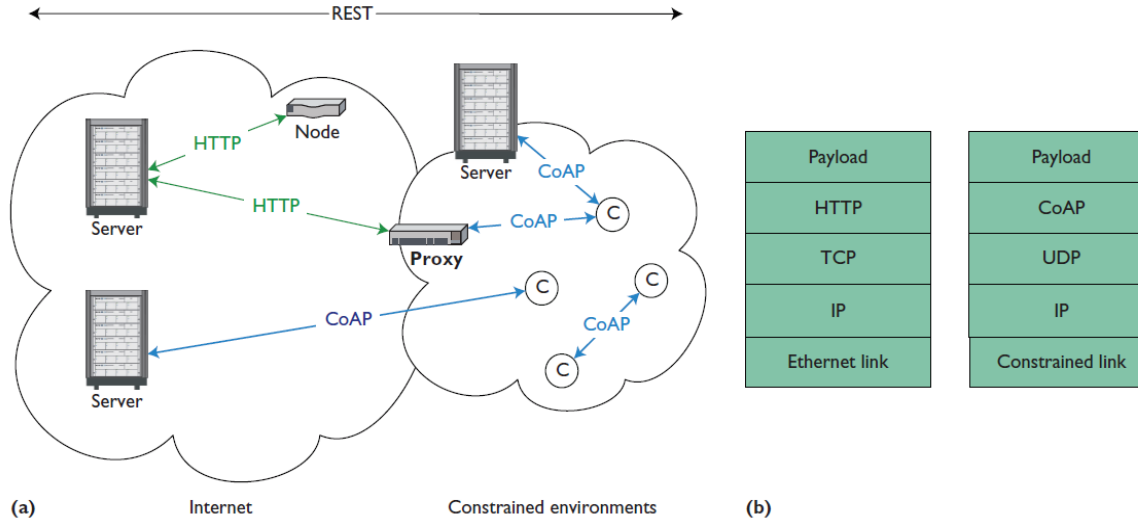
CoAP

- Based on UDP
- Supports multicast
- Uses both client- server & publish- subscribe model
- Small overhead (4 bytes)
- Works with constrained resources
- Additional attributes: Observer and Discovery



Web architecture with HTTP & CoAP : Proxy

// key words



Demo.

Outline:

1. Setup
 - a. Pycharm
 - b. Python 2.7
 - c. Pip
 - d. Install the coapthon library
2. Walk through the library
3. Demo the messages from slide 3 -- confirmable, (may be non confirmable), acknowledgement, reset
4. Demo the resources : Discovery and observable resources.
5. May be demo proxy?
6. Wireshark packet capture

Reference resources:

1. C. Bormann, A. P. Castellani and Z. Shelby, "CoAP: An Application Protocol for Billions of Tiny Internet Nodes," in *IEEE Internet Computing*, vol. 16, no. 2, pp. 62-67, March-April 2012, doi: 10.1109/MIC.2012.29.
2. <http://coap.technology/impls.html>
3. <https://tools.ietf.org/html/rfc7252>
4. G.Tanganelli, C. Vallati, E.Mingozzi, "CoAPthon: Easy Development of CoAP-based IoT Applications with Python", IEEE World Forum on Internet of Things (WF-IoT 2015)