OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG | INF | FAKULTÄT FÜR INFORMATIK

Communication and Networked Systems

Bachelor/Master Thesis

Bringing IoT to the Web – Observing CoAP Resources Through a CoAP-HTTP-Porxy

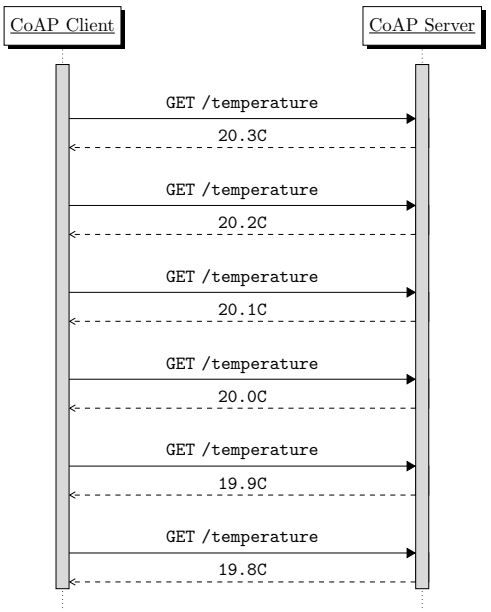
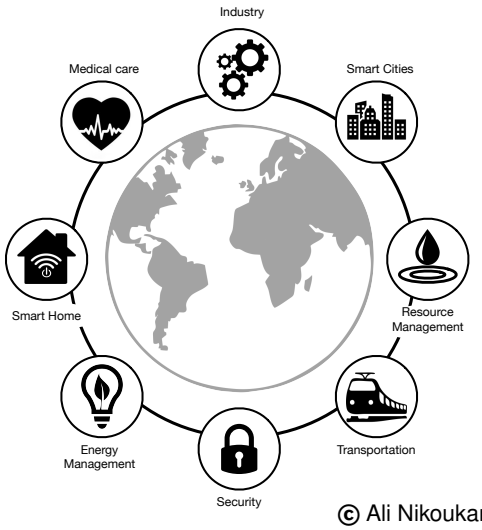


Fig. 1: A CoAP client repetitively requesting a resource

Motivation

The Constrained Application Protocol (CoAP) [1] brings the core concepts of the Web to the IoT: Features like the proven Request/Response Model used in HTTP as well as URIs, methods and status codes are adopted. By using a highly efficient binary encoding instead of the text based format used in HTTP, CoAP can be used for IoT devices at bottom end of the performance range. This allows requesting a temperature in familiar and intuitive way as shown in Fig.1. Due to the close relationship with HTTP, CoAP nodes have the advantage to easily communicate with HTTP devices using a cross protocol proxy. Such a proxy translates messages from one format into the other as depicted in Fig.3.

Often a client is interested to get timely updates of resource. The naive way is to send `GET` requests repetitively as shown in Fig.1. However, the `Observe` CoAP Option [2] allows to request updates in specific intervals or under specific conditions. In Fig.2 a Client is only interested in the measurements of a temperature sensor when the value is below 20 °C. This greatly reduces load on the network and, thus, safes battery life. Still, the `Observe` CoAP Option is not compatible with a CoAP-HTTP-Proxy.



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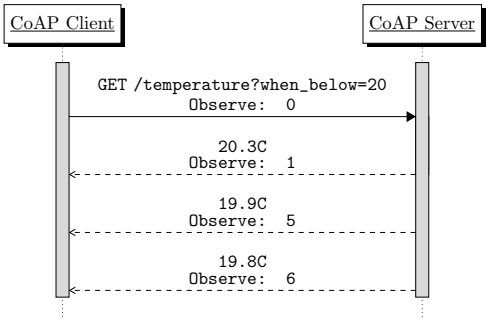

Fig. 2: A CoAP client using `Observe` to get only updates its interested in

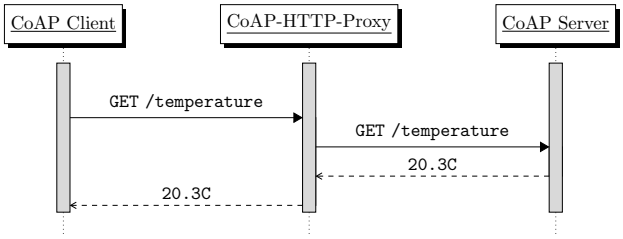

Fig. 3: An HTTP client requesting a resource on a CoAP Server using a cross protocol proxy

Objective

Implement a CoAP-HTTP-Proxy that allows HTTP Clients to observe CoAP servers. We will provide you an existing CoAP implementation and HTTP implementation. On the HTTP side of the proxy an established technique such as WebSockets [3] or Bidirectional-streams Over Synchronous HTTP (BOSH) [4] should be used.

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Required Skills

- Good C99 programming experience
- Network programming experience
- Ideally have attended one of the ComSys software projects

References

[1] **Z. Shelby, K. Hartke, C. Bormann**. The Constrained Application Protocol (CoAP). `https://tools.ietf.org/html/rfc7252`

[2] **K. Hartke**. Observing Resources in the Constrained Application Protocol (CoAP). `https://tools.ietf.org/html/rfc7641`

[3] **I. Fette, A. Melnikov**. The WebSocket Protocol. `https://tools.ietf.org/html/rfc6455`

[4] **XMPP Standards Foundation**. Bidirectional-streams Over Synchronous HTTP (BOSH). `https://xmpp.org/extensions/xep-0124.html`

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