CoAPing with the Internet of Things

RFC 7252

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Huawei

Agenda

- What
- Why
- How
- Demo!

CoAP

"The Constrained Application Protocol (CoAP) is a specialized web transfer protocol for use with ***constrained nodes*** *and* ***constrained networks****."*
– RFC 7252

Constrained-Node Networks

Obligatory RFC 7228 reference...

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Obligatory `RFC 7228` reference. . .

Basically:

- Small
- Slow
- Lossy

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Basically:

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Think more Arduino, less RaspberryPi

Internet of Things

Currently:

- **WWW**: TCP + (TLS) + HTTP
- *Very* widely used and *very* familiar

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IoT? IoE? WoT? <Insert More Buzzwords/>

Internet of Things

Currently:

- **WWW**: TCP + (TLS) + HTTP
- *Very* widely used and *very* familiar

IoT? IoE? WoT? <Insert More Buzzwords/>

- Something more lightweight
- Something *semantically* compatible

RESTful

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Pause for rants, flames and holy wars. . .

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- Client-Server
- Stateless
- Cache
- Layered System
- Uniform Interface

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Hypermedia as the Engine of Application State

Constrained RESTful Environments (core)

"... provides a framework for resource-oriented applications intended to run on constrained IP networks."

"... the working group has defined a Constrained Application Protocol (CoAP) for the manipulation of Resources on a Device."

CoAP Features

- **Asynchronous** request-response model
- Methods analogous to HTTP (GET, PUT, POST)
- Response codes similar to HTTP (2.05, 4.03, 5.00)
- Options in place of headers
- MIME types (JSON, CBOR)
- URI support: `coap://[HOST]:PORT/path?q=query`
- Compact binary protocol (4 byte header)
- UDP binding (TCP and SMS bindings also possible)
- **Observation i.e. subscription mechanism**
- **Resource discovery**
- Block transfer

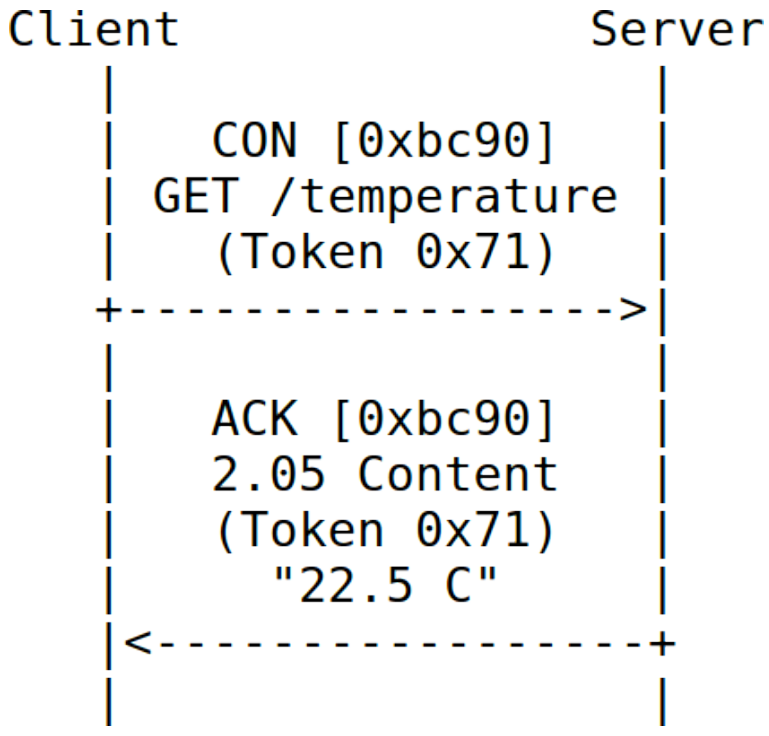
Semantics of CoAP methods

. . . are "almost, but not entirely unlike" [HHGTTG] those of HTTP methods.

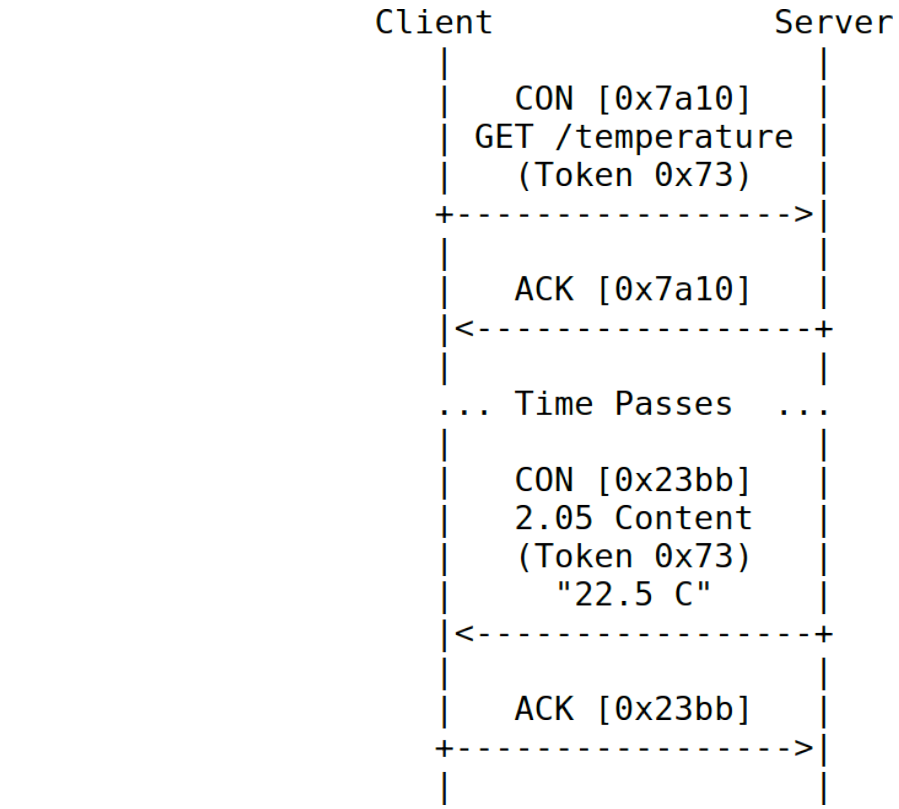
Message Types:

- **CON**firmable
- **NON**-confirmable
- **ACK**nowledgment
- **RST**

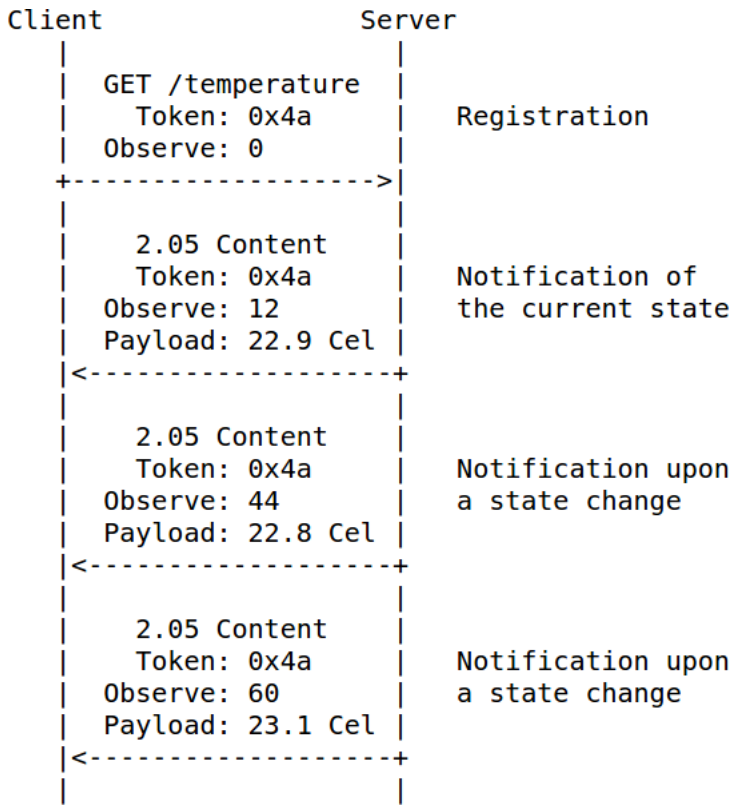
Piggybacked Response



Deferred (Async) Response



Observe


Client
Server
GET /temperature
Token: 0x4a
Observe: 0
Registration
2.05 Content
Token: 0x4a
Observe: 12
Payload: 22.9 Cel
Notification of
the current state
2.05 Content
Token: 0x4a
Observe: 44
Payload: 22.8 Cel
Notification upon
a state change
2.05 Content
Token: 0x4a
Observe: 60
Payload: 23.1 Cel
Notification upon
a state change

Resource Discovery RFC 6690

Resource Discovery RFC 6690

```
REQ: GET /.well-known/core
```

Resource Discovery RFC 6690

```
REQ: GET /.well-known/core

RES: 2.05 Content
</sensors>;ct=40
```

Resource Discovery RFC 6690

```
REQ: GET /.well-known/core

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REQ: GET /sensors
```

Resource Discovery RFC 6690

```
REQ: GET /.well-known/core

RES: 2.05 Content
</sensors>;ct=40

REQ: GET /sensors

RES: 2.05 Content
</sensors/temp>;rt="temperature-c";if="sensor",
</sensors/light>;rt="light-lux";if="sensor"
```

Resource Directory (Draft)

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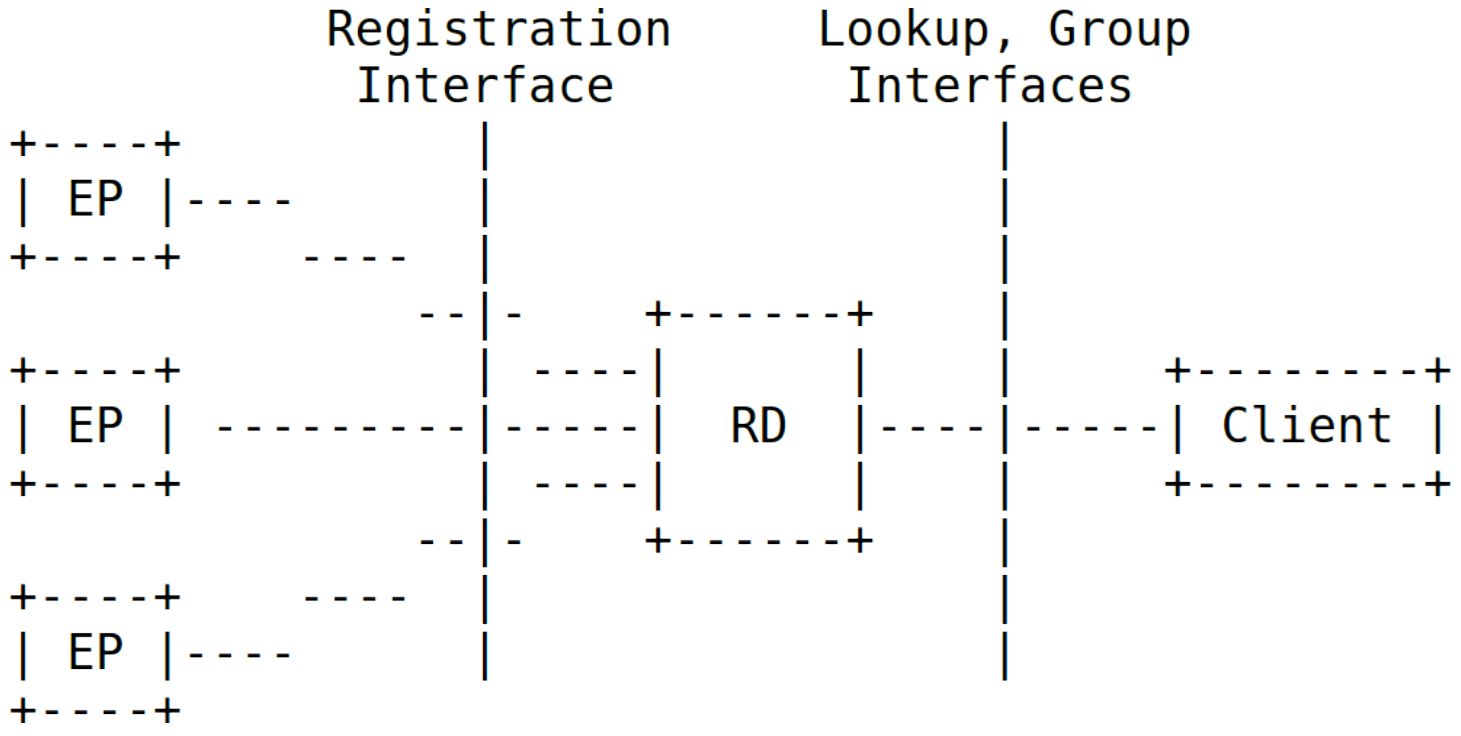
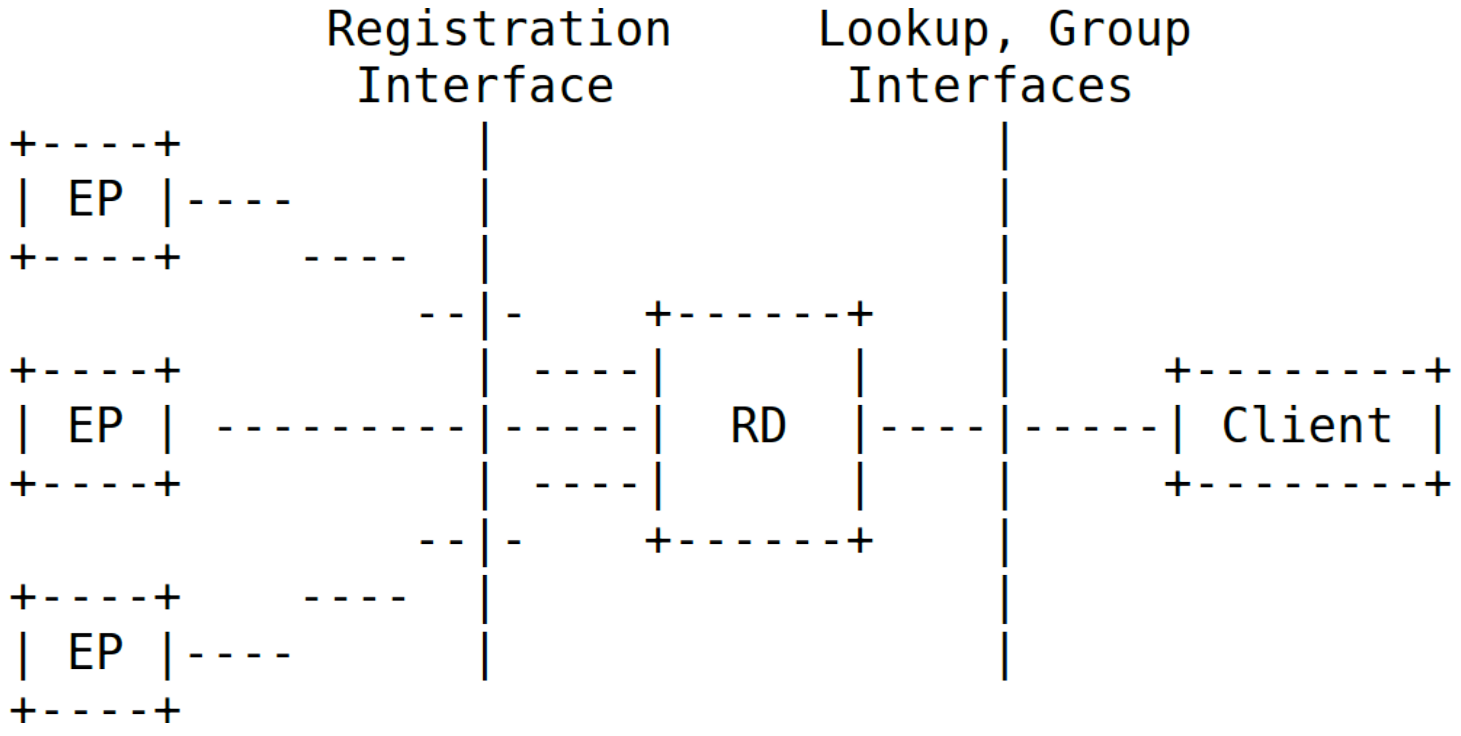


Resource Directory (Draft)



- **Cache / Reverse Crawler**

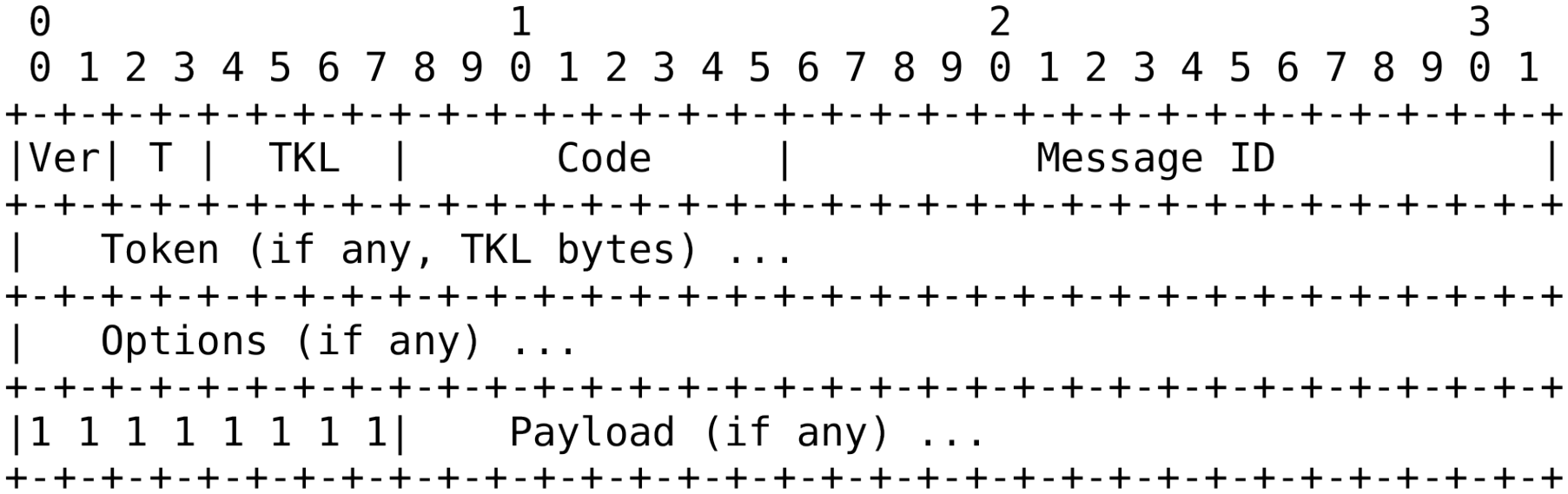
Application Profiles

- OMA LWM2M
- IPSO Alliance
- IETF CoRE Interfaces (Draft)

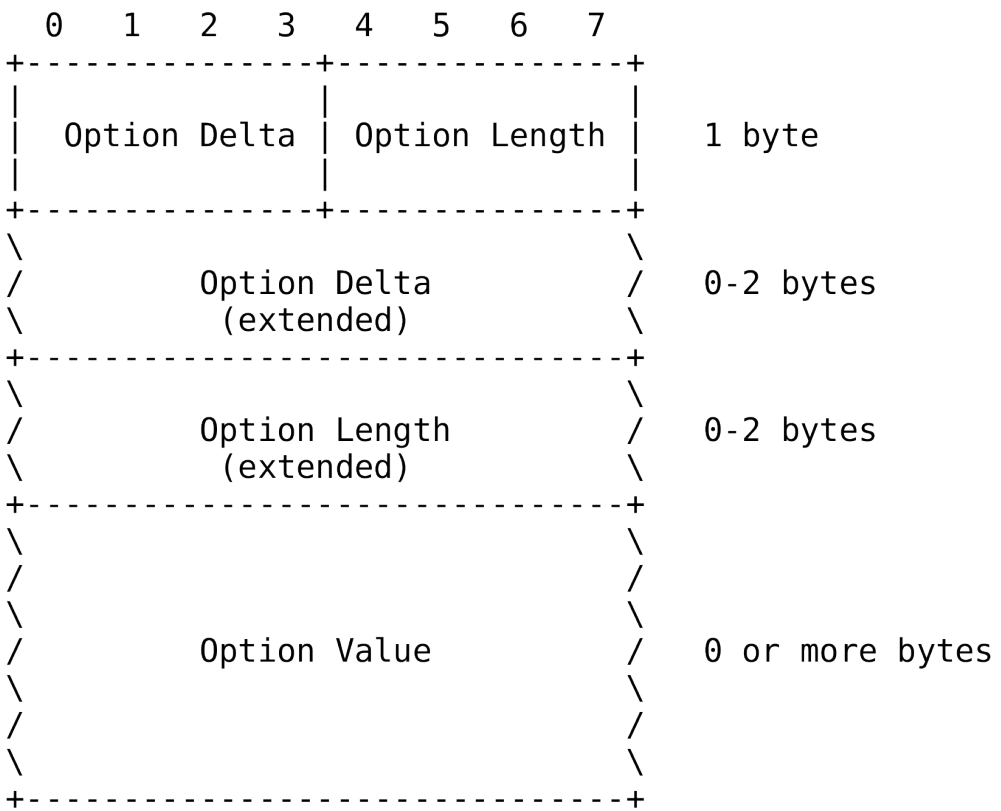
Implementations

- `http://coap.technology/impls.html`

Message Format



Option Format



Demo!

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