DNS over CoAP (DoC)

draft-lenders-dns-over-coap
(https://datatracker.ietf.org/doc/draft-lenders-dns-over-coap/)

Martine S. Lenders, Christian Amsüss, Cenk Gündoğan,
Thomas C. Schmidt, Matthias Wählisch

IETF 114 CoRE Meeting, 2022-07-26

Outline

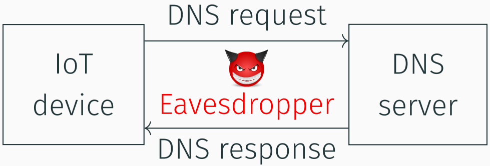
Introduction

Changes since `interim-2022-core-06`

DNS Push and CoAP Observe

Motivation

Attack Scenario



Countermeasure: Encrypt name resolution triggered by IoT devices

Our proposal: DNS over CoAP

- **Encrypted communication** based on DTLS or OSCORE

Additional advantages:

- **Block-wise message transfer** to overcome Path MTU problem
- **Share system resources** with CoAP applications
  - Same socket and buffers can be used
  - Re-use of the CoAP retransmission mechanism

Changes: Reduce Restatements of CoAP behavior

- Be more precise when Confirmable (CON) messages SHOULD be used
- Clean-up paragraph on error handling
- – Removed block-wise recommendations
- – Removed sentence that stated that FETCH is sent to server URI
- – Removed considerations on proxies

Caching:

- + Provide algorithm on CoAP Max-Age vs DNS TTL mitigation
- – Remove ETag considerations

Changes: Done TBDs

+ Recommend OSCORE usage

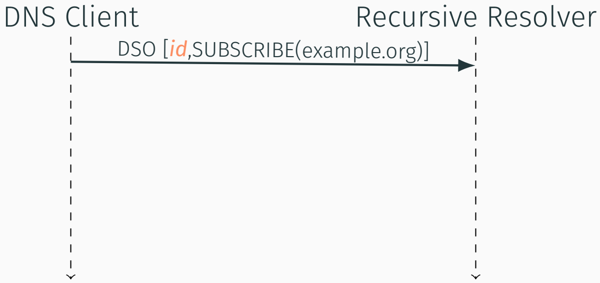
+ Draft out Observe usage (needs work, see next slides)

– Remove TBD for GH Issue #4; Draft on compressed Content-Format planned

Still TBD: IANA Considerations, pick ID for “application/dns-message” Content-Format

Primer on DNS Push Notifications (RFC 8765)

- Based on DNS Stateful Operations (DSOs, RFC 8490)
- Orthogonal to classic QUERY/RESPONSE paradigm



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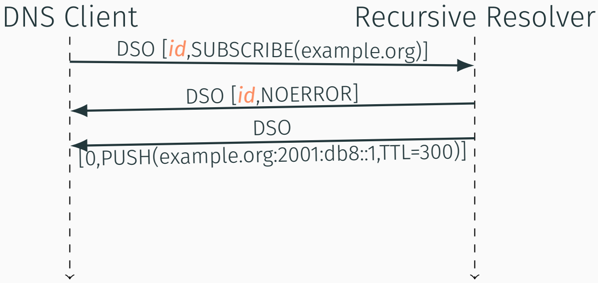
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Recursive Resolver
DSO [*id*,SUBSCRIBE(example.org)]
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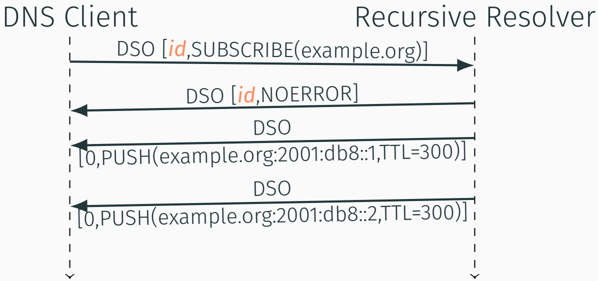
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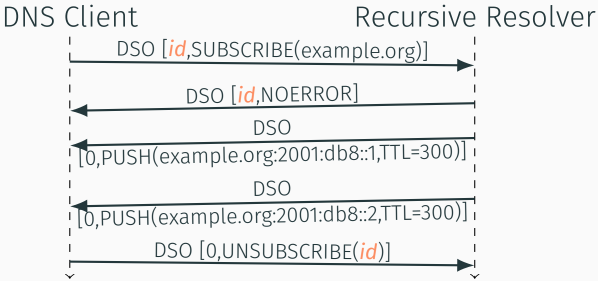

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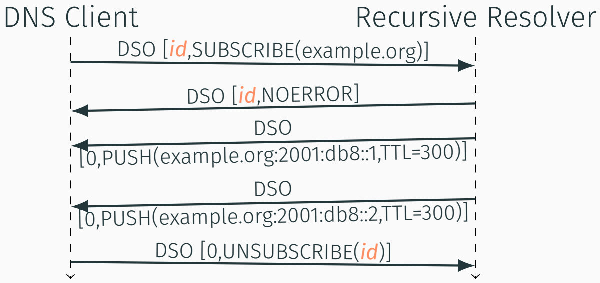
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Requires DNS over TLS and additional state information at client

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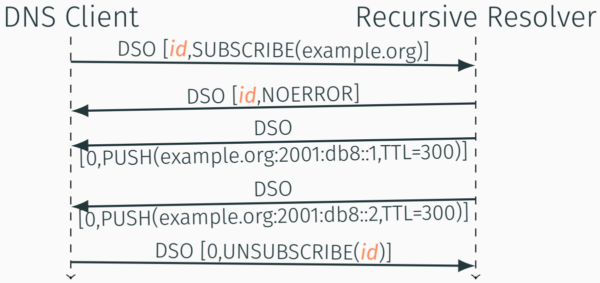
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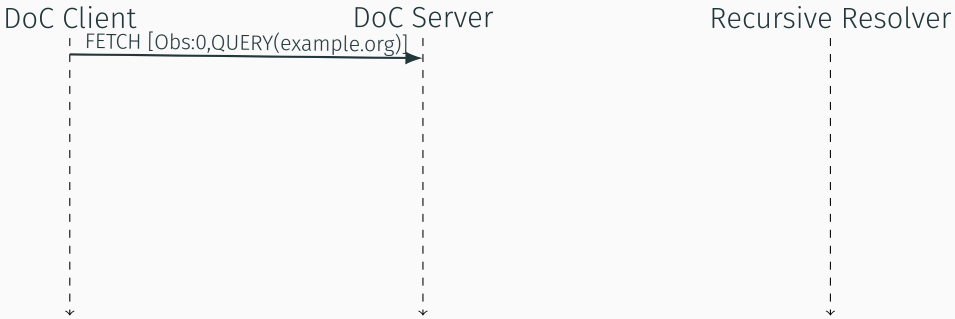
Requires DNS over TLS and additional state information at client

⇒ Use CoAP Observe as signal to use SUBSCRIBE instead of QUERY at DoC Server

Proposal: CoAP Observe for DNS Push Subscriptions



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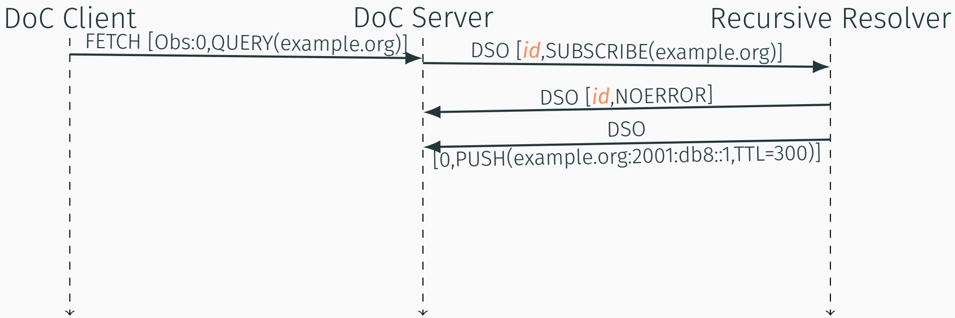
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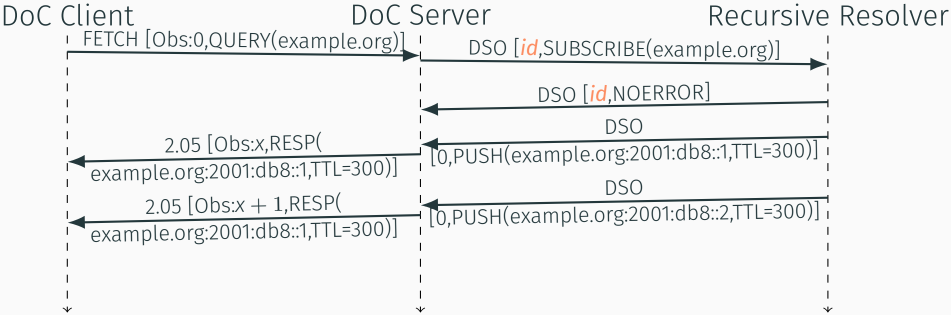
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2.05 [Obs:x,RESP(
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DSO
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2.05 [Obs:x + 1,RESP(
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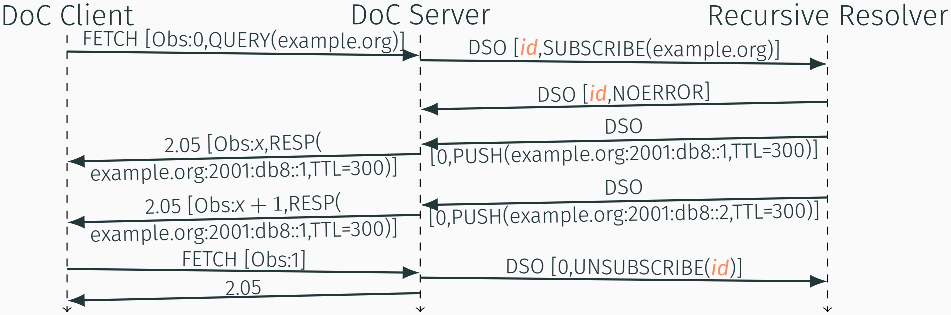
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DSO
[0,PUSH(example.org:2001:db8::2,TTL=300)]
2.05 [Obs:x + 1,RESP(
example.org:2001:db8::1,TTL=300)]
FETCH [Obs:1]
DSO [0,UNSUBSCRIBE(*id*)]
2.05

Use Case Example: Subscribe to list of services using DNS-SD (Subscribe)

```
FETCH coap://[2001:db8::1]/dns
Observe: 0
---
QUERY ID: 0
Questions:
- qname=_coap._udp.local,qtype=PTR,qclass=IN
```

Use Case Example: Subscribe to list of services using DNS-SD (Push)

```
2.05 Content
Observe: 2060
Max-Age: 3600
---
RESPONSE ID: 0
Questions:
- qname=_coap._udp.local,qtype=PTR,qclass=IN
Answers:
- name=0xc00c(_coap._udp.local),type=PTR,class=IN,ttl=3600,
  rdata=_dns._coap._udp.local
- name=0xc00c(_coap._udp.local),type=PTR,class=IN,ttl=3600,
  rdata=_lamp1.coap._udp.local
```