CoAP Protocol Negotiation

draft-silverajan-core-coap-protocol-negotiation

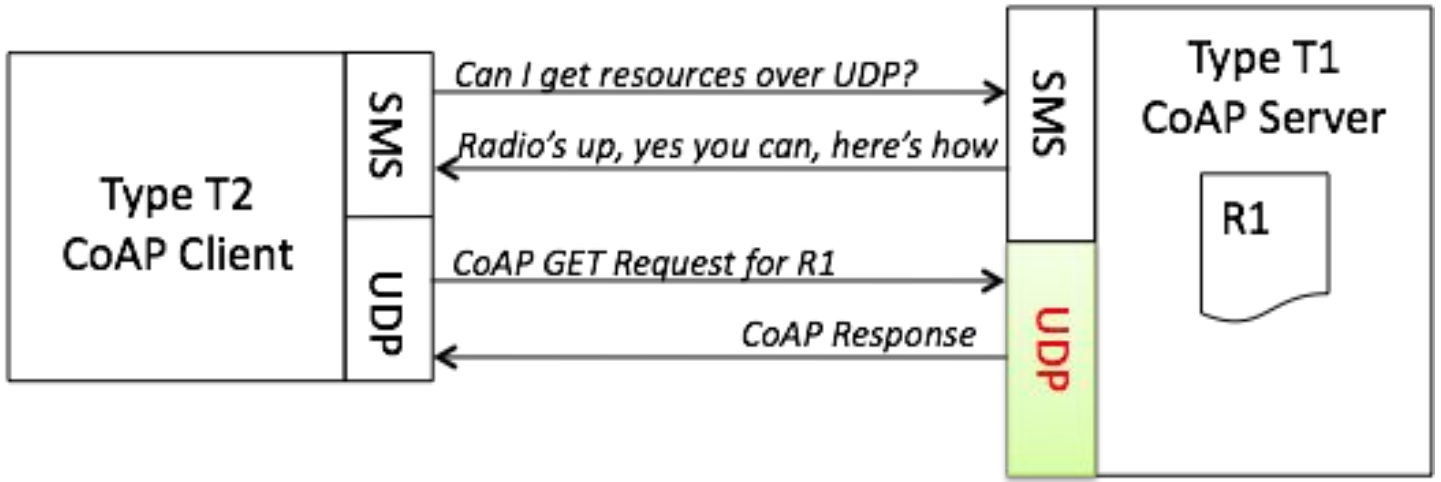
Bill Silverajan TUT
Mert Ocak Ericsson

Background

- Currently at draft version -07
- Aimed at CoAP nodes that have multiple transports, and wish to allow CoAP requests and responses over some or all these transports
- Allows clients to directly query origin servers for available transports and communicate using an alternative transport
- Draft supports both per-server and per-resource models

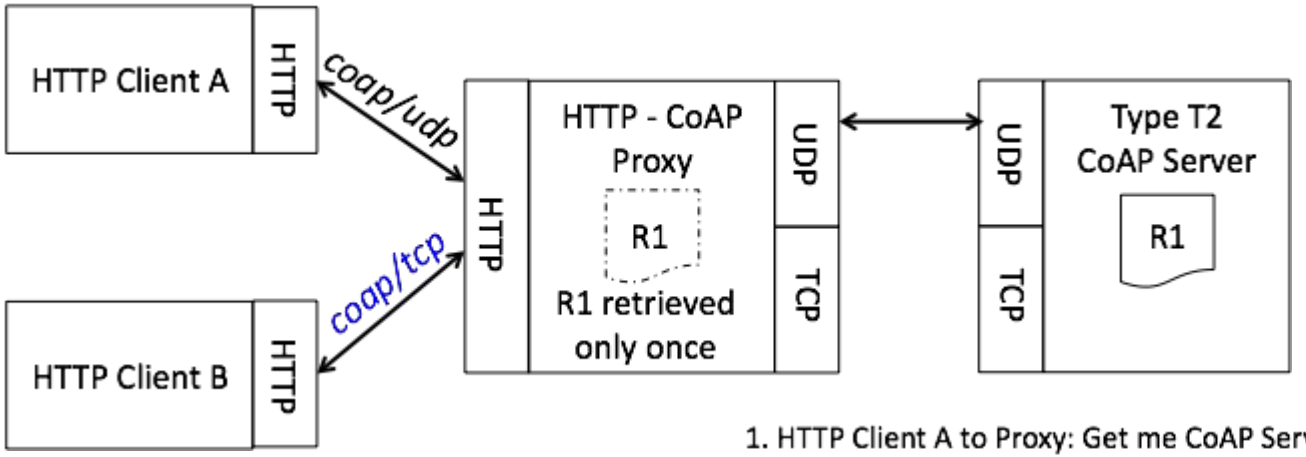
Aim: Allow Discovery

CoAP clients to discover active transports on an origin server



Aim: Better caching

Express same/related resource in alternate transports and locations



1. HTTP Client A to Proxy: Get me CoAP Server resource R1 over UDP
2. Proxy gets R1 from CoAP Server over UDP
3. HTTP Client B to Proxy: Get me CoAP Server resource R1 over TCP
4. Proxy to CoAP Server over UDP: Is it the same resource over TCP?
5. CoAP Server to Proxy over UDP: Yes, it is
6. Proxy Server returns cached R1 to HTTP Client B

CoRE Resource Directory Extensions

- When a CoRE Resource Directory is present, origin servers can also register transport availability to RD for clients to query
- Extend the Resource Directory's Registration and Update Interfaces
  - New optional 'at' RD parameter
- Extend the Resource Directory's Lookup Interface
  - New optional 'tt' RD parameter

CoRE RD parameter: *at*

Name	Query	Validity	Description
CoAP Transport URI List	at	URI	Comma separated list of URIs (scheme, address, port, and path) available at the server

```
Req: POST coap:/rd.example.com/rd?ep=node1&
          at=coap+tcp://server.example.com
 Content-Format: 40
 Payload:
 </sensors/temp>;ct=41;rt="temperature-f"; if="sensor",
 </sensors/door>;ct=41;rt="door";if="sensor"

 Res: 2.01 Created
 Location: /rd/4521
```

CoRE RD parameter: *tt*

Name	Query	Validity	Description
CoAP Transport Type	tt		Transport type requested by the client

Req: GET /rd-lookup/ep?ep=node5&tt=*

Res: 2.05 Content
<coap+tcp://[FDFD::123]:61616>;ep="node5",
<coap+ws://[FDFD::123]:61616>;ep="node5"

Using CoRE RD: Advantages

- RD provides well-defined interfaces with easy way to extend functionality
- Consistent API: Registrations and Updates managed by origin servers based on lifetime values
- Group function set provides new possibilities
- Support for commissioning tools (via ‘con’)
- RD also supports HTTP

CoAP Protocol and CoRE Link Extensions

- CoAP Option called *Alternative-Transport*
  - This enables clients to query for one or more available transports at an origin server for interacting with all resources
  - Functional equivalence to using *at* and *tt* RD parameters
- CoRE Link attribute called *OL* (for “Other Locations”)
  - This enables an origin server to expose alternative transports on a per-resource basis

CoAP Option: *Alternative-Transport*

- Used bidirectionally between client and origin server
- Flexible means to discover multiple transports

No.	C	U	N	R	Name	Format	Length	Default
66		x	-	x	Alternative-Transport	string	0-1034	(none)

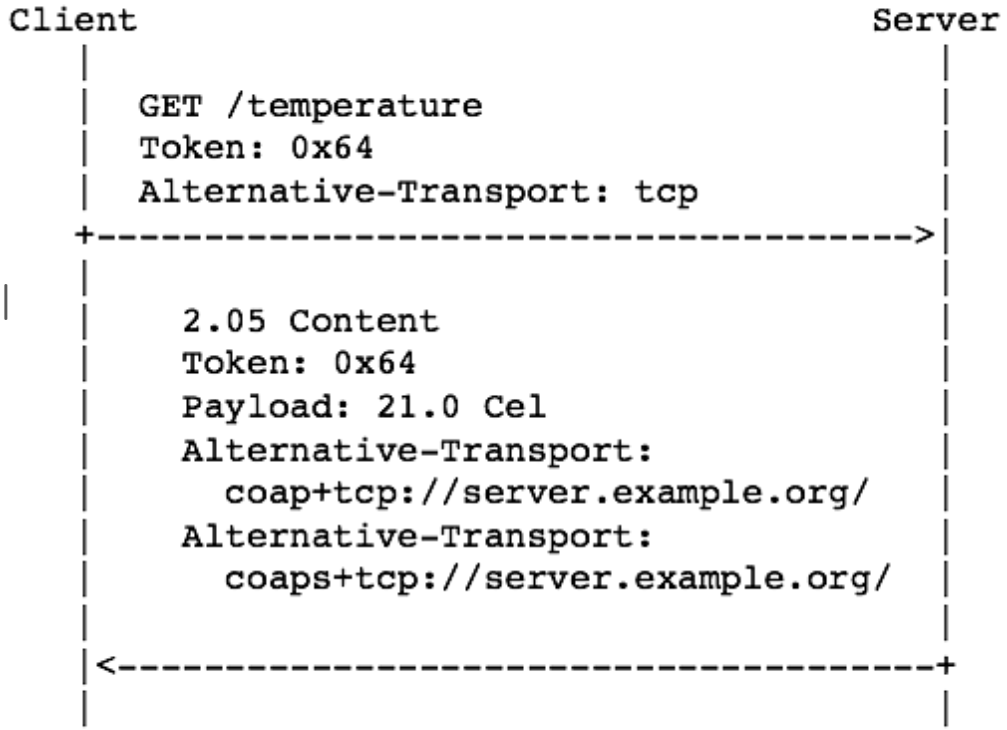
C=Critical, U=Unsafe, N=No-Cache-Key, R=Repeatable

CoRE Link Attribute: *OL*

- CoRE link attribute which describes the alternate transports or alternate locations per resource
- Specified as a list of base URIs for each resource

Example usage: *Alternative-Transport* Option

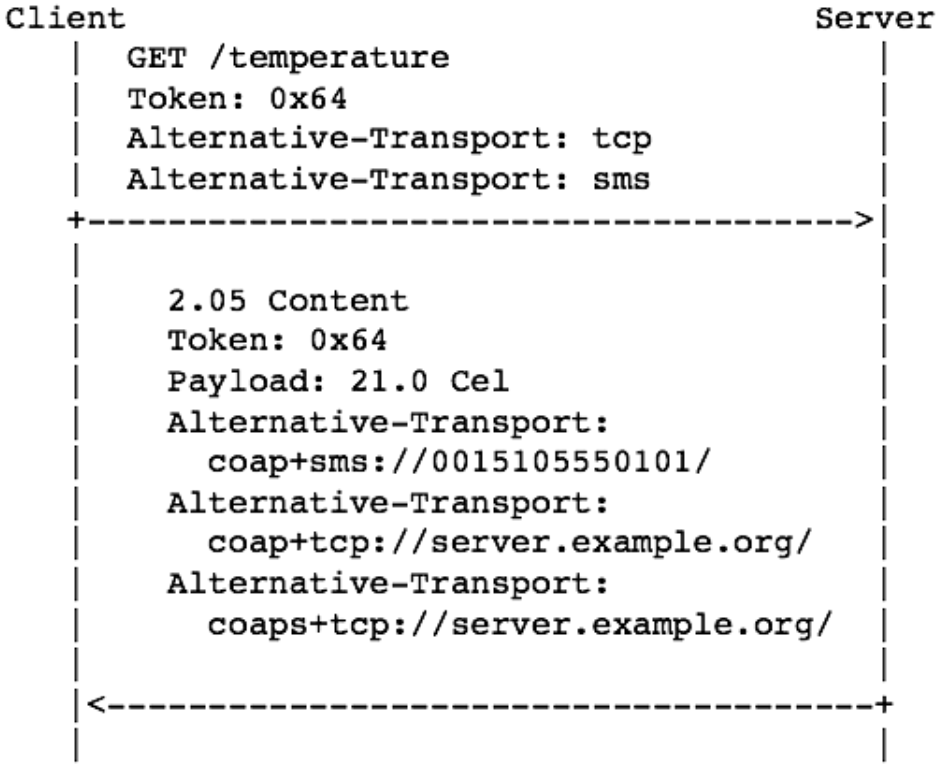
- Client requests for TCP-based transports
- Server responds by returning matching base URIs for CoAP (TCP as well as TLS)



draft-silverajan-core-coap-transport-negotiation-07

Example usage: *Alternative-Transport* Option

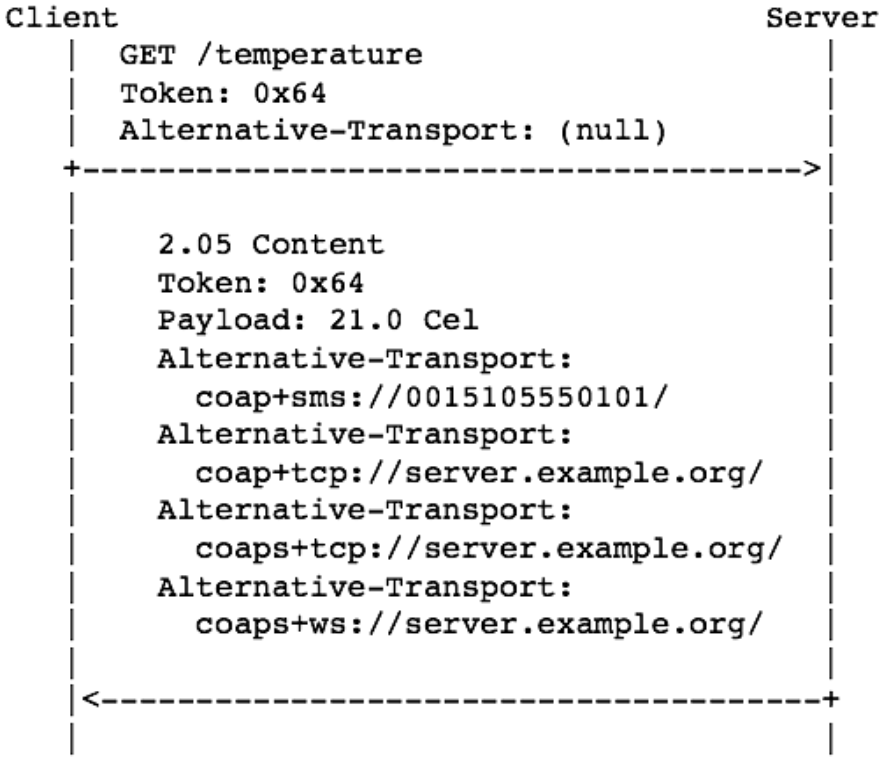
- Client requests for TCP-based transports
- Server responds by returning matching base URIs for CoAP (SMS, TCP as well as TLS)



draft-silverajan-core-coap-transport-negotiation-07

Example usage: *Alternative-Transport* Option

- Client requests for all alternative transports supported by server
- Server responds by returning all base URIs for CoAP



Example usage: *OL* Link Attribute

Using /.well-known/core

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

 RES: 2.05 Content
 </sensors/temp>;ct=41;rt="temperature-f";if="sensor",
 </sensors/door>;ct=41;rt="door";if="sensor",
 </sensors/light>;if="sensor"; ol="http://[FDFD::123]:61616,
   coap://server2.example.com"
```

Example usage: *OL* Link Attribute

Using CoRE Resource Directory

```
Req: POST coap:/rd.example.com/rd
  ?ep=node1&at=coap+tcp://server.example.com,coap+ws://server.example.com:5683/ws/
 Content-Format: 40
 Payload:
 </sensors/temp>;ct=41;rt="temperature-f";if="sensor",
 </sensors/door>;ct=41;rt="door";if="sensor",
 </sensors/light>;if="sensor"; ol="http://[FDFD::123]:61616,
   coap://server2.example.com"

 Res: 2.01 Created
 Location: /rd/4521
```

All resources available on alternate locations

Specific resource available on alternate locations

Using *Alternative-Transport* and *OL*

- *Alternative-Transport* Option is useful when the origin server wishes to expose multiple transports independently of specific resources based on a per-server model
- *OL* link attribute is useful to make some resources or resource locations transport-specific for specific scenarios (similar to OCF's "eps" link attribute)
- It's obviously possible to use both simultaneously