oneM2M Protocol

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Outline

- Core Protocol
- Protocol Binding

Core Protocol

Core Protocol

- XML (Extensible Markup Language) Serialization
  - oneM2M provides XSD (XML Schema Definition) for primitive validation

```
<?xml version="1.0" encoding="UTF-8"?>
<m2m:rqp xmlns:m2m="http://www.oneM2M.org/xml/protocols">
    <op>1</op>
    <to>/mn-cse/home_gateway/light_ae1/light</to>
    <fr>/mn-cse/Clight_ae1</fr>
    <rqi>mncse/24345</rqi>
    <ty>4</ty>
    <rcn>0</rcn>
    <pc>
        <m2m:cin>
            <con>OFF</con>
            <cnf>text/plain:0</cnf>
        </m2m:cin>
    </pc>
</m2m:rsp>
```

Core Protocol

- JSON (Javascript Simple Object Notation) Serialization
  - less verbose and lighter than XML

```
{
"op": "1",
"to": "/mn-cse/home_gateway/light_ae1/light",
"fr": "/mn-cse/Clight_ae1",
"rqi": "mncse/24345",
"ty": 4,
"rcn": 0,
"m2m:cin":
{
  "con": "OFF",
  "cnf": "text/plains:0"
  }
}
```

Core Protocol

- CBOR (Concise Binary Object Representation) Serialization
  - JSON binary compression for lightweight payload

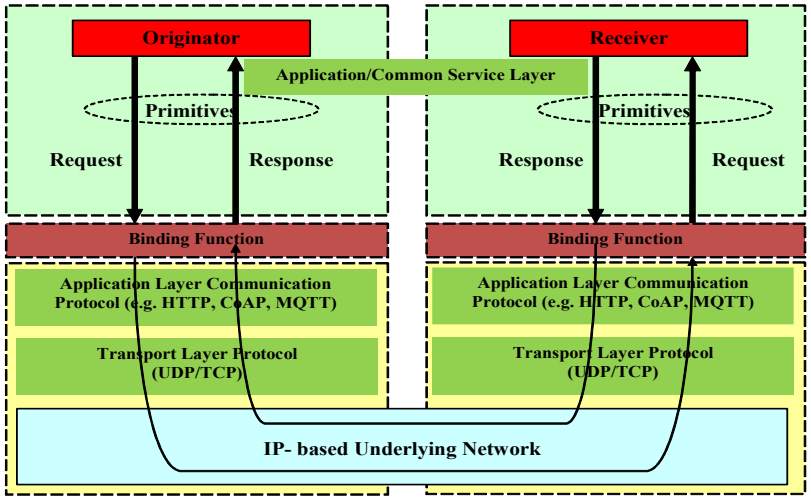
{"op":1,"to":"//example.net/mncse1234","rqi":"A1000",
"rcn":7,"pc":{"m2m:ae":{"rn":"SmartHomeApplication", "api":"Na56", "apn":"app1234"}},"ty":2}

JSON to CBOR

a6427063a1466d326d3a6165a342726e54536d617274486f6d654170706c69636174696f6e436170694
44e6135364361706e476170703132333442747902427 46f572f2f6578616d706c652e6e65742f6d6e637
365313233344372636e07426f700143727169454131303030

Core Protocol

- Core Protocol and Bindings
  - oneM2M primitives are carried over HTTP/CoAP/MQTT/WebSocket protocols
  - primitive parameters are mapped to binding message existing/new headers and body, vice versa
  - there are some binding protocol specific handlings



Communication model using Request and Response primitives

Protocol Binding

Protocol Binding

- Binding Protocols
  - HTTP, CoAP and MQTT from Rel-1
  - WebSocket from Rel-2

	Server/Client	Publish/Subscribe
TCP	HTTP, WebSocket	MQTT
UDP	CoAP	-

Protocol Binding

- HTTP Binding
  - The Content parameter is carried in the body part
  - The other parameters are carried in the header part

HTTP Request:

```
POST /~/mn-cse/home_gateway/light_ae1/light?rcn=0 HTTP/1.1
Host: http://mn.provider.com:8080
X-M2M-Origin: /mn-cse/Clight_ae1
Content-Type: application/vnd.oneM2M-res+xml;ty=4
X-M2M-RI: mncse/24345

<m2m:cin xmlns:m2m="http://www.oneM2M.org/xml/protocols">
<con>OFF</con>
<cnf>text/plain:0</cnf>
</m2m:cin>
```

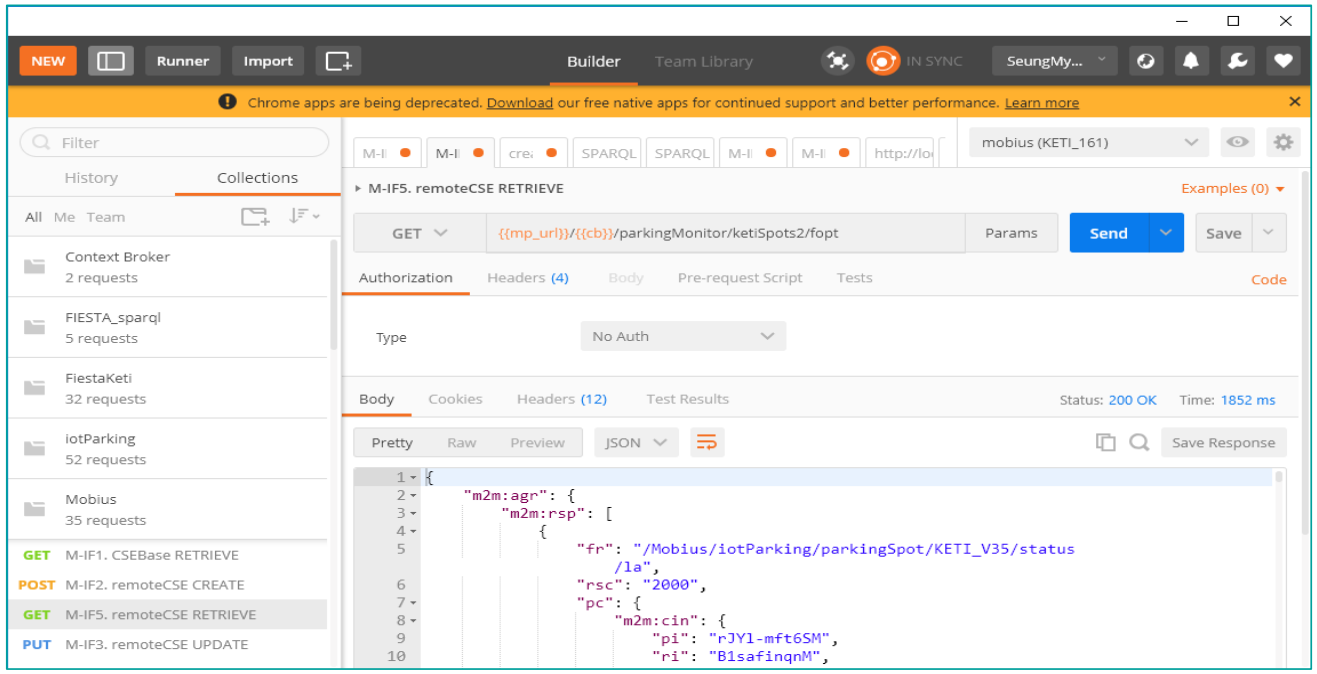
HTTP Response:

```
201 Created
X-M2M-RSC: 2001
X-M2M-RI: mncse/24345
Content-Location: /mn-cse/cin-394798749
Content-Type: application/vnd.oneM2M-res+xml
```

oneM2M Parameter	HTTP Header/component
To	path component
From	X-M2M-Origin
Operation	Method
Filter Criteria	query component
Response Status Code	Status-Code
pointOfAddress (attribute)	Host
Resource Type	Content-Type
Request Identifier	X-M2M-RI
notificationURI (element) of ***Response Type***	X-M2M-RTU
Response Status Code	X-M2M-RSC
Content	Message-Body

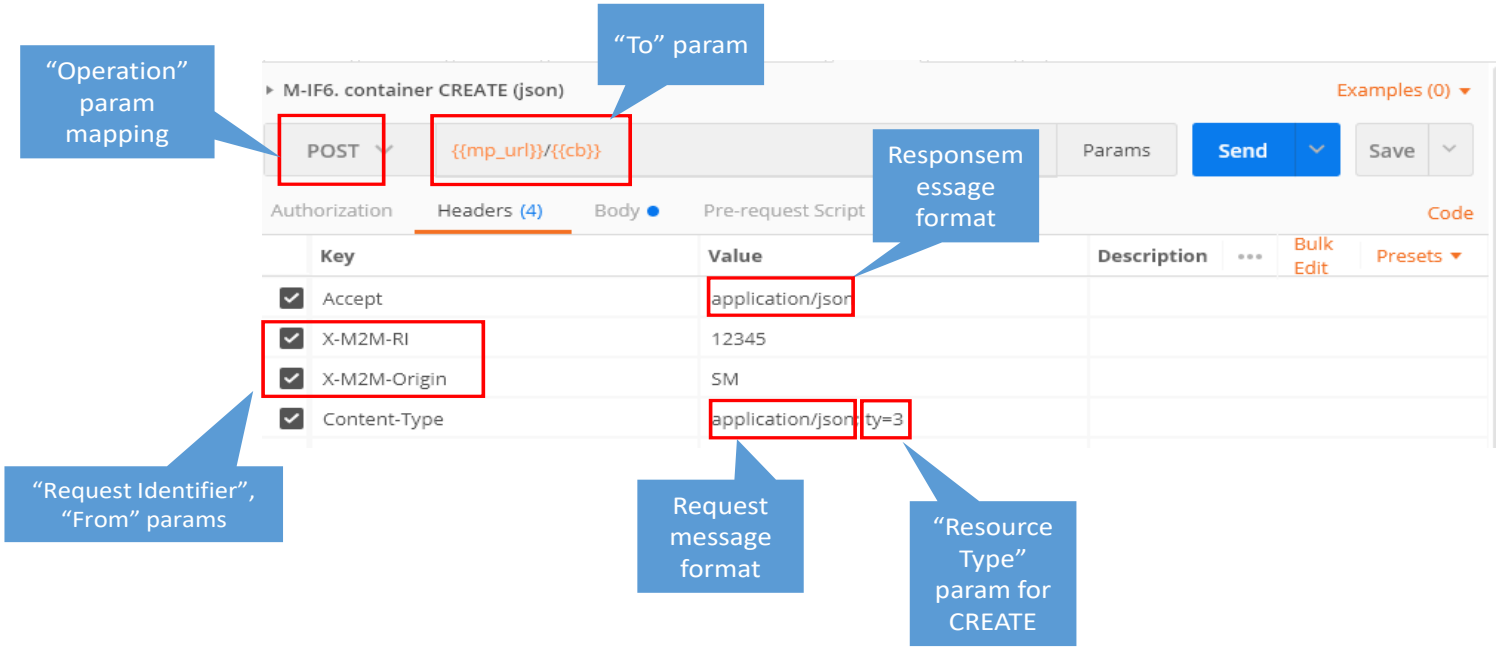
Protocol Binding

- Postman is the Chrome extension
  - Send a HTTP Request with Request-line, Headers, Body
  - And receives HTTP Response



Protocol Binding

- Postman Configurations for oneM2M APIs
  - oneM2M request parameters are mapped to HTTP request-line, headers, body
  - Postman provides GUI for HTTP message generation



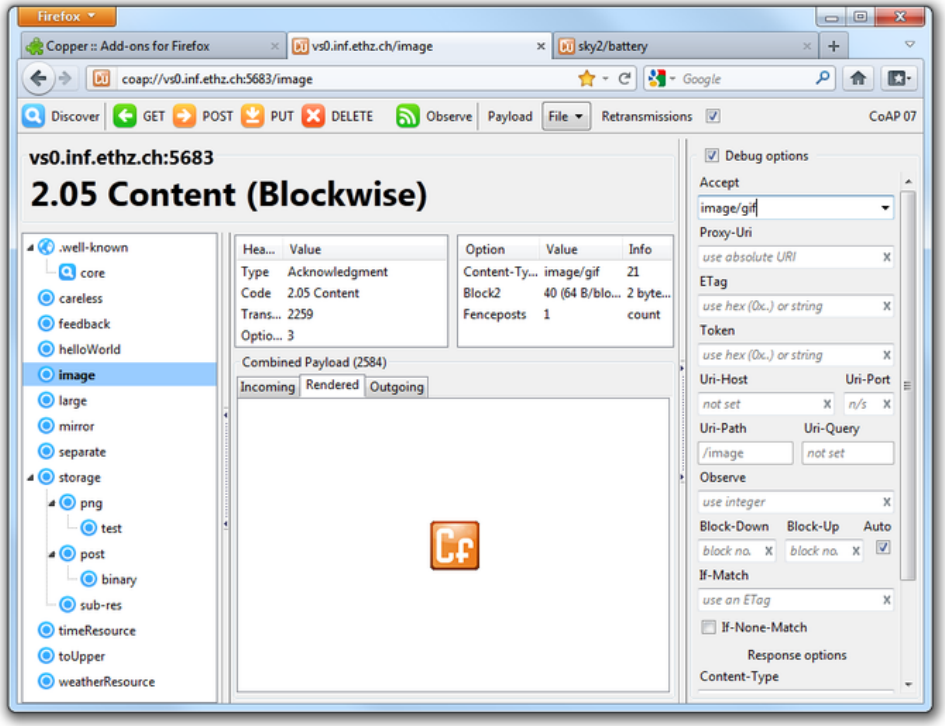
Protocol Binding

- CoAP binding
  - Similar to HTTP binding except the URI length constraint

oneM2M Parameter	CoAP Options
To	URI-Path
From	oneM2M-FR
Operation	Method
Filter Criteria	Uri-Query
Response Status Code	Response Code
pointOfAddress (attribute)	Uri-Host, Uri-Port
Resource Type	oneM2M-TY
Request Identifier	oneM2M-RQI
Response Type	Uri-Query
Response Status Code	oneM2M-RSC
Content	*payload*

Protocol Binding

- Copper is the Firefox add-on
  - Send a CoAP request and receives a response



Protocol Binding

- MQTT Binding
  - MQTT has no header concept
    - The whole request/response primitive representation in XML or JSON is carried in the message body
  - However, some parameters are carried in a MQTT topic
    - E.g. “/oneM2M/req/<originator>/<receiver>”
  - MQTT topics
    - Registration topic using credential
    - Request/response topics using Originator ID and Receiver ID
    - To parameter, which is the target resource address, is carried in the body, while the Receiver’s entity ID is included in the topics

Protocol Binding

- MQTT lens is the Chrome extension
  - There are more MQTT clients