

OCF 2.3 – Clarify batch interface – CTWG CR 2649

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7.6.3.4 Batch Interface

7.6.3.4.1 Overview

The batch Interface is used to interact with a collection of Resources using a single/same Request. The batch Interface can be used to RETRIEVE or UPDATE the Properties of the linked Resources with a single request.

The batch Interface is defined as follows:

- The batch Interface name is "oic.if.b"
- A Collection Resource has linked Resources that are represented as URIs. In the "href" Property of the batch payload the URI shall be fully qualified for remote Resources and a relative reference for local Resources.
- The original request is modified to create new requests targeting each of the linked Resources in the Collection by substituting the URI in the original request with the URI of the linked Resource. The payload in the original request is replicated in the payload of the new requests.
- The requests shall be forwarded assuming use of the Default Interface of the linked Resources.
- Requests shall only be forwarded to linked Resources that are identified by relation types "item" or "hosts" ("hosts" is the default relation type value should the "rel" Link Parameter not be present). Requests shall not be forwarded to linked Resources that do not contain the "item" or "hosts" relation type values.
- Properties of the Collection Resource itself may be included in payloads using "oic.if.b" Interface by exposing a single Link with the link relation "self" along with "item" within the Collection, and ensuring that Link resolution cannot become an infinite loop due to recursive references. For example, if the Default Interface of the Collection is "oic.if.b", then the Server might recursively include its batch representation within its batch representation, in an endless loop. See 7.6.3.4.2 for an example of use of a Link containing "rel": ["self","item"] to include Properties of the Collection Resource, along with linked Resources, in "oic.if.b" payloads.
- If the Default Interface of a Collection Resource is exposed using the Link relation "self", and the Default Interface contains Properties that expose any Links, those Properties shall not be included in a batch representation which includes the "self" Link.
- Any request forwarded to a linked Resource that is a Collection (including a "self" Link reference) shall have the Default Interface of the linked Collection Resource applied.
- All the responses from the linked Resources shall be aggregated into a single Response to the Client. The Server may timeout the response to a time window, the Server may choose any appropriate window based on conditions.
- If a linked Resource cannot process the request, an empty response, i.e. a JSON object with no content ("{}") as the representation for the "rep" Property, or error response should the linked Resource Type provide an error schema or diagnostic payload, shall be returned by the linked Resource. These empty or error responses for all linked Resources that exhibit an error shall be included in the aggregated response to the original Client request. See the example in section 7.6.3.4.2.
- If any of the linked Resources returns an error response, the aggregated response sent to the Client shall also indicate an error (e.g. 4.xx in CoAP). If all of the linked Resources return successful responses, the aggregated response shall include the success response code.

- The aggregated response shall be an array of objects representing the responses from each linked Resource. Each object in the response shall include at least two items: (1) the URI of the linked Resource (fully qualified for remote Resources, or a relative reference for local Resources) as "href": <URI> and (2) the individual response object or array of objects if the linked Resource is itself a Collection using "rep" as the key, e.g. "rep": { < representation of individual response > }.
- If the Collection Resource is marked as Observable, linked Resources referenced in the Collection may be observed using the batch Interface. If the Collection Resource is not marked as Observable then the Collection cannot be observed and Observe requests to the Collection are rejected. The observe mechanism shall work as defined in 11.4.2 with the observe request forwarded to each of the linked Resources. All responses to the request shall be aggregated into a single response to the Client using the same representations and status codes as for RETRIEVE operations using the batch Interface.
- Should any one of the observable linked Resources fail to honour the observe request the response to the batch observe request shall also indicate that the entire request was not honoured using the mechanism described in section 11.4.2.3.
- If any of the Observable Resources in a request to a Collection using the batch Interface replies with an error or Observe Cancel, the Observations of all other linked Resources shall be cancelled and the error or Observe Cancel status shall be returned to the Observing Client.

Note: Behavior may be different for Links that do network requests vs. local Resources

- All notifications to the Client that initiated an observe request using the batch Interface shall use the batch representation for the Collection. This is the aggregation of any individual observe notifications received by the Device hosting the Collection from the individual observe requests that were forwarded to the linked Resources.
- Linked Resources which are not marked Observable in the Links of a Collection shall not trigger Notifications, but may be included in the response to, and subsequent Notifications resulting from, an Observe request to the batch Interface of a Collection.
- Each notification shall contain the most current values for all of the Linked Resources that would be included if the original Observe request were processed again. The Server hosting the Collection may choose to RETRIEVE all of the linked Resources each time, or may choose to employ caching to avoid retrieving linked Resources on each Notification.
- If a Linked Resource is Observable and has responded with a successful Observe response, the most recently reported value of that Resource is considered to be the most current value and may be reported in all subsequent Notifications.
- Links in the Collection should be observed by using the "oic.if.ll" Interface. A notification shall be sent any time the contents of the "oic.if.ll" Interface representation are changed; that is, if a Link is added, if a Link is removed, or if a Link is updated. Notifications on the "oic.if.ll" Interface shall contain all of the Links in the "oic.if.ll" Interface representation.
- Other Properties of the Collection Resource, if present, may be observed by using the Interfaces defined in the definition for the Resource Type, including using the "oic.if.baseline" Interface.
- The Client may choose to restrict the linked Resources to which the request is forwarded by including additional query parameters in the request. The Server should process any additional query parameters in a request that includes "oic.if.b" as selectors for linked Resources that are to be processed by the request.

- A Client shall perform UPDATE operations using the batch Interface by creating a payload that is similar to a RETRIEVE response payload from a batch Interface request. The Server shall send a separate UPDATE request to each of the linked Resources according to each "href" Property and the corresponding value of the "rep" Property.
- If the "href" value is empty, denoted by a zero length string or "" in JSON, the "rep" Property shall be applied to linked Resources in the Collection.
- Items with the empty "href" and link-specific "href" shall not be mixed in the same UPDATE request.
- All of the Properties in the UPDATE request may not be supported by the linked Resource. In such cases, writable Properties in the UPDATE request that are supported by the linked Resource shall be modified and Properties that are not supported shall be silently ignored.
- The UPDATE response shall contain the updated values using the same payload schema as RETRIEVE operations if provided by the linked Resource, along with the appropriate status code. The aggregated response payload shall reflect the known state of the updated Properties after the batch update was completed. If no payload is provided by the updated Resource then an empty response (i.e. "rep": {}) shall be provided for that Resource.
- A Collection shall not support the use of the UPDATE operation to add, modify or remove Links in an existing Collection using the "oic.if.baseline" or "oic.if.rw" or "oic.if.a" Interfaces.

7.6.3.4.2 Examples: Batch Interface

Note that the examples provided are illustrative and do not include all mandatory schema elements in all cases. It is assumed that the Default Interface for the Resource Type "x.org.example.rt.room" is specified in its Resource Type definition file as "oic.if.rw", which exposes the Properties "x.org.example.colour" and "x.org.example.size".

Resources	<pre> /a/room/1 { "rt": "x.org.example.rt.room"], "if": ["oic.if.rw", "oic.if.baseline", "oic.if.b", "oic.if.ll"], "x.org.example.colour": "blue", "x.org.example.dimension": "15bx15wx10h", "links": [{ "href": "/a/room/1", "rel": ["self", "item"], "rt": ["x.org.example.rt.room"], "if": ["oic.if.rw", "oic.if.baseline", "oic.if.b", "oic.if.ll"], "p": {"bm": 2} }, { "href": "/the/light/1", "rel": ["item"], "rt": ["oic.r.switch.binary"], "if": ["oic.if.a", "oic.if.baseline"], "ins": "11111", "p": {"bm": 2} }, </pre>
-----------	---



	<pre> {"href": "/the/light/2", "rel": ["item"], "rt": ["oic.r.switch.binary"], "if": ["oic.if.a", "oic.if.baseline"], "ins": "22222", "p": {"bm": 2} }, {"href": "/my/fan/1", "rel": ["item"], "rt": ["oic.r.switch.binary"], "if": ["oic.if.a", "oic.if.baseline"], "ins": "33333", "p": {"bm": 2} }, {"href": "/his/fan/2", "rel": ["item"], "rt": ["oic.r.switch.binary"], "if": ["oic.if.a", "oic.if.baseline"], "ins": "44444", "p": {"bm": 2} }, {"href": "/the/switches/1", "rel": ["item"], "rt": ["oic.wk.col"], "if":["oic.if.ll", "oic.if.b", "oic.if.baseline"], "ins": "55555", "p": {"bm": 2} }] } /the/light/1 { "rt": ["oic.r.switch.binary"], "if": ["oic.if.a", "oic.if.baseline"], "value": false } /the/light/2 { "rt": ["oic.r.switch.binary"], "if": ["oic.if.a", "oic.if.baseline"], "value": true } /my/fan/1 {</pre>
--	--



```
"rt": ["oic.r.switch.binary"],
"if": ["oic.if.a", "oic.if.baseline"],
"value": true
}

/his/fan/2
{
  "rt": ["oic.r.switch.binary"],
  "if": ["oic.if.a", "oic.if.baseline"],
  "value": false
}

/the/switches/1
{
  "rt": ["oic.wk.col"],
  "if": ["oic.if.ll", "oic.if.b", "oic.if.baseline"],
  "links": [
    {
      "href": "/switch-1a",
      "rt": ["oic.r.switch.binary"],
      "if": ["oic.if.a", "oic.if.baseline"],
      "p": {"bm": 2}
    }
    {
      "href": "/switch-1b",
      "rt": ["oic.r.switch.binary"],
      "if": ["oic.if.a", "oic.if.baseline"],
      "p": {"bm": 2 }
    }
  ]
}
```



	<pre>}] }</pre>
Use of batch, successful response	<p>Request: GET /a/room/1?if=oic.if.b</p> <p>Becomes the following individual request messages issued by the Device in the Client role</p> <p>GET /a/room/1 (NOTE: uses the Default Interface as specified for the Collection Resource, in this example oic.if.rw)</p> <p>GET /the/light/1 (NOTE: Uses the Default Interface as specified for this resource)</p> <p>GET /the/light/2 (NOTE: Uses the Default Interface as specified for this resource)</p> <p>GET /my/fan/1 (NOTE: Uses the Default Interface as specified for this resource)</p> <p>GET /his/fan/2 (NOTE: Uses the Default Interface as specified for this resource)</p> <p>GET /the/switches/1 (NOTE: Uses the default Interface for the Collection that is within the Collection)</p> <p>Response:</p> <pre>[{ "href": "/a/room/1", "rep": {"x.org.example.colour": "blue", "x.org.example.dimension": "15bx15wx10h"} }, { "href": "/the/light/1", "rep": {"value": false} }, { "href": "/the/light/2",</pre>



```
"rep": {"value": true}
},
{
  "href": "/my/fan/1",
  "rep": {"value": true}
},
{
  "href": "/his/fan/2",
  "rep": {"value": false}
},
{
  "href": "/the/switches/1",
  "rep": [{
    "href": "/switch-1a",
    "rt": ["oic.r.switch.binary"],
    "if": ["oic.if.a", "oic.if.baseline"],
    "p": {"bm": 2},
    "eps": [
      {"ep": "coaps://[2001:db8:a::b1d4]:55555"}
    ]
  },
  {
    "href": "/switch-1b",
    "rt": ["oic.r.switch.binary"],
    "if": ["oic.if.a", "oic.if.baseline"],
    "p": {"bm": 2 },
    "eps": [
      {"ep": "coaps://[2001:db8:a::b1d4]:55555"}
    ]
  }
]
```



	<pre> }] }]</pre>
Use of batch, error response	<p>Should any of the RETRIEVE requests in the previous example fail then the response includes an empty payload for that Resource instance and an error code is sent. The example below assumes errors from "/my/fan/1" and "/the/switches/1"</p> <p>Error Response:</p> <pre>[{ "href": "/a/room/1", "rep": {"x.org.example.colour": "blue", "x.org.example.dimension": "15bx15wx10h"} }, { "href": "/the/light/1", "rep": {"value": false} }, { "href": "/the/light/2", "rep": {"value": true} }, { "href": "/my/fan/1", "rep": {} }, { "href": "/his/fan/2",</pre>



	<pre> "rep": {"value": false} }, { "href": "/the/switches/1", "rep": {} }]</pre>
<p>Use of batch</p> <p>(UPDATE has POST semantics)</p>	<pre>UPDATE /a/room/1?if=oic.if.b [{ "href": "", "rep": { "value": false } }]</pre> <p>Since the "href" value in the UPDATE request is empty, the request is forwarded to all Resources in the Collection and becomes:</p> <pre>UPDATE /a/room/1 { "value": false } UPDATE /the/light/1 { "value": false } UPDATE /the/light/2 { "value": false } UPDATE /my/fan/1 { "value": false } UPDATE /his/fan/2 { "value": false } UPDATE /the/switches/1 { "value": false }</pre> <p>Response:</p> <pre>[{ "href": "/the/light/1", "rep": {"value": false} }, { "href": "/the/light/2", "rep": {"value": false} }, {</pre>



	<pre>"href": "/my/fan/1", "rep": {"value": false} }, { "href": "/his/fan/2", "rep": {"value": false} }, { "href": "/the/switches/1", "rep": { } } }] .</pre> <p>Since /a/room/1 does not have a "value" Property exposed by its Default Interface, the UPDATE request will be silently ignored and it will not be included in the UPDATE response.</p> <p>Since the UPDATE request with the link list interface is not allowed, an empty payload for the /the/switches/1 is included in the UPDATE response and an error code is sent.</p>
<p>Use of batch (UPDATE has POST semantics)</p>	<pre>UPDATE /a/room/1?if=oic.if.b [{ "href": "/the/light/1", "rep": { "value": false } }, { "href": "/the/light/2", "rep": { "value": true } }, { "href": "/a/room/1", "rep": { "x.org.example.colour": "red" } }]</pre>



```
}  
]
```

This turns /the/light/1 off, turns /the/light/2 on, and sets the colour of /a/room/1 to "red".

The response will be same as response for GET /a/room/1?if=oic.if.b with the updated Property values as shown below.

```
[  
  
{  
  
  "href": "/a/room/1",  
  
  "rep": {"x.org.example.colour": "red",  
         "x.org.example.dimension": "15bx15wx10h"}  
  
},  
  
{  
  
  "href": "/the/light/1",  
  
  "rep": {"value": false}  
  
},  
  
{  
  
  "href": "/the/light/2",  
  
  "rep": {"value": true}  
  
}  
  
]
```

Example use of additional query parameters to select items by matching Link Parameters.

Turn on light 1 based on the "ins" Link Parameters value of "11111"

```
UPDATE /a/room/1?if=oic.if.b&ins=11111  
[  
  {  
    "href": "",  
    "rep": {  
      "value": false  
    }  
  }  
]
```



Similar to the earlier example, "href": "" applies the UPDATE request to all of the Resources in the Collection. Since the additional query parameter ins=11111 selects only links that have a matching "ins" value, only one link is selected. The payload is applied to the target Resource of that link, /the/light/1.

Retrieving the item using the same query parameter:

```
RETRIEVE /a/room/1?if=oic.if.b&ins=11111
```

Response payload:

```
[  
  {  
    "href": "/the/light/1",  
    "rep": {  
      "value": false  
    }  
  }  
]
```

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