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JSON-LD “@include” Implementation for Thing Description Lifecycle

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https://github.com/w3c/wot/blob/master/proposals/td-lifecycle/JSON-LD_Include_Implementation.pptx

TD sample in Vertical Industry (1)

Some SDOs have defined Device Object Description.

Here is Echonet Consortium's sample for "home air conditioner".

https://echonet.jp/wp/wp-content/uploads/pdf/General/Standard/Release/Release_H_en/SpecAppendixH_e.pdf

ECHONET SPECIFICATION

APPENDIX Detailed Requirements for ECHONET Device objects

Chapter3 Detailed Requirements for Device Objects

Date: February 24, 2017

Release H

ECHONET CONSORTIUM

3. 2. 1 Requirements for home air conditioner class

Class group code : 0x01

Class code : 0x30

Instance code : 0x01–0x7F (0x00: All-instance specification code)

Property name	EPC	Contents of property	Data type	Data size	Unit	Access rule	Mandatory	Announcement at status change	Remark
		Value range (decimal notation)							
Operation status	0x80	This property indicates the ON/OFF status.	unsigned char	1 byte	—	Set	○	○	
		ON=0x30, OFF=0x31				Get	○		
Operation power-saving	0x8F	Used to specify the power-saving operation mode and to acquire the current setting.	unsigned char	1 byte	—	Set/Get	○	○	
		power saving mode = 0x41 normal mode = 0x42							
Operation mode setting	0xB0	Used to specify the operation mode ("automatic," "cooling," "heating," "dehumidification," "air circulator" or "other"), and to acquire the current setting.	unsigned char	1 byte	—	Set/Get	○	○	
		The following values shall be used: Automatic: 0x41 Cooling: 0x42 Heating: 0x43 Dehumidification: 0x44 Air circulator: 0x45 Other: 0x40							
Automatic temperature	0xB1	Used to specify whether or not to use the automatic temperature control	unsigned char	1 byte	—	Set/Get			

TD sample in Vertical Industry (2)

Echonet Consortium's definition can be converted to JSON-LD format according to Things Description syntax.

http://133.242.180.86/Echonet_Aircon.jsonld

```
← → ↺ 133.242.180.86/Echonet_Aircon.jsonld
{
  "@context": {
    "xsd": "http://www.w3.org/2001/XMLSchema#",
    "td": "http://w3c.github.io/wot/w3c-wot-td-ontology.owl#",
    "sch": "http://schema.org",
    "wot": "http://w3c.github.io/wot/w3c-wot-td-context.jsonld#",
    "name": "wot:name",
    "valueType": "wot:valueType",
    "writable": "wot:writable",
    "interactions": {
      "@id": "td:hasProperty",
      "@container": "@set"
    }
  },
  "@type": "td:Thing",
  "name": "echonet",
  "interactions": [
    {
      "@type": "td:Property",
      "name": "operationStatus",
      "EPC": "80",
      "valueType": { "@type": "xsd:boolean" },
      "writable": true
    },
    {
      "@type": "td:Property",
      "name": "EchoOperationSetting",
      "EPC": "0F",
      "valueType": { "@type": "xsd:string" },
      "owl:oneOf": [
        "EchoOperation", "NORMAL"
      ],
      "writable": true
    },
    {
      "@type": "td:Property",
      "name": "operationMode",
      "EPC": "B0",
      "valueType": { "@type": "xsd:string" },
      "writable": true,
      "owl:oneOf": [
        { "@id": "echonet:AirCirculator" },
        { "@id": "echonet:Automatic" },
        { "@id": "echonet:Cooling" },
        { "@id": "echonet:Dehumidification" },
        { "@id": "echonet:Heating" },
        { "@id": "echonet:OtherMode" }
      ]
    }
  ],
  {
    "@type": "td:Property",
    "name": "AutoTemperature",
    "EPC": "B1",
    "valueType": { "@type": "xsd:string" },
    "writable": true
  }
}
```

As vertical industry, minimum set of APIs for home air conditioner could be defined, e.g. Generic Home Air Conditioner.

This description can be created

- 1) Removing needless APIs from full set of APIs.
- 2) After that, including whole original JSON-LD as follows;

http://133.242.180.86/Generic_Aircon_context.jsonld

```
"interactions":{  
  "@id":"td:hasProperty",  
  "@container":"@set",  
  "@include": {  
    "@id":"eco:interactions",
```

```
    "@remove":[  
      "UserRemoteControlTemperatureSettingValue",  
      "BlowoutTemperatureMeasurementValue",  
      "Non-priorityState",  
      "InstallationAirPurificationMethod",  
      "AirCleaningFunctionModeSetting",  
      "InstallationRefreshMethod",  
      "RefreshFunctionModeSetting",  
      "InstallationSelfCleaningMethod",  
      "SelfCleaningFunctionModeSetting",  
      "SpecialOperationModeSetting",  
      "ForcedThermalModeSetting",  
      "AirPurificationModeSetting"
```

APIs expected
to be removed

Including whole
“echo:interactions”

```
    ]  
  }  
},
```

Customized JSON-LD Playground

As PoC, Panasonic customized JSON-LD playground.

<http://133.242.180.86/master/playground/>

The screenshot shows a web browser window with the URL <http://133.242.180.86/master/playground/>. The page title is "JSON-LD Playground". Below the title, there is a description: "Play around with JSON-LD markup by typing in the playground. The playground uses the `jsonld.js` JSON-LD processor, which fully conforms to the JSON-LD Syntax and RDF specifications."

There are several tabs at the top: "Examples:", "Person", "Event", "Place", "Product", "Recipe", "Library", and "Activity". To the right of these tabs are buttons for "Permalink", "Gist", and "Shortcuts".

The main content area is divided into two sections:

- JSON-LD Input**: This section contains a text area with JSON-LD input. A file icon and the URL <http://133.242.180.86/Ge> are shown above the text area. The input JSON-LD includes an `@include` directive. Below the text area are buttons for "Expanded", "Compacted", and "Flattened".
- New JSON-LD Context**: This section contains a text area for a new JSON-LD context. It includes a file icon and a "Context URL" input field.

Below the input sections, there is a large text area showing the "Interpreted JSON-LD TD without '@include'". This area displays the JSON-LD after processing, where the `@include` directive has been removed. Arrows point from the text labels to the corresponding JSON-LD snippets.

The bottom of the image shows a Windows taskbar with various icons and a system clock indicating 11:36 on 2017/05/13.

Interpretation in Playground

Included TD (Echonet_Aircon.jsonld)

```
{
  "@type": "td:Property",
  "name": "IndoorTemperatureMeasurementValue",
  "EPC": "BB",
  "valueType": {
    "@type": "xsd:number",
    "minValue": 16,
    "maxValue": 30
  },
  "writable": false
},
{
  "@type": "td:Property",
  "name": "UserRemoteControlTemperatureSettingValue",
  "EPC": "BC",
  "valueType": {
    "@type": "xsd:number",
    "minValue": 16,
    "maxValue": 30
  },
  "writable": false
},
{
  "@type": "td:Property",
  "name": "BlowoutTemperatureMeasurementValue",
  "EPC": "BD",
  "valueType": {
    "@type": "xsd:number",
    "minValue": 16,
    "maxValue": 30
  },
  "writable": false
},
{
  "@type": "td:Property",
  "name": "OutsideTemperatureMeasurementValue",
  "EPC": "BE",
  "valueType": {
    "@type": "xsd:number",
    "minValue": 16,
    "maxValue": 30
  },
  "writable": false
},
}
```

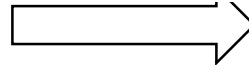
Include

Remove

Remove

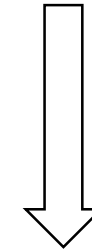
Include

@include
w/ @remove



Including TD (Generic_Aircon.jsonld)

```
"@include": {
  "@id": "eco:interactions",
  "@remove": [
    "UserRemoteControlTemperatureSettingValue",
    "BlowoutTemperatureMeasurementValue"
  ]
}
```



Interpretation in Playground

Interpreted TD (Generic_Aircon.jsonld)

```
{
  "@type": "td:Property",
  "name": "IndoorTemperatureMeasurementValue",
  "valueType": {
    "@type": "xsd:number"
  },
  "writable": false
},
{
  "@type": "td:Property",
  "name": "OutsideTemperatureMeasurementValue",
  "valueType": {
    "@type": "xsd:number"
  },
  "writable": false
},
}
```

The relationship example of organizations and TD

W3C/WoT-WG

- who maintains the style of TD as semantics container type definition for IoT

Organization of each vertical industry

- who maintains the generic semantics of things which belongs to the industry

Mass production manufacturer

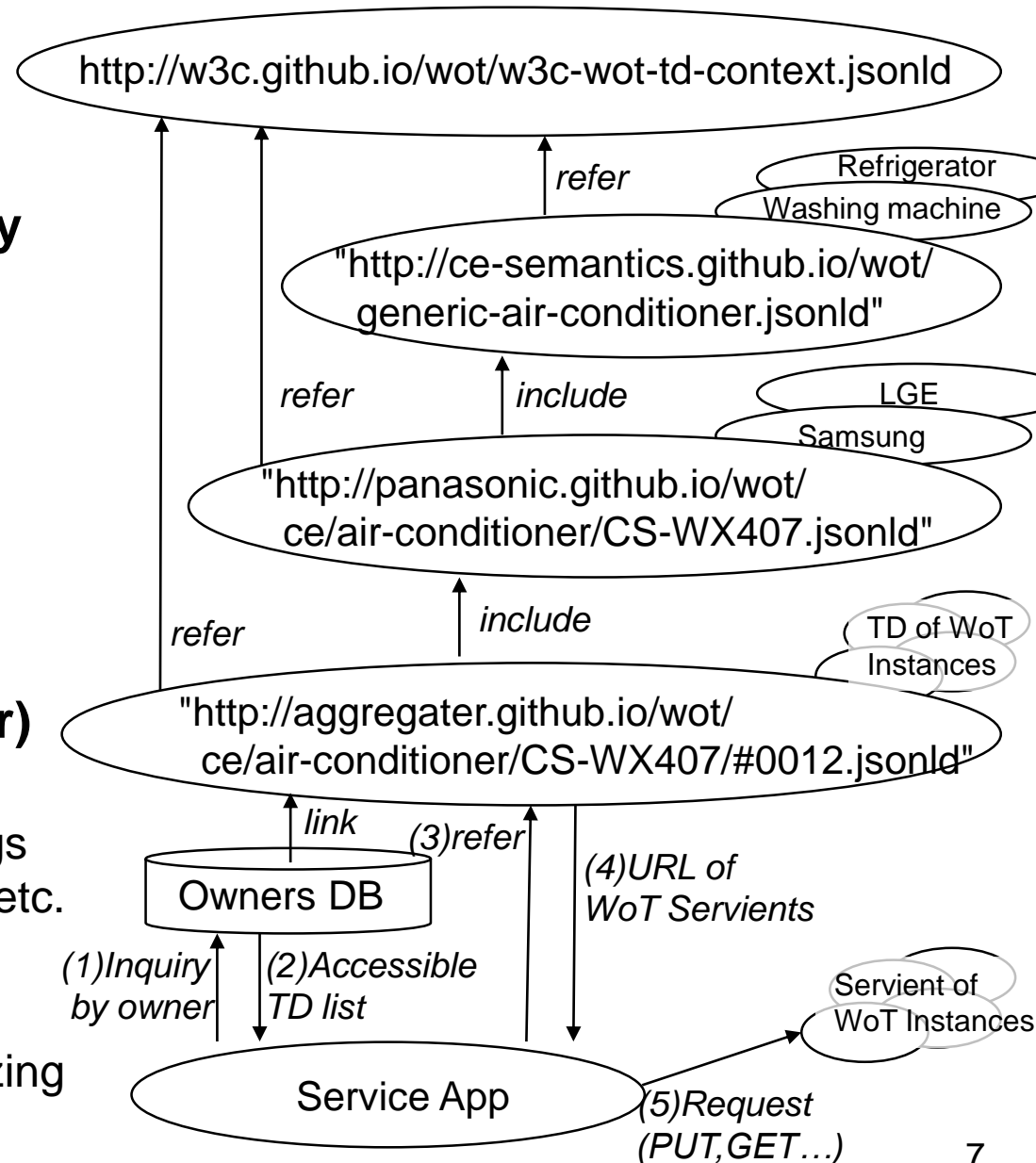
- who maintains the specific semantics of each product with reference to generic semantics of its category thing

Platform provider (Things aggregator)

- who aggregates wide variety of things, manages the relationship between things and its context such as owner, location etc.

Service provider

- who provides service to customers utilizing TDs provided by platform provider(s)



Panasonic would like to contribute the standardization on Consumer Electronics semantics and open it for all stakeholders such as Manufacturers, aggregators and servicers.

Wonders!

by Panasonic