Generic Configurable “Dynamic POI-DP” Specification

## Introduction

This document specifies the FIWARE POI\_DP (Point of Interest Data Provider) Generic Enabler additional functionality provided by a new feature called Dynamic POI’s. Dynamic POI’s are POI’s with additional data elements describing how to retrieve POI specific external information together with data structures to store that information in the POI\_DP server. The main use case for Dynamic POI’s is for example describing, storing and viewing the values of sensor data elements, like temperature, wind, traffic, moisture, air pressure etc. together with the other POI information, like location etc.

## Specification

This chapter is divided into two sections; the first one describes the additional internal POI data elements required by the Dynamic POI system, and the second one the configuration file needed to specify where to retrieve the external information and how to map the response data to the internal data structures used to store the data.

### Additional internal data elements

The Dynamic POI system requires one additional data element called “**fw\_dynamic**” to be included in the POI data:

“fw\_dynamic”: {

“host\_type”: “<name of the host connection type as described in the configuration file>”

“host\_id”: [“<optional ID(s) used to identify a specific sensor by the above host>”]

“data\_type”: “<name of the data type as described in the configuration file>”

“data\_params”: “<optional additional data parameters>”

“last\_update”: { …} /\* for internal use only \*/

}

Depending on the contents of the configuration file additional data elements will be generated automatically to the internal data structure of a specific POI. These would typically include e.g. the “fw\_sensor” structure, but depending on the configuration file any other fields can also be created/updated. A typical sensor specific data structure is described below:

“fw\_sensor”: {

“data”: [ {

“name”: {

“de”: “<sensor name in German>”

“en”: “<in English>”

“es”: “<in Spanish>”

“fi”: “<in Finnish etc.>”

},

“label”: {

“de”: “<sensor printable label in German>”

“en”: “<in English>”

“es”: “<in Spanish>”

“fi”: “<in Finnish etc.>”

},

“type”: “<sensor type, e.g. temp, humidity, wind etc.>”

“value”: “<sensor current/last updated value>”

“unit”: “<unit of above value>”

} ],

valid\_duration:”<valid value cached time in seconds>”

last\_update: {

“timestamp”: “<Unix timestamp of last value update>”

“responsible”: /\* Reserved for future use \*/

}

}

These data structures will be generated for each POI when the POI is created, and the value fields updated according to the rules specified in the configuration file each time the POI is accessed, e.g. by using the get\_pois API unless the cached values in the POI\_DP server are still valid, i.e. the valid\_duration time has not yet exceeded.

### Configuration file

The configuration file is located in the POI\_DP server in the same directory as the POI\_DP itself and named poi\_dp\_dyn\_conf.json. The contents of this file defines where the external dynamic POI data elements should be fetched and how the response content should be mapped to POI additional data structures, like the “fw\_sensor” described above. The same file can contain several host and data mapping configurations. If you modify this file please make sure to use valid JSon format, e.g. by using the JSONLint to validate the syntax before saving the file. Content of the file is described below (note that comments are not allowed in the actual JSon file):

{

"**host\_type**": /\* This section describes the external host connection types \*/

{

"<host\_type>": /\* Name of the host type as referred in “fw\_dynamic” \*/

{

"method": "REST\_GET", /\*Only REST GET method supported so far \*/

"params":

{

"url": "<http url of the host connection>",

"params": "<additional url parameters>",

"headers": {"<header>":"<value>","<header>":"<value>",…}

}

}

},

"**data\_mapping**": /\* Data mapping portion begins here \*/

{

"<data\_type>": /\* Name of the data type as referred in “fw\_dynamic” \*/

{

"fw\_sensor": /\* Name of the additional data structure to be included, typically “fw\_sensor” \*/

{

"data": /\* Name of the data structure below “fw\_sensor”, typically “data” \*/

[

{

"name": {"<Sensor names in different languages as described above for “fw\_sensor” >"},

"type": "<type of the sensor, e.g. temp, humidity, wind, etc.>",

"value": ["<mapping function, see below>", “<mapping function parameters>”],

"unit": “<unit or mapping function reference as above for value>”

}

]

}

}

}

}

#### Host connection methods

For each host\_type in the configuration file the generated host requests need to be described using the available connection methods described below.

Method: Headers: Host request url: Post data:

REST\_GET <headers> <url><host\_id><params> -

REST\_POST <headers> <url> <mod.params>

Where <mod.params> is the <params> string or JSon structure where each occurance of $0, $1 etc. has been replaced by each value given in the <host\_id> array respectively, i.e. $0 by the first id, $1 by the second etc. For the GET method the parameters are simply concatenated with the url and host\_id. E.g. in our below Orion example for sensor id urn:smartsantander:testbed:446 the host request url would become:

http://orion.lab.fi-ware.org:1026/ngsi10/contextEntities/urn:smartsantander:testbed:446?attributeFormat=object

#### Data mapping

The response of the above generated host request is handled according to the rules set in the data\_mapping section of the configuration file. For each data\_type the generated internal POI\_DP data structure is described in JSon format. Part of the data structure can be static and part of it can be dynamic, getting its contents (value field data) from the above host response. Static structures always end up as static string values in this description. Dynamic fields end up as mapping function calls denoted as an array beginning with a data mapping function reference followed by function parameters:

[ “<mapping\_function>”,”<mapping function parameters>”].

Currently two mapping functions are supported, “\_fw\_json” and “\_fw\_match”. The first one is used to extract values from JSon type responses, the second one from text/html responses.

["**\_fw\_json**", {"<json string including “**?**” mark in place of the searched/returned value>”}]

[“**\_fw\_match**”,”<search string including **?**-mark in place of searched/returned value>”]

The \_fw\_json function takes a JSon string as a parameter including the string “?” in place of the field containing the data to be fetched as the value for its data structure element (under which it is located in the configuration description). Similarly the \_fw\_match takes a string as an argument containing a question mark denoting the place of the desired data value location. For example the orion\_traffic\_sensor description example given in Section 5 would result the following new data structure for urn:smartsantander:testbed:446 if its response would include: {"contextElement":{"type":"santander:sound","attributes":{"sound":{"value":"50"}}}}:

"fw\_sensor": { "data": [{

"name": {"en":"Santander sound"},

"type": "noise",

"value": 50,

"unit": “dB”

}]

}

## Orion CB integration demo

A short simple demonstration of how to use Dynamic POI’s is provided using the FILAB Orion Context Broker with Santander city sensor data (sound meters and traffic monitors) as an example case:

* Configuration file: <http://dev.cie.fi/FI-WARE/poi_dp_dyn/poi_dp_dyn_conf.json>
* Demo: <http://dev.cie.fi/FI-WARE/demos/dyn_poi/edit_poi.html>

Open the above demo page with Chrome or Firefox browser and enter “Santander” as position and click the “Go to position” button. Select category as “Sensor” in the left window pane and click visible POIs to view the sensor values and/or right click to edit the POI data. A specific JSon POI data editor will open in case you choose to modify the POI data. See figure 1 below.

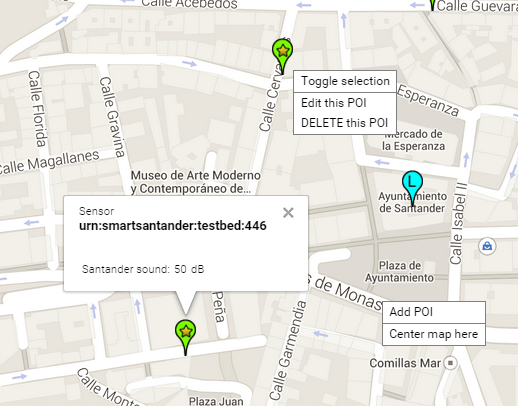


Figure 1. Santander demo case

Example of a dynamic POI data provider configuration file for Orion CB Santander content together with one html/text based Willab weather sensor (Oulu/Linnanmaa) configuration:

{

"host\_type":

{

"filab\_orion\_1026":

{

"method": "REST\_GET",

"params":

{

"url": "http://orion.lab.fi-ware.org:1026/ngsi10/contextEntities/",

"params": "?attributeFormat=object",

"headers": {"Content-Type":"application/json","Accept":"application/json","X-Auth-Token":"SDkJJ…..gfSDkJJBDQ"}

}

},

"willab":

{

"method": "REST\_GET",

"params":

{

"url": "http://weather.willab.fi/weather.html.fi",

"params": "",

"headers": {"Content-Type":"text/html","Accept":"text/html"}

}

}

},

"data\_mapping":

{

"orion\_sound\_sensor":

{

"fw\_sensor":

{

"data":

[

{

"name": {"en":"Santander sound"},

"type": "noise",

"value": ["\_fw\_json", {"contextElement":{"type":"santander:sound","attributes":{"sound":{"value":"?"}}}}],

"unit": ["\_fw\_json", {"contextElement":{"attributes":{"sound":{"metadatas":[{"value":"?"}]}}}}]

}

]

}

},

"orion\_traffic\_sensor":

{

"fw\_sensor":

{

"data":

[

{

"name": {"en":"Santander traffic"},

"type": "occupation",

"value":["\_fw\_json", {"contextElement":{"type":"santander:traffic","attributes":{"occupancy":{"value":"?"}}}}],

"unit": ["\_fw\_json", {"contextElement":{"attributes":{"occupancy":{"metadatas":[{"value":"?"}]}}}}]

}

]

}

},

"willab\_status":

{

"fw\_sensor":

{

"data":

[

{

"name": {"en":"Linnanmaa temperature"},

"type": "temp",

"value": ["\_fw\_match", "<p class=\"tempnow\">? &deg"],

"unit": "C"

},

{

"name": {"en":"Linnanmaa wind"},

"type": "wind",

"value": ["\_fw\_match", "<tr><th>Tuulen nopeus:</th><td>? m/s"],

"unit": "m/s"

},

{

"name": {"en":"Linnanmaa wind direction"},

"type": "winddir",

"value": ["\_fw\_match", "<tr><th>Tuulen suunta:</th><td>?&deg"],

"unit": "&deg;"

},

{

"name": {"en":"Linnanmaa humidity"},

"type": "humidity",

"value": ["\_fw\_match", "<tr><th>Ilmankosteus:</th><td>? %"],

"unit": "%"

},

{

"name": {"en":"Linnanmaa air pressure"},

"type": "pressure",

"value": ["\_fw\_match", "<tr><th>Ilmanpaine:</th><td>? hPa"],

"unit": "hPa"

}

]

}

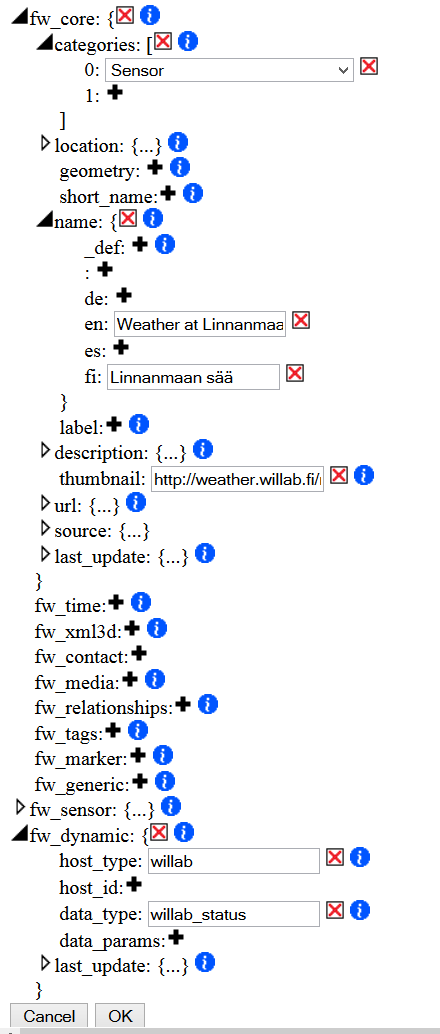
}

}

}

## Adding new Dynamic POIs

To add a new Dynamic POI you need to:



1. Create the new POI either by using the add\_poi API or by using the above demo application “Add POI” menu option.
2. Fill in the required fields as shown on the right: Category, POI name and optional description plus the fw\_dynamic configuration fields: host\_type, host\_id and data\_type. In this case there is only one sensor connected to this host so no host\_id will be given.
3. The above fw\_dynamic fields refer to the configuration file respective fields. If this is a new host\_type or a new data\_type a new entry to the configuration file needs to be added, like in this case the “willab” host and “willab\_status” data types.
4. Analyse the response given by the host, JSon should be preferred if available and \_fw\_json function to be used to parse the return value from the response text, a question mark denotes the place of the expected return value for the given field. Likewise a text matching function \_fw\_match is available for text/html responses, like in this willab case. Similarly a question mark shows the location of the required return value to be fetched to the POI\_DP internal data structures. See the example configuration file above.
5. Before saving the configuration file back to the server it is wise to check the JSon syntax e.g. by using JSONLint.