API Guide

Product Ordering

March 2018

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1. List of Contributing Members

The following members of MEF participated in the development of this document and have requested to be included in this list.

AT&T	Orange
Cataworks	Telus
Colt	

Table 1 Contributing Member Companies

2. Abstract

This API Guide is intended to help company to implement MEF Product Ordering Management API. The API swagger is available on MEF GitHub. In order to help API adoption this document provides:

- API Resource Model
- Resource ProductOrder lifecycle (as well as subResource OrderItem lifecycle)
- Resource ProductOrder full representation
- Detailed description of all API Operations provided

3. Scope

The scope of this API guide covers project the following capabilities for productOrdering:

- Create Order to request install new product
- Change order: create Order to change an existing Product
- Disconnect Order: create Order to disconnect an existing Product
- Cancel Order: cancellation of an inflight-order
- Amend Order: modification of an inflight-order
- Retrieve Order(s) based on criteria
- Get full data of an order based on its id.
- Support for Order Notifications

4. Product Ordering Resource Model

The API Product Ordering resource model is the following:

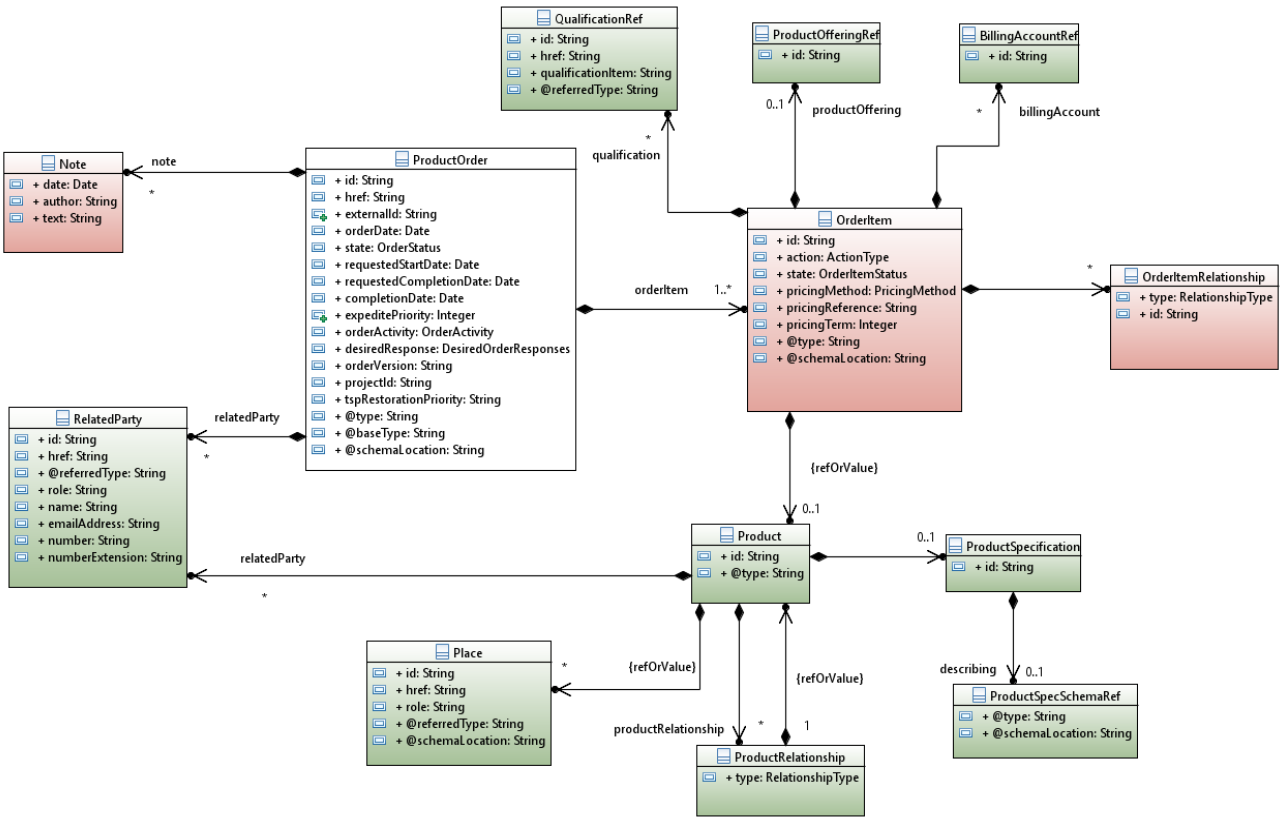


Figure 1 Product Ordering Resource Model

Color coding scheme:

- White box: API main resource
- Pink box: API sub resource(s)
- Green Boxes : API related/referred resource(s)

5. State Diagrams

Following diagram shows the state machine for a Product Order:

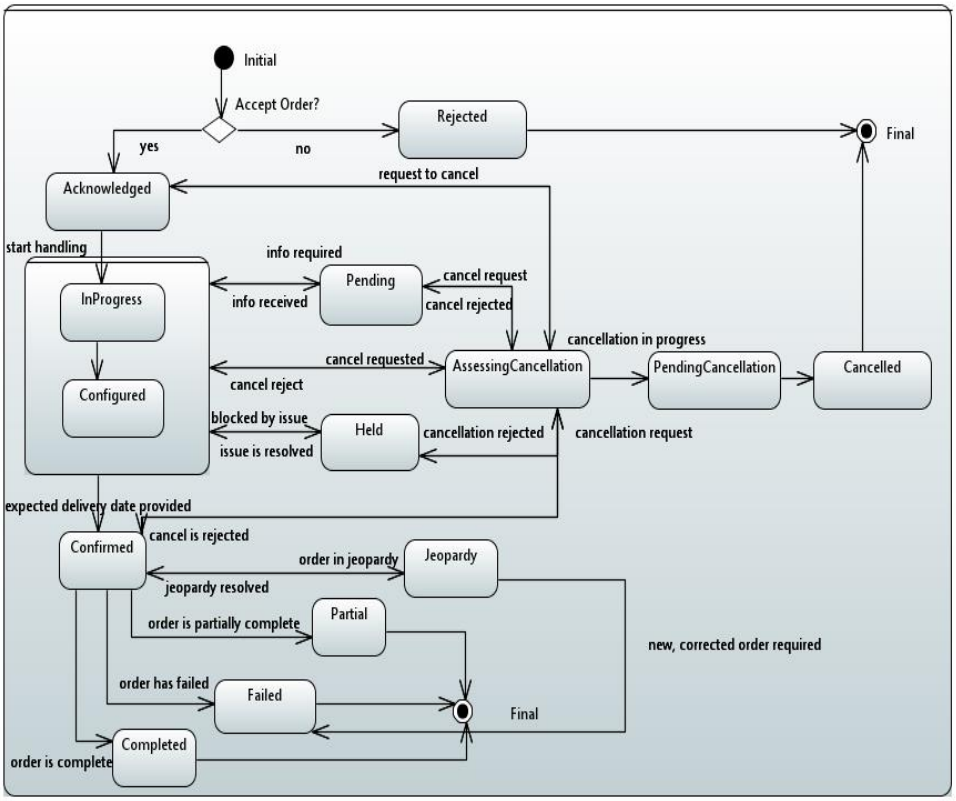


Figure 2 Product Inventory State Machine

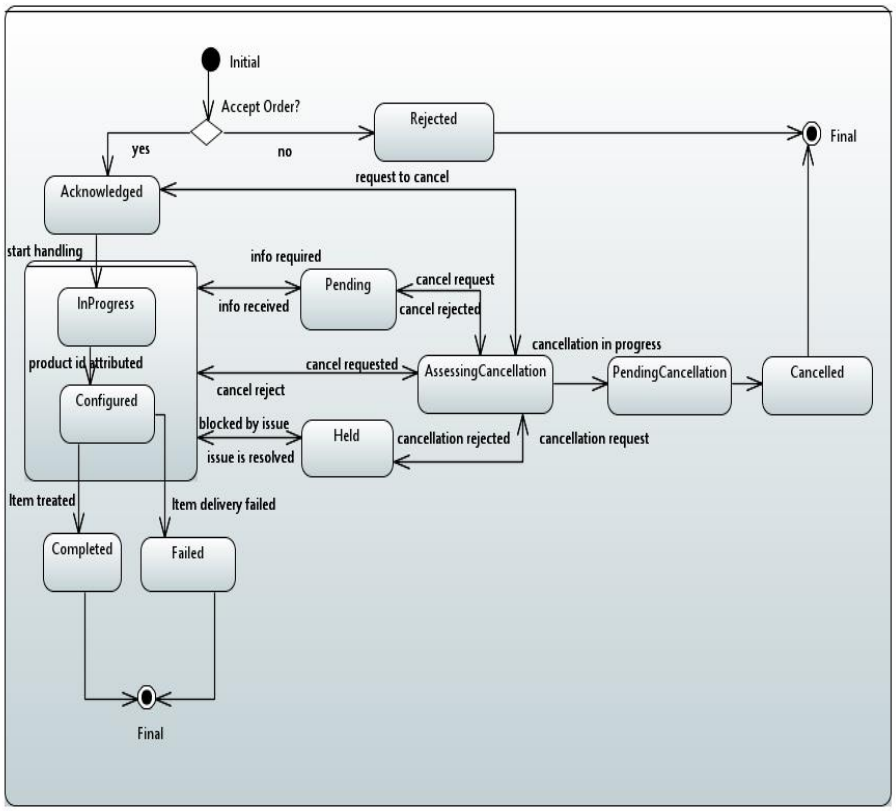
Following table provided state definition:

Product Order State	Definition
REJECTED	One of the following has occurred: 1. The order has failed feasibility check 2. Invalid information was provided on the order 3. The order fails to meet business rules for ordering
ACKNOWLEDGED	An order has been received and has passed message and basic business validations
IN_PROGRESS	An order has passed the order feasibility check successfully and service delivery has started
PENDING	The order is currently in a waiting stage for an action/activity to be completed before the order can progress further, pending order amend or cancel assessment
HELD	An order cannot be progressed due to an issue that is blocking

	on the side of the seller.
ASSESSING_CANCELLATION	A request has been made by the buyer or seller to cancel the order and the order is currently being assessed to determine whether it can be cancelled or not.
PENDING_CANCELLATION	Seller approved the cancellation request and this cancellation is in progress
CANCELLED	The in-flight order has been successfully cancelled
CONFIGURED	Prior to confirmation of the order, the seller configures seller specific data such as Seller UNI ID, Seller ENNI ID, Seller OVC ID, etc.
CONFIRMED	The order is committed to delivery on an expected delivery date.
JEOPARDY	The order is in danger of not meeting its expected delivery date. The seller may request that a new, corrected order be submitted.
PARTIAL	Some order items have failed and some have completed
FAILED	All order items have failed which results in the order failing
COMPLETED	An order has completed provisioning and the service is now active

Table 2 Order State Definition

Following diagram shows the state machine for a Product Order Item:



Because order item states are a subset of the one provided for order please look definition on above table.

Compliance table between order state and order item state:

Product Order State	Condition
REJECTED	At least order item with Rejected state
ACKNOWLEDGED	All order item are in Acknowledged state(fulfillment has not yet started)
IN_PROGRESS	At least fulfillment started for one item – one item must have Pending, Held, Assessing Cancellation, Configured, Completed or Failed Status. If all item AND not any below condition are applicable
PENDING	All order items are Pending or Cancelled; At least one Pending
HELD	All order items are Held or Cancelled; At least one Held
ASSESSING_CANCELLATION	All order items are AssessingCancellation or Cancelled; At least one Pending

CANCELLED	All order items are Cancelled
CONFIGURED	All order items are Configured or Cancelled; At least one Configured
CONFIRMED	All order items are Configured or Cancelled; At least one Configured
JEOPARDY	All order items are Configured or Cancelled; At least one Configured
PARTIAL	All order items are Completed, Failed or Cancelled; At least one Completed and one Failed
FAILED	All order items are Failed or Cancelled; At least one Failed
COMPLETED	All order items are Completed or Cancelled; At least one Completed

Table 3 Compliance between Order State & Order Item State

6. Notifications

Following notifications are managed in this API:

- ProductOrderAttributeValueChangeNotification
- ProductOrderStateChangeNotification

In order to receive Notification, buyer needs

- to subscribe to a notification
- to provide an Event API in order to allow seller to POST him notifications.

6.1 Subscribe to notification:

By doing the following request SP1 will subscribe to productOrder state change for his orders:

```
POST {api_url}/HUB
Accept: application/json

{"callback": http://in.listener.com,
"query":"eventType = ProductOrderStateChangeNotification"
}
```

In yellow, this is the address where Buyer wants to receive the order state change notifications.

The response will be:

```
201
Content
-
Type:
application/json
Location: /api/hub/42
```

```
{"id":"42","callback":"http://in.listener.com","query":"eventType =
ProductOrderStateChangeNotification"}
```

Note: 42 is the id of an HUB resource not a productOrder id

Seller provides GET and DELETE operations on HUB resource in order to allow buyer to retrieve his hub and delete them if necessary:

```
GET {api_url}/HUB
Accept: application/json
```

You will have list of your HUB on this API

```
[
  {
    "id": "42",
    "query": " eventType = ProductOrderStateChangeNotification ",
    "callback": " http://in.listener.com "
  },
  {
    "id": "98",
    "query": " eventType = •   ProductOrderAttributeValueChangeNotification",
    "callback": " http://in.listener.com "
  }
]
```

Buyer did not want any more notification for productOrder attribute value change:

```
DELETE {api_url}/HUB/98
Accept: application/json
```

6.2 Receive Notification:

Now that buyer has subscribed to notification for productOrder status change for example, let's suppose that he posted a productOrder and this one is processed by the seller. The productOrder state changes. Seller will POST an Event to the Buyer:

```
POST {callback}/event
{
"eventType": " ProductOrderStateChangeNotification",
"eventTime": "2014-09-27T05:46:25.0Z",
"eventId": "92445",
"event":
{
     "productOrder": {
        "id": "456987"
     }
}
```

Buyer will response with a standard HTTP 201 if event received.

7. Data mapping with IPS

The following table provides a mapping between IPS attributes and API attributes

IPS Class Model	Ethernet Ordering Technical Specification	API resource or sub-resource	API attribute
productOrder			
expeditePriority	Expedite Priority	ProductOrder	expeditePriority
buyerOrderVersion	Buyer Order Version	ProductOrder	version
buyerPONumber	Buyer Purchase Order Number	ProductOrder	externalId
orderDate	Order Date	ProductOrder	orderDate
orderActivity	Order Activity	ProductOrder	orderActivity
state	Order Status (not on create)	ProductOrder	state
requestedCompletionDate	Requested Completion Date	ProductOrder	requestedCompletionDate
completionDate	Completion Date (not on create)	ProductOrder	completionDate
projectId	Project ID	ProductOrder	projectId
note	Note	Note	Note
desiredResponses	Desired Responses	ProductOrder	desiredResponse
id	Order ID	ProductOrder	id
requestedStartDate	Requested Start Date		requestedStartDate
tspRestorationPriority	Telecommunication Service Priority/Restoration Priority	ProductOrder	tspRestorationPriority
_orderItem		ProductOrder	OrderItem
_relatedParty		ProductOrder	RelatedParty
Order Item			
state		OrderItem	state
id	Order Item Reference Number	OrderItem	id
action	Order Item Action	OrderItem	action
pricingMethod	Pricing Method	OrderItem	pricingMethod
pricingReference	Pricing Reference	OrderItem	pricingReference
pricingTerm	Pricing Term	OrderItem	pricingTerm
_productOffering	Promotion ID	ProductOfferingRef	id
_product		OrderItem	Product
_billingAccount	Billing Account	OrderItem	BillingAccountRef
_orderItemRelationship		OrderItem	OrderItemRelationship
qualificationId	Serviceability Response	QualificationRef	Id

IPS Class Model	Ethernet Ordering Technical Specification	API resource or sub-resource	API attribute
	Identifier		
Order Item Relationship			
type		OrderItem.orderItemRelationship	type
id		OrderItem.orderItemRelationship	id
Billing Account			
accountNumber	Billing Account	BillingAccountRef	id
Related Party			
id	Buyer Id, Seller Id	RelatedParty	id
role	"Buyer", "Seller", "Billing Contact", "Order Contact", "Implementation Contact", "Technical Contact", "UNI Site Contact", "UNI Alt Site Contact", "ENNI Site Contact", "ENNI Alt Site Contact"	RelatedParty	role
emailAddress	Billing Contact Email Address	RelatedParty	emailAddress where RelatedParty.role="Billing Contact"
number	Billing Contact Telephone Number	RelatedParty	number where RelatedParty.role="Billing Contact"
numberExtension	Billing Contact Telephone Extension	RelatedParty	numberExtension where RelatedParty.role="Billing Contact"
name	Billing Contact Contact Name	RelatedParty	name where RelatedParty.role="Billing Contact"
	Buyer Order Contact Email Address	RelatedParty	emailAddress where RelatedParty.role="Order Contact"
	Buyer Order Contact Telephone Number	RelatedParty	number where RelatedParty.role="Order Contact"
	Buyer Order Contact Number Extension	RelatedParty	numbeExtension where RelatedParty.role="Order Contact"
	Buyer Order Contact Name	RelatedParty	name where RelatedParty.role="Order Contact"
	Buyer Implementation Contact Email Address	RelatedParty	emailAddress where RelatedParty.role="Implementation Contact"
	Buyer Implementation	RelatedParty	number where RelatedParty.role="Implementati

IPS Class Model	Ethernet Ordering Technical Specification	API resource or sub-resource	API attribute
	Contact Telephone Number		on Contact"
	Implementation Contact Telephone Number Extension	RelatedParty	numbeExtension where RelatedParty.role="Implementation Contact"
	Buyer Implementation Contact Name	RelatedParty	name where RelatedParty.role="Implementation Contact"
	Buyer Technical Contact Email Address	RelatedParty	emailAddress where RelatedParty.role="Technical Contact"
	Buyer Technical Contact Telephone Number	RelatedParty	number where RelatedParty.role="Technical Contact"
	Buyer Technical Contact Telephone Number Extension	RelatedParty	numbeExtension where RelatedParty.role="Technical Contact"
	Buyer Technical Contact Name	RelatedParty	name where RelatedParty.role="Technical Contact"
	ENNI Site Contact Email Address	RelatedParty	emailAddress where RelatedParty.role="ENNI Site Contact"
	ENNI Site Contact Telephone Number	RelatedParty	number where RelatedParty.role="ENNI Site Contact"
	ENNI Site Contact Telephone Number Extension	RelatedParty	numbeExtension where RelatedParty.role="ENNI Site Contact"
	ENNI Site Contact Name	RelatedParty	name where RelatedParty.role="ENNI Site Contact"
	ENNI Alt. Site Contact Email Address	RelatedParty	emailAddress where RelatedParty.role="ENNI Alt. Site Contact"
	ENNI Alt. Site Contact Telephone Number	RelatedParty	number where RelatedParty.role="ENNI Alt. Site Contact"
	ENNI Alt. Site Contact Telephone Number Extension	RelatedParty	numbeExtension where RelatedParty.role="ENNI Alt. Site Contact"
	ENNI Alt. Site Contact Name	RelatedParty	name where RelatedParty.role="ENNI Alt. Site Contact"
Place			
id	Not in Ordering TS	Place	id
role	Not in Ordering TS	Place	role
type	SiteAddressType	Place	@type
Service Site			
siteCompanyName	UNI Site	This information could be	siteCompanyName

IPS Class Model	Ethernet Ordering Technical Specification	API resource or sub-resource	API attribute
	Company Name	capturer to create a site when fieldedAddress, FormattedAddress, GeographicLocation or ReferencedAddress are described	
endCustomerName	UNI Site Customer Name	same	endCustomerName
additionalSiteInformation	UNI Site Additional Site Information	same	additionalSiteInformation
siteDescription		same	siteDescription
Fielded Address			
streetNr	Street Number	for @type=”FieldedAddress”	streetNr
streetNrSuffix	Street Number Suffix	for @type=”FieldedAddress”	streetNrSuffix
streetNrLast	Street Number Last	for @type=”FieldedAddress”	streetNrLast
streetNrLastSuffix		for @type=”FieldedAddress”	streetNrLastSuffix
streetName	Street Name	for @type=”FieldedAddress”	streetName
streetType	Street Type	for @type=”FieldedAddress”	streetType
streetSuffix	Street Suffix	for @type=”FieldedAddress”	streetSuffix
city	City	for @type=”FieldedAddress”	city
locality	Locality	for @type=”FieldedAddress”	locality
postcode	Postal Code	for @type=”FieldedAddress”	postcode
postcodeExtension	Postal Code Extension	for @type=”FieldedAddress”	postcodeExtension
country	Country	for @type=”FieldedAddress”	country
stateOrProvince	State or Province	for @type=”FieldedAddress”	stateOrProvince
Fielded SubAddress			
buildingName	Building Name	for @type=”FieldedAddress” then subAdress	buildingName
levelNr	Level Number	for @type=”FieldedAddress” then subAdress	levelNr
levelType	Level Type	for @type=”FieldedAddress” then subAdress	levelType
privateStreetName	Private Street Name	for @type=”FieldedAddress” then subAdress	privateStreetName
subUnitNr	Sub Unit Number	for @type=”FieldedAddress” then subAdress	subUnitNr
subUnitType	Sub Unit Type	for @type=”FieldedAddress” then subAdress	subUnitType
Referenced Address			
referenceType	Only exists in serviceability TS	for @type=”ReferencedAddress”	referenceType
referenceId	Address Reference Id	for @type=”ReferencedAddress”	referenceId
Formatted Address			
addrLine1	Formatted Address Line 1	for @type=”FormattedAddress”	addrLine1

IPS Class Model	Ethernet Ordering Technical Specification	API resource or sub-resource	API attribute
addrLine2	Formatted Address Line 2	for @type=”FormattedAddress”	addrLine2
locality	Locality	for @type=”FormattedAddress”	locality
city	City	for @type=”FormattedAddress”	city
stateOrProvince	StateOrProvince	for @type=”FormattedAddress”	stateOrProvince
postcode	Postcode	for @type=”FormattedAddress”	postcode
postcodeExtension	PostcodeExtension	for @type=”FormattedAddress”	postcodeExtension
country	County	for @type=”FormattedAddress”	country
Geographic Point		In the API we'll use GeoLocation structure with Type="point". z coordinate (elevation) will not be used	
spatial	Not in TS	for @type=”GeograpicLocation”	spatial
latitude	In single field "latitude/longitude"	for @type=”GeograpicLocation”	latitude
longitude	In single field "latitude/longitude"	for @type=”GeograpicLocation”	longitude
Product			
id		product	id
_relatedParty		product	relatedParty
_productRelationship	Not specified in TS	productRelationship	
_place	Pointer to the place for a UNI/ENNI product.	GeoLocation or Address or Site	id (use place role to refer the 'right' place)
_productSpec	Product Specification	ProductSpecificationRef	id
Product Relationship			
type	Not specified in TS	productRelationship	type
_product	Not specified in TS	productRelationship	targeted product.id
Product Offering			
id	Not specified in TS	ProductOfferingRef	id

Table 4 Mapping attribute IPS to API

8. JSON representation sample

We provide below the JSON representation of an example of a 'Product' resource object

Important note about product description: The productOrder API is **product-agnostic**. The product specification information is managed with an API extension pattern and it must be dynamically added in API instantiated message. All productSpec attributes are not directly described in this API and in the swagger.

This loose decoupling between the API itself and the ProductSpec allow us to provide a lot of flexibility. Introduction of new product or release of new version for existing product will not trigger impact on the API itself and will not require a new API release.

To allow reader to identify where ordered product characteristics must be added on API instantiation, depending on ordered product, we added the comment *<< This is where productspec characteristics would be given value>>* where these attributes should be present.

This example illustrates an order for new UNI+eLine+both endpoints:


```
{
   "id":"456987",
   "href":"https://spDB//productOrdering/productOrder/456789",
   "externalId":"AZCO456",
   "orderDate":"2018-02-15T14:05:03.498Z",
   "state":"IN_PROGRESS",
   "requestedStartDate":"2018-02-16T14:05:03.498Z",
   "requestedCompletionDate":"2018-02-17T14:05:03.498Z",
   "completionDate":"",
   "expeditePriority":0,
   "orderActivity":"INSTALL",
   "desiredResponses":"CONFIRMATION_AND_ENGINEERING_DESIGN",
   "orderVersion":"1",
   "projectId":"AZCO",
   "tspRestorationPriority":"2",
   "relatedParty":[
      {
         "role":"buyer",
         "name":"Siva",
         "emailAddress":"siva@mef.net",
         "number":"4698521478",
         "numberExtension":"12"
      },
      {
         "role":"Seller",
         "name":"Ludovic",
         "emailAddress":"ludo@mef.net",
         "number":"0698524595"
      }
   ],
   "note":{
      "text":"ProductOrder following discussion established Jan 14, 2018",
      "date":"2018-02-15T14:05:03.498Z",
      "author":"Siva"
   },
   "orderItem":[
      {
         "id":"1",
         "action":"INSTALL",
         "state":"IN_PROGRESS",
         "billingAccount":{
            "id":"BA123654"
```

```
         },
         "productOffering":{
            "id":"OrangeUNI"
         },
         "product":{
            "productSpecification":{
               "id":"UNISpec",
               "describing":{
                  "@type":"UNISpec",
                  "@schemaLocation":"https://github.com/MEF-GIT/MEF-LSO-Sonata-
SDK/blob/master/experimental/api/ProductSpecDescription/Ordering/UNISpec.json"
               }
            },
    << This is where productspec characteristics would be given value>>
            },
            "place":[
               {
                  "role":"UNI Site",
                  "@referredType":"FormattedAddress",
                  "@schemaLocation":"https://github.com/MEF-GIT/MEF-LSO-Sonata-
SDK/blob/master/experimental/api/PlaceDescription/FormattedAddress.json",
                  "addrline1":"12 Avenue Pierre Marie",
                  "city":"Lyon",
                  "stateorProvince":"Rhone",
                  "postcode":"69001",
                  "country":"France"
               }
            ],
            "relatedParty":[
               {
                  "role":"Technical Contact",
                  "name":"Jessie",
                  "emailAddress":"jessie@mef.net",
                  "number":"0625413698"
               },
               {
                  "role":"Implementation Contact",
                  "name":"Jessie",
                  "emailAddress":"jessie@mef.net",
                  "number":"0625413698"
               },
               {
                  "role":"UNI Site Contact",
                  "name":"Jessie",
                  "emailAddress":"jessie@mef.net",
                  "number":"0625413698"
               }
            ]
         },
         "qualification":[
            {
               "id":"1369-4523",

"href":"https://spDB/productOfferingqualificationManagement/POQ/1369-4523",
               "qualificationItem":"1"
            }
         ]
```

```
      },
      {
         "id":"2",
         "action":"INSTALL",
         "state":"ACKNOWLEDGED",
         "productOffering":{
            "id":"OrangeELine"
         },
         "product":{
            "productSpecification":{
               "id":"eLineSpec",
               "describing":{
                  "@type":"eLineSpec",
                  "@schemaLocation":"https://github.com/MEF-GIT/MEF-LSO-Sonata-
SDK/blob/master/experimental/api/ProductSpecDescription/Ordering/ELineSpec.json"
               }
            },
<< This is where productspec characteristics would be given value>>
            "place":[
               {
                  "id":"AZe78-45fgh6-45de5r",
                  "role":"ENNI Site",
                  "@referredType":"site"
               }
            ],
            "relatedParty":[
               {
                  "role":"Technical Contact",
                  "name":"Hunter Pence",
                  "emailAddress":"hunter@giants.com",
                  "number":"4156987852369"
               },
               {
                  "role":"ENNI Site Contact",
                  "name":"Andrew Mc Clutchen",
                  "emailAddress":"andrew@giants.com",
                  "number":"4152236698741"
               }
            ]
         },
         "qualification":[
            {
               "id":"1369-4523",

"href":"https://spDB/productOfferingqualificationManagement/POQ/1369-4523",
               "qualificationItem":"2",
               "@referredType":"string"
            }
         ]
      },
      {
         "id":"3",
         "action":"INSTALL",
         "state":"ACKNOWLEDGED",
         "productOffering":{
            "id":"UNICEEndPoint"
         },
```

```
         "product":{
            "productSpecification":{
               "id":"UNICEEndPointspec",
               "describing":{
                  "@type":"UNICEEndPointspec",
                  "@schemaLocation":"https://github.com/MEF-GIT/MEF-LSO-Sonata-
SDK/blob/master/experimental/api/ProductSpecDescription/Ordering/UNICEEndPointSpec.j
son"
               }
            },
<< This is where productspec characteristics would be given value>>
         },
         "orderItemRelationship":[
            {
               "type":"RELIES_ON",
               "id":"1"
            },
            {
               "type":"RELIES_ON",
               "id":"2"
            }
         ],
         "qualification":[
            {
               "id":"1369-4523",

"href":"https://spDB/productOfferingqualificationManagement/POQ/1369-4523",
               "qualificationItem":"3",
               "@referredType":"string"
            }
         ]
      },
      {
         "id":"4",
         "action":"INSTALL",
         "state":"ACKNOWLEDGED",
         "productOffering":{
            "id":"ENNICEEndPoint"
         },
         "product":{
            "productSpecification":{
               "id":"ENNICEEndPointSpec",
               "describing":{
                  "@type":"ENNICEEndPointSpec",
                  "@schemaLocation":"https://github.com/MEF-GIT/MEF-LSO-Sonata-
SDK/blob/master/experimental/api/ProductSpecDescription/Ordering/ENNICEEndPointSpec.
json"
               }
            },
<< This is where productspec characteristics would be given value>>
            "productRelationship":[
               {
                  "type":"RELIES_ON",
                  "product":{
                     "id":"45df-er26-456r-85gh"
                  }
               }
```

```
            ]
         },
         "orderItemRelationship":[
            {
               "type":"RELIES_ON",
               "id":"2"
            }
         ],
         "qualification":[
            {
               "id":"1369-4523",

"href":"https://spDB/productOfferingqualificationManagement/POQ/1369-4523",
               "qualificationItem":"3"
            }
         ],
         "@type":"string",
         "@schemaLocation":"string"
      }
   ],
   "@type":"MEFProductOrder",
   "@schemaLocation":"https://..."
}
```

9. API Operations

In the following table, the use cases and operations defined in the IPS are mapped to the API use cases:

Use Case	Operation	Uniform API Operation	Description
UC_SONATA_ORDER_0001	Create Order	POST	All order item action set to 'INSTALL"
UC_SONATA_ORDER_0002	Retrieve Orders	GET	without an id but with criteria
UC_SONATA_ORDER_0003	Retrieve a single product order by order identifier	GET	with an id
UC_SONATA_ORDER_0004	Change Order	POST	All order item action set to 'CHANGE" or "INSTALL" or "DISCONNECT" (no all with "INSTALL" or with "DISCONNECT")
UC_SONATA_ORDER_0005	Amend Order	PATCH	
UC_SONATA_ORDER_0006	Cancel Order	Specific operation POST /productOrder/{productOrderId}/cancel	This operation allow to not cancel an order but to post a request to an order cancellation
UC_SONATA_ORDER_0007	Disconnect Order	POST	All order item action set to "DISCONNECT"
UC_SONATA_ORDER_0008	Attribute Value Change (AVC) Notification	No operation	Notification send during order procession – need buyer to have subscribed beforehand
UC_SONATA_ORDER_0009	Status Change Notification	Notification	Notification send during order procession – need buyer to have subscribed beforehand

Table 5 mapping UC – API operation

The product order interaction model is described below:

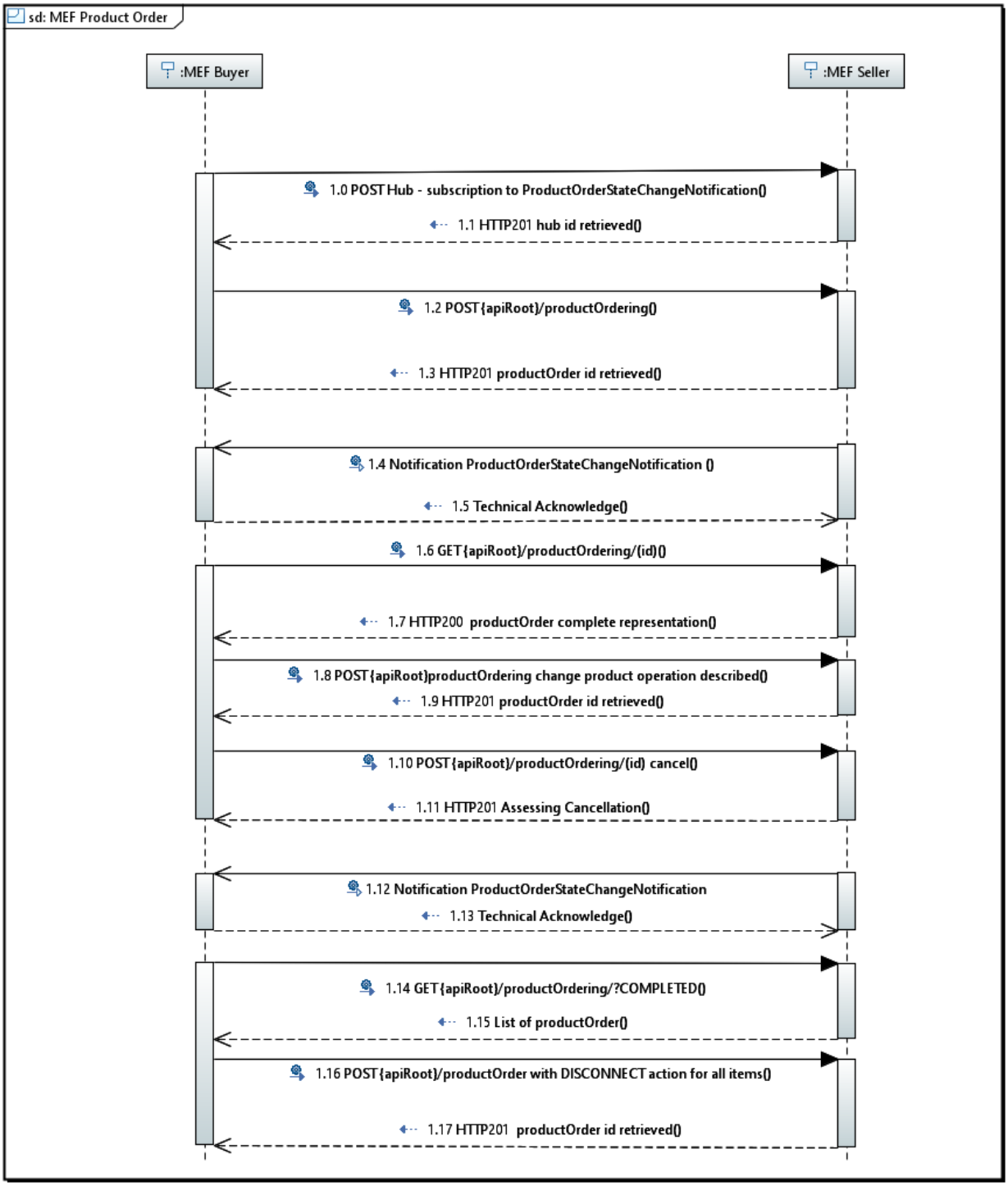


Figure 4 Product Order API generic interaction

9.1 Create Order

`POST {apiRoot}/productOrder`

Description

This operation creates a product order entity

Behavior

Standard 201 response if product order created

Otherwise:

400	Bad Request
401	Unauthorized
403	Forbidden
405	Method Not Allowed
408	Request Time-out
422	Unprocessable entity (see below)

Specific business errors will be encapsulated in HTTP Response 422 Unprocessable entity:

- 100: Missing order item (minimum 1) At least one order item must be provided
- 101: Missing Buyer at order level one and only one related party with a "Buyer" role should be provided at the product order level.
- 102: A relatedParty is at the wrong level The party role provided is not managed - MEF allows to have "Buyer", "Seller", "Billing Contact", "Order Contact", "Implementation Contact", "Technical Contact" roles at product order level "UNI Site Contact", "UNI Alt Site Contact", "ENNI Site Contact", "ENNI Alt Site Contact" at product order item level.
- 103: Missing Buyer Contact at order level one and only one related party with an "Order Contact" role should be provided at the product order level. Buyer Contact name & Telephone number must be provided.
- 104: Missing Buyer Implementation Contact at order level one and only one related party with a "Implementation Contact" role should be provided at the product order level. Implementation Contact name & Telephone number must be provided.
- 105: Missing Buyer Technical contact at order level one and only one related party with a "Technical Contact" role should be provided at the product order level. Technical Contact name, Telephone number and email address must be provided.
- 108: If orderItemAction is not INSTALL, orderItem.product.id is mandatory
- 109: If orderActivity is set to INSTALL, all orderItemAction must be INSTALL
- 110: Quote expired – (use to be defined later)
- 111: If orderActivity is set to DISCONNECT, all orderItemAction must be DISCONNECT
- 112: if orderActivity is set to CHANGE, all order item must not be all DISCONNECT or INSTALL

Usage Samples

Request:

```
POST {api_url}/productOrderingManagement/productOrder
Content-Type: application/json

{
   "externalId":"AZCO456",
   "requestedStartDate":"2018-02-16T14:05:03.498Z",
   "requestedCompletionDate":"2018-02-17T14:05:03.498Z",
   "expeditePriority":0,
   "orderActivity":"INSTALL",
   "desiredResponses":"CONFIRMATION_AND_ENGINEERING_DESIGN",
   "orderVersion":"1",
   "projectId":"AZCO",
   "tspRestorationPriority":"2",
   "relatedParty":[
      {
         "role":"buyer",
         "name":"Siva",
         "emailAddress":"siva@mef.net",
         "number":"4698521478",
         "numberExtension":"12"
      },
      {
         "role":"Seller",
         "name":"Ludovic",
         "emailAddress":"ludo@mef.net",
         "number":"0698524595"
      }
   ],
   "note":{
      "text":"ProductOrder following discussion established Jan 14, 2018",
      "date":"2018-02-15T14:05:03.498Z",
      "author":"Siva"
   },
   "orderItem":[
      {
         "id":"1",
         "action":"INSTALL",
         "billingAccount":{
            "id":"BA123654"
         },
         "productOffering":{
            "id":"OrangeUNI"
         },
         "product":{
            "productSpecification":{
               "id":"UNISpec",
               "describing":{
                  "@type":"UNISpec",
                  "@schemaLocation":"https://github.com/MEF-GIT/MEF-LSO-Sonata-
SDK/blob/master/experimental/api/ProductSpecDescription/Ordering/UNISpec.json"
               }
            },
```

```
    << This is where productspec characteristics would be given value>>
            },
            "place":[
               {
                  "role":"UNI Site",
                  "@referredType":"FormattedAddress",
                  "@schemaLocation":"https://github.com/MEF-GIT/MEF-LSO-
Sonata-
SDK/blob/master/experimental/api/PlaceDescription/FormattedAddress.json",
                  "addrline1":"12 Avenue Pierre Marie",
                  "city":"Lyon",
                  "stateorProvince":"Rhone",
                  "postcode":"69001",
                  "country":"France"
               }
            ],
            "relatedParty":[
               {
                  "role":"Technical Contact",
                  "name":"Jessie",
                  "emailAddress":"jessie@mef.net",
                  "number":"0625413698"
               },
               {
                  "role":"Implementation Contact",
                  "name":"Jessie",
                  "emailAddress":"jessie@mef.net",
                  "number":"0625413698"
               },
               {
                  "role":"UNI Site Contact",
                  "name":"Jessie",
                  "emailAddress":"jessie@mef.net",
                  "number":"0625413698"
               }
            ]
         },
         "qualification":[
            {
               "id":"1369-4523",

"href":"https://spDB/productOfferingqualificationManagement/POQ/1369-4523",
               "qualificationItem":"1"
            }
         ]
      },
      {
         "id":"2",
         "action":"INSTALL",
         "productOffering":{
            "id":"OrangeELine"
         },
         "product":{
            "productSpecification":{
               "id":"eLineSpec",
               "describing":{
                  "@type":"eLineSpec",
```

```
                  "@schemaLocation":"https://github.com/MEF-GIT/MEF-LSO-Sonata-
SDK/blob/master/experimental/api/ProductSpecDescription/Ordering/ELineSpec.json"
               }
            },
<< This is where productspec characteristics would be given value>>
            "place":[
               {
                  "id":"AZe78-45fgh6-45de5r",
                  "role":"ENNI Site",
                  "@referredType":"site"
               }
            ],
            "relatedParty":[
               {
                  "role":"Technical Contact",
                  "name":"Hunter Pence",
                  "emailAddress":"hunter@giants.com",
                  "number":"4156987852369"
               },
               {
                  "role":"ENNI Site Contact",
                  "name":"Andrew Mc Clutchen",
                  "emailAddress":"andrew@giants.com",
                  "number":"4152236698741"
               }
            ]
         },
         "qualification":[
            {
               "id":"1369-4523",

"href":"https://spDB/productOfferingqualificationManagement/POQ/1369-4523",
               "qualificationItem":"2",
               "@referredType":"string"
            }
         ]
      },
      {
         "id":"3",
         "action":"INSTALL",
         "productOffering":{
            "id":"UNICEEndPoint"
         },
         "product":{
            "productSpecification":{
               "id":"UNICEEndPointspec",
               "describing":{
                  "@type":"UNICEEndPointspec",
                  "@schemaLocation":"https://github.com/MEF-GIT/MEF-LSO-Sonata-
SDK/blob/master/experimental/api/ProductSpecDescription/Ordering/UNICEEndPointSpec.json"
               }
            },
<< This is where productspec characteristics would be given value>>
         },
         "orderItemRelationship":[
            {
               "type":"RELIES_ON",
```

```
                "id":"1"
             },
             {
                "type":"RELIES_ON",
                "id":"2"
             }
          ],
          "qualification":[
             {
                "id":"1369-4523",

"href":"https://spDB/productOfferingqualificationManagement/POQ/1369-4523",
                "qualificationItem":"3",
                "@referredType":"string"
             }
          ]
       },
       {
          "id":"4",
          "action":"INSTALL",
          "productOffering":{
             "id":"ENNICEEndPoint"
          },
          "product":{
             "productSpecification":{
                "id":"ENNICEEndPointSpec",
                "describing":{
                   "@type":"ENNICEEndPointSpec",
                   "@schemaLocation":"https://github.com/MEF-GIT/MEF-LSO-Sonata-
SDK/blob/master/experimental/api/ProductSpecDescription/Ordering/ENNICEEndPointSpec.json"
                }
             },
<< This is where productspec characteristics would be given value>>
             "productRelationship":[
                {
                   "type":"RELIES_ON",
                   "product":{
                      "id":"45df-er26-456r-85gh"
                   }
                }
             ]
          },
          "orderItemRelationship":[
             {
                "type":"RELIES_ON",
                "id":"2"
             }
          ],
          "qualification":[
             {
                "id":"1369-4523",

"href":"https://spDB/productOfferingqualificationManagement/POQ/1369-4523",
                "qualificationItem":"3"
             }
          ],
          "@type":"string",
```

```
          "@schemaLocation":"string"
       }
    ],
    "@type":"MEFProductOrder",
    "@schemaLocation":"https://..."
}
```

```
201
{
  "id": "456987"
}
```

9.2 Retrieve Orders

```
GET {apiRoot}/productOrder?{filtering}
```

Description

This operation is used to retrieve product order(s) corresponding to search criteria(s)

The response will be a product order summary.

Only following attributes could be used as search criteria

- externalId
- orderDate
- state
- requestedCompletionDate
- projectId

Only following attributes will be retrieved in summary view:

- id
- externalId
- orderDate
- state
- requestedCompletionDate
- projectId

Behavior

- Returns HTTP/1.1 status code 200 if the request was successful

  Note: if no productOrder match the criteria an empty list is retrieved with a 200 status code (not considered as a fail)

Otherwise:

400	Bad Request
401	Unauthorized
403	Forbidden
405	Method Not Allowed
408	Request Time-out
422	Unprocessable entity (see below)

Usage Samples

Request

```
GET
{api_url}/productOrderingManagement/productOrder ?state=acknowledged&projectI
d=Air France Customer &orderDate>2017-01-01
Accept: application/json
```

Response

```
[
{
  "id": "17",
  "externalId": " OrangeforAirFrance002",
  "orderDate": "2017-06-16T07:54:51.696Z",
  "state": "acknowledged",
  "requestedCompletionDate": "2017-06-16T07:54:51.696Z",
  "projectId": "Air France Customer "
},
{
  "id": "45",
  "externalId": " OrangeforAirFrance003",
  "orderDate": "2017-06-17T09:44:21.614Z",
  "state": "acknowledged",
  "requestedCompletionDate": "2017-06-276T07:54:51.696Z",
  "projectId": "Air France Customer "
}
]
```

9.3 Retrieve a single product order by order identifier

`GET {apiRoot}/productOrder/{id}`

Description

This operation is used to retrieve a product order entity

Behavior

- Returns HTTP/1.1 status code 200 if the request was successful

Otherwise:

400	Bad Request
401	Unauthorized
403	Forbidden
404	Not Found
405	Method Not Allowed
408	Request Time-out
422	Unprocessable entity (see below)

Usage Sample

Request

```
GET {api_url}/productOrderingManagement/productOrder/456987
Accept: application/json
```

Response

```
See JSON illustrating productOrder resource (JSON representation sample §)
```

9.4 Change Order

```
POST {apiRoot}/productOrder
```

Description

This operation creates a product order entity.

All order item action set to ‘CHANGE” or “INSTALL” or “DISCONNECT” (no all with “INSTALL” or with “DISCONNECT”)

Behavior

Standard 201 response if product order created

Otherwise:

400	Bad Request
401	Unauthorized
403	Forbidden
405	Method Not Allowed
408	Request Time-out
422	Unprocessable entity (see below)

Usage Sample

Request

```
POST {api_url}/productOrderingManagement/productOrder
Content-Type: application/json

{
  "externalId": "CHG12365",
  "requestedCompletionDate": "2018-02-15T20:36:48.667Z",
  "requestedStartDate": "2018-02-15T20:36:48.667Z",
```

```
  "@type": "MEFProductOrder",
  "orderActivity": "CHANGE",
  "relatedParty":[
      {
         "role":"buyer",
         "name":"Siva",
         "emailAddress":"siva@mef.net",
         "number":"4698521478",
         "numberExtension":"12"
      },
      {
         "role":"Seller",
         "name":"Ludovic",
         "emailAddress":"ludo@mef.net",
         "number":"0698524595"
      }
   ],
  "orderItem": [
    {
      "id": "1",
      "action": "CHANGE",
      "product": {
        "id": "12h3-856h-hf55-rt56",
        "productSpecification": {
          "id": "UNISpec",
          "describing": {
            "@type": "UNISpec",
            "@schemaLocation":"https://github.com/MEF-GIT/MEF-LSO-Sonata-
SDK/blob/master/experimental/api/ProductSpecDescription/Ordering/UNISpec.json"
               }
            },
    << This is where productspec characteristics modified would be given
value>>
        }
    }
  ]
}
```

Response

```
201
{
  "id": "744544"
}
```

9.5 Amend Order

Description

Amend order will be described in next release.

Behavior

Usage Sample

Request

```
xxxx
```

Response

```
xxxxx
```

9.6 Cancel Order

`POST /productOrder/{id}/cancel`

Description

This specific operation allows buyer to request a pending order cancellation.

In the response the buyer can indicate if

- the request for cancellation is accepted (state PENDING_CANCELLATION or CANCELLED is send back in the response)
- a delay is required to assess if cancellation is possible (state ASSESSING_CANCELLATION sent back)
- the request is denied (current order state is retrieved) – seller could indicate a cancellation Denied reason in the response

In the case where seller need time to assess the request, the buyer will know assessment output via an order ProductOrderStateChangeNotification once the seller made his decision.

Behavior

Standard 201 response if cancellation request created

Otherwise:

400	Bad Request
401	Unauthorized
403	Forbidden
405	Method Not Allowed
408	Request Time-out
422	Unprocessable entity (see below)

Usage Sample

Request

```
POST {api_url}/productOrderingManagement/productOrder/17/cancel
Accept: application/json
```

Response

Cancellation request accepted:

```
201
{
  "id": "744544",
  "state": "CANCELLED"
}
```

Cancellation request need to be assessed:

```
201
{
  "id": "744544",
  "state": "ASSESSING_CANCELATION"
}
```

Cancelation request denied:

```
201
{
  "id": "744544",
  "state": "CONFIRMED",
  "cancellationDeniedReason": "Order already confirmed – cancellation
imposssible"
}
```

9.7 Disconnect Order

`POST {apiRoot}/productOrder`

Description

This operation creates a product order entity.

All order item action set to “DISCONNECT”

Behavior

Standard 201 response if product order created

Otherwise:

400	Bad Request
401	Unauthorized
403	Forbidden
405	Method Not Allowed
408	Request Time-out
422	Unprocessable entity (see below)

Usage Sample

SP1 asks disconnection of an existing UNI to SP2. This UNI has id 459h-85df-87hhj-45uu in SP2 product inventory.

Request

```
POST {api_url}/productOrderingManagement/productOrder
Content-Type: application/json

{
  "externalId": "DIS452136",
  "requestedCompletionDate": "2018-02-15T20:36:48.667Z",
  "requestedStartDate": "2018-02-15T20:36:48.667Z",
  "expeditePriority": 0,
  "@type": "MEFProductOrder",
  "orderActivity": "DISCONNECT",
   "relatedParty":[
      {
         "role":"buyer",
         "name":"Siva",
         "emailAddress":"siva@mef.net",
         "number":"4698521478",
         "numberExtension":"12"
      },
      {
         "role":"Seller",
         "name":"Ludovic",
         "emailAddress":"ludo@mef.net",
         "number":"0698524595"
      }
   ],
  "orderItem": [
    {
      "id": "1",
      "action": "DISCONNECT",
      "product": {
        "id": "459h-85df-87hhj-45uu",
        "@type": "UNISpec",
        "productSpecification": {
```

```
            "id": "UNISpec"
            }
          }
        }
      }
    ]
}
```

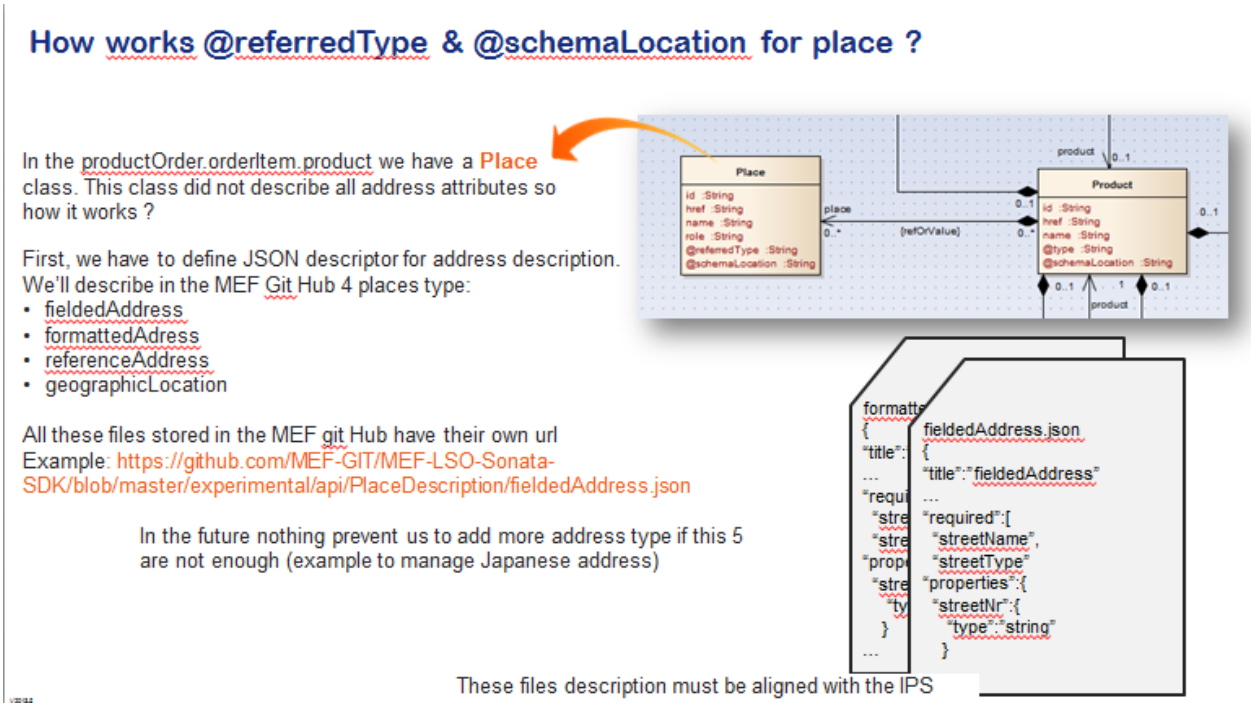
Response

```
201
{
  "id": "789963"
}
```

10. Appendix – Place description pattern

Following 3 diagrams illustrates how to leverage MEF API polymorphism to manage any addres description:

As of now MEF described address in JSON files available here: https://github.com/MEF-GIT/MEF-LSO-Sonata-SDK/blob/master/experimental/api/PlaceDescription/fieldedAddress.json



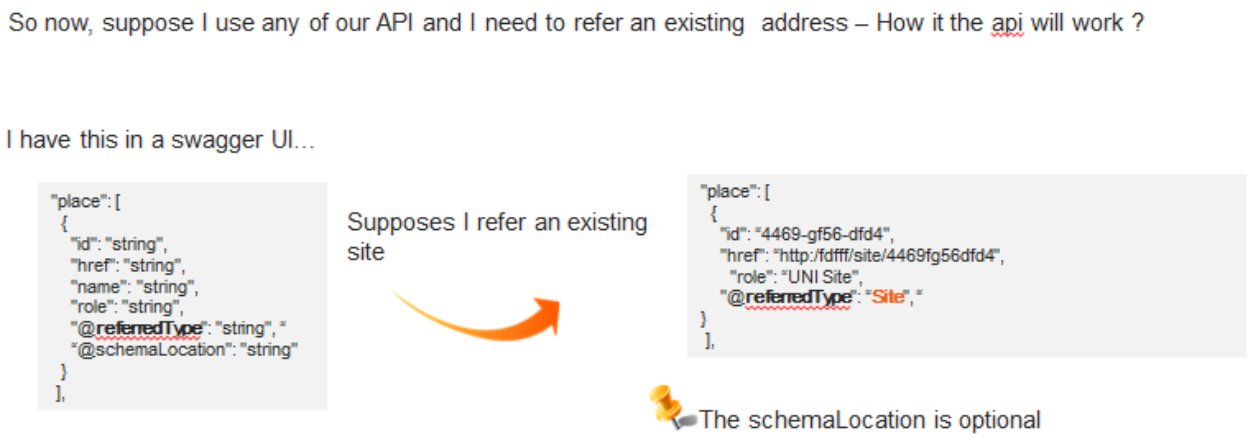
So now, suppose I use any of our API and I need to describe an address (not existing) – How it the api it will work ?

I have this in a swagger UI…

```
"place": [
 {
  "id": "string",
  "href": "string",
  "name": "string",
  "role": "string",
  "@referredType": "string", "
  "@schemaLocation": "string"
 }
],
```

If I need to describe a fielded address (not existing)

```
"place": [
 {
  "id": "string",
  "href": "string",
   "role": "UNI Site",
  "@referredType": "fieldedAddress", "
  "@schemaLocation": "https://github.com/MEF-GIT/MEF-LSO-Sonata-SDK/blob/master/experimental/api/PlaceDescription/fieldedAddress.json"
   "streetNr": "60",
   "streetName": "Ha-Yarkon",
   "streetType": "Street",
   "streetSuffix": "A",
   "city": "Tel Aviv-Yafo",
   "postcode": "78963",
   "stateOrProvince": "Tel Aviv Area",
   "country": "Israel",
 }
],
```



11. Appendix – Product Specification Description

11.1 Product Specification management in the API

The productOrder API is product-agnostic. The product specification information is managed with an API extension pattern. This pattern allows distinguishing 2 types of data:

- Catalog information: What are the product specification attributes? What is the attribute format? What is the cardinality of each attribute? In case of a predefined list, what are the values?
- Order-instantiated productSpec description: What are the attributes values for this order? These values should be filled accordingly to catalog information.

The pattern to describe the data is described in the following 3 steps:

Step 1: Identifying the productSpec

Basically, let's assume an orderItem is describing the order of a productSpecification (and an order is an array of order item) [*That's a simplification because an order item could also describe a bundledProductOffering with no productSpec… but not currently in the MEF*]

The first thing is to identify this productSpecification for the seller by means of an *identifier* (this id is the catalog id of the productSpec for the seller). This id should have been communicated by the seller to the buyer during the on-boarding process between the service provider and the partner (or on-the-fly accessible with a catalog API).

Then we need to provide additional information to retrieve catalog information used to describe this productSpec:

- @type – This is type of productSpec as defined in the MEF. In the example, id and @type have same value but nothing prevents a service provider to have id AZ45hT7 as a productSpec knows a UNISpec in the MEF.
- @schemaLocation describes a URL … and this URL targets the MEF server. Following this URL we have a JSON describing the productSpec. We have there the catalog view of the product spec
- @baseType – is an additional information (optional) to indicate the productSpec category type

@type and @schemaLocation are mandatory information to be filled in the order item.

Step 2: Getting the productSpec description

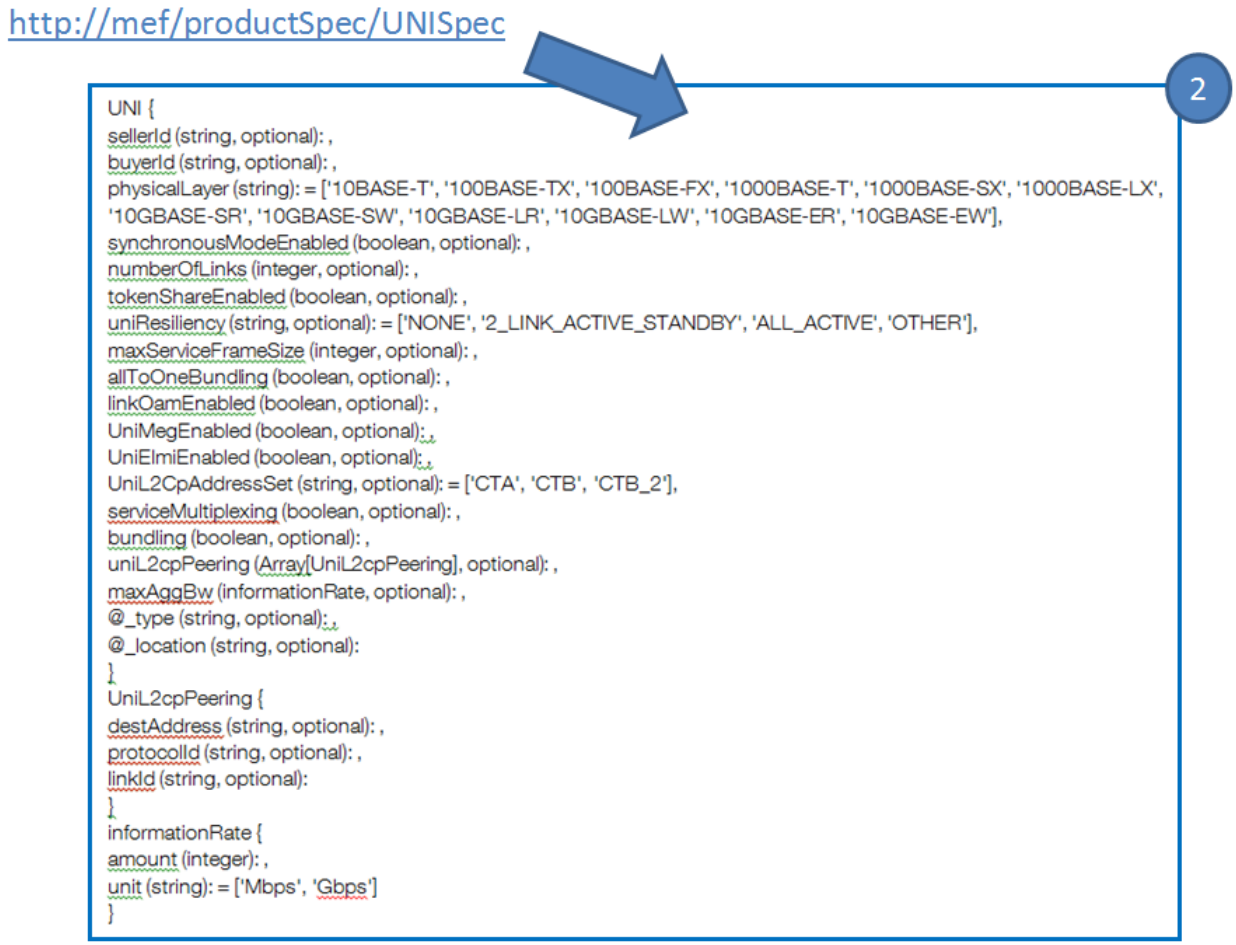
If we follow the link indicated in the @schemaLocation we reach a JSON file stored in the MEF server where the ordered productSpec catalog description is available. The buyer uses this description to build his order and describe the ordered product.

We have the following information for the UNI Spec:

We find the description of the UNI productSpec. We can see there that the

- allToOneBundling is an optional boolean,
- physicalLayer is a mandatory attribute and has a pre-defined list,
- maxAggBw is a complex structure which is itself defined there,
- etc…

We note also there that we have @type and @location attributes. These attributes could be optionally used by a service provider to enrich the productSpec with additional attribute specific to this service provider. Use of this extension must be agreed during the on-boarding process



between the service provider and the partner.

Step 3: Describing the ordered productSpec

The buyer uses the productSpec Description (step 2) to describe the instance of the ordered productSpec. This description is done in a straightforward way with the list of attributes and values directly described in the product structure (in orange).

12.