HUBJECT

Flexible/ Dynamic Pricing

Functional Guide for Service Implementation

Contents

Dynamic Pricing - Functional Guide for Service Implementation and Usage

1.   Introduction

The HBS offers the possibility to flexibly or dynamically price Authorization services. This service is mainly to enable pushing (upload) and pulling (download) of pricing data to and from the HBS through webservice requests and/or through downloads/uploads in the Hubject portal.

The aim of this documentation is to provide partners that wish to implement the service an overview and step by step guide of how to best capitalize on the technical capabilities provided by the service in best practice combination with (and under consideration of) the business restrictions. Specifically, the aim of the guide is to provide a holistic overview (technical & functional) of how to best implement and use the current service within the framework of the current HBS business contracts process (i.e. use of the dynamic pricing OICP API calls in combination with service offers and subscriptions in the HBS Portal).

As mentioned above, the main business goal of the first version of this service is to offer the possibility to "flexibly" and/or "dynamically" price Authorization services. The terminologies "Flexible" and "Dynamic" are specifically chosen to depict the following differentiated functional use of the service:

- Flexible Pricing: **enables CPOs to offer differentiated pricing (in multiple currencies) of charging processes at their charging stations. Currently, the differentiation of prices can be done along the following dimensions:**
  - **charging facility / maximum charging power**
  - **EVSE location**
  - **Time**
  With flexible pricing, the current version of the service offers the capability to exchange these flexible prices over webservice communication between CPOs and EMPs. See the sample use cases description below for a step by step implementation guide.

- Dynamic Pricing: **In addition to the flexible pricing capability, this version of the service also enables more frequent (i.e. near real-time) update and exchange of pricing information between CPOs and EMPs. From a technical perspective, this is achieved whereby a CPO continuously pushes valid prices to the HBS for specific EMPs to pull these prices. How this capability can be utilized within an appropriate business framework on the HBS is detailed in the section "*Sample Use Cases - Dynamic Pricing*" below. Furthermore, it is to be noted that the dynamic pricing capability builds on the flexible pricing capability and can therefore be seen as frequent and near real-time exchange of flexible pricing data (based on bilateral agreements between the involved partners).**

In summary, the HBS beginning with OICP 2.2 offers an extensive breadth of technical capabilities for flexible and/or dynamic pricing of charging services for CPOs. This documentation therefore aims to serve as a guide for successfully implementing a technically and functionally compliant use of the Hubject dynamic pricing webservice.

2.   Use Case - Flexible Pricing

CPO *XYZ* wants to price charging sessions at his charging points based on the following scenarios:

- **Scenario 1 -** *Time-based Pricing*

- **Scenario 2 -** *Charging Facility based (i.e. maximum charging power related) Pricing*

- **Scenario 3 -** *Location-based (EVSE-specific) Pricing*

- **Scenario 4 -** *Location- and Time-based Pricing*

By following the steps detailed below, CPO *XYZ* should be able to setup Authorization service offers with flexible pricing for EMPs:

General steps to be performed

Step 0: Preconditions:

    i.   **To be able to push pricing data to the HBS over webservice communication, CPO *XYZ* must implement the eRoamingDynamicPricing V1.0 webservice as specified in OICP 2.2.**

        Note: the HBS 2.0 platform also provides the possibility for CPOs to upload pricing data over the HBS portal GUI. Thus, partners can also upload and download pricing data through the portal in case they have not implemented the OICP 2.2 Dynamic Pricing webservice.

    ii.   **CPO *XYZ* must define tariffs (referred to in the OICP as pricing products) in accordance with the OICP 2.2 specification for the operation "PushPricingProductData" (see chapter 3.5.1 of the OICP 2.2 Specification document).**

Examples of how CPO *XYZ* can capture his tariff models in the "PricingProductData" payload structure required for transferring pricing data to the HBS using the eRoamingDynamicPricing service are provided below. These examples cover the various flexible pricing scenarios that can result from the above-mentioned use cases and combinations thereof (see the section "Samples - Operator tariff conversion into OICP Pricing Data payload " below).

Step 1: Create a service offer with the following characteristics in the HBS Portal (see https://support.hubject.com for a user guide on how to create service offers on the HBS Portal):

- **Service Type:** *Authorization*
- **Offer Type:** *Offer-to-All*
- **Pricing Model:** *Flexible/Dynamic (Please note that as per the eRoaming Contract, price changes need to be communicated 42 days in advance. Consequently, it is recommended that only flexible pricing is used for Offer-to-All service offers (i.e. Offer-to-All pricing cannot be changed dynamically).*

Step 2: Attach pdf file with offer details such as the business and legal terms and conditions (*i.e. information to help EMPs understand the CPOs flexible pricing approach can be included. Actual prices and pricing products should not be included here but rather provided through the approach described in step 3 below*).

Step 3: Decide on which HBS interface to use in uploading the pricing data. The options available are:

- **3.1** *Webservice upload*: **use the eRoamingDynamicPricing webservice to upload the pricing data by sending a "PushPricingProductData" request to the HBS (see the OICP 2.2 Specification document on https://www.hubject.com/downloads/oicp/ for message details and structure)**

  Note: to use the eRoamingDynamicPricing webservice for uploading pricing data, a service offer must have been created with Authorization as service type (i.e. Step 1 must be completed before step 3.1 can be performed).

- **3.2** *Portal GUI upload:* **upload the pricing data using the respective service offer created in Step 1(see https://support.hubject.com for a user guide on how to create service offers with Flexible/Dynamic pricing as the chosen pricing model). The portal upload option supports csv files which must meet a specific format. Templates can be downloaded during the upload process in the portal to assist with the creation of files of the appropriate format (also, see the section "*Pricing Data transfer through the HBS Portal*" below for details of the required structure for csv files).**

Note: irrespective of the upload interface used in Step 3, the precondition (ii) stated above in Step 0 must be met to enable a successful upload of the pricing data.

Step 4: For the initial pricing data upload, use the Action Type "FullLoad" or "Insert". In case the initial upload had data errors, the action type "update" can be used for corrective modifications of the data. The action type "delete" can also be to delete incorrect or outdated data records. For Flexible Pricing, the action types "Update" and "Delete" can only be used as long as the service offer has no subscribers. After the first subscription to the offer, prices can no longer be updated or deleted.

The above steps can similarly be used to create a bilateral service offer (i.e. *OfferType* in Step 1 above would be "Bilateral" instead of "Offer-to-all") with flexible pricing. In this case, only the specific EMP(s) chosen by CPO XYZ as recipient(s) of the offer will be able to view and download the pricing data uploaded by CPO *XYZ*.

With the above 4 steps, CPO XYZ would be able to create either an offer-to-all or bilateral service offer with flexible pricing of charging sessions. EMPs on the other hand will be able to view the offer and download the pricing data uploaded by the CPO.

EMPs can download the pricing data in the HBS Portal before subscribing to the offer. EMPs can however also use the eRoamingDynamicPricing webservice to pull (download) the data by sending a "PullPricingProductData" request to the HBS (see the OICP 2.2 Specification document for message details and structure). If an EMP wishes to download the pricing data with a webservice request, then a subscription to the service offer by the EMP must be made prior to sending the webservice request. In other words, to be able to pull the pricing data uploaded by CPOs with a webservice request, EMPs will have to subscribe to the respective CPO's flexible pricing service offer in the HBS portal. Without a valid subscription, the webservice request will not be processed by the HBS.

2.1   Samples - Operator Tariff Conversion to OICP Pricing Data Payload

Scenario 1 - Time-based Pricing: in this scenario, CPO XYZ wants to price charging sessions based on what time of the day or week these sessions occur. For instance, he wishes to price morning and afternoon sessions on any day differently from night sessions and weekdays differently from weekends. The table below shows how CPO XYZ can capture his Time-based price differentiation in the "PricingProductData" payload structure required for transferring tariff details to the HBS using the eRoamingDynamicPricing service.

Operator Tariff Details (Time-based tariffs)		Tariff details converted to OICP PricingProductData format
Tariff Name	**Pricing details**	
Day Tariff	**06.00-19.00h: 0.25 EUR/kWh**	
Night Tariff	**19.01-05.59h: 0.30 EUR/kWh**	
Weekend Tariff	**Saturdays & Sundays: 0.35 EUR/kWh**	

```
{
  "ActionType": "fullLoad",
  "PricingProductData": {
    "OperatorID": "DE*XYZ",
    "OperatorName": "CPO XYZ",
    "ProviderID": "*",
    "PricingDefaultPrice": 0.30,
    "PricingDefaultPriceCurrency": "EUR",
    "PricingDefaultReferenceUnit":
"KILOWATT_HOUR",
    "PricingProductDataRecords": [
      {

        "ProductID": "DayTariff",
        "ProductPriceCurrency": "EUR",
        "ReferenceUnit": "
KILOWATT_HOUR "
        "IsValid24hours": false,
        "MaximumProductChargingPower":
50,
        "PricePerReferenceUnit": 0.25,
        "ProductAvailabilityTimes": [
          {
            "Periods": [
              {

                "begin": "06:00",
                "end": "19:00"
              }
            ],
            "on": "Workdays"
          }
        ]
      },

      {

        "ProductID": "NightTariff",
        "ProductPriceCurrency": "EUR",
```

```
        "ReferenceUnit": "
KILOWATT_HOUR "
        "IsValid24hours": false,
        "MaximumProductChargingPower":
50,
        "PricePerReferenceUnit": 0.30,
        "ProductAvailabilityTimes": [
          {
            "Periods": [
              {

                "begin": "19:01",
                "end": "05:59"
              }
            ],
            "on": "Workdays"
          }
        ]
      },

      {

        "ProductID": "WeekendTariff",
        "ProductPriceCurrency": "EUR",
        "ReferenceUnit": "
KILOWATT_HOUR "
        "IsValid24hours": true,
        "MaximumProductChargingPower":
50,
        "PricePerReferenceUnit": 0.35,
        "ProductAvailabilityTimes": [

          {
            "Periods": [
              {

                "begin": "00:00",
                "end": "23:59"
              }
            ],
            {
              "on": "Weekend"
            }
          ]
        }
      }
    }
```

__Scenario 2 - Charging Facility based Pricing:__ in this scenario, CPO XYZ wants to price charging sessions at his charging points based on the maximum charging power (i.e. charging facility capabilities). For instance, CPO XYZ wishes to price charging sessions at AC facilities (i.e. AC charge points) differently from charging sessions at DC facilities. The table below shows how CPO XYZ can capture his Charging Facility based price differentiation in the "PricingProductData" payload structure required for transferring tariff details to the HBS using the eRoamingDynamicPricing service.

Operator Tariff Details (charging facility based tariffs)			Tariff details converted to OICP PricingProductData format
Tariff Name	**Tariff Description**	**Pricing details**	
AC_1	**AC Charging: 200 - 240V, 1- Phase ≤ 32A**	0.15 EUR/min	```{``` ```"ActionType": "fullLoad",``` ```"PricingProductData": {``` ```"OperatorID": "DE*XYZ",``` ```"OperatorName": "CPO XYZ",``` ```"ProviderID": "*",``` ```"PricingDefaultPrice": 0.30,``` ```"PricingDefaultPriceCurrency": "EUR",``` ```"PricingDefaultReferenceUnit": "MINUTE",``` ```"PricingProductDataRecords": [``` ```{```
AC_2	**AC Charging: 380 - 480V, 3- Phase ≤ 32A**	0.25 EUR/min	```"ProductID": "AC_1",``` ```"ProductPriceCurrency": "EUR",``` ```"ReferenceUnit": "MINUTE"``` ```"IsValid24hours": true,``` ```"MaximumProductChargingPower": 7.8,```
DC_1	**DC Charging ≤ 50kW**	0.35 EUR/min	```"PricePerReferenceUnit": 0.15,``` ```"ProductAvailabilityTimes": [``` ```{``` ```"Periods": [``` ```{``` ```"begin": "00:00",``` ```"end": "23:59"``` ```}``` ```],``` ```{``` ```"on": "Everyday"``` ```}``` ```]``` ```},``` ```{```

```json
                                "ProductID": "AC_2",
                                "ProductPriceCurrency": "EUR",
                                "ReferenceUnit": "MINUTE"
                                "IsValid24hours": true,
                                "MaximumProductChargingPower":
15.4,
                                "PricePerReferenceUnit": 0.25,
                                "ProductAvailabilityTimes": [

                                    {
                                      "Periods": [
                                        {

                                            "begin": "00:00",
                                            "end": "23:59"
                                        }
                                    ],

                                    {
                                      "on": "Everyday"
                                    }
                                ]
                            },

                            {

                                "ProductID": "DC_1",
                                "ProductPriceCurrency": "EUR",
                                "ReferenceUnit": "MINUTE"
                                "IsValid24hours": true,
                                "MaximumProductChargingPower":
50,
                                "PricePerReferenceUnit": 0.35,
                                "ProductAvailabilityTimes": [

                                    {
                                      "Periods": [
                                        {

                                            "begin": "00:00",
                                            "end": "23:59"
                                        }
                                    ],
                                    {
                                      "on": "Everyday"
                                    }
                                ]
                            }
                        }
                    }
```

***Scenario 3 - Location-based (EVSE-specific) Pricing**: in this scenario, CPO XYZ wants to price charging sessions at his charging points based on the location of the charge point. This can also be viewed as EVSE-specific pricing whereby each EVSE is assigned its own pricing for charging sessions that take place at that EVSE. To implement location-based pricing, CPOs have to send a second request payload in addition to the "PricingProductData" payload. This is the so-called "EVSEPricing" payload to be sent using the "eRoamingPushEVSEPricing" request (see the OICP 2.2 specification for message structure and details). The table below shows how CPO XYZ can capture his location-based (EVSE-specific) price differentiation in the "PricingProductData" and "EVSEPricing" payload structures required for transferring tariff details to the HBS using the eRoamingDynamicPricing service.*

Operator Tariff Details (location-based tariffs)			OICP Payload Samples	
Tariff Name	EVSE Relation	Pricing Details	Tariff details in OICP PricingProductData format	EVSE Relation to PricingProductData in OICP EVSEPricing format

Region_1	DEXYZE0000012 0
	
	DEXYZE0000012 1
	
	DEXYZE0000012 2
	
	DEXYZE0000012 3
	
	DEXYZE0000012 4
	
	DEXYZE0000012 5
		0.15 EUR/min	{
			 "ActionType": "**fullLoad**",
			 "PricingProductData": {
			  "OperatorID": "**DE*XYZ**",
			  "OperatorName": "**CPO XYZ**",
			  "ProviderID": "*****",
			  "PricingDefaultPrice": **0.30**,
			  "PricingDefaultPriceCurrency": "**EUR**",
			  "PricingDefaultReferenceUnit": "**MINUTE**",
			  "PricingProductDataRecords": [
			   {
			
			    "ProductID": "**Region_1**",
			    "ProductPriceCurrency": "**EUR**",
			    "ReferenceUnit": "**MINUTE**"
			    "IsValid24hours": **true**,
			    "MaximumProductChargingPower": **7.8**,
			    "PricePerReferenceUnit": **0.15**,
			    "ProductAvailabilityTimes": [
			
			     {
			      "Periods": [
			       {
			
			        "begin": "**00:00**",
			        "end": "**23:59**"
			       }
			      ],
			     {
			      "on": "**Everyday**"
			     }
				{
				 "ActionType": "**fullLoad**",
				 "EVSEPricing": [
				  {
				   "EvseID": "**DEXYZE00000120**",
				   "ProviderID": "*****",
				   "EvseIDProductList": [
				    "**Region_1**"
				   ]
				  },
				
				  {
				   "EvseID": "**DEXYZE00000121**",
				   "ProviderID": "*****",
				   "EvseIDProductList": [
				    "**Region_1**"
				   ]
				  },
				
				  {
				   "EvseID": "**DEXYZE00000122**",
				   "ProviderID": "*****",
				   "EvseIDProductList": [
				    "**Region_1**"
				   ]
				  },

Region_2	DEXYZE0000013 0 DEXYZE0000013 1 DEXYZE0000013 2 DEXYZE0000013 3 DEXYZE0000013 4 DEXYZE0000013 5	0.25 CHF/min		

Region_3	DEXYZE00000220	0.35 USD/min		

```
                            ]
                        },
                        {

                            "ProductID": "Region_2",
                            "ProductPriceCurrency": "CHF",
                            "ReferenceUnit": "MINUTE"
                            "IsValid24hours": true,
                            "MaximumProductChargingPower": 15.4,
                            "PricePerReferenceUnit": 0.25,
                            "ProductAvailabilityTimes": [

                                {
                                    "Periods": [
                                        {

                                            "begin": "00:00",
                                            "end": "23:59"
                                        }
                                    ],

                                    {
                                        "on": "Everyday"
                                    }
                                ]
                            },

                            {

                                "ProductID": "Region_3",
                                "ProductPriceCurrency": "USD",
                                "ReferenceUnit": "MINUTE"
                                "IsValid24hours": true,
                                "MaximumProductChargingPower": 50,
                                "PricePerReferenceUnit": 0.35,
                                "ProductAvailabilityTimes": [

                                    {
                                        "Periods": [
                                            {

                                                "begin": "00:00",
                                                "end": "23:59"
                                            }
                                        ],
                                        {
                                            "on": "Everyday"
                                        }
                                    ]
                                }
                            }
                        }
```

```
                {
                    "EvseID": "DEXYZE00000123",
                    "ProviderID": "*",
                    "EvseIDProductList": [

                        "Region_1"
                    ]
                },

                {
                    "EvseID": "DEXYZE00000124",
                    "ProviderID": "*",
                    "EvseIDProductList": [

                        "Region_1"
                    ]
                },

                {
                    "EvseID": "DEXYZE00000125",
                    "ProviderID": "*",
                    "EvseIDProductList": [

                        "Region_1"
                    ]
                },

                {
                    "EvseID": "DEXYZE00000130",
                    "ProviderID": "*",
                    "EvseIDProductList": [

                        "Region_2"
                    ]
                },

                {
                    "EvseID": "DEXYZE00000131",
                    "ProviderID": "*",
                    "EvseIDProductList": [

                        "Region_2"
                    ]
                },

                {
                    "EvseID": "DEXYZE00000132",
                    "ProviderID": "*",
                    "EvseIDProductList": [

                        "Region_2"
```

The EvseID column in the table lists: DEXYZE00000220, DEXYZE00000221, DEXYZE00000222, DEXYZE00000223, DEXYZE00000224, DEXYZE00000225

```
    ]
  },

  {
    "EvseID":
"DEXYZE00000133",
    "ProviderID": "*",
    "EvseIDProductList
": [

      "Region_2"
    ]
  },

  {
    "EvseID":
"DEXYZE00000134",
    "ProviderID": "*",
    "EvseIDProductList
": [

      "Region_2"
    ]
  },

  {
    "EvseID":
"DEXYZE00000135",
    "ProviderID": "*",
    "EvseIDProductList
": [

      "Region_2"
    ]
  },

  {
    "EvseID":
"DEXYZE00000220",
    "ProviderID": "*",
    "EvseIDProductList
": [

      "Region_3"
    ]
  },

  {
    "EvseID":
"DEXYZE00000221",
    "ProviderID": "*",
    "EvseIDProductList
": [

      "Region_3"
    ]
  },

  {
    "EvseID":
"DEXYZE00000222",
    "ProviderID": "*",
    "EvseIDProductList
```

13

```
": [
        "Region_3"
    ]
},

{
    "EvseID":
"DEXYZE00000223",
    "ProviderID": "*",
    "EvseIDProductList
": [
        "Region_3"
    ]
},
{
    "EvseID":
"DEXYZE00000224",
    "ProviderID": "*",
    "EvseIDProductList
": [
        "Region_3"
    ]
},

{
    "EvseID":
"DEXYZE00000225",
    "ProviderID": "*",
    "EvseIDProductList
": [
        "Region_3"
    ]
    }
]
}
```

Scenario 4 - Location- and Time-based Pricing: **in this scenario, CPO XYZ wants to price charging sessions at his charging points based on a combination of the location of the charge point and the period of the day/week when charging occurs at the charge point. The table below shows how CPO XYZ can capture his location- and time-based price differentiation in the "PricingProductData" and "EVSEPricing" payload structures required for transferring tariff details to the HBS using the eRoamingDynamicPricing service.**

Operator Tariff Details (location- and time-based tariffs)			OICP Payload Samples	
Tariff Name	Pricing Details	EVSE Relation	Tariff details in OICP PricingProductData format	EVSE Relation to PricingProductData in OICP EVSEPricing format
Day Tariff - Region 1	06.00-19.00h: 0.25 EUR/kWh	DEXYZE00000120 DEXYZE00000121	{ "ActionType": "fullLoad", "PricingProductData": { "OperatorID": "DE*XYZ", "OperatorName": "CPO XYZ", "ProviderID": "*", "PricingDefaultPrice": 0.25, "PricingDefaultPriceCurrency": "EUR", "PricingDefaultReferenceUnit": "KILOWATT_HOUR ", "PricingProductDataRecords": [{ "ProductID": "DayTariff-Region1", "ProductPriceCurrency": "EUR", "ReferenceUnit": "KILOWATT_HOUR " "IsValid24hours": false, "MaximumProductChargingPower": 50, "PricePerReferenceUnit": 0.25, "ProductAvailabilityTimes": [{ "Periods": [{ "begin": "06:00", "end": "19:00" }], "on": "Everyday" }] },	{ "ActionType": "fullLoad", "EVSEPricing": [{ "EvseID": "DEXYZE00000120", "ProviderID": "*", "EvseIDProductList": ["DayTariff-Region1", "NightTariff-Region1"] }, { "EvseID": "DEXYZE00000121", "ProviderID": "*", "EvseIDProductList": ["DayTariff-Region1", "NightTariff-Region1"] }, { "EvseID": "DEXYZE00000130", "ProviderID": "*", "EvseIDProductList": ["DayTariff-
Day Tariff - Region 2	06.00-19.00h: 0.35 CHF/kWh	DEXYZE00000130 DEXYZE00000131		
Day Tariff - Region 3	06.00-19.00h: 0.45 USD/kWh	DEXYZE00000220 DEXYZE00000022		
Night Tariff - Region 1	19.01-05.59h 0.15 EUR/kWh	DEXYZE00000120 DEXYZE00000121		
Night Tariff - Region 2	19.01-05.59h 0.30 CHF/kWh	DEXYZE00000130 DEXYZE00000131		
Night Tariff - Region 3	19.01-05.59h 0.20 USD/kWh	DEXYZE00000220 DEXYZE00000221		

15

```
            {

                "ProductID": "NightTariff-
        Region1",
                "ProductPriceCurrency": "EUR",
                "ReferenceUnit": "
        KILOWATT_HOUR "
                "IsValid24hours": false,
                "MaximumProductChargingPo
        wer": 50,
                "PricePerReferenceUnit": 0.15,
                "ProductAvailabilityTimes": [
                    {
                      "Periods": [
                        {

                            "begin": "19:01",
                            "end": "05:59"
                        }
                      ],
                      "on": "Everyday"
                    }
                ]
            },

            {

                "ProductID": "DayTariff-
        Region2",
                "ProductPriceCurrency": "CHF",
                "ReferenceUnit": "
        KILOWATT_HOUR "
                "IsValid24hours": false,
                "MaximumProductChargingPo
        wer": 50,
                "PricePerReferenceUnit": 0.35,
                "ProductAvailabilityTimes": [
                    {
                      "Periods": [
                        {

                            "begin": "06:00",
                            "end": "19:00"
                        }
                      ],
                      "on": "Everyday"
                    }
                ]
            },

            {
```

```
        Region2",
                "NightTariff-
        Region2"
            ]
        },

        {
            "EvseID":
        "DEXYZE00000131",
            "ProviderID": "*",
            "EvseIDProductLi
        st": [
                "DayTariff-
        Region2",
                "NightTariff-
        Region2"
            ]
        },

        {
            "EvseID":
        "DEXYZE00000220",
            "ProviderID": "*",
            "EvseIDProductLi
        st": [
                "DayTariff-
        Region3",
                "NightTariff-
        Region3"
            ]
        },

        {
            "EvseID":
            "ProviderID": "*",
        "DEXYZE00000221",
            "EvseIDProductLi
        st": [
                "DayTariff-
        Region3",
                "NightTariff-
        Region3"
            ]
        }
    ]

}
```

```
            "ProductID": "NightTariff-
Region2",
        "ProductPriceCurrency": "CHF",
        "ReferenceUnit": "
KILOWATT_HOUR "
        "IsValid24hours": false,
        "MaximumProductChargingPo
wer": 50,
        "PricePerReferenceUnit": 0.30,
        "ProductAvailabilityTimes": [
            {
            "Periods": [
                {

                    "begin": "19:01",
                    "end": "05:59"
                }
            ],
            "on": "Everyday"
            }
        ]
    },

    {


        "ProductID": "DayTariff-
Region3",
        "ProductPriceCurrency": "USD",
        "ReferenceUnit": "
KILOWATT_HOUR "
        "IsValid24hours": false,
        "MaximumProductChargingPo
wer": 50,
        "PricePerReferenceUnit": 0.45,
        "ProductAvailabilityTimes": [
            {
            "Periods": [
                {

                    "begin": "06:00",
                    "end": "19:00"
                }
            ],
            "on": "Everyday"
            }
        ]
    },

    {


        "ProductID": "NightTariff-
Region3",
        "ProductPriceCurrency": "USD",
```

```
            "ReferenceUnit": "
KILOWATT_HOUR "
            "IsValid24hours": false,
            "MaximumProductChargingPo
wer": 50,
            "PricePerReferenceUnit": 0.20,
            "ProductAvailabilityTimes": [
                {
                  "Periods": [
                      {

                          "begin": "19:01",
                          "end": "05:59"
                      }
                  ],
                  "on": "Everyday"
                }
            ]
          }

      }

      }
```

2.2 Business Guidelines for Flexible Pricing Use Case

This section is intended to provide general best practice guidelines for the use of flexible pricing from a business perspective. These guidelines are intended to supplement the technical functionality by providing details on how to treat edge case scenarios that could occur in the above use cases from a business perspective.

A. <u>Guidelines for creating flexible pricing Service Offers on the HBS Portal</u>

(1) **When creating a service offer for Authorization, the "Flexible/Dynamic" option should be selected as pricing model whenever more than one tariff/price value is applicable. When more than one price value exists for the offer, the OICP *PricingProductDataRecords* structure should be used to capture the pricing details either as:**
   i. **a csv file that needs to be attached to the service offer through an upload (as described on the following page: https://support.hubject.com/hc/en-us/articles/115000150945-Create-a-New-Service-Offer), or**
   ii. **as a JSON object that can be sent per webservice to the HBS using the *eRoamingPushPricingProductData* operation (see the OICP 2.2 document for details)**

   Essentially, the *PricingProductDataRecords* to be defined can have one of the following structures:
   a) **Multiple base prices (e.g. different base prices for different time periods or different locations/EVSEs)**

   b) **Single base price with additional variable components to be referenced in determining the final applicable price (e.g. a single base price for consumed energy plus an additional fee for parking or a start fee for process initiation, etc.)**

   c) **Multiple base prices with additional variable components to be referenced in determining the final applicable price (e.g. any combination of the examples given above in (a) and (b))**

Note: the base price is the price value to be provided in the field "*PricePerReferenceUnit*" for any specific *ProductID*. So, any one *ProductID* always corresponds to one base price.

(2) **The following restrictions apply whenever the "Flexible/Dynamic" pricing option is assigned to a service offer:**

   i. **The *PricingProductData* attached to the offer cannot be updated after the first subscription to the offer is created by an EMP. Specifically, this means new pricing *ProductIDs* can neither be added to nor deleted from the offer.**

ii.   **For location/EVSE-specific pricing, *EVSEPricing* data containing only new EVSEIDs can be added to the dataset on the HBS even after the first EMP subscription. However, if the new EVSEID is assigned to a new *ProductID* that was not included in the original *PricingProductData* upload, the upload will be rejected and no update will be performed by the HBS.**

Note: it is recommended that partners desist from the old practice of selecting the "Standard" pricing option and subsequently adding pricing details (showing multiple tariffs) in a pdf attachment. The "Standard" pricing option is to be selected only if the offer has a single price value for the single selected reference unit (e.g. 10 EUR per hour, or per kWh, or per minute) in all scenarios.

B. **Guidelines for handling potential edge cases in the billing process**

1. **For each charging session, it should be possible to assign one and only one pricing *ProductID* that is to be used for the billing process. It is also highly recommended that this *ProductID* is included in the respective CDR (using the field *PartnerProductID* in the CDR) in order to increase transparency and efficiency in determining which tariff/price is to be applied in billing the charging session.**

Note: CPOs that use the Hubject Intercharge Billing service MUST always include a *ProductID* in their CDRs.

2. **For time-based flexible pricing, if the complete duration of the charging session results in an overlap of two or more pricing products/tariffs (i.e. 2 ProductIDs), the *ProductID* valid at *ChargingStart* time is applicable for the billing process. For instance, in the scenario depicted below, the "MorningTariff" *ProductID* shall be applicable for billing the charging process for EV-1 whereas the "AfternoonTariff" *ProductID* shall be applicable in the case of EV-2:**
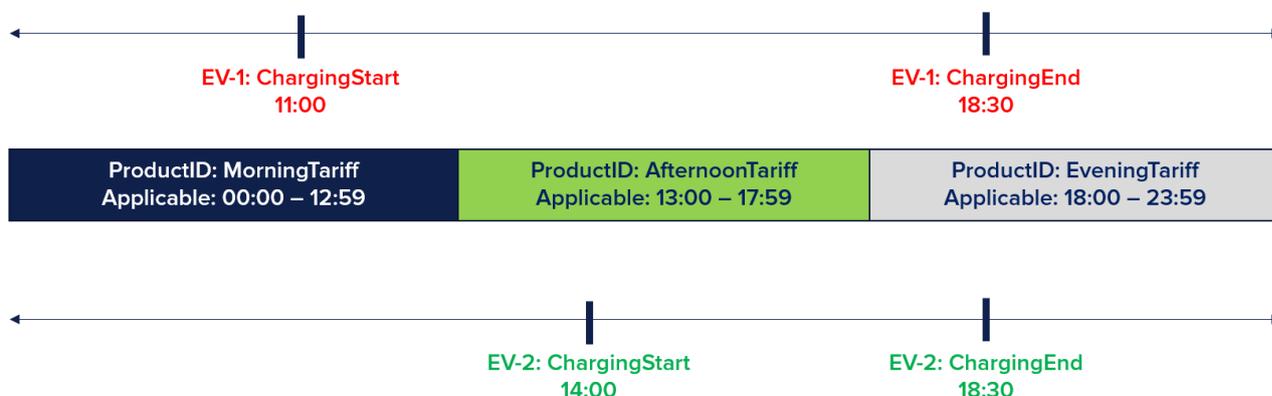
3. The field *"AdditionalReference"* in the OICP *PricingProductDataRecords* structure provides the following additional price references which can be used to define a variable component to be considered in addition to the base price:

   a. **Start Fee**
   b. **Fixed Fee**
   c. **Parking Fee**
   d. **Minimum Fee**
   e. **Maximum Fee**

   In using these additional price references, the following guidelines are to be observed:

   a. *Start Fee:* can be used in case a fixed price is charged for the initiation of the charging session. The price value provided here is to be added on top of the base price value defined for the *ProductID* in question.

   b. *Fixed Fee:* can be used if a single fixed price is to be billed irrespective of charging duration or energy consumption (e.g. when all sessions are to be charged a single fixed fee). When used, the base price value for the respective *ProductID* should be set to zero and in the billing process, the price value provided as fixed fee will be the single value billed for all sessions.

   c. *Parking Fee*: can be used in case sessions are to be billed for both parking and charging. When used, the default definition shall be that the Parking Fee applies from *SessionStart* to *SessionEnd*.

   Note: in future updates of the OICP, we intend to provide the possibility for CPOs to determine when parking starts and when it ends based on different combinations of the *SessionStart*, *ChargingStart*, *SessionEnd*, and *ChargingEnd* attributes. This means, a CPO can for instance choose to define their parking fee as being applicable from *ChargingEnd* to *SessionEnd* rather than the above *SessionStart* to *SessionEnd* definition.

   d. *Minimum Fee*: can be used in case there is a minimum fee to be paid for all charging sessions. When used, this implies that the final amount to be paid cannot be less than (but can however be greater than) the minimum fee. See exhibit below:

Base Price	Minimum Fee	Charging Duration	Total Energy Consumed	Total Amount (Base Price)	Total Amount (Minimum Fee)	Final Amount to be Paid
$5/hour	$2/kWh	6 hours	100 kWh	$30	**$200**	**$200**
$20/hour	$2/kWh	9 hours	50 kWh	**$180**	$100	**$180**
$2/kWh	$5/hour	6 hours	100 kWh	**$200**	$30	**$200**
$3/kWh	$16/hour	10 hours	50 kWh	$150	**$160**	**$160**

e. *Maximum Fee*: **can be used in case there is a maximum fee to be paid for all charging sessions. When used, this implies that the final amount to be paid cannot be more than (but can however be less than) the maximum fee. See exhibit below:**

Base Price	Maximum Fee	Charging Duration	Total Energy Consumed	Total Amount (Base Price)	Total Amount (Maximum Fee)	Final Amount to be Paid
$5/hour	$2/kWh	6 hours	100 kWh	$30	**$200**	**$30**
$20/hour	$2/kWh	9 hours	50 kWh	**$180**	**$100**	**$100**
$2/kWh	$5/hour	6 hours	100 kWh	**$200**	**$30**	**$30**
$3/kWh	$16/hour	10 hours	50 kWh	$150	**$160**	**$150**

3. Use Case - Dynamic Pricing

As mentioned above, the dynamic pricing capability builds on the flexible pricing capability and can therefore be seen as frequent (per demand) and real-time exchange of flexible pricing data. Consequently, the use cases (i.e. scenarios) differ from those detailed above for flexible pricing only with respect to frequency of price updates (i.e. how often prices are updated/changed). This dynamic capability of the eRoamingDynamicPricing service can only be used in combination with bilateral service offers (i.e. based on dynamic price update agreements in bilateral service offers between a CPO and EMP). Within such bilateral agreements (i.e. bilateral service offer and-subscription between a CPO and EMP), the 2 partners can agree on the business and legal specifics (such as how often and within what business and legal scope price updates are to occur) in order to determine on their own terms, the appropriate use of the technical capability of price updates on demand.

Consequently, the dynamic capability of the eRoamingDynamicPricing service is currently incompatible with Offer-to-All service offers. Offer-to-All service offers are therefore restricted to the use of the flexible pricing capability only.

To better align future updates of the eRoamingDynamicPricing service to partner and market needs, Hubject gladly encourages partners to provide feedback and recommendations for potential use cases for both the flexible and dynamic capabilities of the service. Partners can deliver such feedback and input through Zendesk or emails to our Customer Excellence Management department (support@hubject.com).

4. Pricing Data transfer through the HBS Portal

The following section provides details on the structure for csv files to be used by partners that wish to transfer pricing data to HBS over the HBS Portal GUI. As mentioned above, this option for pricing data transfer can be used by partners that are unable to implement the eRoamingDynamicPricing webservice. Furthermore, partners interested in flexible pricing only can skip implementation of the eRoamingDynamicPricing webservice and rather use the functionality provided in the HBS portal for uploading and downloading tariff data.

A: CSV structure for the PushPricingProductData operation

1. **The first row of the file must contain the following details**

Field Name	Description
Operator name	Name of the operator pushing the dat
DefaultReferenceUnit	Default reference unit in time or kWh (possible values are HOUR, KILOWATT_HOUR, MINUTE)
DefaultPrice	A default price for pricing sessions at undefined EVSEs
DefaultPriceCurrency	Currency for default prices (based on ISO 4217 - for example EUR, CHF)

2. **All other rows must/can (as per OICP specification) contain the following details in the given order.**

Field Name	Description
ProductID	Name of the pricing product
ReferenceUnit	reference unit in time or kWh (possible values are HOUR, KILOWATT_HOUR, MINUTE)
PricePerReferenceUnit	A price value per the given reference unit
ProductPriceCurrency	Currency of the defined pricing product (based on ISO 4217 - for example EUR, CHF)
MaximumProductChargingPower	Maximum product charging power (in kW)
IsValid24hours	"True" if this product is applicable 24 hours a day, else "false
ProductAvailabilityTimes	Day values to be used in specifying periods on which the product is available (possible values are Everyday, Workdays, Weekend, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday)

begin	Opening time (HH:MM)
end	Closing time (HH:MM)
AdditionalReference	Additional pricing components to be considered in addition to the base pricing (possible values are START FEE, FIXED FEE, PARKING FEE, MINIMUM FEE; MAXIMUM FEE)
AdditionalReferenceUnit	reference unit in time or kWh (possible values are HOUR, KILOWATT_HOUR, MINUTE)
PricePerAdditionalReferenceUnit	A price in the given currency

Sample csv snippet for PricingProductData

CPO-XYZ,KILOWATT_HOUR,5,EUR
DayTariff,KILOWATT_HOUR,15,EUR,30,false,Workdays,07:00,18:00,START
FEE,KILOWATT_HOUR,4
NightTariff,KILOWATT_HOUR,5,EUR,30,false,Workdays,18:00,06:59
WeekendTariff,KILOWATT_HOUR,13,EUR,30,true,Weekend, 00:00,23:00

Each line must consist of either 12 or 9 entries; 12 entries when the "Additional References" complex data type (see Chapter 5.1.27 of the OICP 2.2 document) is used to define one of the pre-defined additional pricing components (Start Fee, Fixed Fee, Parking Fee, Minimum Fee or Maximum Fee). Line 2 of the above snippet for instance includes a "SART FEE" component and therefore has 12 instead of 9 entries. When used, the 3 entries (fields) within the "Additional References" data type must be placed at the end of the line for the CSV format to be valid (see line 2 of the above snippet). To ease creation of CVSs, a template can also be downloaded in the HBS portal when a user initiates the pricing data upload process.

B: CSV structure for the PushEVSEPricing operation

Field Name	Description
EVSEId	The ID that identifies the charging spot.
ProductId	Name of the pricing product

Sample csv snippet for EVSEPricing

DE*AB7*E840*6587,Region_1
DE*AB7*E840*6625,Region_2
DE*AB7*E840*2833,Region_3

5. Other FAQs and Answers

Question	Answer
1. **Is there a technical restriction for pushing and pulling pricing information (e.g. not more than once an hour) ?**	**Technically, prices can be pushed/uploaded and pulled/downloaded as often as needed. Important hereby are the following details:** • **For Flexible Pricing, prices should not change during the life time of the associated business contract. This means prices for an offer must not be changed after subscribers accept the offer. This applies in particular to Offer-to-All service offers. For Bilateral offers, flexible prices can be changed provided the partners have agreed as such within the bilateral offer details.** • **For Dynamic Pricing, the frequency of price updates (i.e. pushing and pulling of prices changes) should be agreed between the partners within the corresponding bilateral offers. Note: dynamic pricing can only be used in combination with bilateral service offers.**
2. **How can I assign the pricing information to a specific service offer, is there an offer ID?**	**In Version 1.0, there is no direct linkage of pricing data to a service Offer ID. An indirect link based on the platform's implicit logic that only one valid Authorization business contract can exist between any 2 partners at any particular point in time however exists. It is however very likely that Version 2.0 will introduce a direct linkage between pricing data and Service Offer ID.** **Consequently, for Version 1.0, it is automatically assumed that the currently valid pricing dataset available in HBS contains all relevant prices for all applicable active service offers.**
3. **The OICP description shows a mandatory ProviderID field for PricingProductDataType, What value is to be set in the ProviderID field when prices are being pushed for an offer-to-all service offer?**	**The asterix character (" * ") is to be used in this case.**

4. *How can I as an EMP see if the offer uses Flexible or Dynamic pricing?*	1. For Bilateral service offers, this information should ideally be included (by the offerer) in the offer description for display on the portal UI or at least in the offer details pdf attachment. 2. For Offer-To-All offers, it is always Flexible Pricing since the dynamic pricing model cannot be used in combination with Offer-to-All service offers. Note: in the near future, Hubject intends to make a clear distinction between "Flexible Pricing" and "Dynamic Pricing"
5. *How do I as an EMP notice that there are new prices? Do I for instance get a notification?*	For version 1.0, transparency on price push/pull operations can be achieved as follows: 1. for Flexible Pricing offers, prices shouldn't change besides changes mentioned in the initial offer details (i.e. the offer details based on which subscribers accept the offer). Each price push or pull operation performed in the HBS can be seen in the respective process monitor views in the HBS Portal. 2. for Dynamic Pricing, firstly, the frequency of price changes should be agreed upon between the partners in the respective bilateral offer. Additionally, pricing data push/pull operations can be monitored in the respective process monitor views.

6. Overview of Document Changes

Date of Change	Version	Change Details
17.04.2018	v001	**Initial version of document**
17.07.2018	v002	**Addition of Chapter 2.2 – *Business Guidelines for Flexible Pricing Use Cases*** **This Chapter did not exist in the initial version**
17.07.2018	v002	**Addition of Chapter 6 – *Overview of Document Changes*** **This Chapter did not exist in the initial version**