

开展虚拟电厂与电网运管平台、交易 中心的接口说明

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1 概述

1.1 基本内容

半展虚拟电厂 web 如图 1-1 所示。

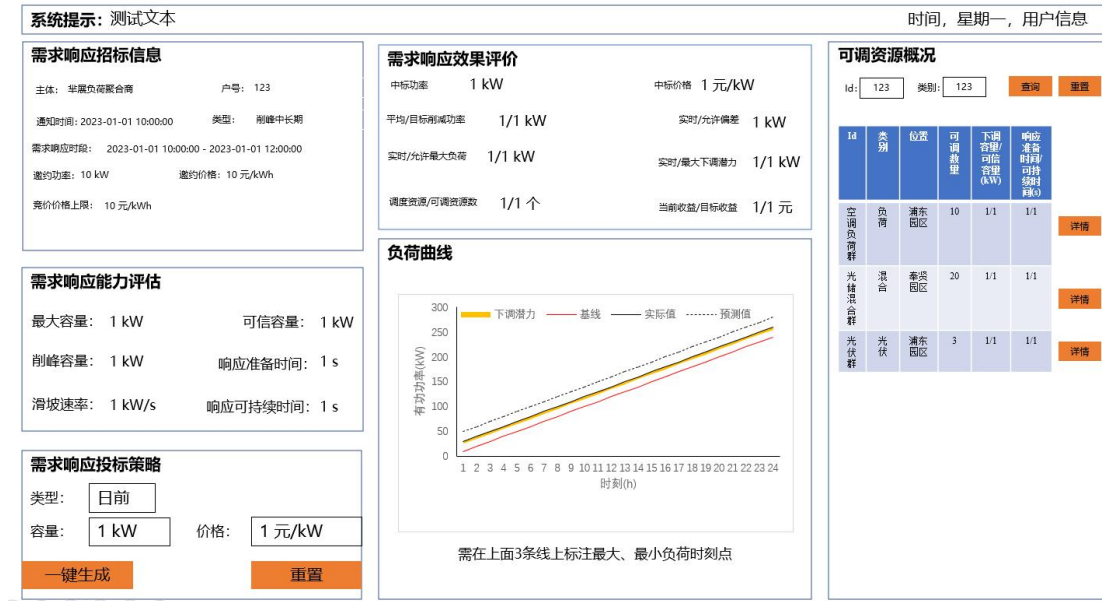


图 1-1 虚拟电厂 web 图

该 web 涉及到与电网运管平台和交易中心的接口, 明细如下所示:

1) 负荷 区域

- 基线
- 实际值
- 预测值

2) 需求响应效果评价 区域

- 中标价格
- 中标功率
- 允许偏差
- 允许最大负荷

3) 需求响应招标信息 区域

- 主体
- 户号

- 通知时间
- 需求响应时段
- 类型
- 邀约功率
- 邀约价格
- 竞价价格上限

1.2 任务需求

- 根据 1.1 节中负荷、需求响应效果评价和需求响应招标信息区域的关键字段，将电网提供的接口文档中 `http` 接口整理，格式详见第 2 章的标红示例。
- 通过 Python 3 实现接口文档的虚拟接口，且运行于云端以供前端测试。
- 暂忽略与电网接入的前置基础。
- 交付 1 个“虚拟电厂-电网的虚拟接口”文件夹，内涵 1 个 `main.py` 和“src”文件夹；运行云端运行 `main.py` 即可挂起该服务；“src”文件夹包含 `setIni.py` 和 `server.py`；`setIni.py` 为 url、请求格式等基本配置；`server.py` 为虚拟接口服务器。

2 虚拟电厂与平台流程接口

2.1 获取 Token

【请求】 请求 token (TokenRequest)

- url: <https://27.115.117.6:9093/TokenRequest>
- way: post
- 请求参数:

名称	类型	描述
root	String	“TokenRequest”
version	Integer	协议版本（继承自 DrRequest）
requestID	String	请求 ID。响应时将请求时 requestID 原样返回，供请求方确定先后顺序。
dnID	String	下位节点的 ID

- ## ● 请求示例

```
{
  "root": "TokenRequest",
  "version": 1,
  "requestID": "bf992657-d1b1-4634-badd-2be6f1275e4f",
  "dnID": "10010103000002"
}
```

- 响应示例, 返回 token (TokenResponse)

```
{
  "root": "TokenResponse",
  "version": 1,
  "code": 200,
  "description": "ok",
  "requestID": "bf992657-d1b1-4634-badd-2be6f1275e4f", //和用户入参一样
  "dnID": "10010103000002",
  "token":
"eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJhdWQiOiM5MTBxGx9.TLLLG99pK15ejxKuI5uSTnNLhJ8cJwtKZXDqsDtS6OY"
}
```

● 响应参数说明

信息交换服务的请求头需带上token信息。

名称	类型	描述
root	String	"TokenResponse"
version	Integer	协议版本（继承自 DrResponse）
code	Integer	响应代码（继承自 DrResponse）
description	String	错误原因（继承自 DrResponse）
requestID	String	请求 ID（继承自 DrResponse）
dnID	String	下位节点的 ID（继承自 DrResponse）
token	String	令牌信息

2.2 推送-注册服务

创建注册请求(CreateRegistrationRequest/CreateRegistrationResponse)

取消注册请求(CancelRegistrationRequest/CancelRegistrationResponse)

查询注册请求(QueryRegistrationRequest/CreateRegistrationResponse)

1.1.1 创建注册请求（CreateRegistrationRequest）

当DN向UN初始化注册信息时，使用该服务。

- url: <https://27.115.117.6:9093/CreateRegistrationRequest>
- way: post
- 请求参数：

root	String	"CreateRegistrationRequest"
version	Integer	协议版本（继承自 DrRequest）
requestID	String	请求 ID（继承自 DrRequest）
dnID	String	下位节点的 ID（继承自 DrRequest）
dnName	String	DN 名称
registrationID	String	注册 ID，首次注册时空，重新注册时使用上一次的 ID
reportOnly	Boolean	是否只支持报告
pullMode	Boolean	是否为 PULL 模式
signature	Boolean	交换的报文是否签名，如果要签名，数据报文需要用

		DrPayload 封装
transport	TransportType	传输方式，可以是 REST 或 MQTT
transportAddress	String	服务接入点；REST 传输方式时是请求 URL，MQTT 传输方式时是服务器地址。
[0..n]otherInfo	KeyVvalue	扩展备案信息

● 请求示例

```
{
  "root": "QueryRegistrationRequest",
  "version": 1,
  "requestID": "a17cf702-4799-4746-beec-3e11ffbe739d",
  "dnID": "10010103000002"
}
```

● 响应示例

```
{
  "root": "CreateRegistrationResponse",
  "version": 1,
  "code": 200,
  "description": "ok",
  "dnID": "10010103000002",
  "unID": "test_un",
  "transport": [
    "REST"
  ],
  "serviceSpecific": []
}
```

1.1.2 创建注册响应（CreateRegistrationResponse）

当DN向UN查询注册信息或初始化注册信息时，UN使用该服务进行响应，确认收到DN的请求。

●

名称	类型	描述
root	String	"DataReportResponse"
version	Integer	协议版本（继承自 DrResponse）

code	Integer	响应代码（继承自 DrResponse）
description	String	错误原因（继承自 DrResponse）
requestID	String	请求 ID（继承自 DrResponse）
dnID	String	下位节点的 ID（继承自 DrResponse）
[0..1]cancelReport	CancelReportRequest	要取消的报告清单

1.1.3 取消注册请求（CancelRegistrationRequest）

UN或者DN利用该服务向对方发起取消注册请求。

- url: <https://27.115.117.6:9093/CancelRegistrationRequest>
- way: post
- 请求参数：

名称	类型	描述
root	String	CancelRegistrationRequest
version	Integer	协议版本（继承自 DrRequest）
requestID	String	请求 ID（继承自 DrRequest）
dnID	String	下位节点的 ID（继承自 DrRequest）
registrationID	String	注册 ID

● 请求示例

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● 响应示例

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1.1.4 取消注册响应（CancelRegistrationResponse）

当 UN 或者 DN 向对方发起取消注册请求时，DN 或 UN 使用该服务予以响应

名称	类型	描述
root	String	"CancelRegistrationResponse"
version	Integer	协议版本（继承自 DrResponse）
code	Integer	响应代码（继承自 DrResponse）
description	String	错误原因（继承自 DrResponse）
requestID	String	请求 ID（继承自 DrResponse）
dnID	String	下位节点的 ID（继承自 DrResponse）
registrationID	String	注册 ID

1.1.5 查询注册请求（QueryRegistrationRequest）

DN向UN查询注册信息时，使用该服务。

- url: <https://27.115.117.6:9093/QueryRegistrationRequest>
- way: post
- 请求参数：

名称	类型	描述
root	String	"QueryRegistrationRequest"
version	Integer	协议版本（继承自 DrRequest）
requestID	String	请求 ID（继承自 DrRequest）
dnID	String	下位节点的 ID（继承自 DrRequest）

- 请求示例

```
{
  "root": "QueryRegistrationRequest",
  "version": 1,
  "requestID": "bf992657-d1b1-4634-badd-2be6f1275e4f",
  "dnID": "10010103000002"
}
```

- 响应示例

```
{
  "root": "TokenResponse",
  "version": 1,
  "code": 200,
  "description": "ok",
  "requestID": "bf992657-d1b1-4634-badd-2be6f1275e4f", //和用户入参一样
  "dnID": "10010103000002",
  "token":
"eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJhdWQiOiM5bGx9.TLLG99pK15ejxKuI5uSTnNLhJ8cJwtKZXDqsDtS60Y"
}
```

- 响应错误示例参见：《**虚拟电厂运行管理与监控平台-虚拟电厂接口协议 20191206**》中 Token 响应异常返回 JSON

2.3 推送-事件服务

(QueryEventRequest/QueryEventResponse)

1.1.6 查询事件请求 (QueryEventRequest)

DN向UN查询已经下发的历史事件清单。

- url: <https://27.115.117.6:9093/QueryEventRequest>
- way: post
- 请求参数:

名称	类型	描述
root	String	"QueryEventRequest"
version	Integer	协议版本 (继承自 DrRequest)
requestID	String	请求 ID (继承自 DrRequest)
dnID	String	下位节点的 ID (继承自 DrRequest)
replyLimit	Integer	返回的事件数量限制
dtstart	DateTime	要查询的事件开始时间
duration	Duration	要查询的事件时间范围

● 请求示例

```
{
  "root": "QueryEventRequest",
  "version": 1,
  "requestID": "490325ed-00e9-42fb-9179-0e664561bc57",
  "dnID": "10010103000002",
  "replyLimit": 1,
  "dtstart": "2019-11-22T12:00:00",
  "duration": "PnM"
}
```

● 响应示例

```
{
  "root": "QueryEventResponse",
  "version": 1,
  "code": 200,
  "description": "ok",
  "requestID": "490325ed-00e9-42fb-9179-0e664561bc57",
  "dnID": "10010103000002",
  "events": [
    {
      "responseRequired": "always",
      "descriptor": {
        "eventID": "EVE_10001911221018",
        "status": "near",
        "createdDateTime": "2019-11-22T10:17:00.300",
        "modificationDateTime": "2019-11-22T10:17:00.300",
        "modificationNumber": 0,
        "modificationReason": "EventStart",
        "priority": 0,
        "test": true,
        "comment": "this is test event.",
        "marketURL": "http://event.test",
        "nofication": "mediumterm",
        "shape": "switchType",
        "control": "peakClipping",
        "tradeseqId": "e54c54b6-b553-11eb-a076-13da228ed479",
        "tradeType": "JY"
      },
      "activePeriod": [

```

```
{
  "dtstart": "2019-11-22T12:00",
  "duration": "PT1H"
},
{
  "dtstart": "2019-11-22T19:00",
  "duration": "PT2H"
}
],
"signals": {
  "signal": [
    {
      "signalID": "83984c4d-14ea-4c57-9ed4-ecc8d18060aa",
      "signalName": "ENERGY_PRICE",
      "signalType": "price",
      "metric": {
        "symbol": "price"
      },
      "intervals": {
        "irregular": {
          "values": [
            {
              "value": 6,
              "timestamp": "2019-11-22T12:15:00"
            },
            {
              "value": 6,
              "timestamp": "2019-11-22T12:30:00"
            },
            {
              "value": 6,
              "timestamp": "2019-11-22T12:45:00"
            },
            {
              "value": 6,
              "timestamp": "2019-11-21T13:00:00"
            },
            {
              "value": 2.4,
              "timestamp": "2019-11-22T19:15:00"
            },
            {
              "value": 2.4,
              "timestamp": "2019-11-22T19:30:00"
            }
          ]
        }
      }
    }
  ]
}
```

```

        },
        {
            "value":2.4,
            "timestamp":"2019-11-22T19:45:00"
        },
        {
            "value":2.4,
            "timestamp":"2019-11-22T20:00:00"
        },
        {
            "value":2.4,
            "timestamp":"2019-11-22T20:15:00"
        },
        {
            "value":2.4,
            "timestamp":"2019-11-22T20:30:00"
        },
        {
            "value":2.4,
            "timestamp":"2019-11-22T20:45:00"
        },
        {
            "value":2.4,
            "timestamp":"2019-11-22T21:00:00"
        }
    ]
}
},
{
    "signalID":"3b3c8992-ad63-4752-ab07-49c621568822",
    "signalName":"DEMAND_CHARGE",
    "signalType":"delta",
    "metric":{
        "metricName":"AP",
        "multiplier":"k",
        "symbol":"W"
    },
    "intervals":{
        "irregular":{
            "values":[
                {
                    "value":400,
                    "timestamp":"2019-11-22T12:15:00"
                }
            ]
        }
    }
}

```

```
    },
    {
      "value":400,
      "timestamp":"2019-11-22T12:30:00"
    },
    {
      "value":400,
      "timestamp":"2019-11-22T12:45:00"
    },
    {
      "value":400,
      "timestamp":"2019-11-22T13:00:00"
    },
    {
      "value":600,
      "timestamp":"2019-11-22T19:15:00"
    },
    {
      "value":600,
      "timestamp":"2019-11-22T19:30:00"
    },
    {
      "value":600,
      "timestamp":"2019-11-22T19:45:00"
    },
    {
      "value":600,
      "timestamp":"2019-11-22T20:00:00"
    },
    {
      "value":600,
      "timestamp":"2019-11-22T20:15:00"
    },
    {
      "value":600,
      "timestamp":"2019-11-22T20:30:00"
    },
    {
      "value":600,
      "timestamp":"2019-11-22T20:45:00"
    },
    {
      "value":600,
      "timestamp":"2019-11-22T21:00:00"
```

```
    }
  ]
}

},
"target": {
  "resourceID ": [
    "10010103000002",
    "10010103000003"
  ],
  "dnID": [
    "10010103000002"
  ]
}
]
}
```

1.1.7 查询事件响应（QueryEventResponse）

UN向按照DN查询要求反馈已经下发过的历史事件。

名称	类型	描述
root	String	"QueryEventResponse"
version	String	协议版本（继承自 DrResponse）
code	Integer	响应代码（继承自 DrResponse）
description	String	错误原因（继承自 DrResponse）
requestID	String	请求 ID（继承自 DrResponse）
dnID	String	下位节点的 ID（继承自 DrResponse）
[0..n]events	Event	事件信息

2.4 推送-报告服务-元数据报告请求

(RegisterReportRequest/RegisterReportResponse)

1.1.8 注册报告请求（RegisterReportRequest）

当DN向UN发送报告前，使用该服务进行注册；当DN自身信息发生变化时，在继续向UN发送报告前，也需要使用该服务进行注册。

- url: <https://27.115.117.6:9093/RegisterReportRequest>
- way: post
- 请求参数:

名称	类型	描述
root	String	"RegisterReportRequest"
version	Integer	协议版本（继承自 DrRequest）
requestID	String	请求 ID（继承自 DrRequest）
dnID	String	下位节点的 ID（继承自 DrRequest）
reportRequestID	String	报告请求 ID(MetaDataReport)
[1..n]report	MetaDataReport	元数据报告

- 请求示例

```
{
  "root": "RegisterReportRequest",
  "version": 1,
  "requestID": "53dc702a-e400-4b06-bb06-335ea876171b",
  "dnID": "10010103000002",
  "reportRequestID": "MetaDataReport",
  "report": [
    {
      "createdDateTime": "2019-11-30 12:00:00",
      "reportDescription": {
        "rID": 0,
        "readingType": "Summed",
        "metric": {
          "metricName": "AP",
          "multiplier": "k",
          "symbol": "W"
        },
        "reportSubject": {
          "endDeviceAsset": {
            "mrid": "Vpp"
          }
        }
      },
      "reportDataSource": {
        "resourceID": [
```



```

        "A"
    ]
},
"samplingRate": {
    "onChange": false,
    "minPeriod": "PT15M",
    "maxPeriod": "PT15M"
}
}
},
{
    "createdDateTime": "2019-11-30 12:00:00",
    "reportDescription": {
        "rID": 1,
        "readingType": "Summed",
        "metric": {
            "metricName": "AP_E",
            "multiplier": "k",
            "symbol": "W"
        },
        "reportSubject": {
            "endDeviceAsset": {
                "mrid": "Resource_IndustrialPlant"
            }
        },
        "reportDataSource": {
            "resourceID": [
                "A"
            ]
        },
        "samplingRate": {
            "onChange": false,
            "minPeriod": "PT15M",
            "maxPeriod": "PT15M"
        }
    }
},
{
    "createdDateTime": "2019-11-30 12:00:00",
    "reportDescription": {
        "rID": 2,
        "readingType": "Direct_Read",
        "metric": {
            "metricName": "AP",

```

```
        "multiplier": "k",
        "symbol": "W"
    },
    "reportSubject": {
        "endDeviceAsset": {
            "mrid": "Office_Air_Conditioner"
        }
    },
    "reportDataSource": {
        "resourceID": [
            "10020109000014"
        ]
    },
    "samplingRate": {
        "onChange": false,
        "minPeriod": "PT15M",
        "maxPeriod": "PT15M"
    }
}
}, {
    "createdDateTime": "2019-11-30 12:00:00",
    "reportDescription": {
        "rID": 3,
        "readingType": "Summed",
        "metric": {
            "metricName": "AP_E",
            "multiplier": "k",
            "symbol": "W"
        },
        "reportSubject": {
            "endDeviceAsset": {
                "mrid": "Vpp"
            }
        },
        "reportDataSource": {
            "resourceID": [
                "10010103000002"
            ]
        },
        "samplingRate": {
            "onChange": false,
            "minPeriod": "PT15M",
            "maxPeriod": "PT15M"
        }
    }
}
```

```
    }
  }
]
```

● 响应示例

```
{
  "root": "RegisterReportResponse",
  "version": 1,
  "code": 200,
  "description": "ok",
  "requestID": "53dc702a-e400-4b06-bb06-335ea876171b",
  "dnID": "100101030000002",
  "reportRequest": [
    {
      "reportRequestID": "6965f7c6-7f53-4dde-a055-b1919e3aa15c",
      "reportSpecifier": {
        "reportType": "usage",
        "backDuration": "PT5M",
        "period": "PT5M",
        "points": [
          0,
          1,
          2
        ]
      }
    }
  ]
}
```

1.1.9 注册报告响应（RegisterReportResponse）

当 UN 接收到 DN 的注册报告请求时，使用该服务进行响应。

名称	类型	描述
root	String	"RegisterReportResponse"
version	Integer	协议版本（继承自 DrResponse）
code	Integer	响应代码（继承自 DrResponse）
description	String	错误原因（继承自 DrResponse）

requestID	String	请求 ID（继承自 DrResponse）
dnID	String	下位节点的 ID（继承自 DrResponse）
[0..n]reportRequest	ReportRequest	根据请求生成的报告样式

2.5 推送-报告服务-实时数据报告请求

(MomentDataReportRequest/DataReportResponse)

1.1.10 实时数据报告请求（MomentDataReportRequest）

DN向UN发送实时报告请求。当报告请求的采集频率与上传周期一致时，使用此报文上传数据。

- url: <https://27.115.117.6:9093/MomentDataReportRequest>
- way: post
- 请求参数:

名称	类型	描述
root	String	MomentDataReportRequest
version	Integer	协议版本（继承自 DrRequest）
requestID	String	请求 ID（继承自 DrRequest）
dnID	String	下位节点的 ID（继承自 DrRequest）
reportRequestID	String	报告请求 ID
createdDateTime	DateTime	创建报告的时间
[1..n]pointData	PointData	测点数据

- 请求示例

```
{
  "root": "MomentDataReportRequest",
  "version": 1,
  "requestID": "0bb17286-47da-4f37-b901-08d4d210d88f",
  "dnID": "10010103000002",
  "reportRequestID": "",
  "createdDateTime": "2019-11-30T12:30:00",
  "pointData": [
    {
```

```

        "rID": 0, (设备 1 的用电量)
        "value": 200.32,
        "timestamp": "2019-11-30T12:00:00",
        "quality": "good"
    },
    {
        "rID": 1, (设备 1 的负荷)
        "value": 213.56,
        "timestamp": "2019-11-30T12:00:00",
        "quality": "good"
    },
    {
        "rID": 2, (电力用户 1 的负荷)
        "value": 224.46,
        "timestamp": "2019-11-30T12:00:00",
        "quality": "good"
    },
    {
        "rID": 3, (虚拟电厂的负荷)
        "value": 224.46,
        "timestamp": "2019-11-30T12:00:00",
        "quality": "good"
    },
    {
        "rID": 4,
        "value": 224.46,
        "timestamp": "2019-11-30T12:00:00",
        "quality": "good"
    }
]
}

```

● 响应示例

```

{
  "root": "DataReportResponse",
  "version": 1,
  "code": 200,
  "description": "ok",
  "requestID": "0bb17286-47da-4f37-b901-08d4d210d88f",
  "dnID": "10010103000002"
}

```

1.1.11 *数据报告响应 (DataReportResponse)

名称	类型	描述
root	String	"DataReportResponse"
version	Integer	协议版本（继承自 DrResponse）
code	Integer	响应代码（继承自 DrResponse）
description	String	错误原因（继承自 DrResponse）
requestID	String	请求 ID（继承自 DrResponse）
dnID	String	下位节点的 ID（继承自 DrResponse）
[0..1]cancelReport	CancelReportRequest	要取消的报告清单

2.6 推送-报告服务-曲线数据报告请求

(IntervalDataReportRequest/DataReportResponse)

1.1.12 曲线数据报告请求（IntervalDataReportRequest）

DN向UN发送曲线报告请求。

- url: <https://27.115.117.6:9093/IntervalDataReportRequest>
- way: post
- 请求参数：

名称	类型	描述
root	String	"IntervalDataReportRequest"
version	Integer	协议版本（继承自 DrRequest）
requestID	String	请求 ID（继承自 DrRequest）
dnID	String	下位节点的 ID（继承自 DrRequest）
reportRequestID	String	报告请求 ID
createdDateTime	DateTime	创建报告的时间
[1..n]pointCurveData	PointCurveData	曲线数据

- 请求示例

```
{
  "root": "IntervalDataReportRequest",
```

```
"version": 1,
"requestID": "20a2730c-500d-49cd-9028-b39613a58aa8",
"dnID": "10010103000002",
"reportRequestID": "",
"createdDateTime": "2019-11-30T12:30:00",
"pointCurveData": [
  {
    "irregular": {
      "values": [
        {
          "value": 1216.03,
          "timestamp": "2019-11-30T00:00:00",
          "quality": "good"
        },
        {
          "value": 1355.38,
          "timestamp": "2019-11-30T00:15:00",
          "quality": "good"
        },
        {
          "value": 1451.37,
          "timestamp": "2019-11-30T00:30:00",
          "quality": "good"
        },
        {
          "value": 1288.24,
          "timestamp": "2019-11-30T00:45:00",
          "quality": "good"
        },
        {
          "value": 1358.68,
          "timestamp": "2019-11-30T01:00:00",
          "quality": "good"
        },
        {
          "value": 1375.25,
          "timestamp": "2019-11-30T01:15:00",
          "quality": "good"
        },
        {
          "value": 1226.88,
          "timestamp": "2019-11-30T01:30:00",
          "quality": "good"
        }
      ]
    }
  }
]
```

```
{
  "value": 1378.19,
  "timestamp": "2019-11-30T01:45:00",
  "quality": "good"
},
{
  "value": 1217.87,
  "timestamp": "2019-11-30T02:00:00",
  "quality": "good"
},
{
  "value": 1430.93,
  "timestamp": "2019-11-30T02:15:00",
  "quality": "good"
},
{
  "value": 1371.38,
  "timestamp": "2019-11-30T02:30:00",
  "quality": "good"
},
{
  "value": 1430.43,
  "timestamp": "2019-11-30T02:45:00",
  "quality": "good"
},
{
  "value": 1264.19,
  "timestamp": "2019-11-30T03:00:00",
  "quality": "good"
},
{
  "value": 1430.85,
  "timestamp": "2019-11-30T03:15:00",
  "quality": "good"
},
{
  "value": 1492.27,
  "timestamp": "2019-11-30T03:30:00",
  "quality": "good"
},
{
  "value": 1319.78,
  "timestamp": "2019-11-30T03:45:00",
  "quality": "good"
}
```



```
},
{
  "value": 1229.15,
  "timestamp": "2019-11-30T04:00:00",
  "quality": "good"
},
{
  "value": 1412.79,
  "timestamp": "2019-11-30T04:15:00",
  "quality": "good"
},
{
  "value": 1333.11,
  "timestamp": "2019-11-30T04:30:00",
  "quality": "good"
},
{
  "value": 1356.44,
  "timestamp": "2019-11-30T04:45:00",
  "quality": "good"
},
{
  "value": 1448.68,
  "timestamp": "2019-11-30T05:00:00",
  "quality": "good"
},
{
  "value": 1231.85,
  "timestamp": "2019-11-30T05:15:00",
  "quality": "good"
},
{
  "value": 1422.15,
  "timestamp": "2019-11-30T05:30:00",
  "quality": "good"
},
{
  "value": 1266.92,
  "timestamp": "2019-11-30T05:45:00",
  "quality": "good"
},
{
  "value": 1381.39,
  "timestamp": "2019-11-30T06:00:00",
```

```
    "quality": "good"
  },
  {
    "value": 1254.3,
    "timestamp": "2019-11-30T06:15:00",
    "quality": "good"
  },
  {
    "value": 1348.68,
    "timestamp": "2019-11-30T06:30:00",
    "quality": "good"
  },
  {
    "value": 1460.07,
    "timestamp": "2019-11-30T06:45:00",
    "quality": "good"
  },
  {
    "value": 1350.77,
    "timestamp": "2019-11-30T07:00:00",
    "quality": "good"
  },
  {
    "value": 1463.85,
    "timestamp": "2019-11-30T07:15:00",
    "quality": "good"
  },
  {
    "value": 1278.95,
    "timestamp": "2019-11-30T07:30:00",
    "quality": "good"
  },
  {
    "value": 1378.93,
    "timestamp": "2019-11-30T07:45:00",
    "quality": "good"
  },
  {
    "value": 1457.41,
    "timestamp": "2019-11-30T08:00:00",
    "quality": "good"
  },
  {
    "value": 1339.88,
```

```
        "timestamp": "2019-11-30T08:15:00",
        "quality": "good"
    },
    {
        "value": 1200.74,
        "timestamp": "2019-11-30T08:30:00",
        "quality": "good"
    },
    {
        "value": 1259,
        "timestamp": "2019-11-30T08:45:00",
        "quality": "good"
    },
    {
        "value": 1338.98,
        "timestamp": "2019-11-30T09:00:00",
        "quality": "good"
    },
    {
        "value": 1229.04,
        "timestamp": "2019-11-30T09:15:00",
        "quality": "good"
    },
    {
        "value": 1446.65,
        "timestamp": "2019-11-30T09:30:00",
        "quality": "good"
    },
    {
        "value": 1292.52,
        "timestamp": "2019-11-30T09:45:00",
        "quality": "good"
    },
    {
        "value": 1221.62,
        "timestamp": "2019-11-30T10:00:00",
        "quality": "good"
    },
    {
        "value": 1303.13,
        "timestamp": "2019-11-30T10:15:00",
        "quality": "good"
    },
    {
```

```
    "value": 1291.84,  
    "timestamp": "2019-11-30T10:30:00",  
    "quality": "good"  
  },  
  {  
    "value": 1337.19,  
    "timestamp": "2019-11-30T10:45:00",  
    "quality": "good"  
  },  
  {  
    "value": 1406.67,  
    "timestamp": "2019-11-30T11:00:00",  
    "quality": "good"  
  },  
  {  
    "value": 1276.71,  
    "timestamp": "2019-11-30T11:15:00",  
    "quality": "good"  
  },  
  {  
    "value": 1351.98,  
    "timestamp": "2019-11-30T11:30:00",  
    "quality": "good"  
  },  
  {  
    "value": 1305.41,  
    "timestamp": "2019-11-30T11:45:00",  
    "quality": "good"  
  },  
  {  
    "value": 1471.31,  
    "timestamp": "2019-11-30T12:00:00",  
    "quality": "good"  
  },  
  {  
    "value": 1248.31,  
    "timestamp": "2019-11-30T12:15:00",  
    "quality": "good"  
  },  
  {  
    "value": 1421.41,  
    "timestamp": "2019-11-30T12:30:00",  
    "quality": "good"  
  },  
}
```

```
{
  "value": 1327.79,
  "timestamp": "2019-11-30T12:45:00",
  "quality": "good"
},
{
  "value": 1230.78,
  "timestamp": "2019-11-30T13:00:00",
  "quality": "good"
},
{
  "value": 1228.45,
  "timestamp": "2019-11-30T13:15:00",
  "quality": "good"
},
{
  "value": 1390.4,
  "timestamp": "2019-11-30T13:30:00",
  "quality": "good"
},
{
  "value": 1400.98,
  "timestamp": "2019-11-30T13:45:00",
  "quality": "good"
},
{
  "value": 1413.26,
  "timestamp": "2019-11-30T14:00:00",
  "quality": "good"
},
{
  "value": 1326.43,
  "timestamp": "2019-11-30T14:15:00",
  "quality": "good"
},
{
  "value": 1363.33,
  "timestamp": "2019-11-30T14:30:00",
  "quality": "good"
},
{
  "value": 1306.36,
  "timestamp": "2019-11-30T14:45:00",
  "quality": "good"
}
```

```
    },
    {
      "value": 1436.16,
      "timestamp": "2019-11-30T15:00:00",
      "quality": "good"
    },
    {
      "value": 1486.64,
      "timestamp": "2019-11-30T15:15:00",
      "quality": "good"
    },
    {
      "value": 1267.26,
      "timestamp": "2019-11-30T15:30:00",
      "quality": "good"
    },
    {
      "value": 1321.24,
      "timestamp": "2019-11-30T15:45:00",
      "quality": "good"
    },
    {
      "value": 1245,
      "timestamp": "2019-11-30T16:00:00",
      "quality": "good"
    },
    {
      "value": 1391.98,
      "timestamp": "2019-11-30T16:15:00",
      "quality": "good"
    },
    {
      "value": 1492.09,
      "timestamp": "2019-11-30T16:30:00",
      "quality": "good"
    },
    {
      "value": 1439.24,
      "timestamp": "2019-11-30T16:45:00",
      "quality": "good"
    },
    {
      "value": 1482.25,
      "timestamp": "2019-11-30T17:00:00",
```

```
    "quality": "good"
  },
  {
    "value": 1389.83,
    "timestamp": "2019-11-30T17:15:00",
    "quality": "good"
  },
  {
    "value": 1439.8,
    "timestamp": "2019-11-30T17:30:00",
    "quality": "good"
  },
  {
    "value": 1370.67,
    "timestamp": "2019-11-30T17:45:00",
    "quality": "good"
  },
  {
    "value": 1494.87,
    "timestamp": "2019-11-30T18:00:00",
    "quality": "good"
  },
  {
    "value": 1341.66,
    "timestamp": "2019-11-30T18:15:00",
    "quality": "good"
  },
  {
    "value": 1480.78,
    "timestamp": "2019-11-30T18:30:00",
    "quality": "good"
  },
  {
    "value": 1407.21,
    "timestamp": "2019-11-30T18:45:00",
    "quality": "good"
  },
  {
    "value": 1363.98,
    "timestamp": "2019-11-30T19:00:00",
    "quality": "good"
  },
  {
    "value": 1453.75,
```

```
        "timestamp": "2019-11-30T19:15:00",
        "quality": "good"
    },
    {
        "value": 1220.49,
        "timestamp": "2019-11-30T19:30:00",
        "quality": "good"
    },
    {
        "value": 1308.35,
        "timestamp": "2019-11-30T19:45:00",
        "quality": "good"
    },
    {
        "value": 1250.43,
        "timestamp": "2019-11-30T20:00:00",
        "quality": "good"
    },
    {
        "value": 1311.12,
        "timestamp": "2019-11-30T20:15:00",
        "quality": "good"
    },
    {
        "value": 1468.64,
        "timestamp": "2019-11-30T20:30:00",
        "quality": "good"
    },
    {
        "value": 1499.16,
        "timestamp": "2019-11-30T20:45:00",
        "quality": "good"
    },
    {
        "value": 1493.58,
        "timestamp": "2019-11-30T21:00:00",
        "quality": "good"
    },
    {
        "value": 1411.63,
        "timestamp": "2019-11-30T21:15:00",
        "quality": "good"
    },
    {
```



```
    "value": 1277.24,  
    "timestamp": "2019-11-30T21:30:00",  
    "quality": "good"  
  },  
  {  
    "value": 1360.72,  
    "timestamp": "2019-11-30T21:45:00",  
    "quality": "good"  
  },  
  {  
    "value": 1379.21,  
    "timestamp": "2019-11-30T22:00:00",  
    "quality": "good"  
  },  
  {  
    "value": 1280.97,  
    "timestamp": "2019-11-30T22:15:00",  
    "quality": "good"  
  },  
  {  
    "value": 1471.59,  
    "timestamp": "2019-11-30T22:30:00",  
    "quality": "good"  
  },  
  {  
    "value": 1345.78,  
    "timestamp": "2019-11-30T22:45:00",  
    "quality": "good"  
  },  
  {  
    "value": 1205.29,  
    "timestamp": "2019-11-30T23:00:00",  
    "quality": "good"  
  },  
  {  
    "value": 1442.43,  
    "timestamp": "2019-11-30T23:15:00",  
    "quality": "good"  
  },  
  {  
    "value": 1241.11,  
    "timestamp": "2019-11-30T23:30:00",  
    "quality": "good"  
  },  
}
```

```
        {
          "value": 1362.38,
          "timestamp": "2019-11-30T23:45:00",
          "quality": "good"
        }
      ]
    },
    "rID": 0
  },
  {
    "irregular": {
      "values": [
        {
          "value": 1221.41,
          "timestamp": "2019-11-30T00:00:00",
          "quality": "good"
        },
        {
          "value": 1218.21,
          "timestamp": "2019-11-30T00:15:00",
          "quality": "good"
        },
        {
          "value": 1483.47,
          "timestamp": "2019-11-30T00:30:00",
          "quality": "good"
        },
        {
          "value": 1338.21,
          "timestamp": "2019-11-30T00:45:00",
          "quality": "good"
        },
        {
          "value": 1499.45,
          "timestamp": "2019-11-30T01:00:00",
          "quality": "good"
        },
        {
          "value": 1450.76,
          "timestamp": "2019-11-30T01:15:00",
          "quality": "good"
        },
        {
          "value": 1206.92,
```

```
        "timestamp": "2019-11-30T01:30:00",
        "quality": "good"
    },
    {
        "value": 1307.57,
        "timestamp": "2019-11-30T01:45:00",
        "quality": "good"
    },
    {
        "value": 1308.53,
        "timestamp": "2019-11-30T02:00:00",
        "quality": "good"
    },
    {
        "value": 1454.25,
        "timestamp": "2019-11-30T02:15:00",
        "quality": "good"
    },
    {
        "value": 1491.21,
        "timestamp": "2019-11-30T02:30:00",
        "quality": "good"
    },
    {
        "value": 1351.5,
        "timestamp": "2019-11-30T02:45:00",
        "quality": "good"
    },
    {
        "value": 1218.15,
        "timestamp": "2019-11-30T03:00:00",
        "quality": "good"
    },
    {
        "value": 1437.02,
        "timestamp": "2019-11-30T03:15:00",
        "quality": "good"
    },
    {
        "value": 1287.48,
        "timestamp": "2019-11-30T03:30:00",
        "quality": "good"
    },
    {
```

```
        "value": 1269.38,  
        "timestamp": "2019-11-30T03:45:00",  
        "quality": "good"  
    },  
    {  
        "value": 1337.56,  
        "timestamp": "2019-11-30T04:00:00",  
        "quality": "good"  
    },  
    {  
        "value": 1275.68,  
        "timestamp": "2019-11-30T04:15:00",  
        "quality": "good"  
    },  
    {  
        "value": 1301.95,  
        "timestamp": "2019-11-30T04:30:00",  
        "quality": "good"  
    },  
    {  
        "value": 1367.86,  
        "timestamp": "2019-11-30T04:45:00",  
        "quality": "good"  
    },  
    {  
        "value": 1418.91,  
        "timestamp": "2019-11-30T05:00:00",  
        "quality": "good"  
    },  
    {  
        "value": 1271.63,  
        "timestamp": "2019-11-30T05:15:00",  
        "quality": "good"  
    },  
    {  
        "value": 1256.83,  
        "timestamp": "2019-11-30T05:30:00",  
        "quality": "good"  
    },  
    {  
        "value": 1419.5,  
        "timestamp": "2019-11-30T05:45:00",  
        "quality": "good"  
    },  
    {
```

```
{
  "value": 1304.71,
  "timestamp": "2019-11-30T06:00:00",
  "quality": "good"
},
{
  "value": 1278.99,
  "timestamp": "2019-11-30T06:15:00",
  "quality": "good"
},
{
  "value": 1355.1,
  "timestamp": "2019-11-30T06:30:00",
  "quality": "good"
},
{
  "value": 1469.65,
  "timestamp": "2019-11-30T06:45:00",
  "quality": "good"
},
{
  "value": 1288.35,
  "timestamp": "2019-11-30T07:00:00",
  "quality": "good"
},
{
  "value": 1261.78,
  "timestamp": "2019-11-30T07:15:00",
  "quality": "good"
},
{
  "value": 1493.18,
  "timestamp": "2019-11-30T07:30:00",
  "quality": "good"
},
{
  "value": 1455.63,
  "timestamp": "2019-11-30T07:45:00",
  "quality": "good"
},
{
  "value": 1478.21,
  "timestamp": "2019-11-30T08:00:00",
  "quality": "good"
}
```

```
},
{
  "value": 1315.38,
  "timestamp": "2019-11-30T08:15:00",
  "quality": "good"
},
{
  "value": 1267.47,
  "timestamp": "2019-11-30T08:30:00",
  "quality": "good"
},
{
  "value": 1446.89,
  "timestamp": "2019-11-30T08:45:00",
  "quality": "good"
},
{
  "value": 1412.69,
  "timestamp": "2019-11-30T09:00:00",
  "quality": "good"
},
{
  "value": 1374.58,
  "timestamp": "2019-11-30T09:15:00",
  "quality": "good"
},
{
  "value": 1406.94,
  "timestamp": "2019-11-30T09:30:00",
  "quality": "good"
},
{
  "value": 1219.18,
  "timestamp": "2019-11-30T09:45:00",
  "quality": "good"
},
{
  "value": 1464.37,
  "timestamp": "2019-11-30T10:00:00",
  "quality": "good"
},
{
  "value": 1226.87,
  "timestamp": "2019-11-30T10:15:00",
```

```
    "quality": "good"
  },
  {
    "value": 1334.42,
    "timestamp": "2019-11-30T10:30:00",
    "quality": "good"
  },
  {
    "value": 1239.42,
    "timestamp": "2019-11-30T10:45:00",
    "quality": "good"
  },
  {
    "value": 1496.67,
    "timestamp": "2019-11-30T11:00:00",
    "quality": "good"
  },
  {
    "value": 1255.19,
    "timestamp": "2019-11-30T11:15:00",
    "quality": "good"
  },
  {
    "value": 1214.53,
    "timestamp": "2019-11-30T11:30:00",
    "quality": "good"
  },
  {
    "value": 1360.53,
    "timestamp": "2019-11-30T11:45:00",
    "quality": "good"
  },
  {
    "value": 1396.2,
    "timestamp": "2019-11-30T12:00:00",
    "quality": "good"
  },
  {
    "value": 1449.86,
    "timestamp": "2019-11-30T12:15:00",
    "quality": "good"
  },
  {
    "value": 1485.17,
```

```
        "timestamp": "2019-11-30T12:30:00",
        "quality": "good"
    },
    {
        "value": 1408.44,
        "timestamp": "2019-11-30T12:45:00",
        "quality": "good"
    },
    {
        "value": 1297.95,
        "timestamp": "2019-11-30T13:00:00",
        "quality": "good"
    },
    {
        "value": 1453.55,
        "timestamp": "2019-11-30T13:15:00",
        "quality": "good"
    },
    {
        "value": 1293.47,
        "timestamp": "2019-11-30T13:30:00",
        "quality": "good"
    },
    {
        "value": 1484.37,
        "timestamp": "2019-11-30T13:45:00",
        "quality": "good"
    },
    {
        "value": 1448.92,
        "timestamp": "2019-11-30T14:00:00",
        "quality": "good"
    },
    {
        "value": 1237.27,
        "timestamp": "2019-11-30T14:15:00",
        "quality": "good"
    },
    {
        "value": 1265.27,
        "timestamp": "2019-11-30T14:30:00",
        "quality": "good"
    },
    {
```



```
        "value": 1407.48,  
        "timestamp": "2019-11-30T14:45:00",  
        "quality": "good"  
    },  
    {  
        "value": 1318.57,  
        "timestamp": "2019-11-30T15:00:00",  
        "quality": "good"  
    },  
    {  
        "value": 1248.53,  
        "timestamp": "2019-11-30T15:15:00",  
        "quality": "good"  
    },  
    {  
        "value": 1229.23,  
        "timestamp": "2019-11-30T15:30:00",  
        "quality": "good"  
    },  
    {  
        "value": 1382.5,  
        "timestamp": "2019-11-30T15:45:00",  
        "quality": "good"  
    },  
    {  
        "value": 1361.64,  
        "timestamp": "2019-11-30T16:00:00",  
        "quality": "good"  
    },  
    {  
        "value": 1325.51,  
        "timestamp": "2019-11-30T16:15:00",  
        "quality": "good"  
    },  
    {  
        "value": 1494.28,  
        "timestamp": "2019-11-30T16:30:00",  
        "quality": "good"  
    },  
    {  
        "value": 1297.64,  
        "timestamp": "2019-11-30T16:45:00",  
        "quality": "good"  
    },  
    }
```

```
{
  "value": 1370.41,
  "timestamp": "2019-11-30T17:00:00",
  "quality": "good"
},
{
  "value": 1433.01,
  "timestamp": "2019-11-30T17:15:00",
  "quality": "good"
},
{
  "value": 1339.47,
  "timestamp": "2019-11-30T17:30:00",
  "quality": "good"
},
{
  "value": 1436.53,
  "timestamp": "2019-11-30T17:45:00",
  "quality": "good"
},
{
  "value": 1419.49,
  "timestamp": "2019-11-30T18:00:00",
  "quality": "good"
},
{
  "value": 1447.43,
  "timestamp": "2019-11-30T18:15:00",
  "quality": "good"
},
{
  "value": 1421.71,
  "timestamp": "2019-11-30T18:30:00",
  "quality": "good"
},
{
  "value": 1227.11,
  "timestamp": "2019-11-30T18:45:00",
  "quality": "good"
},
{
  "value": 1206.33,
  "timestamp": "2019-11-30T19:00:00",
  "quality": "good"
}
```

```
    },
    {
      "value": 1298.7,
      "timestamp": "2019-11-30T19:15:00",
      "quality": "good"
    },
    {
      "value": 1436.22,
      "timestamp": "2019-11-30T19:30:00",
      "quality": "good"
    },
    {
      "value": 1347.9,
      "timestamp": "2019-11-30T19:45:00",
      "quality": "good"
    },
    {
      "value": 1325.54,
      "timestamp": "2019-11-30T20:00:00",
      "quality": "good"
    },
    {
      "value": 1467.36,
      "timestamp": "2019-11-30T20:15:00",
      "quality": "good"
    },
    {
      "value": 1479.27,
      "timestamp": "2019-11-30T20:30:00",
      "quality": "good"
    },
    {
      "value": 1469.76,
      "timestamp": "2019-11-30T20:45:00",
      "quality": "good"
    },
    {
      "value": 1483.92,
      "timestamp": "2019-11-30T21:00:00",
      "quality": "good"
    },
    {
      "value": 1334.26,
      "timestamp": "2019-11-30T21:15:00",
```

```
    "quality": "good"
  },
  {
    "value": 1261.43,
    "timestamp": "2019-11-30T21:30:00",
    "quality": "good"
  },
  {
    "value": 1227.6,
    "timestamp": "2019-11-30T21:45:00",
    "quality": "good"
  },
  {
    "value": 1266.77,
    "timestamp": "2019-11-30T22:00:00",
    "quality": "good"
  },
  {
    "value": 1489.53,
    "timestamp": "2019-11-30T22:15:00",
    "quality": "good"
  },
  {
    "value": 1402.44,
    "timestamp": "2019-11-30T22:30:00",
    "quality": "good"
  },
  {
    "value": 1392.9,
    "timestamp": "2019-11-30T22:45:00",
    "quality": "good"
  },
  {
    "value": 1303.54,
    "timestamp": "2019-11-30T23:00:00",
    "quality": "good"
  },
  {
    "value": 1325.46,
    "timestamp": "2019-11-30T23:15:00",
    "quality": "good"
  },
  {
    "value": 1406.66,
```

```

        "timestamp": "2019-11-30T23:30:00",
        "quality": "good"
    },
    {
        "value": 1353.09,
        "timestamp": "2019-11-30T23:45:00",
        "quality": "good"
    }
]
},
"rID": 1
},
{
    "irregular": {
        "values": [
            {
                "value": 1453.39,
                "timestamp": "2019-11-30T00:00:00",
                "quality": "good"
            },
            {
                "value": 1465.85,
                "timestamp": "2019-11-30T00:15:00",
                "quality": "good"
            },
            {
                "value": 1269.53,
                "timestamp": "2019-11-30T00:30:00",
                "quality": "good"
            },
            {
                "value": 1498.91,
                "timestamp": "2019-11-30T00:45:00",
                "quality": "good"
            },
            {
                "value": 1237.48,
                "timestamp": "2019-11-30T01:00:00",
                "quality": "good"
            },
            {
                "value": 1321.02,
                "timestamp": "2019-11-30T01:15:00",
                "quality": "good"
            }
        ]
    }
}

```

```
},
{
  "value": 1202.15,
  "timestamp": "2019-11-30T01:30:00",
  "quality": "good"
},
{
  "value": 1474.75,
  "timestamp": "2019-11-30T01:45:00",
  "quality": "good"
},
{
  "value": 1285.85,
  "timestamp": "2019-11-30T02:00:00",
  "quality": "good"
},
{
  "value": 1204.51,
  "timestamp": "2019-11-30T02:15:00",
  "quality": "good"
},
{
  "value": 1381.08,
  "timestamp": "2019-11-30T02:30:00",
  "quality": "good"
},
{
  "value": 1360.93,
  "timestamp": "2019-11-30T02:45:00",
  "quality": "good"
},
{
  "value": 1342.1,
  "timestamp": "2019-11-30T03:00:00",
  "quality": "good"
},
{
  "value": 1302.84,
  "timestamp": "2019-11-30T03:15:00",
  "quality": "good"
},
{
  "value": 1236.15,
  "timestamp": "2019-11-30T03:30:00",
```

```
    "quality": "good"
  },
  {
    "value": 1229.42,
    "timestamp": "2019-11-30T03:45:00",
    "quality": "good"
  },
  {
    "value": 1478.7,
    "timestamp": "2019-11-30T04:00:00",
    "quality": "good"
  },
  {
    "value": 1455.23,
    "timestamp": "2019-11-30T04:15:00",
    "quality": "good"
  },
  {
    "value": 1477.82,
    "timestamp": "2019-11-30T04:30:00",
    "quality": "good"
  },
  {
    "value": 1347.25,
    "timestamp": "2019-11-30T04:45:00",
    "quality": "good"
  },
  {
    "value": 1419.65,
    "timestamp": "2019-11-30T05:00:00",
    "quality": "good"
  },
  {
    "value": 1474.24,
    "timestamp": "2019-11-30T05:15:00",
    "quality": "good"
  },
  {
    "value": 1439.76,
    "timestamp": "2019-11-30T05:30:00",
    "quality": "good"
  },
  {
    "value": 1493.21,
```

```
        "timestamp": "2019-11-30T05:45:00",
        "quality": "good"
    },
    {
        "value": 1445.89,
        "timestamp": "2019-11-30T06:00:00",
        "quality": "good"
    },
    {
        "value": 1422.67,
        "timestamp": "2019-11-30T06:15:00",
        "quality": "good"
    },
    {
        "value": 1370.18,
        "timestamp": "2019-11-30T06:30:00",
        "quality": "good"
    },
    {
        "value": 1404.58,
        "timestamp": "2019-11-30T06:45:00",
        "quality": "good"
    },
    {
        "value": 1271.6,
        "timestamp": "2019-11-30T07:00:00",
        "quality": "good"
    },
    {
        "value": 1254.92,
        "timestamp": "2019-11-30T07:15:00",
        "quality": "good"
    },
    {
        "value": 1348.06,
        "timestamp": "2019-11-30T07:30:00",
        "quality": "good"
    },
    {
        "value": 1481.35,
        "timestamp": "2019-11-30T07:45:00",
        "quality": "good"
    },
    {
```



```
    "value": 1426.38,  
    "timestamp": "2019-11-30T08:00:00",  
    "quality": "good"  
  },  
  {  
    "value": 1333.87,  
    "timestamp": "2019-11-30T08:15:00",  
    "quality": "good"  
  },  
  {  
    "value": 1227.32,  
    "timestamp": "2019-11-30T08:30:00",  
    "quality": "good"  
  },  
  {  
    "value": 1344.86,  
    "timestamp": "2019-11-30T08:45:00",  
    "quality": "good"  
  },  
  {  
    "value": 1460.36,  
    "timestamp": "2019-11-30T09:00:00",  
    "quality": "good"  
  },  
  {  
    "value": 1446.29,  
    "timestamp": "2019-11-30T09:15:00",  
    "quality": "good"  
  },  
  {  
    "value": 1422.92,  
    "timestamp": "2019-11-30T09:30:00",  
    "quality": "good"  
  },  
  {  
    "value": 1477.13,  
    "timestamp": "2019-11-30T09:45:00",  
    "quality": "good"  
  },  
  {  
    "value": 1204.78,  
    "timestamp": "2019-11-30T10:00:00",  
    "quality": "good"  
  },  
}
```

```
{
  "value": 1361.12,
  "timestamp": "2019-11-30T10:15:00",
  "quality": "good"
},
{
  "value": 1348.9,
  "timestamp": "2019-11-30T10:30:00",
  "quality": "good"
},
{
  "value": 1455.83,
  "timestamp": "2019-11-30T10:45:00",
  "quality": "good"
},
{
  "value": 1271.06,
  "timestamp": "2019-11-30T11:00:00",
  "quality": "good"
},
{
  "value": 1205.87,
  "timestamp": "2019-11-30T11:15:00",
  "quality": "good"
},
{
  "value": 1398.08,
  "timestamp": "2019-11-30T11:30:00",
  "quality": "good"
},
{
  "value": 1347.63,
  "timestamp": "2019-11-30T11:45:00",
  "quality": "good"
},
{
  "value": 1456.07,
  "timestamp": "2019-11-30T12:00:00",
  "quality": "good"
},
{
  "value": 1476.32,
  "timestamp": "2019-11-30T12:15:00",
  "quality": "good"
}
```

```
    },  
    {  
      "value": 1317.42,  
      "timestamp": "2019-11-30T12:30:00",  
      "quality": "good"  
    },  
    {  
      "value": 1430.01,  
      "timestamp": "2019-11-30T12:45:00",  
      "quality": "good"  
    },  
    {  
      "value": 1440.24,  
      "timestamp": "2019-11-30T13:00:00",  
      "quality": "good"  
    },  
    {  
      "value": 1344.41,  
      "timestamp": "2019-11-30T13:15:00",  
      "quality": "good"  
    },  
    {  
      "value": 1282.14,  
      "timestamp": "2019-11-30T13:30:00",  
      "quality": "good"  
    },  
    {  
      "value": 1278.51,  
      "timestamp": "2019-11-30T13:45:00",  
      "quality": "good"  
    },  
    {  
      "value": 1218.69,  
      "timestamp": "2019-11-30T14:00:00",  
      "quality": "good"  
    },  
    {  
      "value": 1487.99,  
      "timestamp": "2019-11-30T14:15:00",  
      "quality": "good"  
    },  
    {  
      "value": 1204.37,  
      "timestamp": "2019-11-30T14:30:00",
```

```
    "quality": "good"
  },
  {
    "value": 1382.14,
    "timestamp": "2019-11-30T14:45:00",
    "quality": "good"
  },
  {
    "value": 1293.25,
    "timestamp": "2019-11-30T15:00:00",
    "quality": "good"
  },
  {
    "value": 1234.35,
    "timestamp": "2019-11-30T15:15:00",
    "quality": "good"
  },
  {
    "value": 1429.86,
    "timestamp": "2019-11-30T15:30:00",
    "quality": "good"
  },
  {
    "value": 1335.4,
    "timestamp": "2019-11-30T15:45:00",
    "quality": "good"
  },
  {
    "value": 1275.47,
    "timestamp": "2019-11-30T16:00:00",
    "quality": "good"
  },
  {
    "value": 1487.18,
    "timestamp": "2019-11-30T16:15:00",
    "quality": "good"
  },
  {
    "value": 1278.12,
    "timestamp": "2019-11-30T16:30:00",
    "quality": "good"
  },
  {
    "value": 1300.08,
```

```
        "timestamp": "2019-11-30T16:45:00",
        "quality": "good"
    },
    {
        "value": 1307.22,
        "timestamp": "2019-11-30T17:00:00",
        "quality": "good"
    },
    {
        "value": 1293.47,
        "timestamp": "2019-11-30T17:15:00",
        "quality": "good"
    },
    {
        "value": 1467.38,
        "timestamp": "2019-11-30T17:30:00",
        "quality": "good"
    },
    {
        "value": 1334.15,
        "timestamp": "2019-11-30T17:45:00",
        "quality": "good"
    },
    {
        "value": 1396.52,
        "timestamp": "2019-11-30T18:00:00",
        "quality": "good"
    },
    {
        "value": 1203.42,
        "timestamp": "2019-11-30T18:15:00",
        "quality": "good"
    },
    {
        "value": 1236.65,
        "timestamp": "2019-11-30T18:30:00",
        "quality": "good"
    },
    {
        "value": 1348.84,
        "timestamp": "2019-11-30T18:45:00",
        "quality": "good"
    },
    {
```

```
        "value": 1491.25,  
        "timestamp": "2019-11-30T19:00:00",  
        "quality": "good"  
    },  
    {  
        "value": 1482.12,  
        "timestamp": "2019-11-30T19:15:00",  
        "quality": "good"  
    },  
    {  
        "value": 1231.95,  
        "timestamp": "2019-11-30T19:30:00",  
        "quality": "good"  
    },  
    {  
        "value": 1377.53,  
        "timestamp": "2019-11-30T19:45:00",  
        "quality": "good"  
    },  
    {  
        "value": 1373.47,  
        "timestamp": "2019-11-30T20:00:00",  
        "quality": "good"  
    },  
    {  
        "value": 1346.78,  
        "timestamp": "2019-11-30T20:15:00",  
        "quality": "good"  
    },  
    {  
        "value": 1263.15,  
        "timestamp": "2019-11-30T20:30:00",  
        "quality": "good"  
    },  
    {  
        "value": 1322.99,  
        "timestamp": "2019-11-30T20:45:00",  
        "quality": "good"  
    },  
    {  
        "value": 1350.72,  
        "timestamp": "2019-11-30T21:00:00",  
        "quality": "good"  
    },  
    {
```

```
{
  "value": 1328.01,
  "timestamp": "2019-11-30T21:15:00",
  "quality": "good"
},
{
  "value": 1261.69,
  "timestamp": "2019-11-30T21:30:00",
  "quality": "good"
},
{
  "value": 1390.67,
  "timestamp": "2019-11-30T21:45:00",
  "quality": "good"
},
{
  "value": 1449.33,
  "timestamp": "2019-11-30T22:00:00",
  "quality": "good"
},
{
  "value": 1387.41,
  "timestamp": "2019-11-30T22:15:00",
  "quality": "good"
},
{
  "value": 1277.49,
  "timestamp": "2019-11-30T22:30:00",
  "quality": "good"
},
{
  "value": 1217.09,
  "timestamp": "2019-11-30T22:45:00",
  "quality": "good"
},
{
  "value": 1277.55,
  "timestamp": "2019-11-30T23:00:00",
  "quality": "good"
},
{
  "value": 1366.99,
  "timestamp": "2019-11-30T23:15:00",
  "quality": "good"
}
```

```

        },
        {
            "value": 1345.81,
            "timestamp": "2019-11-30T23:30:00",
            "quality": "good"
        },
        {
            "value": 1362.8,
            "timestamp": "2019-11-30T23:45:00",
            "quality": "good"
        }
    ]
},
"rID": 2
}
]
}

```

● 响应示例

```

{
    "root": "DataReportResponse",
    "version": 1,
    "code": 200,
    "description": "ok",
    "requestID": "20a2730c-500d-49cd-9028-b39613a58aa8",
    "dnID": "100101030000002"
}

```

1.1.13 *数据报告响应（DataReportResponse）

名称	类型	描述
root	String	"DataReportResponse"
version	Integer	协议版本（继承自 DrResponse）
code	Integer	响应代码（继承自 DrResponse）
description	String	错误原因（继承自 DrResponse）
requestID	String	请求 ID（继承自 DrResponse）
dnID	String	下位节点的 ID（继承自 DrResponse）
[0..1]cancelReport	CancelReportRequest	要取消的报告清单

3.1 拉取-轮询服务

(Poll/PollResponse)

1.1.14 询问 (Poll)

DN 向 UN 发出询问，询问信息中包括协议版本以及 dnID。

- url: <https://27.115.117.6:9093/Poll>
- way: post
- 请求参数:

名称	类型	描述
root	String	"Poll"
version	Integer	协议版本 (继承自 DrRequest)
dnID	String	下位节点的 ID (继承自 DrRequest)

- 请求示例

```
{
  "root": "Poll",
  "version": 1,
  "requestID": "bf992657-d1b1-4634-badd-2be6f1275e4f",
  "dnID": "10010103000002"
}
```

- 响应示例

```
{
  "root": "PollResponse",
  "version": 1,
  "code": 200,
  "description": "ok",
  "dnID": "10010103000002"
}
```

1.1.15 询问响应 (PollResponse)

DN 向 UN 发送询问，若 UN 没有任何请求或事件发布需求时的回复，包含协议版本以及下位节点的 ID。

名称	类型	描述
root	String	“PollResponse”
version	String	协议版本（继承自 DrResponse）
code	String	响应代码（继承自 DrResponse）
reason	String	错误原因（继承自 DrResponse）
dnID	String	下位节点的 ID（继承自 DrResponse）

3.2 拉取-重新注册

(Poll/ReregistrationRequest/CreateRegistrationRequest/CreateRegistrationResponse)

1.1.16 询问 (Poll)

DN向UN发出询问，询问信息中包括协议版本以及dnID。
表90 列出了Poll的所有内容。

表 1 Poll 的内容

名称	类型	描述
root	String	“Poll”
version	Integer	协议版本（继承自 DrRequest）
dnID	String	下位节点的 ID（继承自 DrRequest）

1.1.17 重新注册请求 (ReregistrationRequest)

UN接收到DN的询问后，请求DN进行重新注册。
表91 列出了ReregistrationRequest的所有内容。

表 2 ReregistrationRequest 的内容

名称	类型	描述
root	String	“ReregistrationRequest”
version	Integer	协议版本（继承自 DrRequest）
requestID	String	请求 ID（继承自 DrRequest）

dnID	String	下位节点的 ID（继承自 DrRequest）
------	--------	-------------------------

1.1.18 创建注册请求（CreateRegistrationRequest）

当DN向UN初始化注册信息时，使用该服务。

表 3 CreateRegistrationRequest 的内容

名称	类型	描述
root	String	"CreateRegistrationRequest"
version	Integer	协议版本（继承自 DrRequest）
requestID	String	请求 ID（继承自 DrRequest）
dnID	String	下位节点的 ID（继承自 DrRequest）
dnName	String	DN 名称
registrationID	String	注册 ID，首次注册时空，重新注册时使用上一次的 ID
reportOnly	Boolean	是否只支持报告
pullMode	Boolean	是否为 PULL 模式
signature	Boolean	交换的报文是否签名，如果要签名，数据报文需要用 DrPayload 封装
transport	TransportType	传输方式，可以是 REST 或 MQTT
transportAddress	String	服务接入点；REST 传输方式时是请求 URL，MQTT 传输方式时是服务器地址。
[0..n]otherInfo	KeyVvalue	扩展备案信息

● 请求示例

略

● 响应示例

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1.1.19 创建注册响应（CreateRegistrationResponse）

当DN向UN查询注册信息或初始化注册信息时，UN使用该服务进行响应，确认收到DN的请求。

表 4 CreateRegistrationResponse 的内容

名称	类型	描述
root	String	“CreateRegistrationResponse”
version	Integer	协议版本（继承自 DrResponse）
code	Integer	响应代码（继承自 DrResponse）
description	String	错误原因（继承自 DrResponse）
requestID	String	请求 ID（继承自 DrResponse）
dnID	String	下位节点的 ID（继承自 DrResponse）
unID	String	上位节点的 ID
registrationID	String	注册 ID
pollFreq	Duration	询问频率
[1..n]transport	TransportType	支持的传输协议类型
[1..n]serviceSpecific	ServiceSpecific	支持的服务规范

3.3 拉取-拉取事件

(Poll/DistributeEventRequest/CreateEventResponse)

1.1.20 询问（Poll）

DN向UN发出询问，询问信息中包括协议版本以及dnID。
表90 列出了Poll的所有内容。

表 5 Poll 的内容

名称	类型	描述
root	String	“Poll”
version	Integer	协议版本（继承自 DrRequest）
dnID	String	下位节点的 ID（继承自 DrRequest）

1.1.21 重新注册请求 (ReregistrationRequest)

UN接收到DN的询问后，请求DN进行重新注册。
表91 列出了ReregistrationRequest的所有内容。

表 6 ReregistrationRequest 的内容

名称	类型	描述
root	String	"ReregistrationRequest"
version	Integer	协议版本 (继承自 DrRequest)
requestID	String	请求 ID (继承自 DrRequest)
dnID	String	下位节点的 ID (继承自 DrRequest)

1.1.22 发布事件请求 (DistributeEventRequest)

UN接收到DN的询问后，向DN推送已经产生的需求响应事件。
表92 列出了DistributeEventRequest的所有内容。

表 7 DistributeEventRequest 的内容

名称	类型	描述
root	String	"DistributeEventRequest"
version	Integer	协议版本 (继承自 DrRequest)
requestID	String	请求 ID (继承自 DrRequest)
dnID	String	下位节点的 ID (继承自 DrRequest)
[1..n]events	Event	事件信息

1.1.23 创建事件响应 (CreateEventResponse)

DN对UN发布的每一个事件做确认响应，明确是否参与。

表 8 CreateEventResponse 的内容

名称	类型	描述
root	String	"CreateEventResponse"
version	Integer	协议版本 (继承自 DrResponse)
code	Integer	响应代码 (继承自 DrResponse)

description	String	错误原因（继承自 DrResponse）
requestID	String	请求 ID（继承自 DrResponse）
dnID	String	下位节点的 ID（继承自 DrResponse）
[1..n]eventResponses	EventResponse	事件响应方式

● 请求示例

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● 响应示例

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3.4 拉取-报告服务-拉取元数据

(Poll/CreateReportRequest/CreateReportResponse/RegisterReportRequest/RegisterReportResponse)

1.1.24 询问（Poll）

DN向UN发出询问，询问信息中包括协议版本以及dnID。
表90 列出了Poll的所有内容。

表 9 Poll 的内容

名称	类型	描述
root	String	“Poll”
version	Integer	协议版本（继承自 DrRequest）
dnID	String	下位节点的 ID（继承自 DrRequest）

1.1.25 创建报告请求（CreateReportRequest）

当UN向DN请求报告时，使用该服务发送报告模板；当报告模板发生变化时，继续使用
该服务发送创建报告请求。

表 10 CreateReportRequest 的内容

名称	类型	描述
root	String	"CreateReportRequest"
version	Integer	协议版本（继承自 DrRequest）
requestID	String	请求 ID（继承自 DrRequest）
dnID	String	下位节点的 ID（继承自 DrRequest）
[1..n]reportRequest	ReportRequest	报告请求

1.1.26 创建报告响应（CreateReportResponse）

当DN收到UN发来的报告模板后，使用该服务进行确认。

表 11 CreateReportResponse 的内容

名称	类型	描述
root	String	"CreateReportResponse"
version	Integer	协议版本（继承自 DrResponse）
code	Integer	响应代码（继承自 DrResponse）
description	String	错误原因（继承自 DrResponse）
requestID	String	请求 ID（继承自 DrResponse）
dnID	String	下位节点的 ID（继承自 DrResponse）
pendingReports	PendingReports	待发报告清单

1.1.27 注册报告请求（RegisterReportRequest）

当DN向UN发送报告前，使用该服务进行注册；当DN自身信息发生变化时，在继续向UN发送报告前，也需要使用该服务进行注册。

表 12 RegisterReportRequest 的内容

名称	类型	描述
root	String	"RegisterReportRequest"
version	Integer	协议版本（继承自 DrRequest）
requestID	String	请求 ID（继承自 DrRequest）
dnID	String	下位节点的 ID（继承自 DrRequest）
reportRequestID	String	报告请求 ID(MetaDataReport)
[1..n]report	MetaDataReport	元数据报告

1. 1. 28 注册报告响应（RegisterReportResponse）

当UN接收到DN的注册报告请求时，使用该服务进行响应。

表 13 RegisterReportResponse 的内容

名称	类型	描述
root	String	"RegisterReportResponse"
version	Integer	协议版本（继承自 DrResponse）
code	Integer	响应代码（继承自 DrResponse）
description	String	错误原因（继承自 DrResponse）
requestID	String	请求 ID（继承自 DrResponse）
dnID	String	下位节点的 ID（继承自 DrResponse）
[0..n]reportRequest	ReportRequest	根据请求生成的报告样式

● 请求示例

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● 响应示例

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