Introduction

MCS (Meter Communications Service) has been designed as a standalone service for providing meter data communications services to other applications (referred to as the master application hereafter).

The master application will send data collection requests to MCS via the "MCS Request API" and MCS will asynchronously send results to the master application via the "MCS Result API".

Basics

Each API is implemented as Web API and will use JSON as the data representation format.

Security and Authentication

To be decided.

It is suggested HTTPS is used in both directions. Authentication (i.e. securing the API with password/tokens) may be omitted and instead client IP addresses could simply be white-listed on the receiving server in each direction.

Response codes

Standard HTTP response codes are used in the response to all the requests in the APIs. The following codes are used

Response code	Meaning
200 OK	Indicates that the request was successful and the response body will contain a Json object (or array of objects) with the requested data.
400 Bad Request	Indicates the request is not valid or understood by the server. The body of the response will provide more details of why the request is considered bad.
404 Not found	Indicates that a referenced object is not found
429 Too Many Requests	Can be sent by the server to throttle inputs. Exact usage to be decided.
500 Internal Server Error	Indicates a fault on the server. The body of the response will provide more details about the error.

All response codes not equal to 200 will provide a JSON object containing a "details" property which provides more information about the error.

MCS Request API

General

The master application can request for data from a meter to be collected by MCS by sending a Data Collection Request and MCS will send a response acknowledging the request or an error code if appropriate.

Data Collection Request method

The Data Collection Request method will use a HTTP POST message and the parameters will be sent in the body of the message as a JSON object:

```
POST collection-request
```

JSON Request Parameters

Name	Type	Value	Mandatory	
requestReference	String	A unique ID for the request. The master application must ensure this id is unique (GUID?)	YES	
mpan	String	Number to identify the meter.	YES	
responseUrl	String	The URL that MCS will send the results to. The URL must implement the MCS Result API	YES	
priority	Int	An integer value (>= 1) assigning a relative priority to the request. The lower the number the higher the priority. (0 is reserved for interactive requests and will not be accepted here).	YES	
delayUntil	String	Can be used to indicate that the request shouldn't be processed until a time in the future. This can be used to indicate requests should be processed overnight.	NO	
meterType	String	Specifies the type of meter to be tested. Currently:	YES	
remoteAddress	String	Specifies the remote address used to connect to the meter. The remote address is mandatory and can take the form of a phone number (for a modem connection), an IP address and port number for a GPRS or TCP connection, or a PAKNET number. A phone number must be a UK national phone number, e.g. 07711000001. An IP address and port number be in the form x.x.x.x:portno, e.g. 10.2.34.4:3400. The PAKNET address must be a 14 digit PAKNET number, e.g. 23000000123456	YES	
comsSettings	String	Normally this field should be ommitted but for cases where meters are configured in a non standard way this field can be used to override the default coms settings. This is only applicable for modem connections and can be used to specify the data bits, parity and stop bits in the form DPS, e.g. 7E1 to specify 7 stop bits, even parity and 1 stop bit.	NO	
outstationAddress	String			NO

Name	Type	Value	Mandatory	
		Specifies the outstation address/device id of the meter.	Meter dependent	
serialNumber	String	The meter serial number. If included a check will be made to determine if the meter returns this serial number and an error will be reported if there is a mismatch	NO	
password	String	The meter password.	Meter dependent	NO
surveyDays	Number	Specifies the number of days of survey data to read. If this field is missing or zero no survey data will be collected	NO	
surveyDate	String	Specifies the start date for reading survey data in the form yyyy-MM-dd. If this field is empty and surveyDays is > 0 then SURVEY_DATE will be assumed to by SURVEY_DAYS before the current day.	NO	
adjustTime	Boolean	Indicates that MCS should attempt to adjust the time of the meter. Note 1. Note 2.	NO	

Notes:

1. The time for meters will only be adjusted if it varies from the MCS server time by more than a configured minimum threshold and less than or equal to a configured maximum threshold. If the time varies by less than the minimum threshold the adjustment is considered "NOT REQUIRED". If the time varies by more than the maximum threshold it is considered an error.
2. Possibly adjusting the time should be move to a seperate method for extensibility

JSON Response parameters

Name	Type	Value	Mandatory
requestReference	String	Unique ID contained in the request.	YES

Sample - successful case

HTTP request from master application to MCS:

```
POST https://www.coherent-research.co.uk/MCS/collection-request
content-type: application/json

{
  "requestReference": "0001",
  "responseUrl": "https://www.company.com/MCSresults",
  "mpan": "12345",
  "priority": 1,
  "meterType": "ELSTER_A1700",
  "remoteAddress": "07777000000",
  "outstationAddress": "1",
  "serialNumber": "12345678",
```

```
  "password": "AAAA0000",
  "surveyDays": 10,
  "surveyDate": "2019-12-01",
  "adjustTime": true
}
```

Reponse from MCS:

```
HTTP/1.1 200 OK
Content-Type: application/json; charset=utf-8

{
  "requestReference": "0001"
}
```

Sample - error case

HTTP request from master application to MCS:

```
POST https://www.coherent-research.co.uk/MCS/collection-request
content-type: application/json

{
  "requestReference": "0001",
  "responseUrl": "https://www.company.com/MCSresults",
  "mpan": "12345",
  "priority": 1,
  "meterType": "ELSTER_A1700",
  "remoteAddress": "abc",
  "outstationAddress": "1",
  "serialNumber": "12345678",
  "password": "AAAA0000",
  "surveyDays": 10,
  "surveyDate": "2019-12-01",
  "adjustTime": true

}
```

HTTP response from MCS:

```
HTTP/1.1 400 Bad Request
Content-Type: application/json; charset=utf-8

{
  "details": "Remote address is not in a recognised format"
}
```

Data Collection Cancel method

The master application can request the cancellation of any previously requested collection. MCS will remove the matching request from the queue. If the request has already been processed (or is being processed) MCS will respond positively.

The Data Collection Cancel method will use a HTTP POST message and the parameters will be sent in the body of the message as a JSON object:

```
DELETE collection-cancel
```

JSON Request Parameters

Name	Type	Value	Mandatory
requestReference	String	A unique ID for the request. The master application must ensure this id is unique	YES

JSON Response parameters

Name	Type	Value	Mandatory
requestReference	String	Unique ID contained in the request.	YES
details	String	Details relating to any errors. This parameter is only included if the response code does not equal 200.	NO

Sample - successful case

HTTP request from master application to MCS:

```
DELETE https://www.coherent-research.co.uk/MCS/collection-cancel
content-type: application/json

{
  "requestReference": "0001"
}
```

HTTP response from MCS:

```
HTTP/1.1 200 OK
Content-Type: application/json; charset=utf-8

{
  "requestReference": "0001"
}
```

Data Collection Status method

The master application can request the status of any previously requested collection. This method is not required to be used by the master application as results will be sent using the MCS Result API but it can be used by system that prefer to poll for the results instead.

The Data Collection Status method will use a HTTP GET message and the parameters will be sent as part of the URL and the response will contain the information in JSON format in the response body.

```
GET collection-status?requestReference=x
```

URL Request Parameters

Name	Type	Value	Mandatory
requestReference	String	Unique ID contained in the request.	YES

JSON Response parameters - successful case

Name	Type	Value	Mandatory
requestReference	String	Note 1	YES
mpan	String	Note 1	YES
meterType	String	Note 1	YES
remoteAddress	String	Note 1	YES
comsSettings	String	Note 1	YES
outstationAddress	String	Note 1	YES
password	String	Note 1	YES
adjustTime	Boolean	Note 1	YES
surveyDays	Number	Note 1	YES
surveyDate	String	Note 1	YES
result	String	Indicates the overall result of the collection request. Values are "PENDING" (i.e. the collection has not been performed yet), "SUCCESS", "PARTIAL SUCCESS" (note 3) or "ERROR: details" where details describe the problem that caused the test to fail.	YES
collectionStartTime	String	Time time the collection started. In the case of multiple retries this will be the start of the first attempt. Note 2	NO
collectionEndTime	String	The time the collection ended. In the case of multiple retries this will be the end of the last attempt. Note 2	NO.
connectionStartTime	String	The time that the communication channel was opened. In the case of multiple retries this will be the start of the last attempt. Note 2	NO
connectionEndTime	String	The time that the communication channel was closed. In the case of multiple retries this will be the of the last attempt. Note 2 in the same format as above.	NO
serialNumber	String	The serial number received from the meter, or "ERROR: details" if it was not possible to fetch the serial number from the meter or if the serial number from the request is	NO

Name	Type	Value	Mandatory
		included and does not match the serial number read from the meter.	
meterTime	String	The meter date/time received from the meter with an offset in seconds from the time the test took place in the format YYYY-MM-DDTHH:mm:ss +/- Ns, e.g. 2014-10-31T23:33:32 -203s (indicates that the time was 203 seconds behind the real time when it was read). If no time was read this will contain "ERROR: details" where details describe the problem.	NO
statusEvents	Array of strings	An array of strings representing status events indicated by the meter. These will vary by meter type	NO
timeAdjustmentResult	String	"NOT REQUIRED", "SUCCESS", "ERROR: details". The timeAdjustmentResult can be an ERROR if it was not possible to adjust the time or the variation was above the maximum threshold.	NO
registerValues	Array	An array of Register Value objects. See below	NO
surveyData	Array	An array of Register Survey Data objects. See below	NO

Notes:

1. The parameters from the original Data Collection Request (or their interpretation in the case where their values were implicit) are repeated here.
2. All times are in UTC and in the format YYYY-MM-DDTHH:mm:ssZ
3. A collection will be considered partially successful if some, but not all, of the data was collected.

Register Value Object

A Register Value Object contains an instantaneous value read from the meter.

Name	Type	Value	Mandatory
name	String	The register name (depending on the meter type)	YES
value	Number	The value of the register	
units	String	The units of the register	

Register Survey Data Object

A Register Survey Value Object contains survey data for an individual register/channel from the meter:

Name	Type	Value	Mandatory
name	String	The register name (depending on the meter type)	YES
units	String	The units of the register	YES
readings	JSON object	An array of readings	YES

Name	Type	Value	Mandatory

Survey Reading Object

Name	Type	Value	Mandatory
timestamp	String	The time of the reading	YES
value	Number	The value of the register	YES

Sample - successfully completed collection

HTTP request from master application to MCS:

```
GET https://www.coherent-research.co.uk/MCS/collection-status?requestReference=0001
```

HTTP response from MCS:

```
HTTP/1.1 200 OK
Content-Type: application/json; charset=utf-8

{
  "requestReference": "0001",
  "mpan": "12345",
  "meterType": "ELSTER_A1700",
  "remoteAddress": "07777000000",
  "outstationAddress": "1",
  "serialNumber": "12345678",
  "password": "AAAA0000",
  "surveyDays": 1,
  "surveyDate": "2019-01-01",
  "resultSummary": "SUCCESS",
  "collectionStartTime": "2019-01-02T04:00:00",
  "collectionEndTime": "2019-01-02T04:01:30",
  "connectionStartTime": "2019-01-02T04:02:00",
  "connectionEndTime": "2019-01-02T04:01:28",
  "serialNumber": "12345678",
  "meterTime": "2019-01-02T03T04:02:15 +10s",
  "statusEvents" : [
        "Lid/terminal cover tamper"
  ],
  "registerValues": [
    {
      "name": "kWh Import",
      "timestamp": "2019-01-02T04:02:10Z",
      "value": "758",
      "units": "kWh"
    },
    {
      "name": "kvarh Q1",
      "timestamp": "2019-01-02T04:02:11Z",
      "value": "1190",
      "units": "kvarh"
    }
  ],
  "surveyData": [
      {
        "name": "kWh Import",
```

```
        "units": "kWh",
        [
          {
            "timestamp": "2019-01-01T00:00:00Z",
            "value": "640"
          },
          {
            "timestamp": "2019-01-01T00:30:00Z",
            "value": "645"
          },
          ...
          {
            "timestamp": "2019-01-01T23:30:00Z",
            "value": "700"
          }
        ]
      },
      {
        "name": "kvarh Q1",
        "units": "kvarh",
        [
          {
            "timestamp": "2019-01-01T00:00:00Z",
            "value": "900"
          },
          {
            "timestamp": "2019-01-01T00:30:00Z",
            "value": "910"
          },
          ...
          {
            "timestamp": "2019-01-01T23:30:00Z",
            "value": "1000"
          }
        ]
      },
  ]
}
```

Sample - successfully completed time adjustment (no survey data)

HTTP request from master application to MCS:

```
GET https://www.coherent-research.co.uk/MCS/collection-status/0001
```

HTTP response from MCS:

```
HTTP/1.1 200 OK
Content-Type: application/json; charset=utf-8

{
  "requestReference": "0001",
  "mpan": "12345",
  "meterType": "ELSTER_A1700",
  "remoteAddress": "07777000000",
  "outstationAddress": "1",
  "serialNumber": "12345678",
  "password": "AAAA0000",
  "surveyDays": 1,
  "surveyDate": "2019-01-01",
```

```
  "resultSummary": "SUCCESS",
  "collectionStartTime": "2019-01-02T04:00:00",
  "collectionEndTime": "2019-01-02T04:01:30",
  "connectionStartTime": "2019-01-02T04:02:00",
  "connectionEndTime": "2019-01-02T04:01:28",
  "serialNumber": "12345678",
  "meterTime": "2019-01-02T03T04:02:15 +500s",
  "timeAdjustmentResult": "SUCCESS"
}
```

Service Status method

MCS provides a method to check the status of the service itself.

```
GET service-status
```

URL Request parameters

This method takes no parameters.

JSON Response parameters

Name	Type	Value	Mandatory
version	String	The version of the service in the format X.Y.Z	YES
status	String	A string indicating the status of the service if it is running. Normally this will be OK	YES

Sample

HTTP request from master application to MCS:

```
GET https://www.coherent-research.co.uk/MCS/service-status
```

HTTP response from MCS:

```
HTTP/1.1 200 OK
Content-Type: application/json; charset=utf-8

{
  "version": "1.0.0",
  "status": "OK"
}
```

MCS Result API

General

MCS will send the results of any data collection request to the provided URL using the MCS Result API.

Data Collect Result method

The Data Collection Result method will use a HTTP POST message and the parameters will be sent in the body of the message as a JSON object. The object format is exactlty as in the response to the MCS Collection Status request above.

```
POST collection-result
```

JSON Request Parameters

See MCS Collection Status request above.

JSON Response parameters

Name	Type	Value	Mandatory
requestReference	String	Unique ID contained in the request.	YES
details	String	Details relating to any errors. This parameter is only included if the response code does not equal 200.	NO

Sample - successfully completed collection

HTTP request from MCS to master application:

```
POST https://www.coherent-research.co.uk/MCS/collection-result
Content-Type: application/json; charset=utf-8

{
  "requestReference": "0001",
  "mpan": "12345",
  "meterType": "ELSTER_A1700",
  "remoteAddress": "07777000000",
  "outstationAddress": "1",
  "serialNumber": "12345678",
  "password": "AAAA0000",
  "surveyDays": 1,
  "surveyDate": "2019-01-01",
  "resultSummary": "SUCCESS",
  "collectionStartTime": "2019-01-02T04:00:00",
  "collectionEndTime": "2019-01-02T04:01:30",
  "connectionStartTime": "2019-01-02T04:02:00",
  "connectionEndTime": "2019-01-02T04:01:28",
  "serialNumber": "12345678",
  "meterTime": "2019-01-02T03T04:02:15 +10s",
  "registerValues": [
    {
      "name": "kWh Import",
      "timestamp": "2019-01-02T04:02:10Z",
      "value": "758",
      "units": "kWh"
    },
    {
      "name": "kvarh Q1",
      "timestamp": "2019-01-02T04:02:11Z",
```

```
        "value": "1190",
        "units": "kvarh"
      }
    ],
    "surveyData": [
        {
          "name": "kWh Import",
          "units": "kWh",
          [
            {
              "timestamp": "2019-01-01T00:00:00Z",
              "value": "640"
            },
            {
              "timestamp": "2019-01-01T00:30:00Z",
              "value": "645"
            },
            ...
            {
              "timestamp": "2019-01-01T23:30:00Z",
              "value": "700"
            }
          ]
        },
        {
          "name": "kvarh Q1",
          "units": "kvarh",
          [
            {
              "timestamp": "2019-01-01T00:00:00Z",
              "value": "900"
            },
            {
              "timestamp": "2019-01-01T00:30:00Z",
              "value": "910"
            },
            ...
            {
              "timestamp": "2019-01-01T23:30:00Z",
              "value": "1000"
            }
          ]
        },
    ]
}
```


HTTP response from master application:

```
HTTP/1.1 200 OK
```

Service Status method

The Service Statuc Method mirrows the Service Status method and allows for a remote end to check the status of the MCS Result service itself.

```
GET service-status
```

URL Request parameters

This method takes no parameters.

JSON Response parameters

Name	Type	Value	Mandatory
version	String	The version of the service in the format X.Y.Z	YES
status	String	A string indicating the status of the service if it is running. Normally this will be OK	YES

Sample

See the corresponding MCS Request API method.