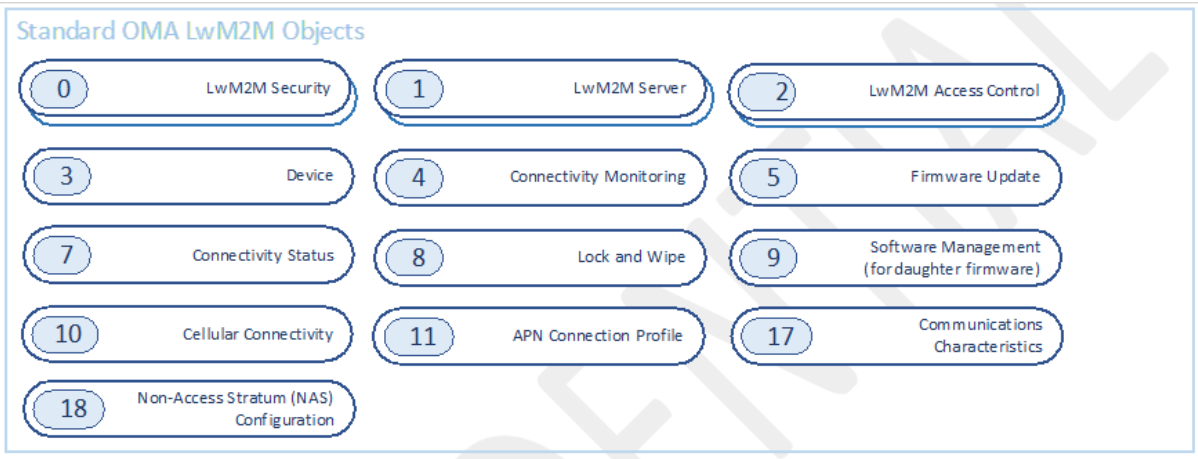
Introduction

The aim of this document is to provide an overview of interval / event data format.

LWM2M client running on this water meter consists of both existing OMA objects and vendor defined objects to meet specific data collection requirements.

This document is based off South East Water's "Digital Utility LwM2M Technical Specification".



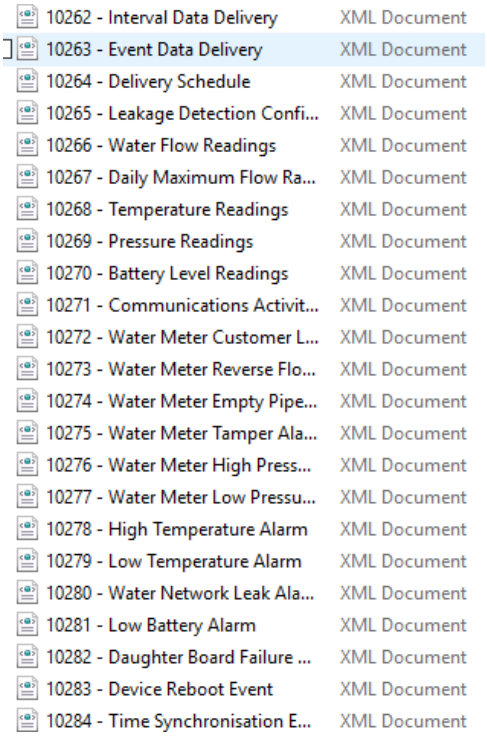


Figure 1 LWM2M object model

Data definition

1. Interval Data Delivery Object Instance 0 – Interval Data Delivery

Following is the default configuration of /10262/0. A definition is provided in the later section of this document for each of the interval reading objects.

Resource ID	Resource Name	Default Value
0	Name	Default Interval Data Delivery
1	Interval Data Links	By default, this should link to the following objects:- 1. /10266/0 Flow Data Readings (daily) 2. /10266/1 Flow Data Readings (30 minutes) 3. /10267/0 Daily Maximum Flow Rate Readings 4. /10268/0 Water Temperature Readings * 5. /10269/0 Water Pressure Readings * 6. /10270/0 Battery Level Readings 7. /10271/0 Meter Communication Activity Time Readings * If supported
3	Schedule	By default, this should link to the following schedule /10264/0

When a device registers with the LwM2M Server, an Observe operation on the **Latest Payload** resource must be initiated from the Server. This Observe operation is necessary to configure the daily notification of interval data to the server.

2. Event Data Delivery Object Instance 0 – Event Data Delivery

Following is the default configuration of **/10263/0**. A definition is provided in the later section of this document for each of the alarm objects.

Resource ID	Resource Name	Default Value
0	Name	Default Event Data Delivery
1	Event Data Links	1. 10272/0 Water Meter Customer Leakage Alarm 2. 10273/0 Water Meter Reverse Flow Alarm 3. 10273/1 Water Meter Reverse Flow Alarm (real time) 4. 10274/0 Water Meter Empty Pipe Alarm 5. 10275/0 Water Meter Tamper Alarm 6. 10276/0 Water Meter High Pressure Alarm 7. 10277/0 Water Meter Low Pressure Alarm 8. 10278/0 High Temperature Alarm 9. 10279/0 Low Temperature Alarm 10. 10280/0 Water Network Leak Alarm 11. 10281/0 Low Battery Alarm 12. 10282/0 Daughter Board Failure Alarm 13. 10283/0 Device Reboot Event 14. 10284/0 Time Synchronization Event By default, the links should also include any vendor specific events that are supported by the meter.
3	Schedule	By default, this should link to the following schedule: /10264/0

When a device registers with the LwM2M Server, an Observe operation on the **Latest Eventlog** resource must be initiated from the Server. This Observe operation is necessary to configure the daily notification of Event Data to the server.

3. Payload data format

3.1. Interval data objects

3.1.1. 10266 Water Flow Readings object

The water meters support two instances of this object, one for daily water flow register (which is the accumulated lifetime total, also known as the 'register', 'billing' or 'face-value' of the meter) and one for interval flow readings (which will be the periodic volumes that have been consumed by the meter, e.g. hourly or half hourly).

Object Name	**Instances**	**Mandatory**	**ID**
Water Flow Readings	Multiple	Optional	10266
Measures the flow of water in regular intervals.			
Resource ID	Resource Name	Default Value (Instance 0)	Default Value (Instance 1)
6000	Interval Period	86400 [1 day]	1800 [30 Minutes]
6001	Interval Start Offset	0	0
6002	Interval UTC Offset	UTC+00	UTC+00
6007	Delivery Midnight Aligned	1	1
6029 Payload Configuration	Number of Values Per Interval	1	1
	Size of Value 1	32 bits	16 bits
	Type of Value 1	Unsigned Integer value (between 0-99999) Units = KILO-LITRES	Unsigned Integer value (between 0-9999) Units = LITRES

Valid interval periods for instance 1 for the meter can be configured as follows:

1. 300 [5 Minutes]
2. 1800 [30 Minutes] (Default)
3. 3600 [60 Minutes]
4. 7200 [2 Hours]
5. 14400s [4 Hours]
6. 28800 [8 Hours]
7. 43200 [12 Hours]
8. 86400 [24 Hours]

Example A: Four hourly single value data from Midnight 2nd March (local time, UTC+10) to Midnight 3rd March (local time, UTC+10) described as a CBOR object (RFC7049). Timestamps should represent the end of each interval

```
[
  10266,            # Object ID
  1,                 # Instance ID  (Water flow interval data)
  [

      1519927200,    # Time of the end of first interval in the payload(this is UTC+00,
                     # which converts to 4am local time on 2nd March (UTC+10))
      14400,         # Interval period
      [
        1011,        # Interval 1 value (1519927200 this is UTC+00)
        543,         # Interval 2 value
        12,          # Interval 3 value
        57,          # Interval 4 value
```

```
        2222,       # Interval 5 value
        1482        # Interval 6 value
      ]
    ]
  ]
```

Example B: Hourly single value data for water flow intervals from Midnight 2nd March (local time, UTC+10) to Midnight 3rd March (local time, UTC+10) described as a CBOR object (RFC7049). Timestamps should represent the end of each interval

```
[
  10266,           # Object ID
  1,               # Instance ID  (Water flow interval data)
  [

      1519916400,    # Time of the end of first interval in the payload(this is UTC+00,
                     # which converts to 1am local time on 2nd March (UTC+10))
      3600,          # Interval period in seconds (3600 seconds = 1 hour)
      [
             1011,       # Interval 1 value
             543,        # Interval 2 value
             12          # Interval 3 value
             57,         # Interval 4 value
             2222,       # Interval 5 value
             1482,       # Interval 6 value
             235,        # Interval 7 value
             789,        # Interval 8 value
             651,        # Interval 9 value
             1489,       # Interval 10 value
             9856,       # Interval 11 value
             324,        # Interval 12 value
             2654,       # Interval 13 value
             1111,       # Interval 14 value
             9856,       # Interval 15 value
             3256,       # Interval 16 value
             321,        # Interval 17 value
             856,        # Interval 18 value
             79,         # Interval 19 value
             456,        # Interval 20 value
             987,        # Interval 21 value
             234,        # Interval 22 value
             632,        # Interval 23 value
             215         # Interval 24 value
      ]
    ]
  ]
```

Example C: Four hourly single value data, catch up from 8:00 a.m. 3rd March (UTC+10) to Midnight 5th March (UTC+10) described as a CBOR object (RFC7049). Interval timestamps representing the end of the interval.

```
[
       10266,              # Object ID
       1,                  # Instance ID
       [

           1520042400,     # Time of the first interval in the payload
           14400,          # Interval period
           [
             100,          # Interval 1 value (1520042400 = 12pm 3rd)
             200,          # Interval 2 value
             300,          # Interval 3 value
             400,          # Interval 4 value
             500,          # Interval 5 value
             600,          # Interval 6 value
```

```
        700,            # Interval 7 value
        800,            # Interval 8 value
        900,            # Interval 9 value
        1000            # Interval 10 value
      ]
    ]
  ]
```

This can also be represented by breaking it up in 2 days, as shown below. However, we would prefer the method above as it has a smaller payload size.

```
[
  10266,               #  Object  ID
  1,                   # Instance ID
  [

      1520042400,      # Time of the first interval in the payload
      14400,           # Interval period
      [
        100,           # Interval 1 value (1520042400 = 12pm 3rd)
        200,           # Interval 2 value
        300,           # Interval 3 value
        400          # Interval 4 value
  ]
],
[
   1520100000,      # 4th March 4am UTC+10
        14400,           # Interval period
[
             500,            # Interval 5 value
             600,            # Interval 6 value
             700,            # Interval 7 value
             800,            # Interval 8 value
             900,            # Interval 9 value
             1000            # Interval 10 value
      ]
    ]
  ]
```

Example D: Four hourly single value data, from Midnight 2nd March (UTC+10) to Midnight 3rd March (UTC+10), where the device was offline from 7:00 a.m. to 6:00 p.m.

```
[
       10266,               # Object ID
       1,                   # Instance ID
       [

           1519927200,      # Time of the first interval in block 1
           14400,           # Interval period
           [
             100            # Interval 1 value (1519927200)
      ]
    ],
    [
           1520071200,      # Time of the first interval in block 2
           14400,           # Interval period
           [
             500,           # Interval 5 value (4:00 - 8:00 p.m.)
                            # note the meter will have only recorded
                            # from 6:00 pm in this example so the
                            # value is only a partial interval record.
             600            # Interval 6 value (8:00 - 12:00 p.m.)
      ]
    ]
  ]
```

Example E: The next example shows how the Water Flow reading instance 0 (10266/0) should be handled. Remember that this value represents the midnight aligned snapshot of the meter register/face-value (ie the lifetime accumulated read that is used for billing purposes, and would traditionally

have been read by

manual meter reading personnel). The example shows this snapshot taken on the 15th February 2018 12AM (UTC+10), representing the register read at end of the day on the 14th February:

```
[
  10266,           # Object ID
  0,                # Instance ID  (Water flow register data)
  [

      1518616800,   # Time of the end of day in the payload
      86400,        # Interval period
      [
        1011,       # Register reading 1 value (1518616800)

      ]
    ]
  ]
```

3.1.2. 10267 Daily Maximum Flow Rate Readings

The water meters support the following Daily Maximum Flow Rate object and configuration.

Object Name		**Instances**	**Mandatory**	**ID**
Daily Maximum Flow Rate Readings		Multiple	Optional	10267
Measures the maximum flow rate and its time stamp for specified period.				
Resource ID	Resource Name	Default Value		
6000	Interval Period	86400 [1 day]		
6001	Interval Start Offset	0		
6002	Interval UTC Offset	UTC+00		
6007	Delivery Midnight Aligned	1		
6029 Payload Configuration	Number of Values Per Interval	2		
	Size of Value 1	32 bits		
	Type of Value 1	Timestamp of maximum flow [32-bit unsigned integer] representing as the number of seconds since Jan 1st, 1970 in the UTC time zone.		
	Size of Value 2	16 bits		
	Type of Value 2	Unsigned Integer value (between 0-999) representing L/min		

Example: Sending daily maximum flow rate values as interval data using multi-value format. This example uses the same format as example 2 however as described in the specifications in this document earlier (for object ID 10267) the first value in the multi-value array would be the actual timestamp at which the maximum flowrate occurred. The timestamp at the beginning of the payload will be for the day during for which the data is contained within.

Example A: Sending a single value of daily maximum flowrate for the 2nd of March. The daily maximum flowrate occurred between 2-3pm on the 2nd of March.

```
[
  10267,            # Object ID for daily maximum flow rate
  0,                # Instance ID
  [

      1519999200,   # March 3 00:00 (UTC+10) i.e. end of 2nd March
      86400,        # Interval period
       [
      [
```

```
        1519966800,    # March 2 15:00 (UTC+10), end of interval
                       # when max flow rate occurred
          50           # flow rate between 14:00-15:00 on March 2
       ]
        ]
     ]
   ]
```

Example B: Sending multiples values of daily maximum flowrate to catchup from 2nd of March to the end of 3rd of March. The daily maximum flowrate occurred between 2-3pm on the 2nd of March and between 7- 8pm on the 3rd of March.

```
[
  10267,           # Object ID for daily maximum flow rate
  0,                # Instance ID
  [

      1519999200,    # March 3 00:00 (UTC+10) i.e. end of 2nd March
      86400,         # Interval period
       [
      [
       1519966800,  # March 2 15:00 (UTC+10), end of interval
          # when max flow rate occurred
         50              # flow rate between 14:00-15:00 on March 2
      ],
        [                #Interval of 86400 means array for the next day
         #(March 3) starts here
       1520071200,  # March 2 20:00 (UTC+10), end of interval
          # when max flow rate occurred
        37              # flow rate between 19:00-20:00 on March 2
       ]
      ]
    ]
  ]
```

3.1.3. 10268 Water Temperature Readings

The water meters support the following Water Temperature Readings object and configuration.

Object Name	Instances	Mandatory	ID
Temperature Readings	Multiple	Optional	10268
Periodic temperature measurements.			
Resource ID	Resource Name	Default Value	
6000	Interval Period	14400 [4 Hours]	
6001	Interval Start Offset	0	
6002	Interval UTC Offset	UTC+00	
6007	Delivery Midnight Aligned	1	
6029 Payload Configuration	Number of Values Per Interval	1	
	Size of Value 1	8 bits	
	Type of Value 1	unsigned Integer value (between 0-60) Deg-C	

Example A: `[ 10268, 0, [ 1520071200, 14400, [ 27, 28, 27, 29, 26, 27 ] ] ]`

3.1.4. 10269 Pressure Readings

The water meters support the following Water Pressure Readings object and configuration.

Object Name	Instances	Mandatory	ID
Pressure Readings	Multiple	Optional	10269
Periodic pressure measurements			
Resource ID	Resource Name	Default Value	
6000	Interval Period	14400 [4 Hours]	
6001	Interval Start Offset	0	

6002	Interval UTC Offset	UTC+00
6007	Delivery Midnight Aligned	1
6029 Payload Configuration	Number of Values Per Interval	1
	Size of Value 1	8 bits
	Type of Value 1	Unsigned Integer value (between 0-150) mH_2O

Example A: `[ 10269, 0, [ 1520071200, 14400, [ 140, 139, 131, 126, 97, 127 ] ] ]`

3.1.5. 10270 Battery Readings object

The water meters support the following Battery Level Readings object and configuration.

Object Name	**Instances**	**Mandatory**	**ID**
Battery Level Readings	Multiple	Optional	10270
Periodic battery level measurements			
Resource ID	Resource Name	Default Value	
6000	Interval Period	86400 [1 Day]	
6001	Interval Start Offset	0	
6002	Interval UTC Offset	UTC+00	
6007	Delivery Midnight Aligned	1	
6029 Payload Configuration	Number of Values Per Interval	2	
	Size of Value 1	8 bits	
	Type of Value 1	unsigned Integer value (between 0-33) dV (Battery Voltage)	
	Size of Value 2	8 bits	
	Type of Value 2	unsigned Integer value (between 0-100) % (Battery Percentage)	

Example A: Daily multi value (2 – used for battery readings or communication activity time for example) data from Midnight 2nd March (UTC+10) to Midnight 6th March (UTC+10) described as a CBOR object (RFC7049). Midnight aligned, with interval timestamps representing the end of the interval.

```
[
  10270,              # Object ID for battery meter readings
  0,                  # Instance ID
  [

      1519999200,     # Time of the end of first interval in the
      # payload
      86400,          # Interval period
      [
        [
          27,          # Interval 1 value 1 - voltage
          83        # Interval 1 value 2 - percentage
        ],
        [
          26,          # Interval 2 value 1
          75         # Interval 2 value 2
        ],
        [
          25,          # Interval 3 value 1
          70       # Interval 3 value 2
        ],
        [
          25,          # Interval 4 value 1
          70          # Interval 4 value 2
        ]
      ]
    ]
  ]
```

3.1.6. 10271 Communication Activity Time Readings

The water meters support the following Communications Activity Time Readings object and configuration.

Object Name	Instances	Mandatory	ID
Communications Activity Time Readings	Multiple	Optional	10271
Measures the total duration that the meter was activating its radio for packet transmission or receipt for the period			
Resource ID	Resource Name	Default Value	
6000	Interval Period	86400 [1 Day]	
6001	Interval Start Offset	0	
6002	Interval UTC Offset	UTC+00	
6007	Delivery Midnight Aligned	1	
6029 Payload Configuration	Number of Values Per Interval	2	
	Size of Value 1	32 bits	
	Type of Value 1	unsigned Integer value (between 0-86400) Transmit Time in Seconds	
	Size of Value 2	32 bits	
	Type of Value 2	unsigned Integer value (between 0-86400) Receive Time in Seconds	

Example A: `[10271, 0, [1580738400, 86400, [0, 133]]]`

Example B: `[10271, 0, [1580738400, 86400, [[0, 133], [0, 52]]]]`

3.2. Event data objects

3.2.1. 10272 Water Meter Customer Leakage Alarm

Object Name	Instances	Mandatory	ID
Water Meter Customer Leakage Alarm	Multiple	Optional	10272
A binary flag indicating continual usage (e.g. greater than 5 L/h for 24 hours – and the flow never returning to zero at any time).			
Resource ID	Resource Name	Default Value	
6024	Event Code	100	
6011	Event Type	1 - Alarm Current State	
6012	Alarm Realtime	0 – Non Realtime	
6014	Alarm Set Threshold	5.0 (represented as L/hr over 24 hours)	
6015	Alarm Set Operator	1 – Greater Than	
6016	Alarm Clear Threshold	0.0 (represented as L/hr measured over any period)	
6017	Alarm Clear Operator	2 – Less Than or equal to	
6018	Alarm Maximum Event Count	2	
6019	Alarm Maximum Event Period	86400 (1 Day)	
6023	Alarm Auto Clear	0	
6025 Payload Configuration	Alarm Value	Current value for the alarm (1 or 0)	

Example A: `[100, 1, [1580738400, 1]]`

Example B: `[100, 1, [[1580738400, 1], [1580824800, 0]]]`

Example C: `[100, 1, [[1580738400, 1], [1580824800, 0], [1580911200, 1]]]`

3.2.2. 10273 Water Meter Reverse Flow Alarm

The water meters support two instances of this object, one real-time and other non-real time

Object Name		Instances	Mandatory	ID
Water Meter Reverse Flow Alarm		Multiple	Optional	10273
An alarm indicating reverse flow through the pipe. Also supports delivery of the approximate volume of water flowing in the reverse direction in the preceding period.				
Resource ID	Resource Name	Default Value (Instance 0)		Default Value (Instance 1)
6024	Event Code	101		102
6011	Event Type	2 – Alarm State Change Log		1 – Alarm Current State
6012	Alarm Realtime	0 – Non Realtime		1 – Realtime
6018	Alarm Maximum Event Count	1		1
6019	Alarm Maximum Event Period	86400 (1 Day)		86400 (1 Day)
6023	Alarm Auto Clear	1		1
6025 Payload Configuration	Number of Values Per Event	1		1
	Size of Value 1	32 bits		NA
	Type of Value 1	unsigned Integer value representing reverse flow litres.		Current value for the alarm (1 or 0)

Example A: `[101, 2, [1580738400, 123]] for 10273/0 representing reverse flow 123 litres`

Example B: `[102, 1, [1580738400, 1]] for 10273/1 representing alarm is set`

3.2.3. 10274 Water Meter Empty Pipe Alarm

The water meters support the following default configuration. This is an alarm that should be raised if the meter detects that there is no liquid in the pipe. No Set or Clear threshold configuration is required as the alarm should clear as soon as the pipe fills.

Object Name		Instances	Mandatory	ID
Water Meter Empty Pipe Alarm		Multiple	Optional	10274
An alarm when meter detects there is no liquid in the pipe				
Resource ID	Resource Name	Default Value (Instance 0)		
6024	Event Code	103		
6011	Event Type	2 – Alarm State Change Log		
6012	Alarm Realtime	1 – Realtime		
6018	Alarm Maximum Event Count	2 (Only trigger twice per day – set and clear)		
6019	Alarm Maximum Event Period	86400 (1 Day)		
6023	Alarm Auto Clear	0		
6025 Payload Configuration	Alarm Value	Current value for the alarm (1 or 0)		

Example A: `[103, 2, [[1580738400, 1], [1580824800, 0]]]`

Example B: `[103, 2, [[1580738400, 1], [1580824800, 1]]]`

3.2.4. 10275 Water Meter Tamper Alarm

The water meters support the following default configuration. This is an alarm that should be raised if the meter detects interference from strong magnetic field or other electrical sources. No Set or

Clear

threshold configuration is required as the alarm should clear daily and re-raise the next day if the tamper occurs again.

Object Name		Instances	Mandatory	ID
Water Meter Tamper Alarm		Multiple	Optional	10275
Detects interference from strong magnetic field or other electrical sources. If this is not relevant for ultrasonic meters then the tamper alarm may be used to indicate someone attempting to open the physical enclosure or other options the manufacturer may present.				
Resource ID	Resource Name	Default Value (Instance 0)		
6024	Event Code	104		
6011	Event Type	2 – Alarm State Change Log		
6012	Alarm Realtime	1 – Realtime		
6018	Alarm Maximum Event Count	1 (Only trigger once per day)		
6019	Alarm Maximum Event Period	86400 (1 Day)		
6023	Alarm Auto Clear	1		
6025 Payload Configuration	Alarm Value	Current value for the alarm (1 or 0)		

Example A: `[104, 2, [1580738400, 1]]`

3.2.5. 10276 Water Meter High Pressure Alarm

The water meters that are provisioned with pressure sensors support the following default configuration. this is an alarm that should be raised if the meter detects pressure above a pre-configured threshold. When the pressure drops below the clear threshold, the alarm should be cleared. Because pressure varies over the network, the alarm thresholds (both set and clear) are defined as threshold (in mH_2O) above a rolling 7-day average.

Object Name		Instances	Mandatory	ID
Water Meter High Pressure Alarm		Multiple	Optional	10276
Where supported by the meter this is an alarm that should be raised if the meter detects pressure above a pre-configured threshold.				
Resource ID	Resource Name	Default Value (Instance 0)		
6024	Event Code	105		
6011	Event Type	2 – Alarm State Change Log		
6012	Alarm Realtime	0 – Non Realtime		
6014	Alarm Set Threshold	10 (mH_2O above rolling 7-day average)		
6015	Alarm Set Operator	1 – Greater Than		
6016	Alarm Clear Threshold	5 (mH2O above rolling 7-day average)		
6017	Alarm Clear Operator	2 – Less Than or Equal to		
6018	Alarm Maximum Event Count	2 (Only trigger twice per day – set and clear)		
6019	Alarm Maximum Event Period	86400 (1 Day)		
6023	Alarm Auto Clear	0		
6025 Payload Configuration	Number of Values Per Event	2		
	Size of Value 1	8 bits		
	Type of Value 1	Current value for the alarm (1 or 0)		
	Size of Value 2	8 bits		
	Type of Value 2	Float value representing pressure reading (0-150 mH2O).		

Example A: `[105, 2, [1575561603, 1, 20]]`

Example B: `[105, 2, [[1575561603, 1, 20], [1575565203, 0, 5], [15755341603, 1, 20], [153565203, 0, 5]]]`

3.2.6. 10277 Water Meter Low Pressure Alarm

The water meters that are provisioned with pressure sensors support the following default configuration. This is an alarm that should be raised if the meter detects pressure below a pre-configured threshold. When the pressure raises above the clear threshold, the alarm should be cleared. Because pressure varies over the network, the alarm thresholds (both set and clear) are defined as threshold (in mH_2O) below a rolling 7-day average.

Object Name		Instances	Mandatory	ID
Water Meter Low Pressure Alarm		Multiple	Optional	10277
Where supported by the meter this is an alarm that should be raised if the meter detects pressure below a pre-configured threshold.				
Resource ID	Resource Name	Default Value (Instance 0)		
6024	Event Code	106		
6011	Event Type	2 – Alarm State Change Log		
6012	Alarm Realtime	0 – Non Realtime		
6013	Alarm State			
6014	Alarm Set Threshold	-5 (mH2O above rolling 7-day average)		
6015	Alarm Set Operator	2 – Less Than		
6016	Alarm Clear Threshold			
6017	Alarm Clear Operator	1 – Greater Than or Equal to		
6018	Alarm Maximum Event Count	2 (Only trigger twice per day – set and clear)		
6019	Alarm Maximum Event Period	86400 (1 Day)		
6023	Alarm Auto Clear	0		
6025 Payload Configuration	Number of Values Per Event	2		
	Size of Value 1	8 bits		
	Type of Value 1	Current value for the alarm (1 or 0)		
	Size of Value 2	8 bits		
	Type of Value 2	Float value representing pressure reading (0-150 mH2O).		

Example A: `[106, 2, [1575561603, 1, -6]]`

Example B: `[106, 2, [[1575561603, 1, -6], [1575565203, 0, 10]]]`

3.2.7. 10278 High Temperature Alarm

The water meters support the following default configuration. This is an alarm that should be raised if the meter detects temperature above a pre-configured threshold. When the temperature drops below the clear threshold, the alarm should be cleared.

Object Name		Instances	Mandatory	ID
High Temperature Alarm		Multiple	Optional	10278
Where supported by the meter this is an alarm that should be raised if the meter detects temperature above a pre-configured threshold. When the temperature drops below the clear threshold, the alarm should be cleared.				
Resource ID	Resource Name	Default Value (Instance 0)		
6024	Event Code	107		
6011	Event Type	2 – Alarm State Change Log		
6012	Alarm Realtime	0 – Non Realtime		
6013	Alarm State			
6014	Alarm Set Threshold	50 (Celsius)		

6015	Alarm Set Operator	1 – Greater Than
6016	Alarm Clear Threshold	45 (Celsuis)
6017	Alarm Clear Operator	2 – Less Than or Equal to
6018	Alarm Maximum Event Count	2 (Only trigger twice per day – set and clear)
6019	Alarm Maximum Event Period	86400 (1 Day)
6023	Alarm Auto Clear	0
6025 Payload Configuration	Number of Values Per Event	2
	Size of Value 1	8 bits
	Type of Value 1	Current value for the alarm (1 or 0)
	Size of Value 2	8 bits
	Type of Value 2	Integer value representing temperature reading.

Example A: `[107, 2, [1575561603, 1, 51]]`

Example B: `[107, 2, [[1575561603, 1, 51], [1575565203, 0, 45]]]`

3.2.8. 10279 Low Temperature Alarm

The water meters support the following default configuration. This is an alarm that should be raised if the meter detects temperature below a pre-configured threshold. When the temperature rises above the clear threshold, the alarm should be cleared.

Object Name		**Instances**	**Mandatory**	**ID**
Low Temperature Alarm		Multiple	Optional	10279
Where supported by the meter this is an alarm that should be raised if the meter detects temperature below a pre-configured threshold. When the temperature rises above the clear threshold, the alarm should be cleared				
Resource ID	Resource Name	Default Value (Instance 0)		
6024	Event Code	108		
6011	Event Type	2 – Alarm State Change Log		
6012	Alarm Realtime	0 – Non Realtime		
6013	Alarm State			
6014	Alarm Set threshold	1 (Celsius)		
6015	Alarm Set Operator	2 – Less Than		
6016	Alarm Clear threshold	3 (Celsius)		
6017	Alarm Clear Operator	1 – Greater Than or Equal to		
6018	Alarm Maximum Event Count	2 (Only trigger twice per day – set and clear)		
6019	Alarm Maximum Event Period	86400 (1 Day)		
6023	Alarm Auto Clear	0		
6025 Payload Configuration	Number of Values Per Event	2		
	Size of Value 1	8 bits		
	Type of Value 1	Current value for the alarm (1 or 0)		
	Size of Value 2	8 bits		
	Type of Value 2	Integer value representing temperature reading.		

Example A: `[108, 2, [1575561603, 1, 0]]`

Example B: `[108, 2, [[1575561603, 1, 0], [1575565203, 0, 4]]]`

3.2.9. 10281 Low Battery Alarm

The water meters support the following default configuration. This alarm is raised when the battery voltage drops below a defined level.

Object Name	**Instances**	**Mandatory**	**ID**
Low Battery Alarm	Multiple	Optional	10281

This Alarm is raised when the battery voltage drops below a defined level		
Resource ID	Resource Name	Default Value (Instance 0)
6024	Event Code	111
6011	Event Type	2 – Alarm State Change Log
6012	Alarm Realtime	0 – Non Realtime
6014	Alarm Set Threshold	<TBC>
6015	Alarm Set Operator	2 – Less than
6016	Alarm Clear Threshold	<not configured>
6017	Alarm Clear Operator	<not configured>
6018	Alarm Maximum Event Count	1 (Only trigger once per day)
6019	Alarm Maximum Event Period	86400 (1 Day)
6023	Alarm Auto Clear	1
6025 Payload Configuration	Number of Values Per Event	2
	Size of Value 1	8 bits
	Type of Value 1	Current value for the alarm (1 or 0)
	Size of Value 2	8 bits
	Type of Value 2	Integer Value representing the current battery voltage in Deci-volts

Example A: `[111, 2, [1580846701, 1, 36]]`

3.2.10. 10283 Device Reboot Event

The water meters support the following default configuration. This event represents the current counter of the number of times that this device has rebooted. This is a useful indicator of a systemic problem with the device. This event should only be raised when a reboot has occurred but should contain the current reboot total count for the device.

Object Name	**Instances**	**Mandatory**	**ID**
Device Reboot Event	Multiple	Optional	10283
This event records the fact that the device has rebooted			
Resource ID	Resource Name	Default Value (Instance 0)	
6024	Event Code	113	
6011	Event Type	3 – Event Log	
6012	Alarm Realtime	0 – Non Realtime	
6018	Alarm Maximum Event Count	1	
6019	Alarm Maximum Event Period	86400 (1 Day)	
6023	Alarm Auto Clear	0	
6025 Payload Configuration	Number of Values Per Event	1	
	Size of Value 1	16 bits	
	Type of Value 1	Integer value representing total reboot counter for the device.	

Example A: `[113, 2, [1580846701, 9]]`

Example B: `[113, 2, [[1580846701, 9], [1580918701, 10]]]`

3.2.11. 10284 Time Synchronisation Event

The water meters support the following default configuration. This alarm represents the fact that a device required a significant time clock correction (in this case > 5 minutes). This alarm should only be raised when the adjustment has occurred but should contain the correction time in seconds for the

device.

Object Name		Instances	Mandatory	ID
Time Synchronisation Alarm		Multiple	Optional	10284
This alarm records the fact that a significant (e.g. >5mins) time adjustment was required on the device				
Resource ID	Resource Name	Default Value (Instance 0)		
6024	Event Code	114		
6011	Event Type	2 – Alarm State Change		
6012	Alarm Realtime	0 – Non Realtime		
6014	Alarm Set Threshold	1 – Greater Than		
6015	Alarm Set Operator	300 (time adjustment in seconds)		
6016	Alarm Clear Threshold			
6017	Alarm Clear Operator			
6018	Alarm Maximum Event Count	2		
6019	Alarm Maximum Event Period	86400 (1 Day)		
6023	Alarm Auto Clear	1		
6025 Payload Configuration	Number of Values Per Event	1		
	Size of Value 1	32 bits		
	Type of Value 1	Integer value representing total time correction on the device in seconds.		

Example A: `[114, 2, [1580684216, 2783]]`

Example B: `[114, 2, [1580684216, 2783], [1580685306, 3171], [1580847718, 386]]]`