

# **Interface Specifications**

## **for Application Layer**

### **Communication between Smart**

### **Electric Energy Meters and**

### **Controllers**

**Version 1.10**



**Revision record**

| Date         | Version        | Explanation  |
|--------------|----------------|--|
| Dec.2, 2013  | Ver:1.00       | Released, open to consortium members   |
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| Apr.21, 2023 | Ver:1.10 Draft | <ul style="list-style-type: none"> <li>• Changed “HEMS controller” to “controller” overall</li> <li>• Changed the descriptions in Chapter 1.</li> <li>• Changed the title of 1.2, changed the APPENDIX to refer to Release R or later; and added the descriptions for the ECHONET Lite System Design Guidelines.</li> <li>• Added Route B identification number; one-minute measured cumulative amount of electric energy (normal and reverse directions), historical data of measured cumulative amounts of electric energy 3, and day for which the historical data of measured cumulative amounts of electric energy is to be retrieved 3 properties to Table 2-4.</li> <li>• Added a description of historical data of measured cumulative amounts of electric energy 3 to the remarks column of Table 2-5.</li> <li>• Changed the number of OPCs supported by smart electric energy meters to 7 in 2.4.4</li> <li>• Added descriptions for one-minute measured cumulative amount of electric energy to 2.5.1.</li> <li>• Added to 3.1.3 that this AIF Specifications covers low-voltage smart electric energy meters with an Appendix Release number of R or later.</li> <li>• Added route B identification numbers to target properties in 3.1.4</li> <li>• Added descriptions for one-minute measured cumulative amount of electric energy to 3.3.4.</li> <li>• Added historical data on measured (one-minute, max. 10 minutes) acquisition to 3.3.5</li> </ul> |
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|  |  |  |
|--|--|--|
|  |  | <ul style="list-style-type: none"><li>• 3.3.2, 3.3.3, 3.3.5</li><li>(2) Added a description for the sequence</li><li>• Changed “HEMS controller” to “controller” in 3.3.5.</li></ul> |
|--|--|--|

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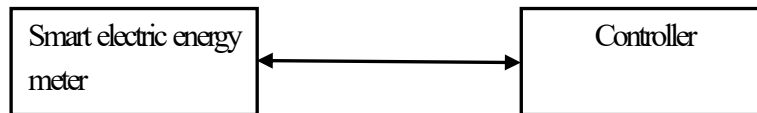
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## Chapter 1. Introduction

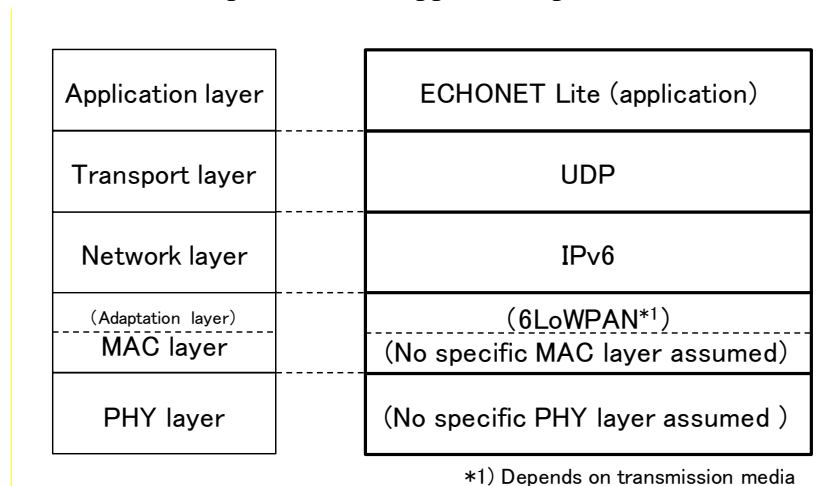
This document specifies matters necessary for ensuring interoperability between the products of different manufacturers in connection with application layer communication between low-voltage smart electric energy meters and controllers, using ECHONET Lite as an application protocol via UDP/IPv6 communications.

This document covers low-voltage smart electric energy meters installed for customers supplied with power of 400V or less. High-voltage smart electric energy meters installed for customers supplied with 6.6kV or later shall comply with “Interface Specifications for Application Layer Communication between Bidirectional High-Voltage Smart Electric Energy Meters and Controllers” .



**Fig. 1-1 Connection configuration**

Fig. 1- shows the assumed network stack for operating ECHONET Lite in this document. ECHONET Lite will be operated as an application protocol via UDP/IPv6.



**Fig. 1-2 Assumed network stack**

Lower Layer Connection processing specific to each communication medium necessary before the start of ECHONET Lite communication is outside the scope of this document. In this document, application communication using ECHONET Lite will be described on the assumption that connection processing specific to those communication media is complete.



## 1.1. Definitions

|                             |  |
|-----------------------------|--|
| Controller                  | A node that communicates with a smart electric energy meter in ECHONET Lite using IPv6                         |
| Smart electric energy meter | A node that communicates with a controller and provides various electric power data in ECHONET Lite using IPv6 |

## 1.2. Reference Standards and documents

Standards referenced in this document are as stated below. Matters not specifically explained in this document shall be as described in each document.

[EL] ECHONET Lite Specification Version 1.01 or later

[ELOBJ] ECHONET Specification APPENDIX: Detailed Requirements for ECHONET Device Objects, Release R or later

In addition, Chapter 6 of the ECHONET Lite System Design Guidelines [ELSDG] describes installation cases and expected behaviors that may cause interoperability problems with respect to this document, and should be kept in mind when designing low-voltage smart electric energy meters and controllers.

[ELSDG] ECHONET Lite System Design Guidelines

## Chapter 2. Application Layer

ECHONET Lite [EL] will be adopted in an application layer. Nodes based on the descriptions in this document must support all mandatory functions specified in [EL].

### 2.1. ECHONET Objects (EOJ)

ECHONET objects (EOJ) installed in smart electric energy meters and controllers shall be as shown in Table 2-1.

**Table 2-1 ECHONET objects (EOJ)**

|   | Group code | Class code | Class name                              | Instance code* |
|---|------------|------------|---|----------------|
| Low-voltage smart electric energy meter | 0x02       | 0x88       | Low-voltage smart electric energy meter | 0x01           |
|   | 0x0E       | 0xF0       | Node profile                            | 0x01           |
| Controller                              | 0x05       | 0xFF       | Controller                              | 0x01           |
|   | 0x0E       | 0xF0       | Node profile                            | 0x01           |

\*The instance code shall be fixed at 0x01.

### 2.2. ECHONET Lite Services (ESV)

Smart electric energy meters and controllers shall support the ECHONET Lite service codes (ESV) shown in Table 2-.

**Table 2-2 ECHONET Lite service codes (ESV)**

| Service code (ESV) | ECHONET Lite service content                             | Symbol   |
|--------------------|--|----------|
| 0x51               | Property value write<br>“response-not-possible” response | SetC_SNA |
| 0x52               | Property value read<br>“response-not-possible” response  | Get_SNA  |
| 0x61               | Property value write request (response required)         | SetC     |
| 0x62               | Property value read request                              | Get      |
| 0x71               | Property value write response                            | Set_Res  |
| 0x72               | Property value read response                             | Get_Res  |
| 0x73               | Property value notification                              | INF      |
| 0x74               | Property value notification (response required)          | INFC     |
| 0x7A               | Property value notification response                     | INFC_Res |

ESV = 0x60, 0x63, 0x6E, 0x7E, 0x50, 0x53, and 0x5E shall not be subject to certification tests based on this document.

## 2.3. Object-Specific ECHONET Properties (EPC)

Smart electric energy meters shall install the ECHONET properties (EPC) of device objects shown in Table 2- and Table 2-. ECHONET properties (EPC) of node profile objects shall only support mandatory properties.

**Table 2-3 Device objects (super class requirements)**

| Property name                           | EPC  | Access rule |     | Announcement at status change | Remarks   |
|---|------|-------------|-----|-------------------------------|---|
|   |      | Get         | Set |                               |   |
| Installation location                   | 0x81 | ⊙           | ⊙   | ⊙                             |   |
| Standard version information            | 0x82 | ⊙           | —   | —                             |   |
| Fault status                            | 0x88 | ⊙           | —   | ⊙                             |   |
| Manufacturer code                       | 0x8A | ⊙           | —   | —                             |   |
| Serial No.                              | 0x8D | ○           | —   | —                             | To make it easier to judge whether a meter should be replaced due to malfunction or inspection expiry, it is recommended that this number be unique to each device in corresponding to the manufacturer code. |
| Current time setting                    | 0x97 | ⊙           | ●   | —                             |   |
| Current date setting                    | 0x98 | ⊙           | ●   | —                             |   |
| Status change announcement property map | 0x9D | ⊙           | —   | —                             |   |
| Set property map                        | 0x9E | ⊙           | —   | —                             |   |
| Get property map                        | 0x9F | ⊙           | —   | —                             |   |

⊙: mandatory, ○: optional, —: not supported, ●: installation prohibited

**Table 2-4 Device objects (smart electric energy meter class requirements)**

| Property name  | EPC  | Access rule |     | Announcement at status change | Remarks |
|--|------|-------------|-----|-------------------------------|---------|
|  |      | Get         | Set |                               |         |
| Operation status   | 0x80 | ⊙           | —   | ⊙                             |         |
| Route B identification number  | 0xC0 | ⊙*1         | —   | —                             |         |
| One-minute measured cumulative amount of electric energy (normal and reverse directions) | 0xD0 | ⊙           | —   | —                             |         |

|  |      |   |   |   |   |
|--|------|---|---|---|---|
| Coefficient  | 0xD3 | ○ | — | — | The actual power consumption value shall be calculated by multiplying the cumulative amounts of electric energy by the Coefficient. |
| Number of effective digits for cumulative amount of electric energy                                      | 0xD7 | ◎ | — | — |   |
| Measured cumulative amount of electric energy ( normal direction)  | 0xE0 | ◎ | — | — | *2  |
| Unit for cumulative amounts of electric energy (normal and reverse directions)                           | 0xE1 | ◎ | — | — | *3  |
| Historical data of measured cumulative amounts of electric energy 1 (normal direction)                   | 0xE2 | ◎ | — | — |   |
| Measured cumulative amounts of electric energy (reverse direction)                                       | 0xE3 | ○ | — | — | *2, *3, *4  |
| Historical data of measured cumulative amounts of electric energy 1 (reverse direction)                  | 0xE4 | ○ | — | — | *3, *4  |
| Day for which the historical data of measured cumulative amounts of electric energy is to be retrieved 1 | 0xE5 | ◎ | ◎ | — |   |
| Measured instantaneous electric power  | 0xE7 | ◎ | — | — |   |
| Measured instantaneous currents  | 0xE8 | ◎ | — | — |   |
| Cumulative amounts of electric energy measured at fixed time (normal direction)                          | 0xEA | ◎ | — | — |   |
| Cumulative amounts of electric energy measured at fixed time (reverse direction)                         | 0xEB | ○ | — | — | *3, *4  |
| Historical data of measured cumulative amounts of electric energy 2 (normal and reverse directions)      | 0xEC | ○ | — | — | *4  |
| Day for which the historical   | 0xED | ○ | ○ | — |   |

|  |      |   |   |   |    |
|--|------|---|---|---|----|
| data of measured cumulative amounts of electric energy is to be retrieved 2                              |      |   |   |   |    |
| Historical data of measured cumulative amounts of electric energy 3 (normal and reverse directions)      | 0xEE | ◎ | — | — | *5 |
| Day for which the historical data of measured cumulative amounts of electric energy is to be retrieved 3 | 0xEF | ◎ | ◎ | — |    |

◎: mandatory, ○: optional, —: not supported

- Notes: \*1 Low-voltage smart electric energy meters in Japan must be equipped with this property.  
\*2 The current value shall be in response to a Get request, not the cumulative amount of electric energy measured at a fixed time or the one-minute measured cumulative amount of electric energy.  
\*3 Equipping this shall be mandatory if there is a reverse direction measurement function  
\*4 If there is no reverse direction measurement function when this property is installed, the reverse direction measurement value shall be 0xFFFFFFFFE.  
\*5 If there is no reverse direction measurement function, the reverse direction measurement value shall be 0xFFFFFFFFE.

## 2.4. Application Operation

### 2.4.1. Successive Requests

Smart electric energy meters and controllers shall operate on the basis of request and response sets; one request sent receives one response in return. If the controller receives a response in response to a request, it can make another request without waiting for the response wait timer to timeout. On the other hand, if no response to the request is received, the controller can make the next request after the response waiting timer timeout.

Note that the “successive requests” means continuous requests made from the same device.

\*Note that in the case of low-voltage smart electric energy meters installed by a General Electricity Transmission and Distribution Utility in Japan that comply with “The EMS/aggregation controller smart meter Route B (low-voltage smart electric energy meter) operational guidelines [Version 5.0 or later]”, communication is supported with up to three controllers (communication frequency: 1 unit x 10[sec], 1 unit x 30[sec], and 1 unit x 30[min]) on a best-effort basis.

### 2.4.2. Response Wait Timer

The response wait timer values of a controller when a smart electric energy meter is

responding to a request from it shall be based on Table 2-5. Here, the response wait timer value defines the waiting time that the controller waits until it can make the next request, after the smart electric energy meter does not respond to the request from the controller.

**Table 2-5 Response wait timer values of controllers**

| Parameter name        | Value             | Remarks  |
|-----------------------|-------------------|--|
| Response wait timer 1 | At least 20 [sec] | When the OPC value is 1, except when the EPC is as shown below.<br><ul style="list-style-type: none"> <li>• EPC=0xE2<br/> Historical data of measured cumulative amounts of electric energy 1 (normal direction)</li> <li>• EPC=0xE4<br/> Historical data of measured cumulative amounts of electric energy 1 (reverse direction)</li> <li>• EPC=0xEC<br/> Historical data of measured cumulative amounts of electric energy 2 (normal and reverse directions)</li> <li>• EPC=0xEE<br/> Historical data of measured cumulative amounts of electric energy 3 (normal and reverse directions)</li> </ul>     |
| Response wait timer 2 | At least 60 [sec] | When the OPC value is 2 or more, or when the EPC is as shown below.<br><ul style="list-style-type: none"> <li>• EPC=0xE2<br/> Historical data of measured cumulative amounts of electric energy 1 (normal direction)</li> <li>• EPC=0xE4<br/> Historical data of measured cumulative amounts of electric energy 1 (reverse direction)</li> <li>• EPC=0xEC<br/> Historical data of measured cumulative amounts of electric energy 2 (normal and reverse directions)</li> <li>• EPC=0xEE<br/> Historical data of measured cumulative amounts of electric energy 3 (normal and reverse directions)</li> </ul> |

The response wait timer values of a smart electric energy meter when an controller is responding to a request from it shall be based on Table 2- 2 . Here, the response timer value defines the waiting time before the smart electric energy meter can make another request, if there is no response received from the controller to respond to a request from smart electric energy meter.

**Table 2-2 Response wait timer values of smart electric energy meters**

| Parameter name        | Value             | Remarks |
|-----------------------|-------------------|---------|
| Response wait timer 1 | At least 20 [sec] |         |

### 2.4.3. Retransmission Processing

When smart electric energy meters and controllers are subject to a timeout at application (ECHONET Lite) level, data shall not be retransmitted within the frame of the same transaction ID (TID).

### 2.4.4. Processing Target Property Counter (OPC) Value

Smart electric energy meters must be capable of supporting OPC value 7 or more and controllers OPC value 2 or more. However, when using the EPC for historical data of measured cumulative amounts of electric energy described in 3.3.2, 3.3.3 and 3.3.5, smart electric energy meters need not support multiple OPCs.

Response to requests with more than one OPC value is given in the sequence of processing properties designated by EPC when the request was made.

### 2.4.5. Property Value Set Request

When a controller makes a SetC[0x61] request, a value outside the range of properties required by [ELOBJ] must not be set.

When a smart electric energy meter receives a SetC[0x61] request from a controller, a response shall be given with Set\_Res[0x71] after the settings have been completely set. When the settings are outside the range and cannot be set, the response shall be SetC\_SNA[0x51].

Therefore, when a controller receives Set\_Res[0x71], set confirmation via Get[0x62] is not necessary.

## 2.5. Others

### 2.5.1. Treatment of Data Duplication

If a controller receives duplicated measurements of cumulative amounts of electric energy at fixed time (30-minute value) and one-minute measured cumulative amount of electric energy from a smart electric energy meter at the same measurement time, the data arriving last shall be taken as correct.

## Chapter 3. Standard Operation

In this Chapter, the standard operation between smart electric energy meters and controllers will be shown. Smart electric energy meters and controllers produced on the basis of this document must support the operation described in this Chapter.

Fig. 3- illustrates a sequence of standard operations between a smart electric energy meter and a controller. Here, it shall be assumed that network connection processing in the lower layer between smart electric energy meters and controllers has been completed.

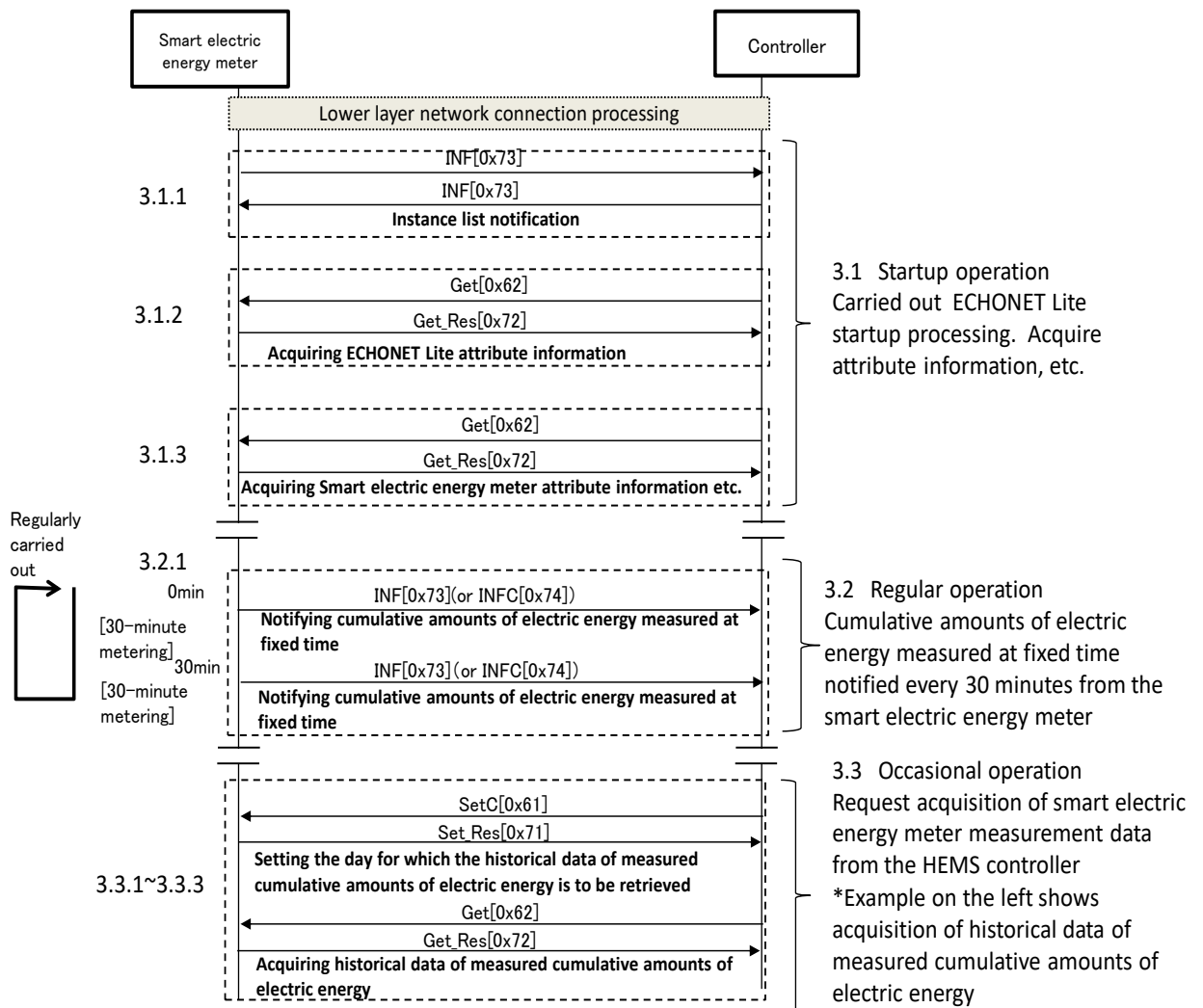


Fig.3-1 Example of standard operating sequence

### 3.1. Startup Operation



### 3.1.1. ECHONET Lite Node Startup Processing

After completing connection of lower layer network, the smart electric energy meter and the controller notify an instance list.

- (1) Target properties (node profile objects)
  - 0xD5: Instance list notification

### 3.1.2. Smart electric energy meters search processing

The controller shall have a process to search smart electric energy meters in preparation of cases that the controllers fail to receive the instance list notifications sent from smart electric energy meters at start-up. Specifically, controllers shall send a read request via multicast with DEOJ as low-voltage smart electric energy meter (instance code: 0x00), and with EPC as operation status.

- (1) Target properties (low-voltage smart electric energy meter class)
  - 0x80: Operation status

### 3.1.3. Acquiring ECHONET Lite Attribute Information

After receiving instance list notification from the smart electric energy meter, the controller requests ECHONET Lite attribute information necessary for ECHONET Lite communication.

It is recommended that the controller confirms the Appendix Release No. and properties mounted with the smart electric energy meter based on the ECHONET Lite attribute information, and makes requests in line with the mounting status of the smart electric energy meter.

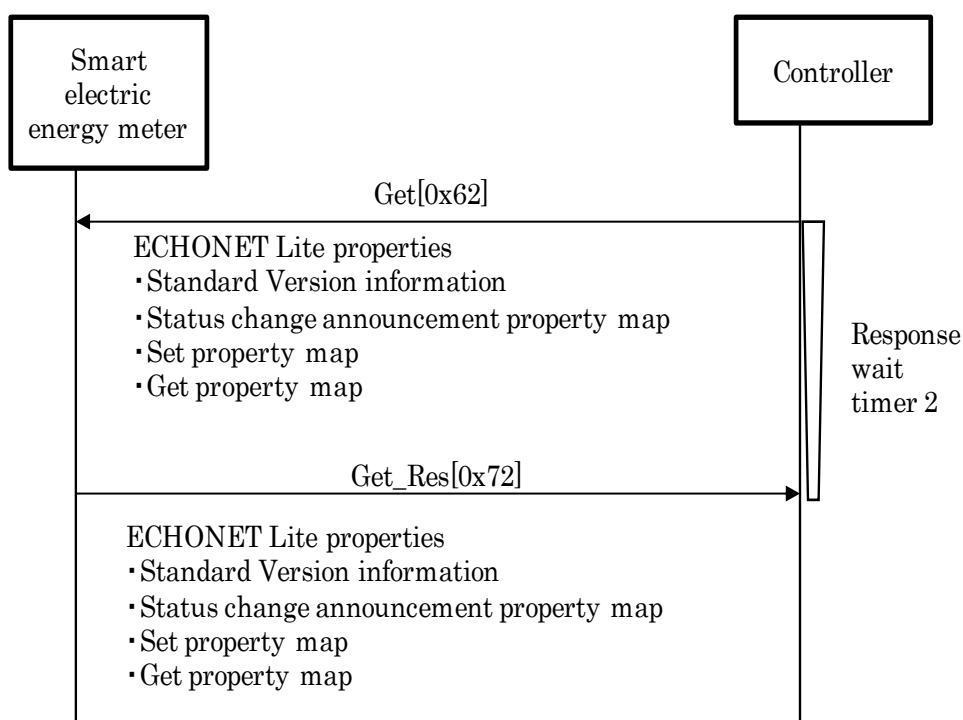
The contents of this document shall apply to low-voltage smart electric energy meters with Appendix Release No. R or later. Refer to the AIF specifications Ver. 1.0.1 if dealing with low-voltage smart electric energy meters with Appendix Release numbers prior to R.

- (1) Target properties (low-voltage smart electric energy meter objects)
  - 0x82: Standard version information
  - 0x9D: Status change announcement property map
  - 0x9E: Set property map
  - 0x9F: Get property map

- (2) Sequence

Fig. 3- shows an example of the sequence for acquiring ECHONET Lite attribute information.

1. After receiving instance list notification from the smart electric energy meter, the controller requests target properties (combination and sequence may be arbitrary) via Get[0x62].
2. The smart electric energy meter transmits the relevant property value via Get\_Res[0x72].



**Fig. 3-2 Example of sequence for acquiring ECHONET Lite attribute information**

#### 3.1.4. Acquiring Smart Electric Energy Meter Attribute Information, etc.

After acquiring ECHONET Lite attribute information from the smart electric energy meter, the controller requests attribute information, etc., from the smart electric energy meter. The attribute information, etc., of the smart electric energy meter may be re-acquired if necessary.

- (1) Target properties (low-voltage smart electric energy meter objects)
  - 0x8D: Serial number [optional property]
  - 0xC0: Route B identification number
  - 0xD3: Coefficient [optional property]
  - 0xD7: Number of effective digits for cumulative amounts of electric energy

- 0xE1: Unit for cumulative amounts of electric energy (normal and reverse directions)
- 0xEA: Cumulative amounts of electric energy measured at fixed time (normal direction)
- 0xEB: Cumulative amounts of electric energy measured at fixed time (reverse direction) [if there is a reverse direction measurement function]

(2) Sequence

Fig. 3- shows an example of the sequence for acquiring smart electric energy meter attribute information, etc.

1. After acquiring ECHONET Lite attribute information from the smart electric energy meter, the controller requests target properties (combination and sequence may be arbitrary) via Get[0x62].
2. The smart electric energy meters transmit the relevant property value via Get\_Res[0x72]. If an unmounted optional property is requested, the relevant property is transmitted via Get\_SNA[0x52].

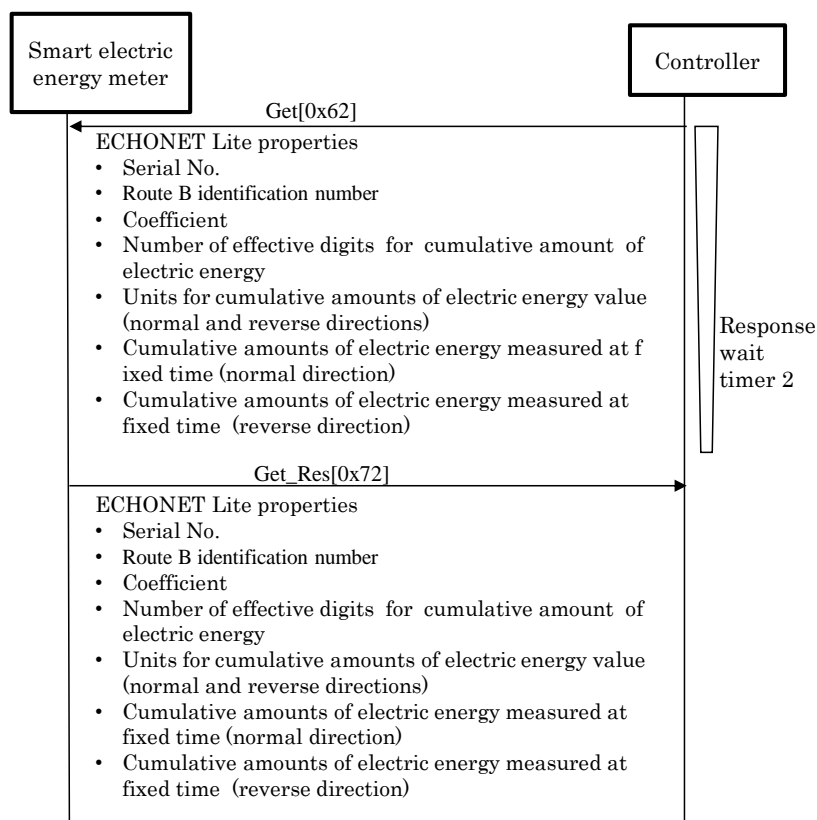


Fig. 3-3 Example of sequence for acquiring smart electric energy meter attribute information, etc.

## 3.2. Regular Operation

### 3.2.1. Notifying Cumulative Amounts of Electric Energy Measured at Fixed Time (30-Minute Value)

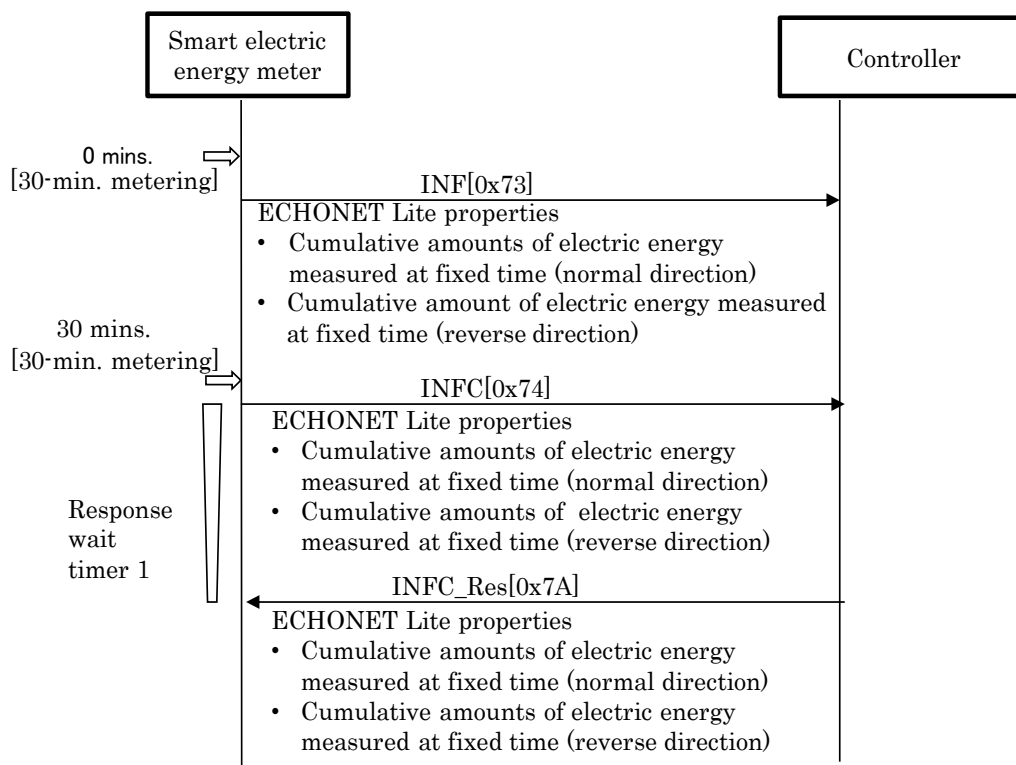
The smart electric energy meter notifies the latest cumulative amounts of electric energy measured at fixed time (30-minute value) to the controller within 5 minutes of 00 minutes and 30 minutes after every hour.

(1) Target properties (low-voltage smart electric energy meter objects)  
0xEA: Cumulative amounts of electric energy measured at fixed time (normal direction)  
0xEB: Cumulative amounts of electric energy measured at fixed time (reverse direction)  
[if there is a reverse direction measurement function]

(2) Sequence

Fig. 3- shows an example of the sequence for notification of cumulative amounts of electric energy measured at fixed time (30-minute value).

1. The smart electric energy meter notifies target properties (combination and sequence may be arbitrary) to the controller (individually or generally broadcast) via INF[0x73] or INFC[0x74] within 5 minutes of 00 minutes and 30 minutes after every hour.
2. If the controller receives INFC[0x74], it transmits INFC\_Res[0x7A] to the smart electric energy meter.



**Fig. 3-4 Example of sequence for notifying cumulative amounts of electric energy measured at fixed time (30-minute value)**

### 3.3. Occasional Operation

#### 3.3.1. Acquiring Cumulative Amounts of Electric Energy Measured at Fixed Time (30-Minute Value)

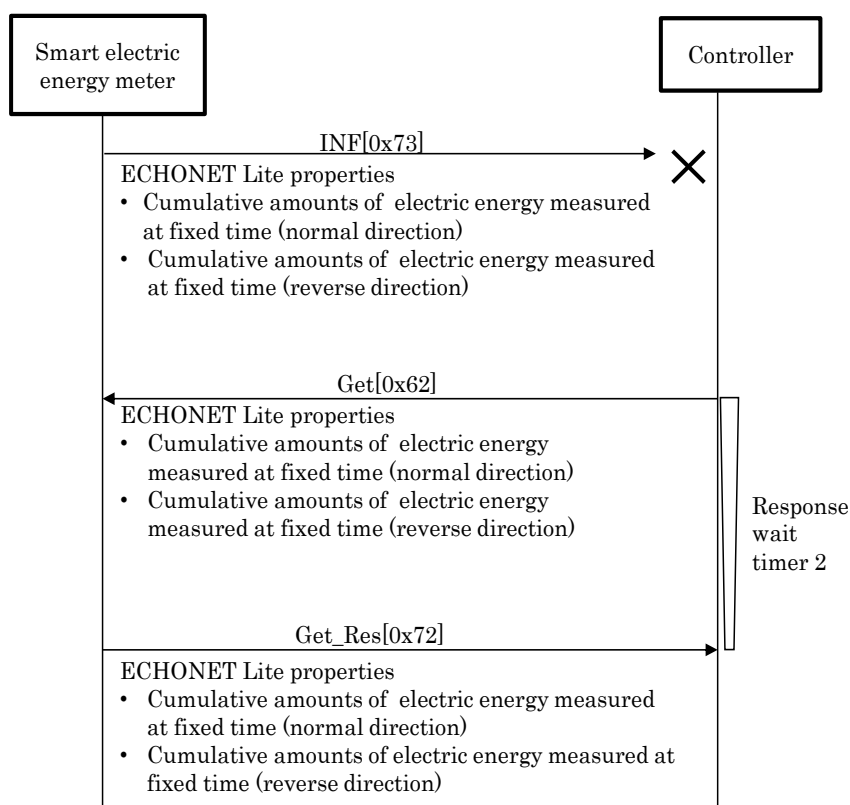
If necessary, the controller makes a request to the smart electric energy meter for cumulative amounts of electric energy measured at fixed time (30-minute value). Normally, this is notified from the smart electric energy meter within 5 minutes of 00 minutes and 30 minutes after every hour as shown in 3.2.1 Therefore, this is used as a backup function in case data cannot be received due to temporary communication breakdown, etc.

- (1) Target properties (low-voltage smart electric energy meter objects)
  - 0xEA: Cumulative amounts of electric energy measured at fixed time (normal direction)
  - 0xEB: Cumulative amounts of electric energy measured at fixed time (reverse direction) [if there is a reverse direction measurement function]

(2) Sequence

Fig. 3- shows an example of the sequence for acquiring cumulative amounts of electric energy measured at fixed time (30-minute value).

1. If the controller is unable to receive cumulative amounts of electric energy measured at fixed time (30-minute value), it requests necessary data such as “cumulative amounts of electric energy measured at fixed time (normal direction)” via Get[0x62], targeting at 05 minutes and 35 minutes after every hour or later.
2. The smart electric energy meter transmits the relevant property value via Get\_Res [0x72]. If the normal value cannot be responded owing to a fault, Get\_SNA[0x52] is transmitted.



**Fig. 3-5 Example of sequence for acquiring cumulative amounts of electric energy measured at fixed times (30-minute value)**

### 3.3.2. Acquiring Historical Data of Measured Cumulative Amounts of

#### Electric Energy (30-minute Value, 1-Day Basis)

If necessary, the controller requests the historical data of measured cumulative amounts of electric energy (1-day basis, normal direction or reverse direction). If the historical data of measured cumulative amounts of electric energy needed by the controller corresponds to less than or equal to 6 hours, it can make effective use of the communication bandwidth to acquire the historical data of measured cumulative amounts of electric energy (maximum 6 hours) described in 3.3.3.

- (1) Target properties (low-voltage smart electric energy meter objects)
  - 0xE5: Day for which the historical data of measured cumulative amounts of electric energy is to be retrieved 1
  - 0xE2: Historical data of measured cumulative amounts of electric energy 1 (normal direction)
  - 0xE4: Historical data of measured cumulative amounts of electric energy 1 (reverse direction)

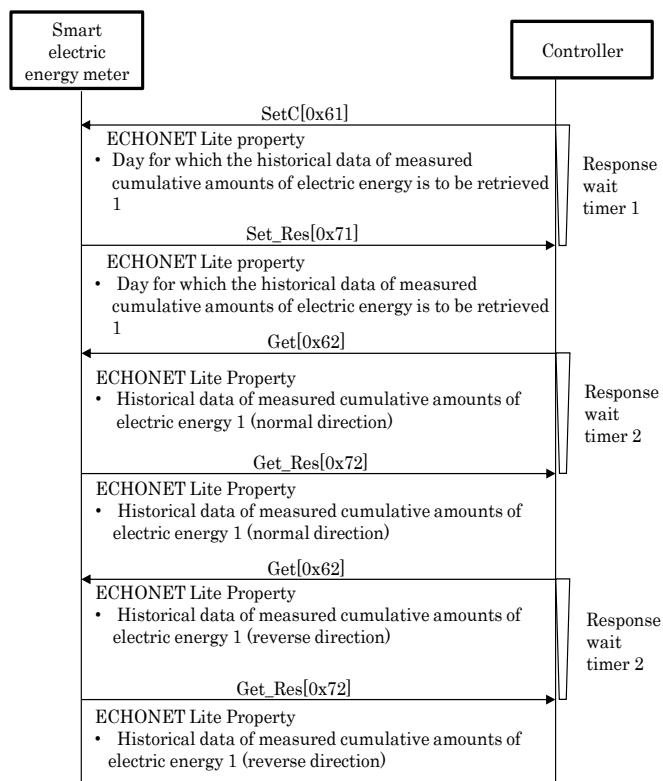
- (2) Sequence

Fig. 3- shows an example of the sequence for acquiring historical data of measured cumulative amounts of electric energy (30-minute value, 1-day basis).

1. If the controller needs the historical data of measured cumulative amounts of electric energy, it sets the days needed in “Day for which the historical data of measured cumulative amounts of electric energy is to be retrieved 1” and makes a request via SetC[0x61].
2. After completing the set of settings (EDT) designated by SetC[0x61], the smart electric energy meter responds with Set\_Res[0x71]. If the designated settings (EDT) cannot be set because they are outside the range of the properties, etc., it responds with SetC\_SNA[0x51].
3. After confirming receipt of Set\_Res[0x71], the controller requests either “Historical data of measured cumulative amounts of electric energy 1 (normal direction)” or “Historical data of measured cumulative amounts of electric energy 1 (reverse direction)” via Get[0x62].
4. The smart electric energy meter transmits the relevant property value via Get\_Res[0x72]. When it does not have the measured cumulative amounts of electric energy for the time in question, the data will be void, and the value will be given as 0xFFFFFFFF. If the normal value cannot be responded owing to a fault, Get\_SNA[0x52] is transmitted.

5. If the controller requests other historical data of measured cumulative amounts of electric energy, it requests either “Historical data of measured cumulative amounts of electric energy 1 (reverse direction)” or “Historical data of measured cumulative amounts of electric energy 1 (normal direction)” via Get[0x62].
6. The smart electric energy meter transmits the relevant property value via Get\_Res[0x72]. When it does not have the measured cumulative amounts of electric energy for the time in question, the data will be void, and the value will be given as 0xFFFFFFFF. If the normal value cannot be responded owing to a fault, Get\_SNA[0x52] is transmitted.

Here, in Sequences (4) and (6), the controller shall use the historical data, only after checking if the first date and time of the received historical data of measured cumulative amounts of electric energy is identical with the date and time set in the Sequence (1). Considering that a conflict may occur if two or more controllers run sequence (1) at the same time, countermeasures should be taken by adjusting the timing of the initial run and retry of sequence (1) or by limiting the number of retries.



**Fig. 3-6 Example of sequence for acquiring historical data of measured cumulative amounts of electric energy (30-minute value, 1-day basis)**



### 3.3.3. Acquiring Historical Data of Measured Cumulative Amounts of

#### Electric Energy (30-minute Value, Max. 6 Hours) [Optional]

If necessary, the controller requests historical data of measured cumulative amounts of electric energy (max. 6 hours, normal and reverse directions). If the smart electric energy meter is mounted with target properties, it is recommended that this function be used when acquiring historical data of measured cumulative amounts of electric energy corresponding to less than 6 hours, in order to make effective use of the communication band.

- (1) Target properties (low-voltage smart electric energy meter objects)
  - 0xED: Day for which the historical data of measured cumulative amounts of electric energy is to be retrieved 2
  - 0xEC: Historical data of measured cumulative amounts of electric energy 2 (normal and reverse directions)

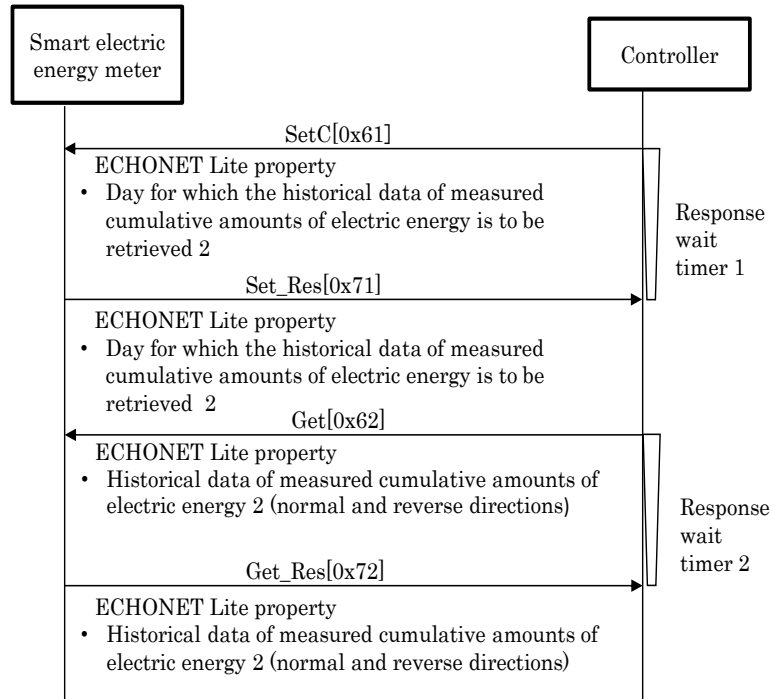
- (2) Sequence

Fig. 3- shows an example of the sequence for acquiring historical data of measured cumulative amounts of electric energy (30-minute value, max. 6 hours).

1. If the controller needs the historical data of measured cumulative amounts of electric energy, it sets the time needed in “Day for which the historical data of measured cumulative amounts of electric energy is to be retrieved 2” and makes a request via SetC[0x61].
2. After completing the set of the settings (EDT) designated by SetC[0x61], the smart electric energy meter responds with Set\_Res[0x71]. If the designated settings (EDT) cannot be set because they are outside the range of the properties, etc., it responds with SetC\_SNA[0x51].
3. After confirming the receipt of Set\_Res[0x71], the controller requests “Historical data of measured cumulative amounts of electric energy 2 (normal and reverse directions)” via Get[0x62].
4. The smart electric energy meter transmits the relevant property value via Get\_Res[0x72]. When it does not have the measured cumulative amounts of electric energy for the time in question, the data will be void, and the value will be given as 0xFFFFFFFF. If the normal value cannot be responded owing to a fault, Get\_SNA[0x52] is transmitted.

Here, the controller shall use the historical data, only after checking if the first date and time of the received historical data of measured cumulative amounts of electric energy is identical with the date and time set in the Sequence (1). Considering that a conflict may occur if two or more controllers run sequence (1) at the same time,

countermeasures should be taken by adjusting the timing of the initial run and retry of sequence (1) or by limiting the number of retries.



**Fig. 3-7 Example of sequence for acquiring historical data of measured cumulative amounts of electric energy (30-minute value, max. 6 hours)**

### 3.3.4. Acquiring one-minute measured cumulative amount of electric energy

If necessary, the controller makes a request to the smart electric energy meter for one-minute measured cumulative amount of electric energy (normal and reverse directions).

- (1) Target properties (low-voltage smart electric energy meter objects)
- 0xD0: One-minute measured cumulative amount of acquiring electric energy (normal and reverse directions)

(2) Sequence

Figure 3-8 shows an example of the sequence for acquiring one-minute measured cumulative amount of electric energy.

1. The controller requests the target properties (in any combination or in any order) via (Get[0x62]).
2. The smart electric energy meter transmits the relevant property value via Get\_Res[0x72].  
If the normal value cannot be responded owing to a fault, Get\_SNA[0x52] is transmitted.

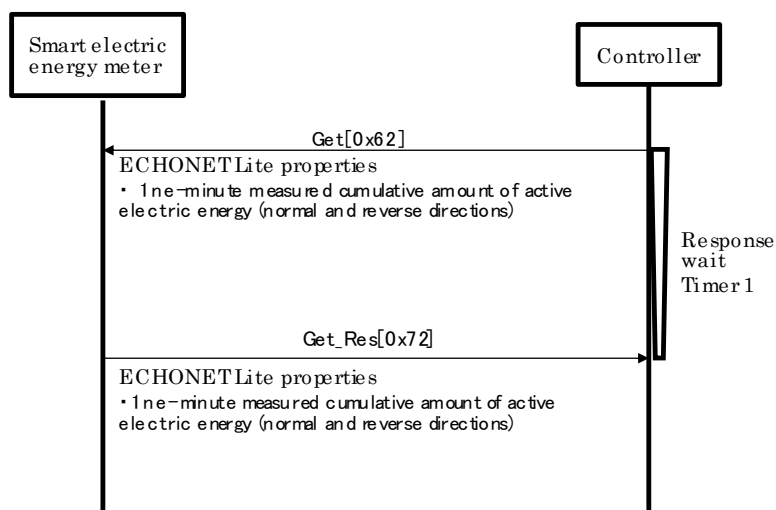


Fig. 3-1 Example of sequence for acquiring one-minute measured cumulative amount of electric energy

### 3.3.5. Acquiring historical data of measured values (one-minute, max. 10 minutes)

If necessary, the controller requests historical data of measured cumulative amounts of electric energy 3 (max. 10 minutes, normal and reverse directions).

(1) Target properties (low-voltage smart electric energy meter objects)

- 0xEF: Day for which the historical data of measured cumulative amounts of electric energy is to be retrieved 3
- 0xEE: Historical data of measured cumulative amounts of electric energy 3 (normal and reverse directions)

(2) Sequence

Figure 3-9 shows an example of the sequence for acquiring historical data of measured cumulative amounts of electric energy (max. 10 minutes).

1. If the controller needs the historical data of measured cumulative amounts of electric energy 3, it sets the time needed in “Day for which the historical data of measured cumulative amounts of electric energy is to be retrieved 3” and makes a request via SetC[0x61].
2. After completing the set of settings (EDT) designated by SetC[0x61], the smart electric energy meter responds with Set\_Res[0x71]. If the designated settings (EDT) cannot be set because they are outside the range of the properties, etc., it responds with SetC\_SNA[0x51].
3. After confirming the receipt of Set\_Res[0x71], the controller requests “Historical data of measured cumulative amounts of electric energy 3 (normal and reverse directions)” via Get[0x62].
4. The smart electric energy meter transmits the relevant property value via Get\_Res[0x72]. If it does not have the measured cumulative amounts of electric energy for the time in question, the data will be void, and the value will be given as 0xFFFFFFFF. If the normal value cannot be responded owing to a fault, Get\_SNA[0x52] is transmitted. Here, the controller shall use the historical data, only after checking if the first date and time of the received historical data of measured cumulative amounts of electric energy is identical with the date and time set in the Sequence (1). Considering that a conflict may occur if two or more controllers run sequence (1) at the same timing, countermeasures should be taken by adjusting the timings of the initial run and retry of sequence (1) or by limiting the number of retries.

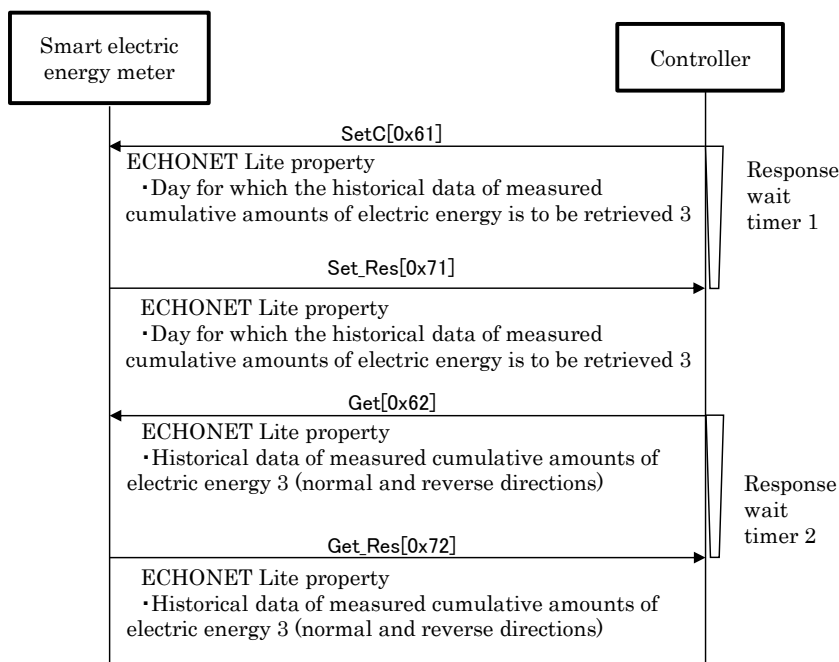


Fig. 3-2 Example of sequence for measured cumulative amount of electric energy

### 3.4. Operation during a Fault

#### 3.4.1. Fault Status Notification

If the smart electric energy meter succumbs to a fault status making it unable to transmit the cumulative amounts of electric energy measured at fixed time (30-minute value), etc., it notifies the fault status (“Fault occurred”) to the controller. When it has recovered from the fault, it notifies the fault status (“No fault has occurred”) to the controller.

During the fault, the smart electric energy meter does not notify the cumulative amounts of electric energy measured at fixed time (30-minute value) described in 3.2.1. Operation of the controller is not required while the smart electric energy meter is in fault status.

- (1) Target properties (low-voltage smart electric energy meter objects)  
 0x88: Fault status

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## Annex. 1 Handling of Each Property Value for Use in Japan

In the case of low-voltage smart electric energy meters installed by a General Electricity Transmission and Distribution Utility in Japan that comply with “The EMS/aggregation controller smart meter Route B (low-voltage smart electric energy meter) operational guidelines [Version 5.0 or later]”, please note that the values of the relevant properties are handled as follows.

(1) “Route B identification number” property

The property values of the “Route B identification number” property shall indicate Route B Authentication ID in 16 bytes. The 1st to 4th bytes identifies the smart meter installation business operator. The 1st byte shall be fixed at 0x00, and the 2nd to 4th bytes shall be the manufacturer’s codes. The 5th and following bytes are free space for the Route B Authentication ID.

(2) Properties related to the number of effective digits

For the “number of effective digits for cumulative amounts of electric energy” property, property values are consistently used as 0x08 (8 digits).

(3) Properties subject to verification of instrumental error

The values of the following properties are subject to the verification of instrumental error to examine accuracy of the measurement of amount of electric energy. Although bidirectional meters are verified in both the normal and reverse directions (bidirectional verification), there are meters that measure only in the normal direction (unidirectional verification). In this case, such meters are not verified for the reverse direction.

<Target properties (low-voltage smart electric energy meter class)>

- 0xD0: One-minute measured cumulative amount of electric energy (normal and reverse directions)
- 0xE0: Measured cumulative amount of electric energy (normal direction)
- 0xE2: Historical data of measured cumulative amounts of electric energy 1 (normal direction)
- 0xE3: Measured cumulative amount of electric energy (reverse direction)
- 0xE4: Historical data of measured cumulative amounts of electric energy 1 (reverse direction)
- 0xEA: Cumulative amounts of electric energy measured at fixed time (normal direction)
- 0xEB: Cumulative amounts of electric energy measured at fixed time (reverse direction)