Interface Specification

LINKWARE IEC 61968

EVENT

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Contents

1 Overview

The purpose of this Linkware interface is to allow external systems to receive events and notifications from Gateware. Events include realtime events that are sent when status of a device changes. In addition events contain configuration events which are triggered when data in the system or the configuration of the system are changed. The interface is implemented as a web service using the IEC 61968 standards.

References

Reference	Document
IEC 61968-100 ed.1 Implementation profiles	The document describes how message payloads defined by parts 3-9 of IEC 61968 are conveyed using web services and the Java Messaging System.
IEC 61968-9 ed.2 Interfaces for meter reading and control	The purpose of this document is to define a standard for the integration of metering systems (MS), which would include traditional (one or two-way) automated meter reading (AMR) systems, with other systems and business functions within the scope of IEC 61968.
Interface Specification – Linkware IEC 61968 Common	Common Linkware IEC 61968 interface specification. Contains general specifications, guidelines and restrictions, including i.e. message headers, error handling and security policies.
Feature PGM Alarms	The document describes the power grid monitoring feature used in different Aidon device types.

2 Interface specification

2.1 Services

2.1.1 IEC Event

Service name	IEC Event
Description	Service is used to send end device and configuration events from Linkware to external systems.
WSDL	IECReceiveEvent.wsdl
Default endpoint	Defined by external system(s)

2.1.2 IEC Event Subscription

Service name	IEC Event Subscription
Description	Service is used to subscribe to specified end device and/or configuration events.
WSDL	IECEventSubscription.wsdl
Default endpoint	http://<LW server>:50100/IecEventSubscription/IecEventSubscription.svc

2.2 Common Message Envelope

The common structure for all messages can be found in document Interface Specification – Linkware IEC 61968 Common.

2.2.1 Header

The common header can be found in the document Interface Specification – Linkware IEC 61968 Common.

2.2.2 Reply

The common reply can be found in the document Interface Specification – Linkware IEC 61968 Common.

2.3 Manage Subscriptions

Client system event subscription are managed with IEC Event interface with the operations described in this chapter.

2.3.1 m:EventSubscription

Element	Data type	Cardinality	CRD*	Remarks
endpointAddress	xs:string	1	CRD	Event web service endpoint address to which Linkware

				should send the subscribed events
name	xs:string	0..1	CRD	Descriptive name of the endpoint
useGuaranteedDelivery	xs:boolean	1	CR	Should Linkware use guaranteed delivery methods described in Interface Specification - Linkware IEC 61968 Common v2 (draft).docx
EndDeviceEvents		1	CRD	
EndDeviceEvents/EndDeviceEvent		0..n	CRD	List of end device event types to which client is subscribing. Empty list will cause no end device events to be sent for the subscriber.
./ruleType	xs:string	1	CRD	Defines if the specified events are allowed or denied in the subscription. Allowed values: - allow - deny Deny rules have priority over allow rules.
./EndDeviceEventType		1	CRD	Event types to send for the subscriber. See list of event categories in chapter 3. Use "*" for every subcategory to subscribe to all end device events. Wildcard may not be used for single subcategory: all or specific category must be specified in the subscription.
./EndDeviceEventType/type	xs:string	1	CRD	Type of the EndDevice where event was created
./EndDeviceEventType/domain	xs:string	1	CRD	High-level nature of the event
./EndDeviceEventType/subdomain	xs:string	1	CRD	More specific nature of the event
./EndDeviceEventType/eventOrAction	xs:string	1	CRD	Specific event that occured

ConfigurationEvents		1	CRD	
ConfigurationEvents/ConfigurationEvent		0..n	CRD	List of configuration event types to which client is subscribing. Empty list will cause no configuration events to be sent for the subscriber.
./ruleType	xs:string	1	CRD	Defines if the specified events are allowed or denied in the subscription. Allowed values: - allow - deny Deny rules have priority over allow rules.
./Noun	xs:string	1	CRD	Noun of the event message. See chapter 2.3.1 for details. Use "*" as a wildcard.
./Verb	xs:string	1	CRD	Verb of the event message. See chapter 2.3.1 for details. Use "*" as a wildcard.

*CRD = Is element available in Create, Read and Delete operations

2.3.2 CreateEventSubscription

CreateEventSubscription is used to create an event subscription for Linkware events.

2.3.2.1 Request

Element	Data type	Cardinality	Description and usage
Header		1	The header that contains information about the message. See Interface Specification – Linkware IEC 61968 Common for generic Header elements.
Header/Verb	xs:string	1	Possible values: "create": create event subscription
Header/Noun	xs:string	1	Static "EventSubscription"
Payload		1	
Payload/EventSubscription	m:EventSubscription	1	Event subscription to be created. See element schema in 2.3.1.

2.3.2.2 Response

Element	Data type	Cardinality	Description and usage
Header		1	The header that contains information about the message. See Interface Specification – Linkware IEC 61968 Common for generic Header elements.
Header/Verb	xs:string	1	Static "reply"
Header/Noun	xs:string	1	Static "EventSubscription"
Reply		1	
Reply/Result		1	OK, FAILED
Reply/Error		0..1	If Result=Failed, return Error
./code	xs:string	1	Error code, see table below
./level	xs:string	1	
./reason	xs:string	0..1	Description of the error

2.3.2.3 Result codes

Code	Description	Error level
0.0	Ok	
1.0	Request message is invalid or incomplete. This code is used when the request is invalid i.e. some required element is missing or invalid. For example when ChangeEndDevices message header's verb is not change or header's correlation id is missing.	FATAL
1.1	The message contains incorrect time specification. Only UTC times are supported.	FATAL
2.44	Event subscription already exists	WARN
2.45	Invalid category. Only specific categories or all categories (*.*.*.*) are allowed values for end device event category	FATAL
5.0	Operation failed. This code is used when the request cannot be completed because an exception has occurred.	FATAL

This table describes result codes that are possibly returned from the described service. Result codes are listed and maintained in the document Interface Specification – Linkware IEC 61968 Common.

2.3.2.4 Examples

Request

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:even="http://aidon.com/IEC/Event/v2/EventSubscriptionMessage"
xmlns:mes="http://iec.ch/TC57/2011/schema/message"
xmlns:even1="http://iec.ch/TC57/2007/EventSubscription#"
xmlns:end="http://iec.ch/TC57/2007/EndDeviceEvent#"
xmlns:con="http://iec.ch/TC57/2007/ConfigurationEvent#">
  <soapenv:Header />
  <soapenv:Body>
    <even:CreateEventSubscriptionRequest>
```

```
      <even:Header>
        <mes:Verb>create</mes:Verb>
        <mes:Noun>EventSubscription</mes:Noun>
        <mes:Timestamp>2016-04-10T10:00:00Z</mes:Timestamp>
        <mes:Source>Client System</mes:Source>
        <mes:MessageID>665931F9-3DF3-4D2C-A743-AF139041E3A0</mes:MessageID>
        <mes:CorrelationID>664496DD-E2F8-4775-A332-
D3DE25B96100</mes:CorrelationID>
      </even:Header>
      <even:Payload>
        <even:EventSubscription>
<even1:endpointAddress>https://ws.example.tld/IECEventReceive</even1:endpointAdd
ress>
          <even1:name>ExampleEndPoint</even1:name>
          <even1:useGuaranteedDelivery>true</even1:useGuaranteedDelivery>
          <even1:EndDeviceEvents>
            <even1:EndDeviceEvent>
              <end:ruleType>allow</end:ruleType>
              <end:EndDeviceEventType>
                <end:type>*</end:type>
                <end:domain>*</end:domain>
                <end:subdomain>*</end:subdomain>
                <end:eventOrAction>*</end:eventOrAction>
              </end:EndDeviceEventType>
            </even1:EndDeviceEvent>
            <even1:EndDeviceEvent>
              <end:ruleType>deny</end:ruleType>
              <end:EndDeviceEventType>
                <end:type>3</end:type>
                <end:domain>31</end:domain>
                <end:subdomain>17</end:subdomain>
                <end:eventOrAction>42</end:eventOrAction>
              </end:EndDeviceEventType>
            </even1:EndDeviceEvent>
            <even1:EndDeviceEvent>
              <end:ruleType>deny</end:ruleType>
              <end:EndDeviceEventType>
                <end:type>3</end:type>
                <end:domain>31</end:domain>
                <end:subdomain>17</end:subdomain>
                <end:eventOrAction>68</end:eventOrAction>
              </end:EndDeviceEventType>
            </even1:EndDeviceEvent>
          </even1:EndDeviceEvents>
          <even1:ConfigurationEvents>
            <even1:ConfigurationEvent>
              <con:ruleType>allow</con:ruleType>
              <con:Noun>*</con:Noun>
              <con:Verb>*</con:Verb>
            </even1:ConfigurationEvent>
          </even1:ConfigurationEvents>
        </even:EventSubscription>
      </even:Payload>
    </even:CreateEventSubscriptionRequest>
  </soapenv:Body>
</soapenv:Envelope>
```

Response

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
```

```
xmlns:even="http://aidon.com/IEC/Event/v2/EventSubscriptionMessage"
xmlns:mes="http://iec.ch/TC57/2011/schema/message">
  <soapenv:Header />
  <soapenv:Body>
    <even:CreateEventSubscriptionResponse>
      <even:Header>
        <mes:Verb>reply</mes:Verb>
        <mes:Noun>EventSubscription</mes:Noun>
        <mes:Timestamp>2016-04-10T10:00:02Z</mes:Timestamp>
        <mes:Source>Aidon Linkware</mes:Source>
        <mes:MessageID>665931F9-3DF3-4D2C-A743-AF139041E3A1</mes:MessageID>
        <mes:CorrelationID>664496DD-E2F8-4775-A332-
D3DE25B96100</mes:CorrelationID>
      </even:Header>
      <even:Reply>
        <mes:Result>OK</mes:Result>
      </even:Reply>
    </even:CreateEventSubscriptionResponse>
  </soapenv:Body>
</soapenv:Envelope>
```

2.3.3 DeleteEventSubscription

DeleteEventSubscription is used to remove existing event subscriptions from Linkware.

2.3.3.1 Request

Element	Data type	Cardinality	Description and usage
Header		1	The header that contains information about the message. See Interface Specification – Linkware IEC 61968 Common for generic Header elements.
Header/Verb	xs:string	1	Possible values: “delete”: remove event subscription
Header/Noun	xs:string	1	Static “EventSubscription”
Payload		1	
Payload/EventSubscription	m:EventSubscription	1	Event subscription to be deleted. See element schema in 2.3.1.

2.3.3.2 Response

Element	Data type	Cardinality	Description and usage
Header		1	The header that contains information about the message. See Interface Specification – Linkware IEC 61968 Common for generic Header elements.
Header/Verb	xs:string	1	Static “reply”
Header/Noun	xs:string	1	Static “EventSubscription”

Reply		1	
Reply/Result		1	OK, FAILED
Reply/Error		0..1	If Result=Failed, return Error
./code	xs:string	1	Error code, see table below
./level	xs:string	1	
./reason	xs:string	0..1	Description of the error

2.3.3.3 Result codes

Code	Description	Error level
0.0	Ok	
1.0	Request message is invalid or incomplete. This code is used when the request is invalid i.e. some required element is missing or invalid. For example when ChangeEndDevices message header's verb is not change or header's correlation id is missing.	FATAL
1.1	The message contains incorrect time specification. Only UTC times are supported.	FATAL
2.37	Event subscription not found	WARN
5.0	Operation failed. This code is used when the request cannot be completed because an exception has occurred.	FATAL

This table describes result codes that are possibly returned from the described service. Result codes are listed and maintained in the document Interface Specification – Linkware IEC 61968 Common.

2.3.3.4 Examples

Request

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:even="http://aidon.com/IEC/Event/v2/EventSubscriptionMessage"
xmlns:mes="http://iec.ch/TC57/2011/schema/message"
xmlns:even1="http://iec.ch/TC57/2007/EventSubscription#"
xmlns:end="http://iec.ch/TC57/2007/EndDeviceEvent#"
xmlns:con="http://iec.ch/TC57/2007/ConfigurationEvent#">
  <soapenv:Header />
  <soapenv:Body>
    <even:DeleteEventSubscriptionRequest>
      <even:Header>
        <mes:Verb>delete</mes:Verb>
        <mes:Noun>EventSubscription</mes:Noun>
        <mes:Timestamp>2016-04-10T10:00:00Z</mes:Timestamp>
        <mes:Source>Client System</mes:Source>
        <mes:MessageID>665931F9-3DF3-4D2C-A743-AF139041E3A0</mes:MessageID>
        <mes:CorrelationID>664496DD-E2F8-4775-A332-
D3DE25B96100</mes:CorrelationID>
      </even:Header>
      <even:Payload>
        <even:EventSubscription>
<even1:endpointAddress>https://ws.example.tld/IECEventReceive</even1:endpointAdd
ress>
          <even1:name>ExampleEndPoint</even1:name>
          <even1:useGuaranteedDelivery>true</even1:useGuaranteedDelivery>
```

```
          <even1:EndDeviceEvents>
            <even1:EndDeviceEvent>
              <end:ruleType>deny</end:ruleType>
              <end:EndDeviceEventType>
                <end:type>3</end:type>
                <end:domain>31</end:domain>
                <end:subdomain>17</end:subdomain>
                <end:eventOrAction>42</end:eventOrAction>
              </end:EndDeviceEventType>
            </even1:EndDeviceEvent>
            <even1:EndDeviceEvent>
              <end:ruleType>deny</end:ruleType>
              <end:EndDeviceEventType>
                <end:type>3</end:type>
                <end:domain>31</end:domain>
                <end:subdomain>17</end:subdomain>
                <end:eventOrAction>68</end:eventOrAction>
              </end:EndDeviceEventType>
            </even1:EndDeviceEvent>
          </even1:EndDeviceEvents>
          <even1:ConfigurationEvents />
        </even:EventSubscription>
      </even:Payload>
    </even:DeleteEventSubscriptionRequest>
  </soapenv:Body>
</soapenv:Envelope>
```

Response

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:even="http://aidon.com/IEC/Event/v2/EventSubscriptionMessage"
xmlns:mes="http://iec.ch/TC57/2011/schema/message">
  <soapenv:Header />
  <soapenv:Body>
    <even:DeleteEventSubscriptionResponse>
      <even:Header>
        <mes:Verb>reply</mes:Verb>
        <mes:Noun>EventSubscription</mes:Noun>
        <mes:Timestamp>2016-04-10T10:00:02Z</mes:Timestamp>
        <mes:Source>Aidon Linkware</mes:Source>
        <mes:MessageID>665931F9-3DF3-4D2C-A743-AF139041E3A1</mes:MessageID>
        <mes:CorrelationID>664496DD-E2F8-4775-A332-
D3DE25B96100</mes:CorrelationID>
      </even:Header>
      <even:Reply>
        <mes:Result>OK</mes:Result>
      </even:Reply>
    </even:DeleteEventSubscriptionResponse>
  </soapenv:Body>
</soapenv:Envelope>
```

2.3.4 GetEventSubscription

GetEventSubscription is used to retrieve existing event subscriptions from Linkware.

2.3.4.1 Request

Element	Data type	Cardinality	Description and usage

Header		1	The header that contains information about the message. See Interface Specification – Linkware IEC 61968 Common for generic Header elements.
Header/Verb	xs:string	1	Possible values: "get": retrieve event subscriptions
Header/Noun	xs:string	1	Static "EventSubscription"
Request			
Request/ID	xs:string	0..1	Event subscription endpoint. If subscription endpoint is not specified, all subscriptions are returned.

2.3.4.2 Response

Element	Data type	Cardinality	Description and usage
Header		1	The header that contains information about the message. See Interface Specification – Linkware IEC 61968 Common for generic Header elements.
Header/Verb	xs:string	1	Static "reply"
Header/Noun	xs:string	1	Static "EventSubscription"
Reply		1	
Reply/Result		1	OK, FAILED
Reply/Error		0..1	If Result=Failed, return Error
./code	xs:string	1	Error code, see table below
./level	xs:string	1	
./reason	xs:string	0..1	Description of the error
Payload		1	
Payload/EventSubscriptions		1	
./EventSubscription	m:EventSubscription	0..n	List of event subscriptions

2.3.4.3 Result codes

Code	Description	Error level
0.0	Ok	
1.0	Request message is invalid or incomplete. This code is used when the request is invalid i.e. some required element is missing or invalid. For example when ChangeEndDevices message header's verb is not change or header's correlation id is missing.	FATAL
1.1	The message contains incorrect time specification. Only UTC times are supported.	FATAL

5.0	Operation failed. This code is used when the request cannot be completed because an exception has occurred.	FATAL

This table describes result codes that are possibly returned from the described service. Result codes are listed and maintained in the document Interface Specification – Linkware IEC 61968 Common.

2.3.4.4 Examples

Request

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:even="http://aidon.com/IEC/Event/v2/EventSubscriptionMessage"
xmlns:mes="http://iec.ch/TC57/2011/schema/message">
  <soapenv:Header />
  <soapenv:Body>
    <even:GetEventSubscriptionRequest>
      <even:Header>
        <mes:Verb>get</mes:Verb>
        <mes:Noun>EventSubscription</mes:Noun>
        <mes:Timestamp>2016-04-10T10:00:00Z</mes:Timestamp>
        <mes:Source>Client System</mes:Source>
        <mes:MessageID>665931F9-3DF3-4D2C-A743-AF139041E3A0</mes:MessageID>
        <mes:CorrelationID>664496DD-E2F8-4775-A332-
D3DE25B96100</mes:CorrelationID>
      </even:Header>
      <even:Request>
        <mes:ID>https://ws.example.tld/IECEventReceive</mes:ID>
      </even:Request>
    </even:GetEventSubscriptionRequest>
  </soapenv:Body>
</soapenv:Envelope>
```

Response

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:even="http://aidon.com/IEC/Event/v2/EventSubscriptionMessage"
xmlns:mes="http://iec.ch/TC57/2011/schema/message"
xmlns:even1="http://iec.ch/TC57/2007/EventSubscription#"
xmlns:end="http://iec.ch/TC57/2007/EndDeviceEvent#"
xmlns:con="http://iec.ch/TC57/2007/ConfigurationEvent#">
  <soapenv:Header />
  <soapenv:Body>
    <even:GetEventSubscriptionResponse>
      <even:Header>
        <mes:Verb>reply</mes:Verb>
        <mes:Noun>EventSubscription</mes:Noun>
        <mes:Timestamp>2016-04-10T10:00:02Z</mes:Timestamp>
        <mes:Source>Aidon Linkware</mes:Source>
        <mes:MessageID>665931F9-3DF3-4D2C-A743-AF139041E3A1</mes:MessageID>
        <mes:CorrelationID>664496DD-E2F8-4775-A332-
D3DE25B96100</mes:CorrelationID>
      </even:Header>
      <even:Reply>
        <mes:Result>OK</mes:Result>
      </even:Reply>
      <even:Payload>
        <even1:EventSubscriptions>
          <even1:EventSubscription>
```

```
<even1:endpointAddress>https://ws.example.tld/IECEventReceive</even1:endpointAdd
ress>
            <even1:name>ExampleEndPoint</even1:name>
            <even1:useGuaranteedDelivery>true</even1:useGuaranteedDelivery>
            <even1:EndDeviceEvents>
              <even1:EndDeviceEvent>
                <end:ruleType>allow</end:ruleType>
                <end:EndDeviceEventType>
                  <end:type>*</end:type>
                  <end:domain>*</end:domain>
                  <end:subdomain>*</end:subdomain>
                  <end:eventOrAction>*</end:eventOrAction>
                </end:EndDeviceEventType>
              </even1:EndDeviceEvent>
            </even1:EndDeviceEvents>
            <even1:ConfigurationEvents>
              <even1:ConfigurationEvent>
                <con:ruleType>allow</con:ruleType>
                <con:Noun>*</con:Noun>
                <con:Verb>*</con:Verb>
              </even1:ConfigurationEvent>
            </even1:ConfigurationEvents>
          </even1:EventSubscription>
        </even1:EventSubscriptions>
      </even:Payload>
    </even:GetEventSubscriptionResponse>
  </soapenv:Body>
</soapenv:Envelope>
```

2.4 Configuration changes

To receive events from configuration changes the receiver system must implement the interface specified in this chapter. This interface provides a way to notify the receiving system about the internal and/or external changes made to Aidon Gateware data and/or configuration.

Receiver should implement the notification handler which responds with correct result codes to Linkware. Notification handler should return a quick response that the notification was received. Any subsequent actions are the receiving system's responsibility and they shouldn't be blocking acknowledging the notification.

2.4.1 CreatedConfigurationEvent

Operation is used to receive notification events from Gateware to indicate that some core asset data was changed by internal and/or external operation.

2.4.1.1 Request

Element	Data type	Cardinality	Description and usage
Header		1	The header that contains information about the message.
Header/Verb	xs:string	1	Possible values: - created - changed - deleted

Header/Noun	xs:string	1	Possible values: - EndDevice - UsagePoint - UsagePointGroup - Contract - Configuration - Product
Payload		1	
Payload/ConfigurationEvents		1	
Payload/ConfigurationEvents/ ConfigurationEvent[]		1	List of configuration events
./effectiveDateTime	xs:dateTime	1	Date and time when this event has become effective
./modifiedBy	xs:string	1	Gateware username or external system user name
./changedEntity	a:identifiedObject	1	
./changedEntity/mRID	xs:string	1	Identifier of the entity that was affected by this event
./sequenceNumber	xs:int	0..1	Sequence number to indicate sequence of configuration events if provided by meter

2.4.1.2 Expected response

Element	Data type	Cardinality	Description and usage
Header		1	The header that contains information about the message.
Header/Verb	xs:string	1	Static “reply”
Header/Noun	xs:string	1	Static “ConfigurationEvent”
Reply		1	
Reply/Result		1	OK, FAILED
Reply/Error		0..n	
./code	xs:string	1	Error code, see table below
./level	xs:string	1	
./reason	xs:string	0..1	Description of the error

2.4.1.3 Error codes

Code	Description
0.0	Ok
1.0	Request message is invalid or incomplete. This code is used when the request is invalid i.e. some required element is missing or invalid. For example when ChangeEndDevices message header’s verb is not “change” or header’s correlation id is missing.

2.0	Invalid request. For example when the specified request would result in an configuration that is not allowed. For example setting a parent device that has a type that does not allow child devices.
5.0	Operation failed. This code is used when the request cannot be completed because an exception has occurred.

This table describes result codes that are possibly returned from the described service. Result codes are listed and maintained in the References document.

2.4.1.4 Examples

Request

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:con="http://aidon.com/IEC/Event/v2/ConfigurationEventMessage"
xmlns:mes="http://iec.ch/TC57/2011/schema/message"
xmlns:con1="http://iec.ch/TC57/2007/ConfigurationEvent#"
xmlns:com="http://aidon.com/IEC/Event/v2/Common"
xmlns:con2="http://aidon.com/IEC/Event/v2/ConfigurationEvent">
   <soapenv:Header />
   <soapenv:Body>
      <con:CreatedConfigurationEventRequest>
         <con:Header>
            <mes:Verb>created</mes:Verb>
            <mes:Noun>UsagePoint</mes:Noun>
            <mes:Timestamp>2014-01-01T12:15:00Z</mes:Timestamp>
            <mes:Source>Aidon Linkware</mes:Source>
            <mes:MessageID>805931F9-3DF3-4D2C-A743-AF139041E3A0</mes:MessageID>
            <mes:CorrelationID>804496DD-E2F8-4775-A332-
D3DE25B96100</mes:CorrelationID>
         </con:Header>
         <con:Payload>
            <con1:ConfigurationEvents>
               <con1:ConfigurationEvent>
                  <con1:effectiveDateTime>2014-01-
01T12:14:58Z</con1:effectiveDateTime>
                  <con1:modifiedBy>testuser</con1:modifiedBy>
                  <con1:changedEntity>
                     <com:mRID>123456789</com:mRID>
                  </con1:changedEntity>
                  <con1:SequenceNumber>123</con1:SequenceNumber>
               </con1:ConfigurationEvent>
            </con1:ConfigurationEvents>
         </con:Payload>
      </con:CreatedConfigurationEventRequest>
   </soapenv:Body>
</soapenv:Envelope>
```

Response

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:con="http://aidon.com/IEC/Event/v2/ConfigurationEventMessage"
xmlns:mes="http://iec.ch/TC57/2011/schema/message">
   <soapenv:Header />
   <soapenv:Body>
      <con:CreatedConfigurationEventResponse>
         <con:Header>
            <mes:Verb>reply</mes:Verb>
```

```
            <mes:Noun>UsagePoint</mes:Noun>
            <mes:Timestamp>2014-01-01T12:15:01Z</mes:Timestamp>
            <mes:Source>Client System</mes:Source>
            <mes:MessageID>805931F9-3DF3-4D2C-A743-AF139041E3C0</mes:MessageID>
            <mes:CorrelationID>804496DD-E2F8-4775-A332-
D3DE25B96100</mes:CorrelationID>
         </con:Header>
         <con:Reply>
            <mes:Result>OK</mes:Result>
            <mes:Error>
               <mes:code>0.0</mes:code>
            </mes:Error>
         </con:Reply>
      </con:CreatedConfigurationEventResponse>
   </soapenv:Body>
</soapenv:Envelope>
```

2.5 Spontaneous events

Spontaneous events include events that are generated by an unexpected change of the state in the system.

2.5.1 CreatedEndDeviceEvent

2.5.1.1 Request

Element	Data type	Cardinality	Description and usage
Header		1	The header that contains information about the message.
Header/Verb	xs:string	1	Possible values: - created
Header/Noun	xs:string	1	Static "EndDeviceEvent"
Payload		1	
Payload/EndDeviceEvents		1	
Payload/EndDeviceEvents/EndDeviceEvent		1..n	List of end device events
./createdDateTime	xs:dateTime	1	
./EndDeviceEventDetails		0..1	Additional event information. See chapter 3.4.
./EndDeviceEventDetails/EndDeviceEventDetail		0..n	
./name			
./value			
./EndDeviceEventType			IEC specific event definition. See chapter 3.1.
./EndDeviceEventType/type		1	Type of the EndDevice where event was created

./EndDeviceEventType/domain		1	High-level nature of the event
./EndDeviceEventType/subdomain		1	More specific nature of the event
./EndDeviceEventType/eventOrAction		1	Specific event that occured
./MeterReading		0..1	Meter readings if the event contained reading information
./MeterReading/Readings			
./MeterReading/Readings/value		1	
./MeterReading/Readings/ReadingType/@ref		1	Meter reading type. Possible values are described in Interface Specification - Linkware IEC 61968 Common v2 (draft).docx.
./UsagePoint		0..1	Metering point if the device was linked to a metering point
./UsagePoint/mRID		1	Metering point identifier (mRID)
./EndDevice		1	Device on which the event occurred
./EndDevice/mRID		1	Device identifier

2.5.1.2 Expected response

Element	Data type	Cardinality	Description and usage
Header		1	The header that contains information about the message.
Header/Verb	xs:string	1	Static “reply”
Header/Noun	xs:string	1	Static “EndDeviceEvents”
Reply		1	
Reply/Result		1	OK, FAILED
Reply/Error		0..n	
./code	xs:string	1	Error code, see table below
./level	xs:string	1	
./reason	xs:string	0..1	Description of the error

2.5.1.3 Error codes

Code	Description
0.0	Ok

1.0	Request message is invalid or incomplete. This code is used when the request is invalid i.e. some required element is missing or invalid. For example when ChangeEndDevices message header's verb is not change or header's correlation id is missing.
2.0	Invalid request. For example when the specified request would result in an configuration that is not allowed. For example setting a parent device that has a type that does not allow child devices.
5.0	Operation failed. This code is used when the request cannot be completed because an exception has occurred.

This table describes result codes that are possibly returned from the described service. Result codes are listed and maintained in the References document.

2.5.1.4 Examples

Request

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:end="http://aidon.com/IEC/Event/v2/EndDeviceEventMessage"
xmlns:mes="http://iec.ch/TC57/2011/schema/message"
xmlns:end1="http://iec.ch/TC57/2007/EndDeviceEvent#"
xmlns:com="http://aidon.com/IEC/Event/v2/Common"
xmlns:con="http://aidon.com/IEC/Event/v2/ConfigurationEventMessage">
   <soapenv:Header />
   <soapenv:Body>
      <end:CreatedEndDeviceEventRequest>
         <end:Header>
            <mes:Verb>created</mes:Verb>
            <mes:Noun>EndDeviceEvent</mes:Noun>
            <mes:Timestamp>2014-01-01T12:15:00Z</mes:Timestamp>
            <mes:Source>Aidon Linkware</mes:Source>
            <mes:MessageID>805931F9-3DF3-4D2C-A743-AF139041E3A0</mes:MessageID>
            <mes:CorrelationID>804496DD-E2F8-4775-A332-
D3DE25B96100</mes:CorrelationID>
         </end:Header>
         <end:Payload>
            <end:EndDeviceEvents>
               <end1:EndDeviceEvent>
                  <end1:createdDateTime>2014-01-
01T12:14:00Z</end1:createdDateTime>
                  <end1:EndDeviceEventDetails>
                     <end1:EndDeviceEventDetail>
                        <end1:name>DetectionActive</end1:name>
                        <end1:value>true</end1:value>
                     </end1:EndDeviceEventDetail>
                     <end1:EndDeviceEventDetail>
                        <end1:name>Spontaneous</end1:name>
                        <end1:value>true</end1:value>
                     </end1:EndDeviceEventDetail>
                     <end1:EndDeviceEventDetail>
                        <end1:name>CircuitBreakerReleased</end1:name>
                        <end1:value>false</end1:value>
                     </end1:EndDeviceEventDetail>
                  </end1:EndDeviceEventDetails>
                  <end1:EndDeviceEventType>
                     <end1:type>3</end1:type>
                     <end1:domain>26</end1:domain>
```

```
                  <end1:subDomain>126</end1:subDomain>
                  <end1:eventOrAction>85</end1:eventOrAction>
               </end1:EndDeviceEventType>
               <end1:MeterReading>
                  <end1:Readings>
                     <end1:Reading>
                        <end1:value>231.34</end1:value>
                        <end1:ReadingType ref="0.0.6.0.0.4.0.0.64.0.5" />
                     </end1:Reading>
                     <end1:Reading>
                        <end1:value>231.56</end1:value>
                        <end1:ReadingType ref="0.0.6.0.0.4.0.0.128.0.5" />
                     </end1:Reading>
                     <end1:Reading>
                        <end1:value>231.65</end1:value>
                        <end1:ReadingType ref="0.0.6.0.0.4.0.0.32.0.5" />
                     </end1:Reading>
                  </end1:Readings>
               </end1:MeterReading>
               <end1:UsagePoint>
                  <com:mRID>123456789</com:mRID>
               </end1:UsagePoint>
               <end1:EndDevice>
                  <com:mRID>987654321</com:mRID>
               </end1:EndDevice>
            </end1:EndDeviceEvent>
         </end:EndDeviceEvents>
      </end:Payload>
   </end:CreatedEndDeviceEventRequest>
</soapenv:Body>
</soapenv:Envelope>
```

Response

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:con="http://aidon.com/IEC/Event/v2/EndDeviceEventMessage"
xmlns:mes="http://iec.ch/TC57/2011/schema/message">
   <soapenv:Header />
   <soapenv:Body>
      <con:CreatedEndDeviceEventResponse>
         <con:Header>
            <mes:Verb>reply</mes:Verb>
            <mes:Noun>EndDeviceEvent</mes:Noun>
            <mes:Timestamp>2014-01-01T12:15:01Z</mes:Timestamp>
            <mes:Source>Client System</mes:Source>
            <mes:MessageID>805931F9-3DF3-4D2C-A743-AF139041E3C0</mes:MessageID>
            <mes:CorrelationID>804496DD-E2F8-4775-A332-
D3DE25B96100</mes:CorrelationID>
         </con:Header>
         <con:Reply>
            <mes:Result>OK</mes:Result>
            <mes:Error>
               <mes:code>0.0</mes:code>
            </mes:Error>
         </con:Reply>
      </con:CreatedEndDeviceEventResponse>
   </soapenv:Body>
</soapenv:Envelope>
```

3 EndDeviceEvent types and details

3.1 Event categories and types

IEC 61968-9 ed. 2.0 defines an 'EndDeviceEvent' category, which is split into multiple identifiers. These are used in the messaging. For example, a category '3.26.126.85' is split into the following parts:

Type	Domain	Subdomain	EventOrAction
3 (ElectricMeter)	26 (Power)	126 (PhaseA)	85 (Failed)

This event corresponds to Aidon power grid monitoring event "Blown fuse".

The following tables list all mappings of Aidon power grid monitoring events to the IEC 61968-9 categories. The mapping is follows the normative "EndDeviceEventTypes" listed in IEC 61968-9 appendix E.9 as closely as possible.

3.2 Generic events

3.2.1 Cover Tampering

Cover tampering is detected when the cover protecting the device is opened or closed.

Event status	Category	Description
Detected	3.12.29.257	ElectricMeter.Security.Cover.TamperingDetected
Not Detected	3.12.29.291	ElectricMeter.Security.Cover.TamperingCleared

This event is only transmitted as a spontaneous event and does not include readings. Additional information for the detection is included in the event specific details.

Note: There is no Not Detected event available when the Detected event is during a power outage.

3.2.2 Magnetic Tampering

Magnetic tampering is detected when a powerful magnet is brought close to the device.

Event status	Category	Description
Detected	3.12.66.257	ElectricMeter.Security.MagneticSwitch.TamperingDetected

This event is only transmitted as a spontaneous event and does not include readings. Note that this device does not have a clearing event status, it is only a one-time notice of the detection.

3.2.3 Software Version Update Started

A new software version is requested to be updated to the device.

Event status	Category	Description
Detected	3.11.124.34	ElectricMeter.Firmware.Version.InProgress

This event is only transmitted as a spontaneous event and does not include readings. The event does not have a clearing event status and successful or failed update is indicated as a separate event.

When software version update is sent to multiple devices at the same time, the events may be batched to a single event message.

This event includes additional event detail for software version, module ID and update job ID. See paragraph 3.5 for more information.

3.2.4 Software Version Updated

A new software version is uploaded and activated in the device.

Event status	Category	Description
Detected	3.11.124.36	ElectricMeter.Firmware.Version.Loaded

This event is only transmitted as a spontaneous event and does not include readings. The event does not have a clearing event status and downgrading a software will cause a new software version updated event.

This event includes additional event detail for software version, module ID and update job ID. See paragraph 3.5 for more information.

3.2.5 Software Version Update Failed

Updating new software version to the device have failed and it will not be retried automatically.

Event status	Category	Description
Detected	3.11.124.85	ElectricMeter.Firmware.Version.Failed

This event is only transmitted as a spontaneous event and does not include readings. The event does not have a clearing event status.

This event includes additional event detail for software version, failure reason, module ID and update job ID. See paragraph 3.5 for more information.

3.2.6 Device Registration

A new device is powered up and it has registered itself to the system.

Event status	Category	Description
Detected	0.6.90.17	0.Installation.Registration.Confirmed

This event is only transmitted as a spontaneous event and does not include readings. The event does not have a clearing event status.

3.2.7 I/O Adapter Lost

A device detects an installed and paired I/O adapter to be disconnected from the device.

Event status	Category	Description
Detected	0.6.60.68	0.Installation.IO.Disconnected
Not Detected	0.6.60.42	0.Installation.IO.Connected

This event is only transmitted as a spontaneous event and does not include readings.

3.2.8 Auxiliary Meter Lost

A device detects an installed and paired auxiliary meter to be disconnected from the device.

Event status	Category	Description
Detected	0.6.74.68	0.Installation.Association.Disconnected
Not Detected	0.6.74.42	0.Installation.Association.Connected

This event is only transmitted as a spontaneous event and does not include readings.

This event includes additional event detail for auxiliary meter ID. See paragraph 3.5 for more information.

3.3 Power grid monitoring events

3.3.1 Circuit Breaker State

Circuit Breaker State indicates any changes in the circuit breaker state. An additional detail "RCDSwitchReason" is sent with this event to describe which action changed the circuit breaker state (see paragraph 3.5).

Event status	Category	Description
Circuit breaker connected	3.31.17.42	ElectricMeter.RCDSwitch.0.Connected
Circuit breaker disconnected	3.31.17.68	ElectricMeter.RCDSwitch.0.Disconnected

This event mapping is based on table E.27 "RCDSwitch events" in IEC 61968-9.

Can be based on function CBS parameter E00 in chapter 3.1 of the Feature PGM Alarms document. In this case momentary voltage and momentary current readings are included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.2 Blown Fuse

Blown Fuse indicates that voltage in one or more phases has been below a specified limit longer than a specified detection time.

Event status	Category	Description
Detection in Phase L1	3.26.126.85	ElectricMeter.Power.PhaseA.Failed
Detection in Phase L2	3.26.134.85	ElectricMeter.Power.PhaseB.Failed
Detection in Phase L3	3.26.135.85	ElectricMeter.Power.PhaseC.Failed
No detection in Phase L1	3.26.126.216	ElectricMeter.Power.PhaseA.Restored
No detection in Phase L2	3.26.134.216	ElectricMeter.Power.PhaseB.Restored
No detection in Phase L3	3.26.135.216	ElectricMeter.Power.PhaseC.Restored

This event mapping is based on table E.25 "Power events" in IEC 61968-9.

Based on function BFU parameter E01 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average voltage readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.3 Neutral Wire Broken

Neutral Wire Broken indicates that voltage has been over a specified limit in at least one phase under a specified limit in at least one phase longer than a specified detection time. Detected even if one phase is missing.

Event status	Category	Description
Detected	3.26.79.98	ElectricMeter.Power.PhaseVoltage.Imbalanced
Not detected	3.26.79.75	ElectricMeter.Power.PhaseVoltage.ImbalanceCleared

This event mapping is based on table E.25 "Power events" in IEC 61968-9.

This event shares the same category with Medium Voltage Wire Broken (3.3.5), they are distinguished by the WireType event detail. See paragraph 3.5 for more information.

Based on function NWB parameter E02 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average voltage readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.4 Changed Phase Order

Changed Phase Order indicates that the phase order has changed from a specified reference phase order. Only available for three phase meters.

Event status	Category	Description
Detected	3.26.78.24	ElectricMeter.Power.PhaseSequence.Changed
Not detected	3.26.78.216	ElectricMeter.Power.PhaseSequence.Restored

This event mapping is based on table E.25 "Power events" in IEC 61968-9.

Additional detail "PhaseOrder" is sent with this event to describe which order is active (see paragraph 3.5).

Based on function CPO parameter E03 in chapter 3.1 of the Feature PGM Alarms document.

3.3.5 Medium Voltage Wire Broken

Medium Voltage Wire Broken indicates that two phases have been inside a specified voltage range while one phase has been in normal voltage range longer than a specified detection time.

Event status	Category	Description
Detected	3.26.79.98	ElectricMeter.Power.PhaseVoltage.Imbalanced
Not detected	3.26.79.75	ElectricMeter.Power.PhaseVoltage.ImbalanceCleared

This event mapping is based on table E.25 "Power events" in IEC 61968-9.

This event shares the same category with Neutral Wire Broken (3.3.3), they are distinguished by the WireType event detail. See paragraph 3.5 for more information.

Based on function MWB parameter E04 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average voltage readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.6 Under Voltage, norm based

Under Voltage, norm based indicates that the 10 minute average voltage voltage in one or more phases is under a specified limit.

Event status	Category	Description
Detection in Phase L1	3.26.131.150	ElectricMeter.Power.PhaseAVoltage.MinLimitReached
Detection in Phase L2	3.26.132.150	ElectricMeter.Power.PhaseBVoltage.MinLimitReached
Detection in Phase L3	3.26.133.150	ElectricMeter.Power.PhaseCVoltage.MinLimitReached
No detection in Phase L1	3.26.131.292	ElectricMeter.Power.PhaseAVoltage.MinLimitCleared
No detection in Phase L2	3.26.132.292	ElectricMeter.Power.PhaseBVoltage.MinLimitCleared
No detection in Phase L3	3.26.133.292	ElectricMeter.Power.PhaseCVoltage.MinLimitCleared

This event mapping is based on table E.25 "Power events" in IEC 61968-9.

This event shares the same category with Under Voltage, FoL (3.3.8) and they are distinguished by the AverageVoltageDetection event detail. See paragraph 3.5 for more information.

Based on function UVN parameter E05 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average voltage readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.7 Over Voltage, norm based

Over Voltage, norm based event indicates that the 10 minute average voltage voltage in one or more phases is over a specified limit.

Event status	Category	Description
Detection in Phase L1	3.26.131.93	ElectricMeter.Power.PhaseAVoltage.MaxLimitReached
Detection in Phase L2	3.26.132.93	ElectricMeter.Power.PhaseBVoltage.MaxLimitReached
Detection in Phase L3	3.26.133.93	ElectricMeter.Power.PhaseCVoltage.MaxLimitReached
No detection in Phase L1	3.26.131.293	ElectricMeter.Power.PhaseAVoltage.MaxLimitCleared
No detection in Phase L2	3.26.132.293	ElectricMeter.Power.PhaseBVoltage.MaxLimitCleared
No detection in Phase L3	3.26.133.293	ElectricMeter.Power.PhaseCVoltage.MaxLimitCleared

This event mapping is based on table E.25 "Power events" in IEC 61968-9.

This event shares the same category with Over Voltage, FoL (3.3.9) and they are distinguished by the AverageVoltageDetection event detail. See paragraph 3.5 for more information.

Based on function OVN parameter E06 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average voltage readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.8 Under Voltage, FoL

Under Voltage, FoL indicates that the one minute average voltage voltage in one or more phases is under a specified limit.

Event status	Category	Description

Detection in Phase L1	3.26.131.150	ElectricMeter.Power.PhaseAVoltage.MinLimitReached
Detection in Phase L2	3.26.132.150	ElectricMeter.Power.PhaseBVoltage.MinLimitReached
Detection in Phase L3	3.26.133.150	ElectricMeter.Power.PhaseCVoltage.MinLimitReached
No detection in Phase L1	3.26.131.292	ElectricMeter.Power.PhaseAVoltage.MinLimitCleared
No detection in Phase L2	3.26.132.292	ElectricMeter.Power.PhaseBVoltage.MinLimitCleared
No detection in Phase L3	3.26.133.292	ElectricMeter.Power.PhaseCVoltage.MinLimitCleared

This event mapping is based on table E.25 "Power events" in IEC 61968-9.

This event shares the same category with Under Voltage, norm based (3.3.6) and they are distinguished by the AverageVoltageDetection event detail. See paragraph 3.5 for more information.

Based on function UVF parameter E21 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average voltage readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.9 Over Voltage, FoL

Over Voltage, FoL event indicates that the one minute average voltage voltage in one or more phases is over a specified limit.

Event status	Category	Description
Detection in Phase L1	3.26.131.93	ElectricMeter.Power.PhaseAVoltage.MaxLimitReached
Detection in Phase L2	3.26.132.93	ElectricMeter.Power.PhaseBVoltage.MaxLimitReached
Detection in Phase L3	3.26.133.93	ElectricMeter.Power.PhaseCVoltage.MaxLimitReached
No detection in Phase L1	3.26.131.293	ElectricMeter.Power.PhaseAVoltage.MaxLimitCleared
No detection in Phase L2	3.26.132.293	ElectricMeter.Power.PhaseBVoltage.MaxLimitCleared
No detection in Phase L3	3.26.133.293	ElectricMeter.Power.PhaseCVoltage.MaxLimitCleared

This event mapping is based on table E.25 "Power events" in IEC 61968-9.

This event shares the same category with Over Voltage, norm based (3.3.73.3.6) and they are distinguished by the AverageVoltageDetection event detail. See paragraph 3.5 for more information.

Based on function OVF parameter E22 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average voltage readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.10 Under Voltage, release switch

Under Voltage, release switch indicates that 30 second average voltage voltage in one or more phases is under a specified limit.

Event status	Category	Description
Detection in all phases	3.31.79.150	ElectricMeter.RCDSwitch.PhaseVoltage.MinLimitReached
No detection in any phase	3.31.79.292	ElectricMeter. RCDSwitch.PhaseVoltage.MinLimitCleared

Based on function UVR parameter E07 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average voltage readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.11 Over Voltage, release switch

Under Voltage, release switch indicates that 30 second average voltage in one or more phases is over a specified limit.

Event status	Category	Description
Detection in Phase L1	3.31.131.93	ElectricMeter. RCDSwitch .PhaseAVoltage.MaxLimitReached
Detection in Phase L2	3.31.132.93	ElectricMeter. RCDSwitch.PhaseBVoltage.MaxLimitReached
Detection in Phase L3	3.31.133.93	ElectricMeter. RCDSwitch.PhaseCVoltage.MaxLimitReached
No detection in Phase L1	3.31.131.293	ElectricMeter. RCDSwitch.PhaseAVoltage.MaxLimitCleared
No detection in Phase L2	3.31.132.293	ElectricMeter. RCDSwitch.PhaseBVoltage.MaxLimitCleared
No detection in Phase L3	3.31.133.293	ElectricMeter. RCDSwitch.PhaseCVoltage.MaxLimitCleared

Based on function OVR parameter E08 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average voltage readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.12 Slow Fuse

Slow fuse indicates that the 30 second average current in one or more phases is over a specified limit for a specified configured detection time. The purpose of slow fuse is to set a current limit for a metering point.

Event status	Category	Description
Detection in Phase L1	3.26.287.93	ElectricMeter.Power.PhaseACurrent.MaxLimitReached
Detection in Phase L2	3.26.288.93	ElectricMeter.Power.PhaseBCurrent.MaxLimitReached
Detection in Phase L3	3.26.289.93	ElectricMeter.Power.PhaseCCurrent.MaxLimitReached
No detection in Phase L1	3.26.287.293	ElectricMeter.Power.PhaseACurrent.MaxLimitCleared
No detection in Phase L2	3.26.288.293	ElectricMeter.Power.PhaseBCurrent.MaxLimitCleared
No detection in Phase L3	3.26.289.293	ElectricMeter.Power.PhaseCCurrent.MaxLimitCleared

This event shares the same category with Fast Fuse (3.3.13), they are distinguished by the FuseType event detail. See paragraph 3.5 for more information.

Based on function SFU parameter E10 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average current readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.13 Fast Fuse

Fast fuse indicates that the 30 second average current in one or more phases is over a specified limit for a specified configured detection time. The purpose of a fast fuse is to act as a protection when demand spikes suddenly.

Event status	Category	Description
Detection in Phase L1	3.26.287.93	ElectricMeter.Power.PhaseACurrent.MaxLimitReached

Detection in Phase L2	3.26.288.93	ElectricMeter.Power.PhaseBCurrent.MaxLimitReached
Detection in Phase L3	3.26.289.93	ElectricMeter.Power.PhaseCCurrent.MaxLimitReached
No detection in Phase L1	3.26.287.293	ElectricMeter.Power.PhaseACurrent.MaxLimitCleared
No detection in Phase L2	3.26.288.293	ElectricMeter.Power.PhaseBCurrent.MaxLimitCleared
No detection in Phase L3	3.26.289.293	ElectricMeter.Power.PhaseCCurrent.MaxLimitCleared

This event shares the same category with Slow Fuse (3.3.12), they are distinguished by the FuseType event detail. See paragraph 3.5 for more information.

Based on function FFU parameter E11 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average current readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.14 Producing and Consuming Energy

Producing and Consuming Energy indicates that the meter has measured both consumption and production for longer than a specified detection time.

Event status	Category	Description
Detected	3.26.48.219	ElectricMeter.Power.Flow.Reversed
Not detected	3.26.48.37	ElectricMeter.Power.Flow.Normal

Based on function PCE parameter E12 in chapter 3.1 of the Feature PGM Alarms document.

3.3.15 Contract Fuse

Contract Fuse indicates that current in one or more phases has been over a specified limit for longer than a specified detection time.

Event status	Category	Description
Detection in Phase L1	3.7.287.93	ElectricMeter.Configuration.PhaseACurrent.MaxLimitReached
Detection in Phase L2	3.7.288.93	ElectricMeter.Configuration.PhaseBCurrent.MaxLimitReached
Detection in Phase L3	3.7.289.93	ElectricMeter.Configuration.PhaseCCurrent.MaxLimitReached
No detection in Phase L1	3.7.287.293	ElectricMeter.Configuration.PhaseACurrent.MaxLimitCleared
No detection in Phase L2	3.7.288.293	ElectricMeter.Configuration.PhaseBCurrent.MaxLimitCleared
No detection in Phase L3	3.7.289.293	ElectricMeter.Configuration.PhaseCCurrent.MaxLimitCleared

Based on function CFU parameter E13 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average current readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.16 Demand Fuse

Contract Fuse indicates that average of total demand has been over a specified limit for longer than a specified detection time.

Event status	Category	Description
Detected	3.8.0.93	ElectricMeter.Demand.0.MaxLimitReached

Not Detected	3.8.0.293	ElectricMeter.Demand.0.MaxLimitCleared

Based on function DFU parameter E20 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average current readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.17 Device Error

Device Error indicates that a severe device error has occurred and the device might not function correctly.

Event status	Category	Description
Detected	3.11.0.79	ElectricMeter.Firmware.0.Error
Not Detected	3.11.0.216	ElectricMeter.Firmware.0.Restored

This event mapping is based on table E.12 "Firmware events" in IEC 61968-9.

Based on function DER parameter E14 in chapter 3.1 of the Feature PGM Alarms document.

3.3.18 Status Input 1

Status Input 1 indicates that the state of the device attached to status input 1 has changed for longer than a specified detection time.

Event status	Category	Description
Enabled	3.39.17.39	ElectricMeter.AssociatedDevice.Status.Open
Disabled	3.39.17.16	ElectricMeter.AssociatedDevice.Status.Closed

This event shares the same category with Status Input 2 (3.3.19), they are distinguished by the StatusInput event detail. See paragraph 3.5 for more information.

Based on function ST1 parameter E15 in chapter 3.1 of the Feature PGM Alarms document.

3.3.19 Status Input 2

Status Input 2 indicates that the state of the device attached to status input 2 has changed for longer than a specified detection time.

Event status	Category	Description
Enabled	3.39.17.39	ElectricMeter.AssociatedDevice.Status.Open
Disabled	3.39.17.16	ElectricMeter.AssociatedDevice.Status.Closed

This event shares the same category with Status Input 1 (3.3.18), they are distinguished by the StatusInput event detail. See paragraph 3.5 for more information.

Based on function ST2 parameter E16 in chapter 3.1 of the Feature PGM Alarms document.

3.3.20 High Phase Current

High Phase Current indicates that current in one or more phases has been larger that the meter type specific maximum for over 1 minute.

Event status	Category	Description

Detection in Phase L1	3.31.287.93	ElectricMeter.RCDSwitch.PhaseACurrent.MaxLimitReached
Detection in Phase L2	3.31.288.93	ElectricMeter.RCDSwitch.PhaseBCurrent.MaxLimitReached
Detection in Phase L3	3.31.289.93	ElectricMeter.RCDSwitch.PhaseCCurrent.MaxLimitReached
No detection in Phase L1	3.31.287.293	ElectricMeter.RCDSwitch.PhaseACurrent.MaxLimitCleared
No detection in Phase L2	3.31.288.293	ElectricMeter.RCDSwitch.PhaseBCurrent.MaxLimitCleared
No detection in Phase L3	3.31.289.293	ElectricMeter.RCDSwitch.PhaseCCurrent.MaxLimitCleared

Based on function HPC parameter E17 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average current readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.21 High neutral wire current

High Neutral Wire current indicates that the neutral wire current has been higher than a specified limit for longer than a specified detection time.

Event status	Category	Description
Detected	3.26.137.40	ElectricMeter.Power.NeutralCurrent.OutofRange
Not Detected	3.26.137.74	ElectricMeter.Power.NeutralCurrent.OutofRangeCleared

Based on function HNC parameter E23 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage and momentary current readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.22 Earth Fault

Earth fault indicates that the sum of the phase currents has been higher than a specified limit for longer than a specified detection time. This is only valid for Aidon meter types 6515 and 6525.

Event status	Category	Description
Detected	3.26.137.93	ElectricMeter.Power.NeutralCurrent.MaxLimitReached
Not Detected	3.26.137.293	ElectricMeter.Power.NeutralCurrent.MaxLimitCleared

Based on function EAF parameter E18 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current for all available phases and momentary earth fault current readings included, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.23 Mains Switch Bypassing

Mains switch bypassing indicates that a mains switch bypassing wire has been installed to the meter. Detected when phase 1 and phase 2 voltage levels are less than 12V and absolute current in phase 3 is less than 0.03A.

Event status	Category	Description
Detected	3.26.15.68	ElectricMeter.Power.Cable.Disconnected
Not Detected	3.26.15.42	ElectricMeter.Power.Cable.Connected

Based on function MSB parameter E19 in chapter 3.1 of the Feature PGM Alarms document.

Momentary voltage, momentary current and 10 minute average voltage readings included for all available phases, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.3.24 Last Gasp

Last Gasp event is detected when the device loses it's operating power. It's sent through the communication infrastructure if communication capabilities are still available. The delivery of the message is non-guaranteed.

Event status	Category	Description
Detected	3.26.0.68	ElectricMeter.Power.0.Disconnected
Not Detected	3.26.0.42	ElectricMeter.Power.0.Connected

This event is only transmitted as a spontaneous event and does not include readings.

3.4 Substation monitoring events

3.4.1 Digital Input N (1-10)

Digital Input N indicates that the state of the device attached to digital input N has changed for longer than a specified detection time. The inputs are numbered from 1 to 10. An additional detail is sent with this event to describe input state ("InputState"). See paragraph 3.5 for details.

Event status	Category	Description
Enabled	22.39.55.286	Substation.AssociatedDevice.Input.Registered
Disabled	22.39.55.37	Substation.AssociatedDevice.Input.Normal

The specific input number is distinguished by the DigitalInput event detail. See paragraph 3.5 for more information.

3.4.2 Voltage Input

Voltage Input indicates that the voltage of the device or sensor attached to voltage input has dropped below threshold for longer than a specified detection time.

Event status	Category	Description
Enabled	22.2.22.286	Substation.Battery.Charge.LimitReached
Disabled	22.2.22.37	Substation.Battery.Charge.Normal

Momentary battery voltage reading is included with the event, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.4.3 Temperature Input N (1-2)

Temperature Input indicates that the temperature of the device or sensor attached to temperature input N has reached threshold for longer than a specified detection time. The inputs are numbered from 1 to 2.

Event status	Category	Description
Enabled	22.35.261.286	Substation.Temperature.Threshold.LimitReached
Disabled	22.35.261.37	Substation.Temperature.Threshold.Normal

The specific input number is distinguished by the TemperatureInput event detail. See paragraph 3.5 for more information.

Momentary temperature reading is included with the event, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.4.4 Earth Fault

Earth fault indicates that the earth fault related input has been activated to fulfil alarm criteria. An additional details are sent with this event to describe earth fault triggering method ("TriggeringMethod") and source of the earth fault alarm ("Source"). See paragraph 3.5 for details.

Event status	Category	Description
Detected	22.26.137.93	Substation.Power.NeutralCurrent.MaxLimitReached
Not Detected	22.26.137.293	Substation.Power.NeutralCurrent.MaxLimitCleared

Momentary earth fault voltage reading is included with the event if the source is multi-instrument device which is capable to report earth fault voltage, see the document Interface Specification – Linkware IEC 61968 Common for the reading types.

3.5 Event specific details

The following name value pairs are included in EndDeviceEvent.EndDeviceEventDetails. They provide additional information on the events they are related to.

Name	Values	Description
DetectionActive	boolean	True if the detection for this event has been configured to be active. This can never be false for spontaneous events.
Spontaneous	boolean	True if this event was sent spontaneously from the device. False if the status change was only stored to the devices power grid monitoring event log.
RCDSwitchReleased	boolean	True if the circuit breaker has been released due to this event.
RCDSwitchButtonEnabled	Boolean	True if the circuit breaker button is enabled and the end user is able to manually switch it on.
RCDSwitchReason	"button", "power grid monitoring", "system", "safety cutoff", "unknown"	This event detail is only used with the event type Circuit Breaker State (3.3.1). If the circuit breaker is released, this indicates why it has been released. • "button" means the user has used the button on the circuit breaker. • "power grid monitoring" means that an PGM event has been triggered and has changed the circuit breaker state. • "system" means that the circuit breaker has been remotely controlled from Gateware. • "safety cutoff" means that the devices safety cutoff limit has been reached and the state has changed. • "unknown" means that the circuit breaker state has been changed for an unknown reason.

WireType	”medium” or ”neutral”	This event detail is only used for the events Neutral Wire Broken (3.3.3) and Medium Voltage Wire Broken (3.3.5). The value indicates which wire the event is related to.
FuseType	”slow” or ”fast”	This event detail is only used for the events Slow Fuse (3.3.12) and Fast Fuse (3.3.13). The value indicates which fuse the event is related to.
StatusInput	“1” or “2”	This event detail is only used for the events Status Input 1 (3.3.18) and Status Input 2 (3.3.19). The value indicates which status input register the event is related to.
PhaseOrder	“ABC” or “CBA”	This event details is only used for the event Changed Phase Order (3.3.4). The value indicates the order of the phases according to the device.
PhaseCVoltageOk	boolean	This event detail is only used for the event Mains Switch Bypassing (3.3.23). The value indicates whether or not the voltage measurement on phase C is ok. This is additional information that doesn’t cause an alarm by itself.
TamperingType	“opened”, “power outage”, “installation”	This event detail is only used with the event type Cover Tampering (3.2.1). If the cover is opened this detail indicates the way it was opened. • “opened” means the cover was opened when the device was powered. • “power outage” means the cover was opened during a power outage. • “installation” means the cover was left open after installation of the device.
AverageVoltageDetection	“norm based”, “FoL”	This event detail is only used for the events Under Voltage, norm based (3.3.6), Over Voltage, norm based (3.3.7), Under Voltage, FoL (3.3.8) and Over Voltage, FoL (3.3.9). The value indicates which type of average voltage detection the event is related to.
SoftwareVersion	string	This event detail is only used for Software Version Update Started (3.2.3), Software Version Updated (3.2.4) event and Software Version Update Failed (3.2.5) event.
UpdateJobID	string	This event detail is only used for Software Version Update Started (3.2.3), Software Version Updated (3.2.4) event and Software Version Update Failed (3.2.5) event.
ModuleID	string	This event detail is only used for Software Version Update Started (3.2.3), Software Version Updated (3.2.4) event and Software Version Update Failed (3.2.5) event.
FailureReason	string (see 3.5.1)	This event detail is only used for Software Version Update Failed (3.2.5) event.
DigitalInput	integer	This event detail is only used for the event Digital Input N (3.4.1). The value indicates which digital input register the event is related to.
InputState	“on” or “off”	This event detail is only used for the event Digital Input N (3.4.1). The value indicates if the input is on or off.

TemperatureInput	integer	This event detail is only used for the event Temperature Input N (3.4.3). The value indicates which temperature input register the event is related to.
TriggeringMethod	"rule1", "rule2", "rule3"	This event detail is only used for the event Earth Fault (3.4.4) to indicate which criteria was used to trigger the event. Possible values: - "rule1": Detection is active for longer than 24h - "rule2": More than 5 detections lasting over 2h during a week - "rule3": Detection is active for more than 25% of a week
Source	string	This event detail is only used for the event Earth Fault (3.4.4) to indicate which source was used to identify earth fault. Possible values: - "Input": Device or IO adapter input - "MI": Multi-instrument device
AuxiliaryMeterID	string	This event detail is only used for the event Auxiliary Meter Lost (3.2.8) to indicate the identifier of the device the event was detected for.

3.5.1 Failure reasons in Software Version Update Failed event

Following failure reasons are possible in FailureReason field of Software Version Update Failed (3.2.5) event.

Reason	Description
Activation failed	Image was transferred, but could not be activated.
Integrity check failed	Image was transferred, but integrity check has failed.
Image transfer failed	Image transfer failed or timed out.
Image transfer canceled	Image transfer was cancelled by Meteringware.
Downgrade not allowed	Software update failed because device responded that it is not allowed to be downgraded.
Protocol error	Software update failed because of a protocol related error.
Invalid image	Software update failed because the image was invalid.
Connection broken	Software update failed because the connection was broken during initialization.
Job task timedout	Software update failed because the job task timed out in Meteringware.
Unknown job ID	Device received a software update related message with incorrect job ID.
General device error	General error in the device.

4 Appendix: Change history

Version	Author	Date	Changes
2.01D	HKl	21.11.2014	First draft version for v2 interface.
2.02D	HKl	26.1.2015	Added end device events.
2.03D	HKl	5.3.2015	Added event category descriptions
2.04D	VLa	10.3.2015	Changed the RCDSwitchReason description to better describe the different states and accommodate for new circuit breaker event sources.
2.05D	VLa	11.3.2015	Added mentions of readings included in different power grid monitoring events.
2.06D	HKl	2.4.2015	Added Error/code element to successful response example messages.
2.07D	VLa	21.4.2015	Added tampering events and related event details.
2.08D	HKl	10.7.2015	Updated event descriptions
2.09D	HKl	14.7.2015	Added events: Under Voltage, FoL; Over Voltage, FoL; Demand Fuse; High neutral wire current
2.10	HKl	29.8.2015	Published Linkware 1.7 release version
2.11D	HKl	16.9.2015	Added device identifier to CreatedEndDevice event operation
2.12D	HKl	5.11.2015	Added software version updated event
2.13D	HKl	18.11.2015	Changed updated service version to examples
2.14	HKl	18.11.2015	Published Linkware 1.8 release version
2.15D	HKl	2.2.2016	Added subscription management operations to 2.3 and added 2.1 Services to describe different web service definitions.
2.16D	HKl	22.2.2016	Removed mRID from event subscriptions and added deny/allow rules for subscribed events
2.17D	HKl	4.3.2016	Changed event subscriptions to allow dynamic configuration (adding or removing subscriptions one-by-one) and removed ChangeEventSubscription
2.18D	HKl	6.3.2016	Added draft for substation monitoring events (chapter 3.3)
2.19D	HKl	10.3.2016	Added Device Registration event, updated substation monitoring events based on review comments
2.20D	HKl	18.4.2016	Fixed CreatedEndDeviceEvent example message to include EndDevice element, added example messages to event subscription related operations, added result code 1.1 to all operations
2.21D	HKl	28.4.2016	Removed result code 2.37 from GetEventSubscription
2.22D	HKl	17.5.2016	Added name to EventSubscription, changed domain for Cover Tampering and Magnetic Tampering events to "Security" and fixed event category to include "Substation" as event type for all substation events
2.23D	HKl	26.5.2016	Added Software Version Update Started and Software Version Update Failed events
2.24D	HKl	30.5.2016	Updated software version update event details based on review comments

2.25	HKl	31.5.2016	Published Linkware 1.9 release version
2.26D	HKl	8.7.2016	Fixed incorrect category for Software Update Failed event
2.27D	TPa	31.8.2016	Added software update failure reasons and descriptions
2.28D	HKl	23.9.2016	Initial draft for I/O adapter installation events
2.29D	HKl	26.9.2016	Updated I/O adapter events
2.30D	TPa	27.9.2016	Added general device error to software update failure reasons.
2.31D	HKl	14.10.2016	Added draft for Auxiliary Meter Lost event
2.32D	HKl	17.10.2016	Changes to Auxiliary Meter Lost event based on review comments
2.33	TPa	15.11.2016	Published Linkware 1.10 release version
2.34	PVa	12.12.2017	Changed sequenceNumber field to optional.
2.35	PVa	29.3.2018	Published Linkware 1.13 release version