

61968 – 9 Meter Reading and Control

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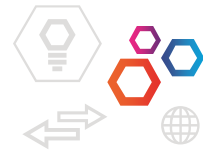
Introduction

- Scope/Purpose
- Reference Model
- Information Models
- Meter Reading and Control Messages

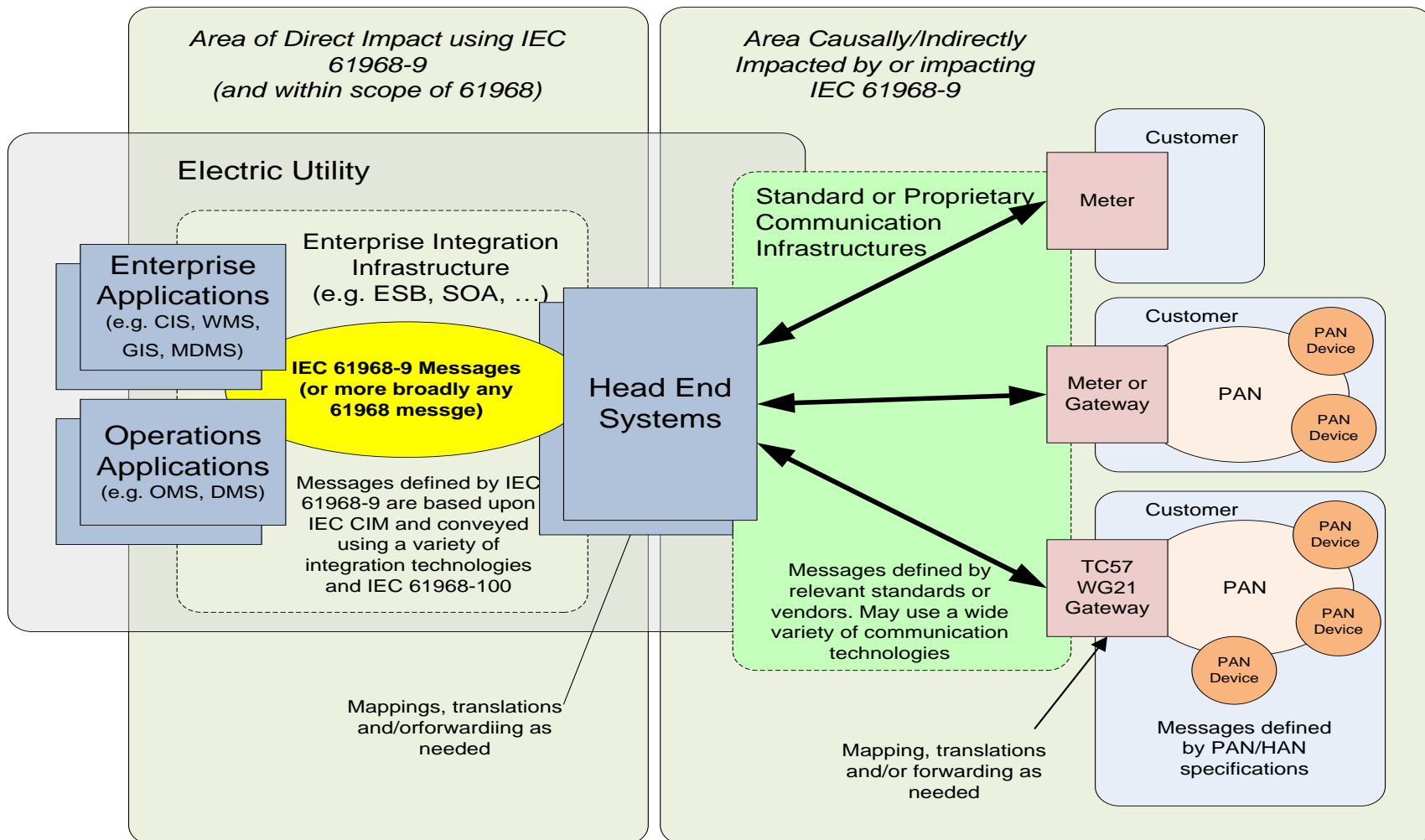


Scope/Purpose

- To Define the exchange of information between a Metering System and other systems within the Utility enterprise
- Specifies the information content of a set of message types that can be used to support many of the business functions related to Meter Reading and Control.
- Typical uses of the message types include:
 - Meter Reading and Meter Control
 - Meter Events
 - Customer Data Synchronization and Customer Switching



Scope



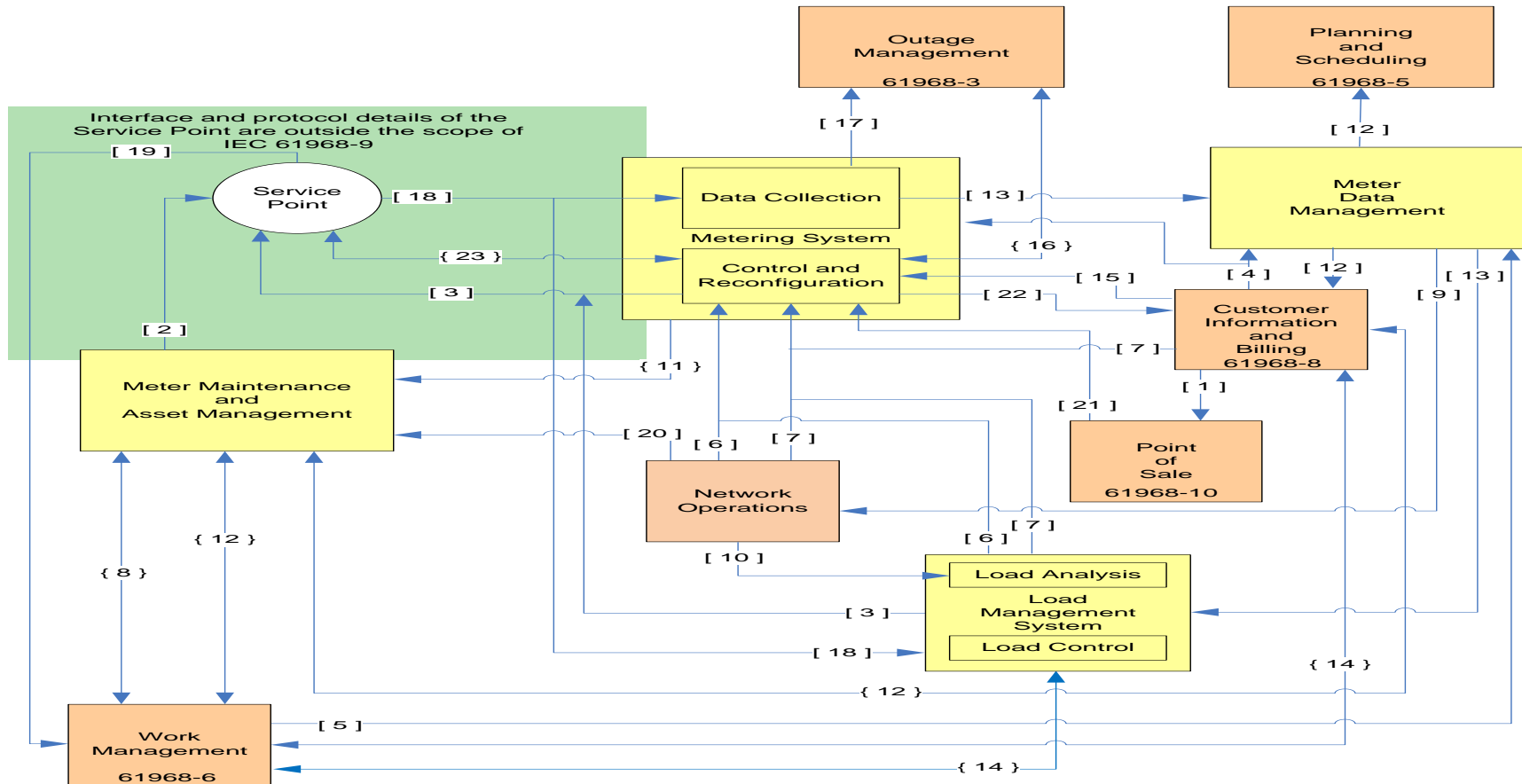


Reference Model

- The Reference Model provides examples of the logical components and data flows related to this standard.
- The Meter is treated as an “end device”
- An End Device:
 - Has a unique identity
 - Is managed as a physical asset
 - May issue events
 - May receive control requests
 - May collect and report measured values
 - May participate in utility business processes
- The Reference Model describes the flows between the components.



Reference Model - Full



- [1] Account information
- [2] Configuration, installation etc.
- [3] Controls and signals
- [4] Customer data set
- [5] Data obtained by special read
- [6] Demand response signals
- [7] Disconnect/reconnect, demand reset
- [8] Install, remove, repair, disconnect, reconnect
- [9] Load curves, Measurement history, etc.
- [10] Load scenarios
- [11] Meter health and tamper detection
- { 12 } Meter history

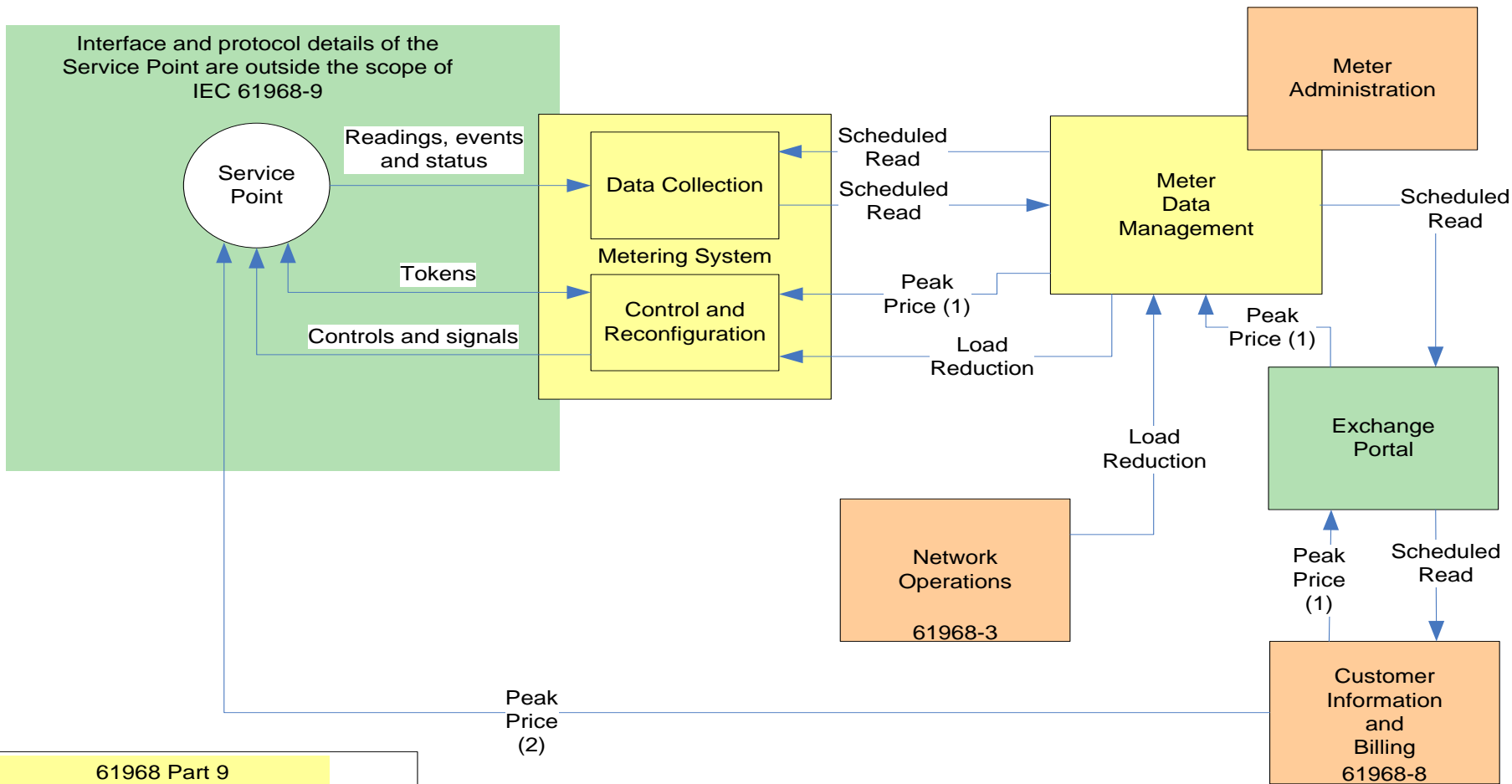
- [13] Meter readings
- { 14 } Meter service request
- [15] On request read
- [16] Outage and restoration verification
- [17] Power reliability and quality events
- [18] Readings, events and status
- [19] Special read
- [20] Tariffs, parameters
- [21] Transaction information
- [22] Transaction records
- { 23 } Tokens

61968 Part 9
Defined by other 61968 Parts
Key
Outside the scope of 61968





Reference Model - Partial



61968 Part 9

Defined by other 61968 Parts

Key Outside the the scope of 61968

Part 9 Business Functions and Components



Business Functions	Business Sub-Functions	Abstract Components
Meter Reading and Control (MR)	Metering System (MS)	Data collection
		End point controls
		End point reconfiguration
		Disconnect/reconnect
		Demand reset
		On request read
		Point of sale
		Outage detection and restoration verification
		Power reliability and quality events
		Metering system events
	Meter Maintenance and Asset Management	End point install, configure, remove, repair, disconnect, reconnect
		End point asset history
		End point reconfiguration
		Special read
		Meter service request
		Tariffs
	Meter Data Management (MDM)	Meter data repository
		Usage history
		Validation, estimation and editing
		Customer billing data
		End device controls and events
	Demand Response (DR)	Real-time pricing
		Emergency reductions
		Economic reductions
Program registration		
Load Management (LM)	Load analysis	
	Load control	
	Demand response	
	Performance measurements	
	Risk management	



Information Model

- The Static Information Model that contains the metering classes, attributes and associations is defined in detail in IEC61968 Part 11 or in IEC61970 Part 301.
- Classes for Meter Reading and Control are contained in the following Packages:
 - Asset classes are defined in Asset package in 61968-11
 - Customer classes are defined in the Customer package in 61968-11
 - Metering classes are defined in the Metering package in 61968-11
 - Prepayment classes are defined in the PaymentMetering package in 61968



Meter Reading and Control Message Types

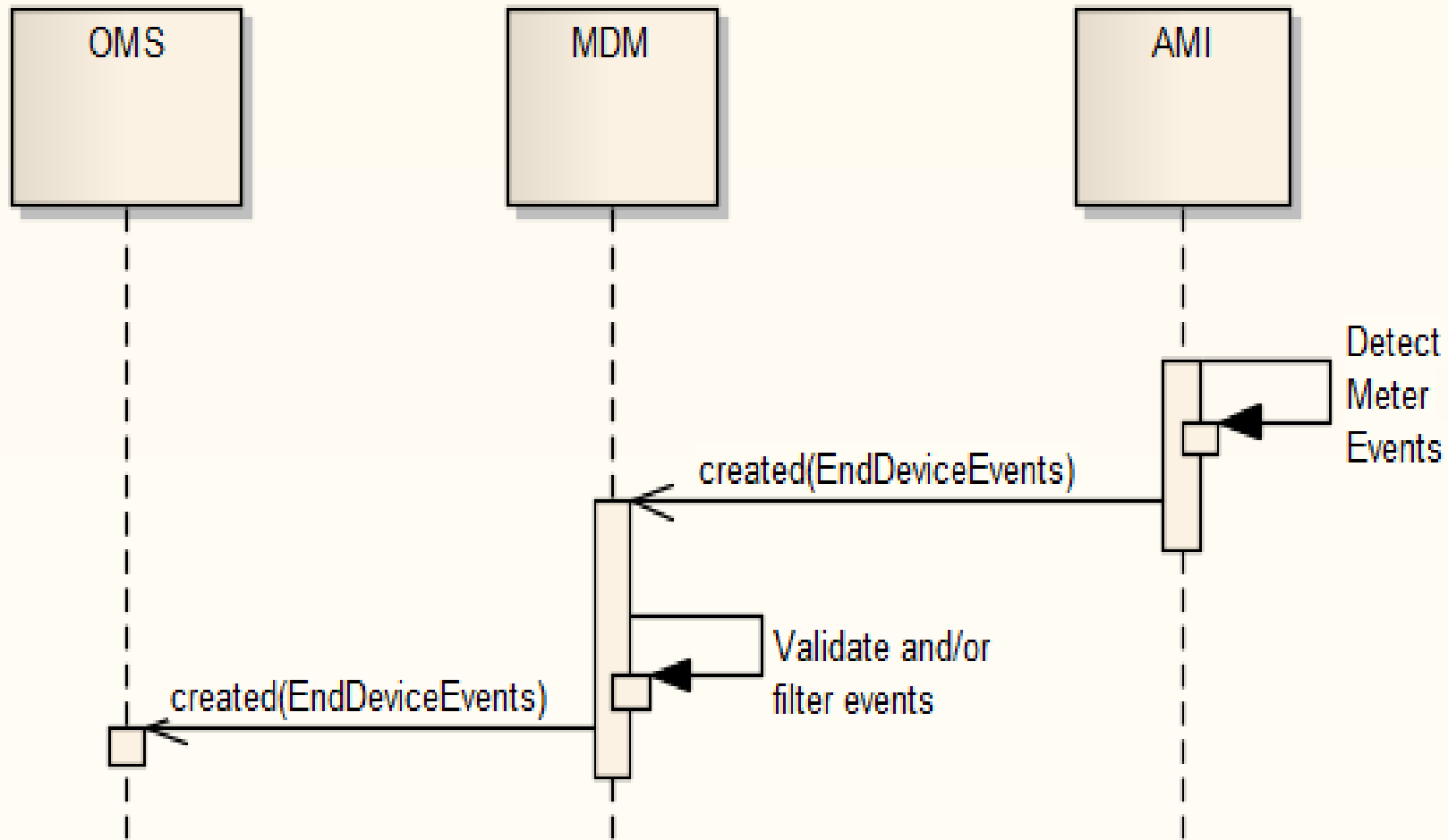
- There are currently 63 messages
- End Device Event Messages (includes PAN Messages)
- Master Data Management and Data linkage Messages
- Meter Reading Messages
- End Device Control Messages (includes PAN Messages)
- Meter Service Request Messages (includes Customer Switching)
- Meter System Event Messages
- Payment Metering Service Messages (not covered here)



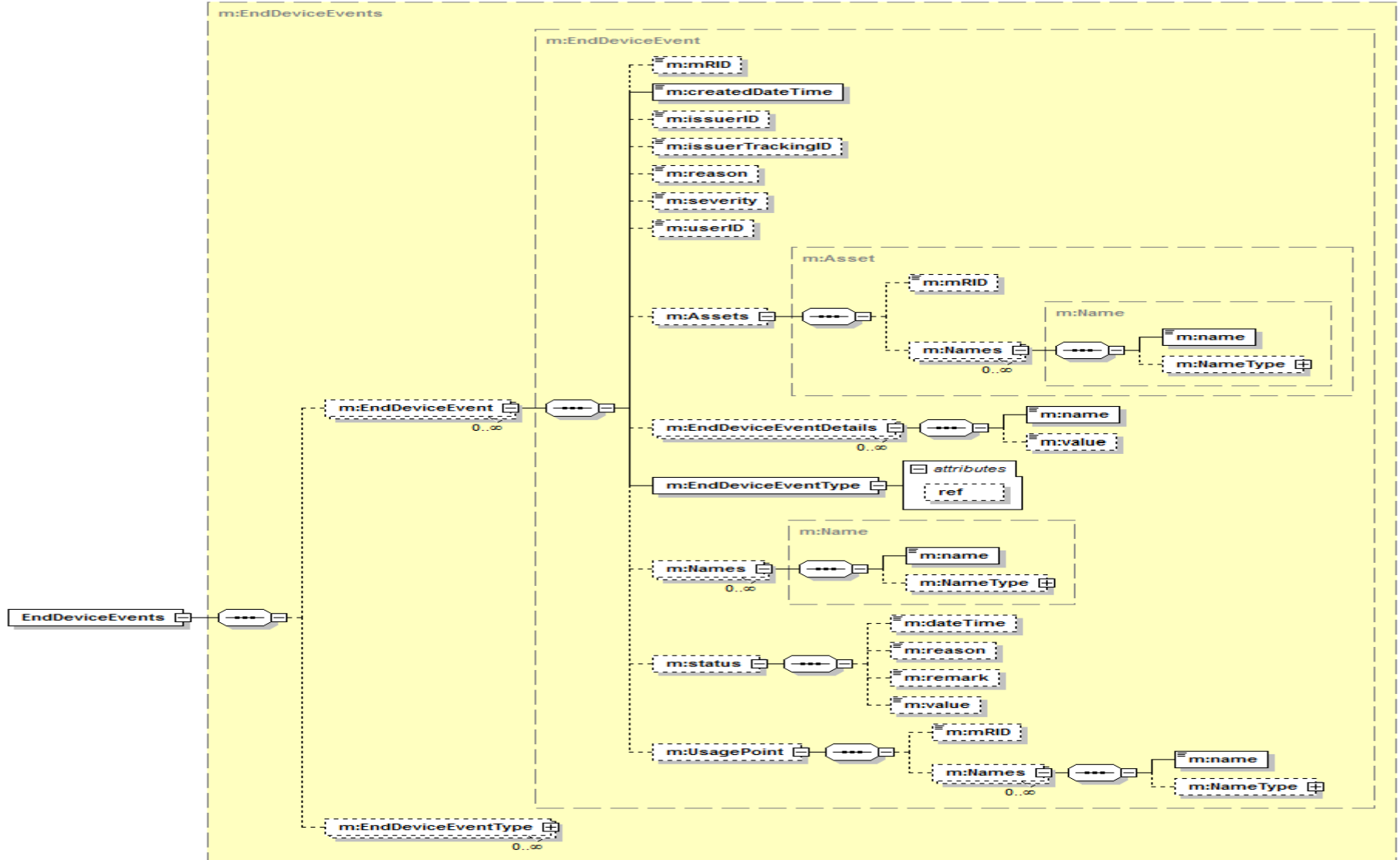
EndDeviceEvent Messages

- EndDeviceEvent Messages Convey events related to:
 - Sustained and Momentary Outage Detection
 - Low and High Voltage Threshold Detection
 - Meter Health
 - Tamper Detection
 - Revenue Event

EndDeviceEvent Use Case for Outage Detection Event



EndDeviceEvent Message



EndDeviceEventType Enumerations



- EndDeviceEventType enumerations defines the event using four parts:

EndDeviceEventType :=

<EndDeviceType>.<EndDeviceDomain>.<EndDeviceSubdomain>.<EndDeviceEventorAction>

Where:

<EndDeviceType> = a numeric value from the EndDeviceType enumeration. Example: 3 is Electric Meter, 5 is a Gateway, 12 is a PAN Device, etc.

<EndDeviceDomain> = a numeric value from the EndDeviceDomain enumeration. Example: 26 is Power, 15 is Load Control, etc.

<EndDeviceSubdomain> = a numeric value from the EndDeviceSubdomain enumeration. Example: 0 is N/A, 28 is Power Quality, etc.

<EndDeviceEventorAction> = a numeric value from the EndDeviceEventorAction enumeration. Example: 85 is Failed, 81 is Opted-Out, etc.

Message Organization – Event Type Enumerations



EndDeviceEventType	Description
3.26.0.85	Power off alarm
3.26.0.216	Power on
3.26.38.150	Low voltage
3.26.38.93	High voltage
3.26.38.37	Voltage Imbalance Cleared
3.12.1.38	Unauthorized Access attempt
3.12.0.257	Tamper detection
3.8.0.215	Demand reset occurred
3.31.0.68	Disconnected
3.31.0.42	Connected

EndDeviceEvent XML Message Example

Meter Power Off Event: Electric, Power, N/A, Failed



```
<ns1:EndDeviceEvents
xmlns:ns1="http://iec.ch/TC57/2011/EndDeviceEvents#">
  <ns1:EndDeviceEvent>
    <ns1:createdDateTime>2009-11-04T18:52:50.001-
05:00</ns1:createdDateTime>
    <ns1:EndDeviceEventType ref="3.26.0.85"/>
    <ns1:description>Power off alarm</ns1:description>
    <ns1:Assets>
      <ns1:mRID>3dc53ee5-777e-50b4-8699-
a1c224f45f3d</ns1:mRID>
      <ns1:Names>
        <ns1:name>Meter23253</ns1:name>
      </ns1:Names>
    </ns1:Assets>
  </ns1:EndDeviceEvent>
</ns1:EndDeviceEvents>
```




Master Data Management and Data Linkage Messages

- These messages are used to:
 - Perform Initialization or Synchronization
 - Provide Configuration Information
 - Change Customer Information
 - Assign IDs to devices
 - Add to Service and Inventory
 - Remove from Service and Inventory
 - Configure Objects



Master Data Management and Data Linkage Messages

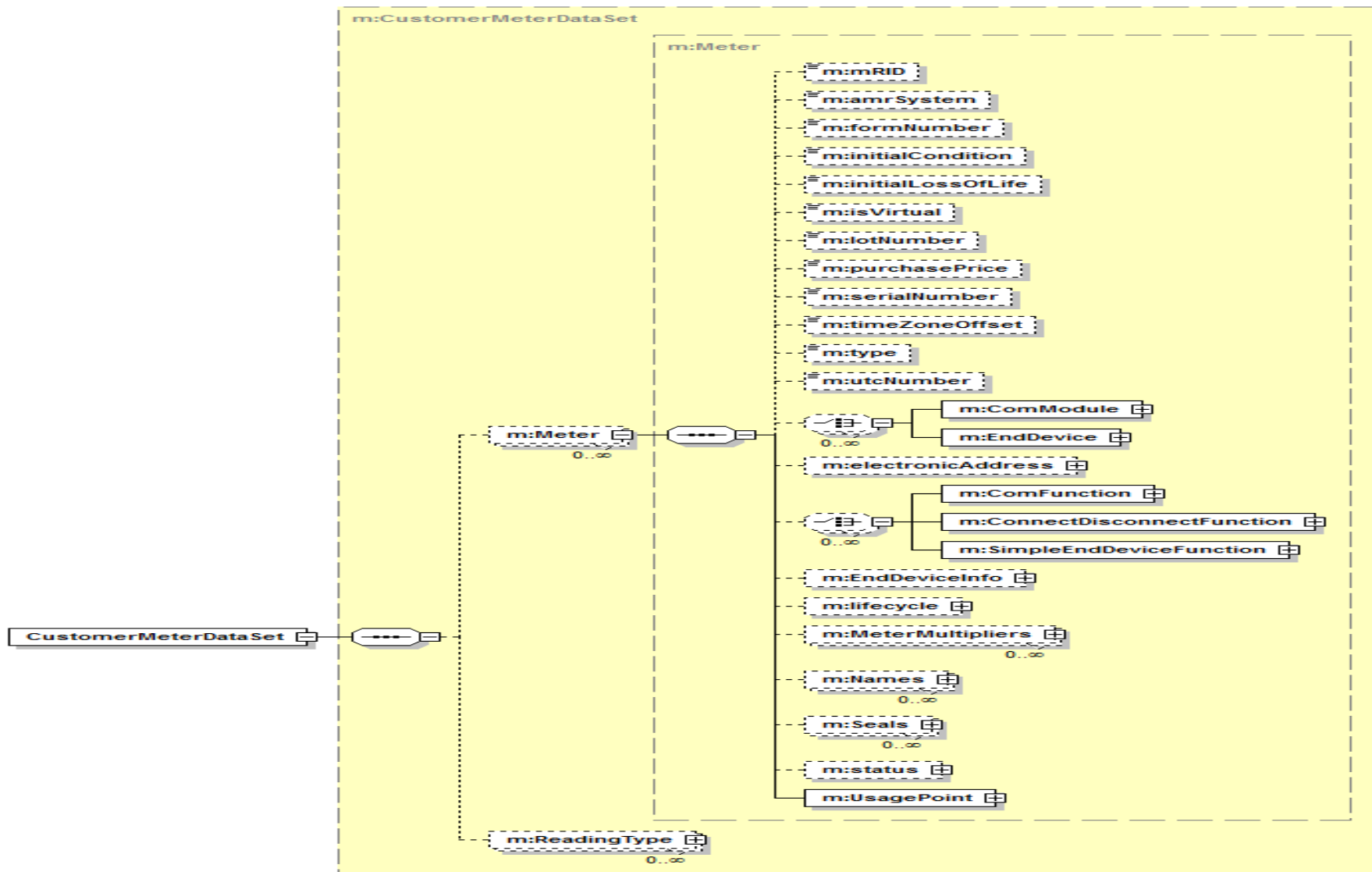
- These messages are closely related to Data Linkage messages
- Examples of these types of Messages are:
 - CustomerMeterDataSet
 - MasterDataLinkageConfig



CustomerMeterDataSet Message

- This message is designed to initialize and synchronize Meters.
- This is a very complex message that provides all information about the meter, including but not limited to:
 - Type of Functions
 - UsagePoint Information – Provides linkages for a variety of objects such as CustomerAgreement, ServiceLocation, ServiceSupplier, UsagePointLocations, etc.
 - Meter Serial Number

CustomerMeterDataSet Message

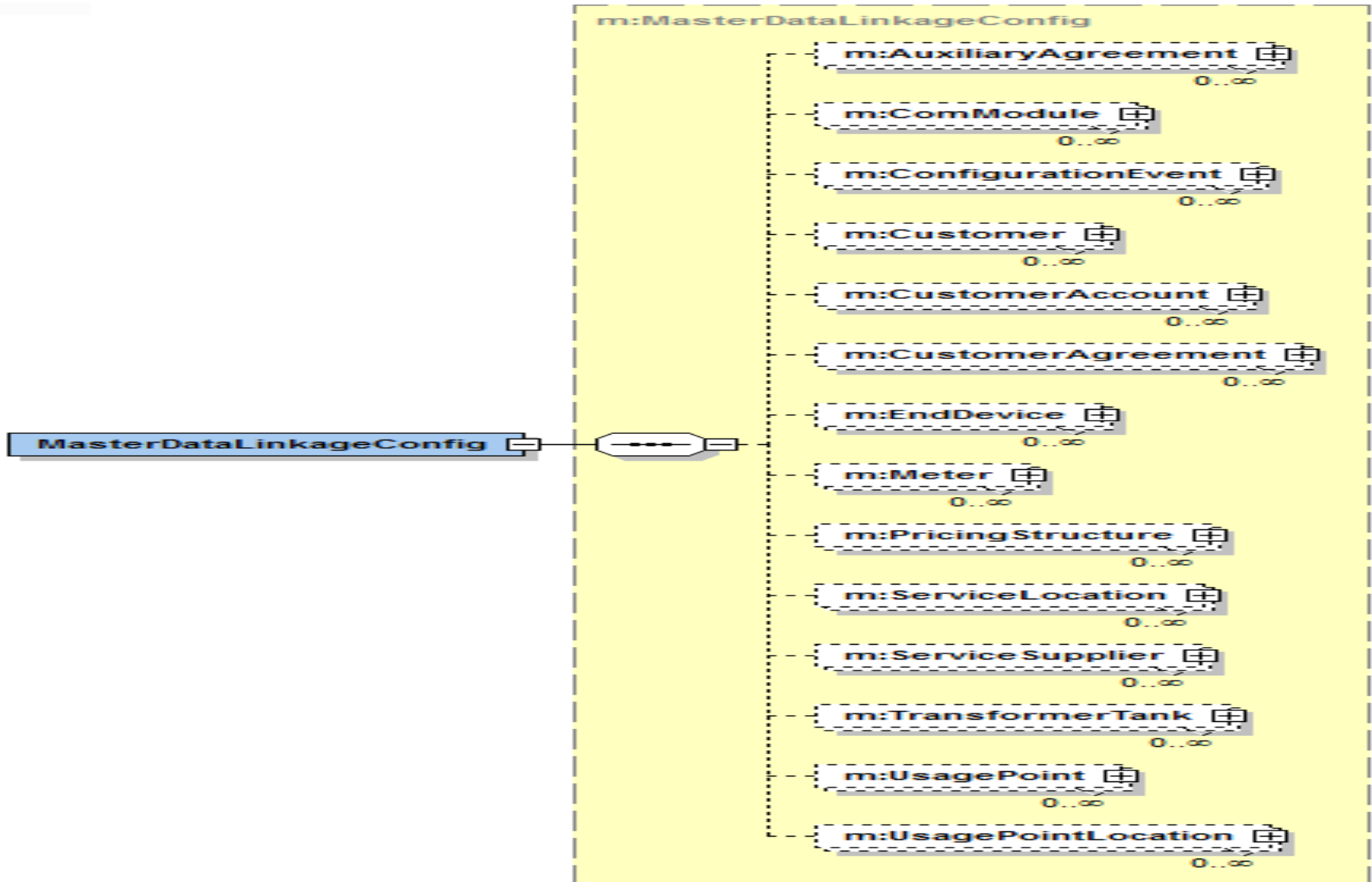




Master Data Linkage Config Message

- This message is designed to configure relationships between objects.
- Specifically relationships between the customer, customer Agreement/Account, and the associated Pricing Structure, Meter, Usage Point, etc. are defined in this configuration message.

MasterDataLinkageConfig Message





Meter Reading Messages

- Examples of these types of Messages are:
 - MeterReadSchedule
 - MeterReading Message for the following types of requests:
 - Manual MeterRead
 - On-Request/On-Demand Meter Read
 - Historical Meter Data Access
 - Billing Inquiry
 - Bulk Readings



MeterReadings Message

- MeterReadings message allows for:
 - Readings from one or more meters
 - Reading values each have an associated reading type, timestamp and value
 - Many Quality values can be associated with each reading value
 - Readings can be supplied in the form of interval blocks if the common reading types are grouped together.
 - Event Histories are returned with meter readings.

MeterReadings Message



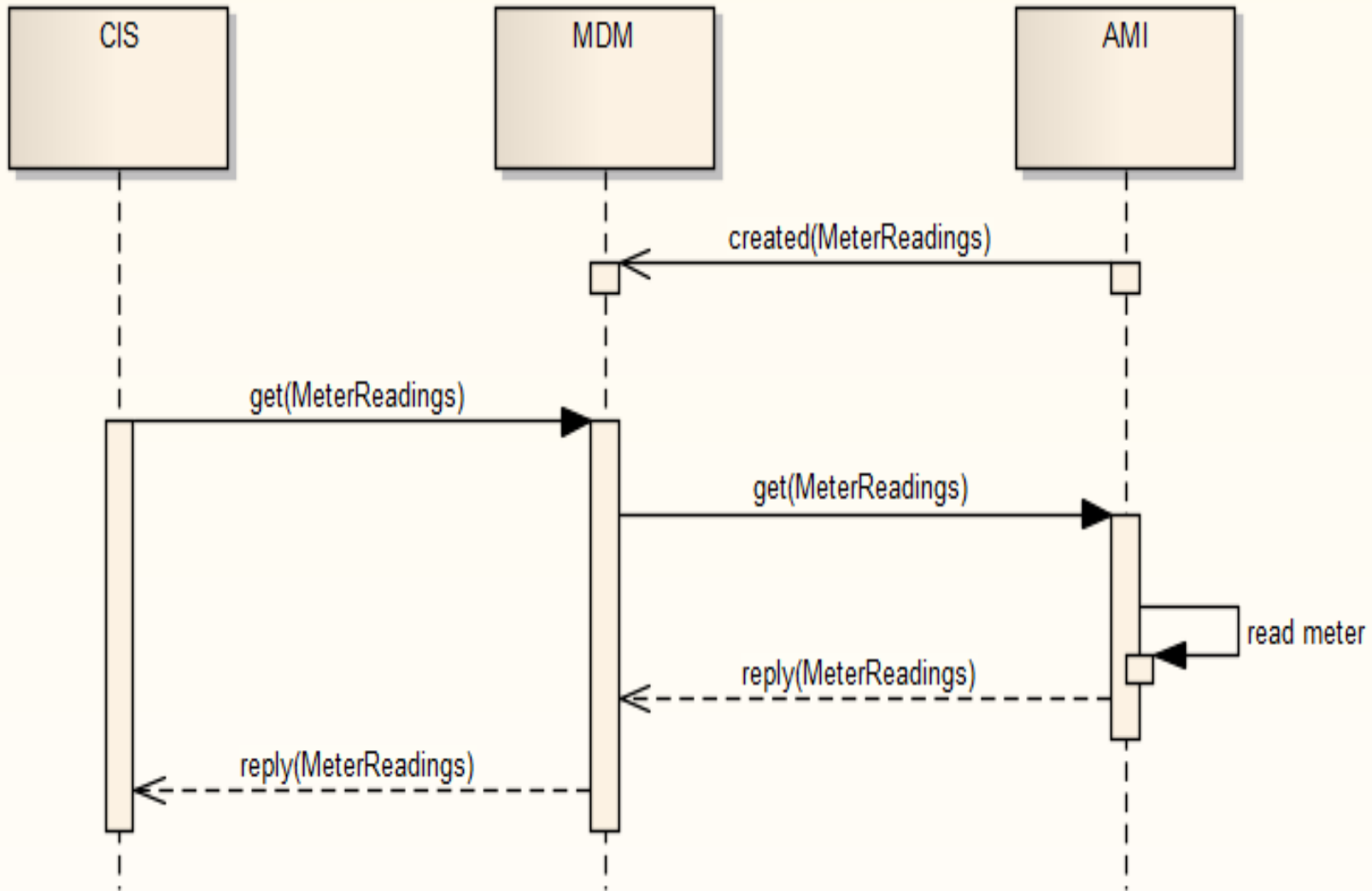
- The request for meter reading should specify:
 - A meter or group of meters
 - A type of reading to collect
 - A frequency
 - A Duration of interest
- The scheduled frequency may consist of regular or irregular periods.



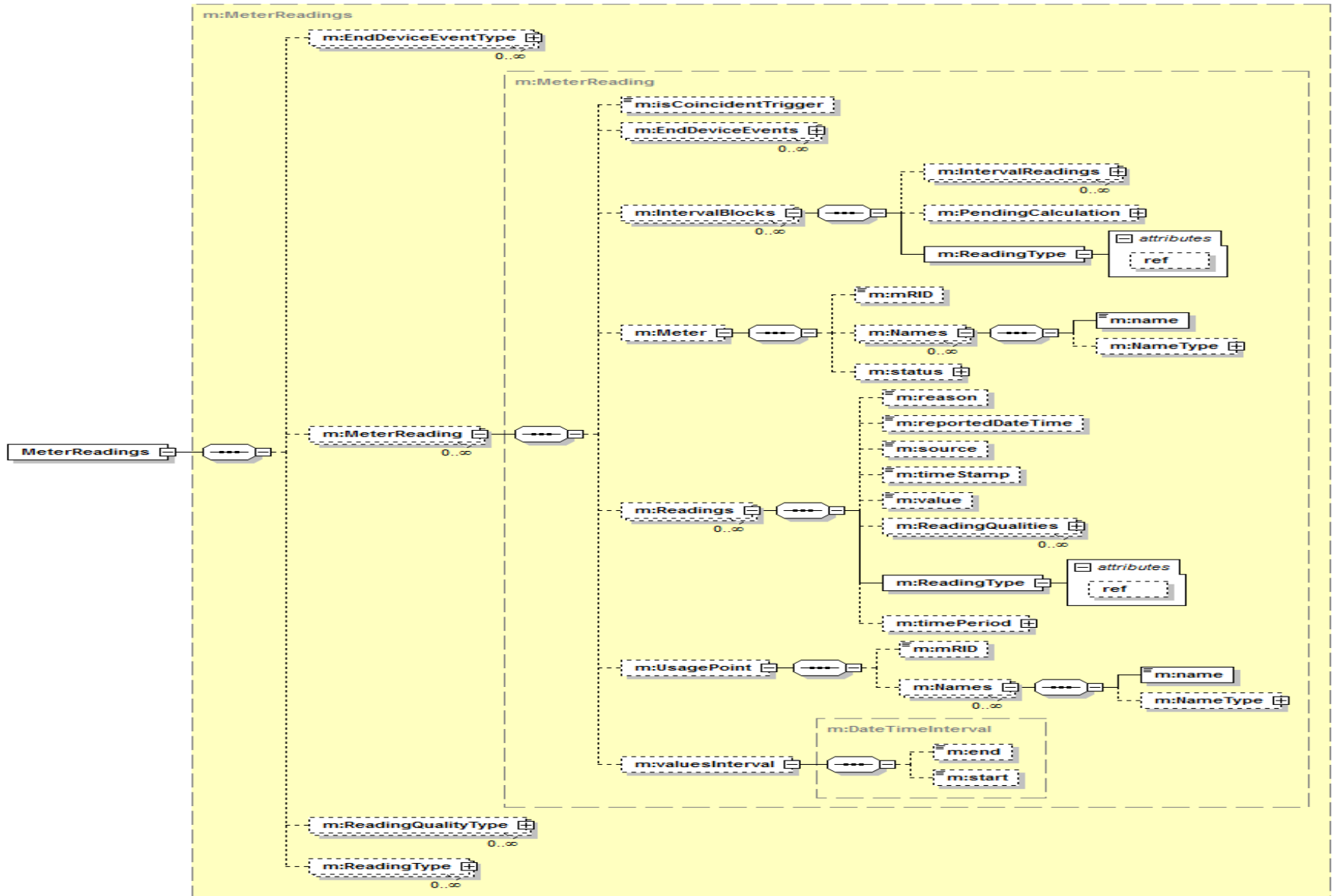
MeterReadings Message

- The MeterReadings request may be initiated by any of the following:
 - The CIS (in an effort to collect billing determinants).
 - A Planning and Scheduling application (in an effort to acquire engineering data about the distribution network).
 - An OMS (in order to verify if a customer is affected by an outage or has been restored)
 - An MDM system (in an effort to broker data for any or all of the above applications).
 - The MS itself may also directly initiate a meter read

MeterReadings Use Case - Billing Inquiry



MeterReadings Message





End Device Control Messages

- The EndDeviceControl message issues control commands related to:
 - Load Control
 - Demand Reset
 - Connect/Disconnect
 - Real-Time Pricing
- Load control commands can be addressed by:
 - EndDeviceGroup (using a group address)
 - By EndDevice (using mRID)
 - By CustomerAgreement



End Device Control Messages

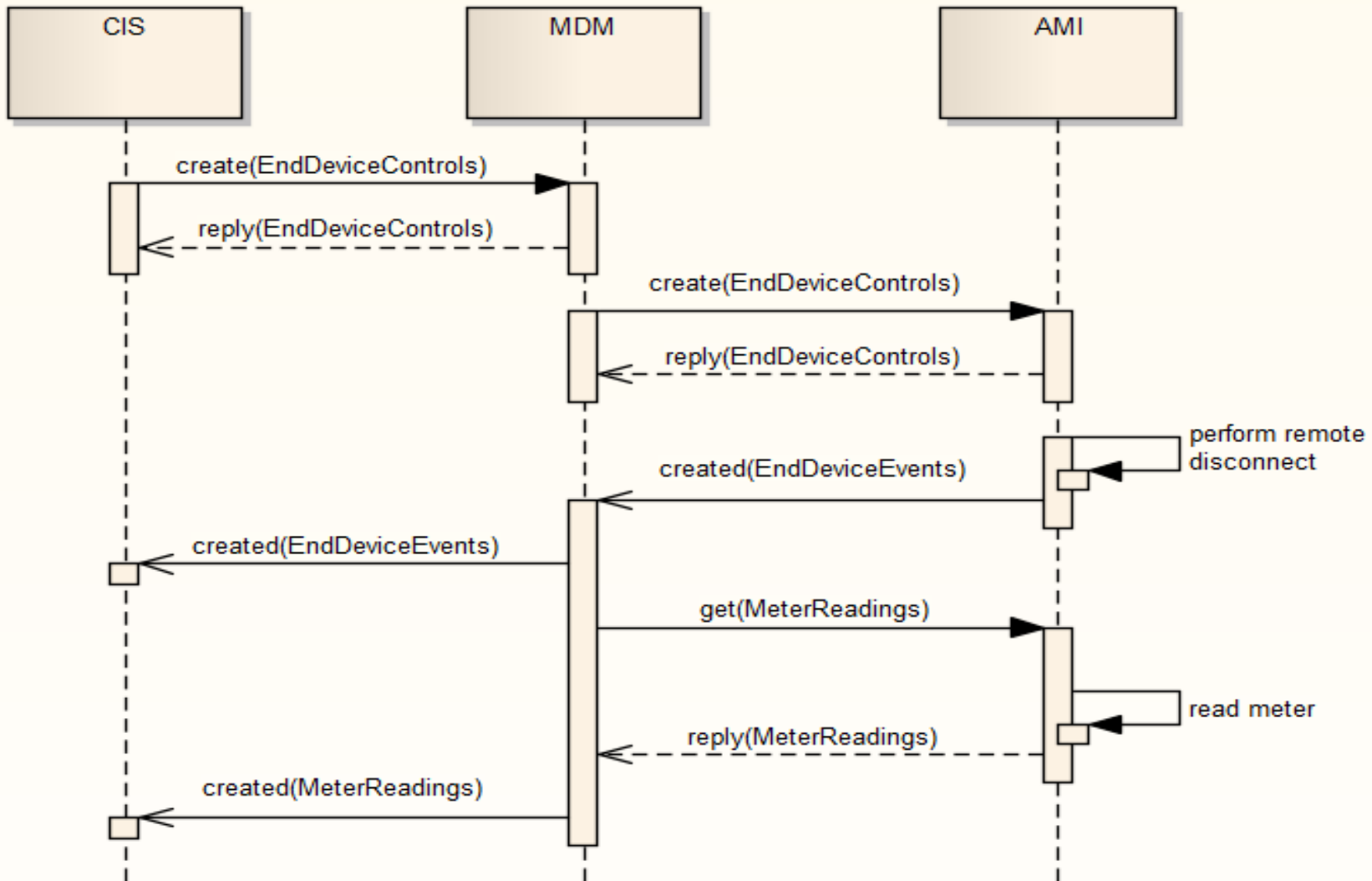
- Real-time pricing signals and/or schedules that can be sent to a meter via the MS include:
 - Price signal issued in real-time identifying a price for a given time interval
 - Time of use (TOU) schedules published, which cause changes in the accumulation for each TOU Tier
 - Energy price schedules published in advance.

EndDeviceControls Message

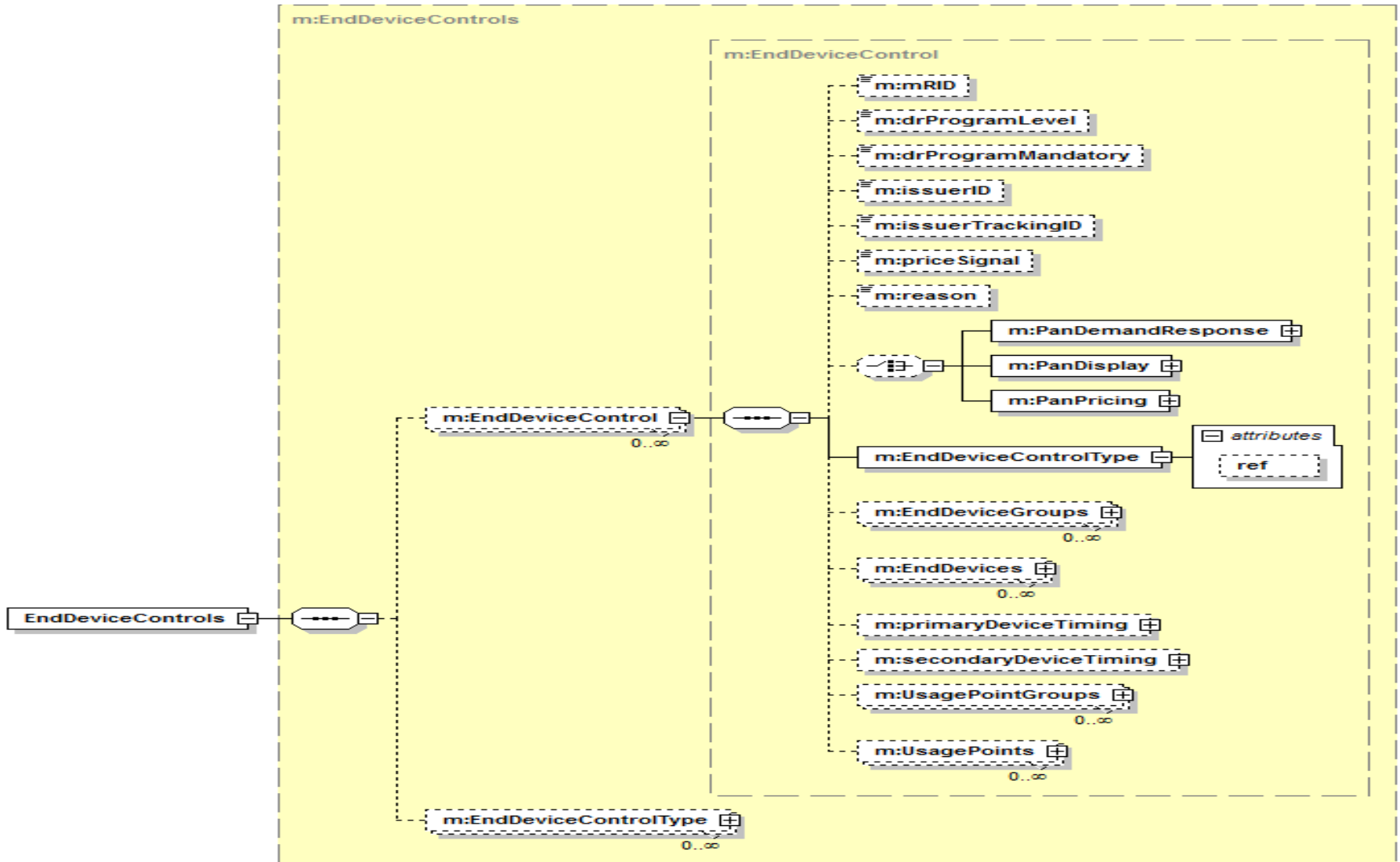


- Specific Meters may be addressed by CustomerAgreement, EndDeviceAsset and/or EndDeviceGroup
- At least one address and an EndDeviceControlType attribute is required
- EndDeviceControlType element identifies the type of control to be performed

EndDeviceControls Use Case – Remote Disconnect



EndDeviceControls Message



EndDeviceControlType Enumerations



- EndDeviceControlType enumerations defines the event using four parts:

EndDeviceControlType :=

<EndDeviceType>.<EndDeviceDomain>.<EndDeviceSubdomain>.<EndDeviceEventorAction>

Where:

<EndDeviceType> = a numeric value from the EndDeviceType enumeration. Example: 3 is Electric Meter, 5 is a Gateway, 12 is a PAN Device, etc.

<EndDeviceDomain> = a numeric value from the EndDeviceDomain enumeration. Example: 31 is RCDSwitch, 26 is Power, 15 is Load Control, etc.

<EndDeviceSubdomain> = a numeric value from the EndDeviceSubdomain enumeration. Example: 0 is N/A, 28 is Power Quality, etc.

<EndDeviceEventorAction> = a numeric value from the EndDeviceEventorAction enumeration. Example: 23 is Disconnect, 85 is Failed, 81 is Opted-Out, etc.

Message Organization – Control Type Enumerations



EndDeviceControlType	Description
3.8.0.214	Demand reset
3.15.6.242.0	Load control started
3.15.6.243.1	Load control stopped
3.31.0.18	Close remote Connect/Disconnect Switch
3.31.0.22	Disable RCD Switch
3.31.0.23	Open remote connect/disconnect switch
3.31.0.26	Enable RCD switch
3.20.9.82	Price signal

EndDeviceControl XML Message Example - Meter Disconnect by Group: Electric, RCD Switch, N/A, Disconnect



```
xml version="1.0" encoding="UTF-8"?>
<!--Scheduled Disconnect on an End Device Group-->
<m:EndDeviceControls
xsi:schemaLocation="http://iec.ch/TC57/2010/EndDeviceControls#
EndDeviceControls.xsd" xmlns:m="http://iec.ch/TC57/2010/EndDeviceControls#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <m:EndDeviceControl>
    <m:type>3.31.0.23</m:type>
    <m:EndDeviceGroup>
      <m:mRID>3dc53ee5-777e-50b4-8699-
a1c224f45f3d</m:mRID>
    </m:EndDeviceGroup>
    <m:scheduledInterval>
      <m:start>2011-05-05T09:30:00.0Z</m:start>
    </m:scheduledInterval>
  </m:EndDeviceControl>
</m:EndDeviceControls>
```

MeterServiceRequests Message



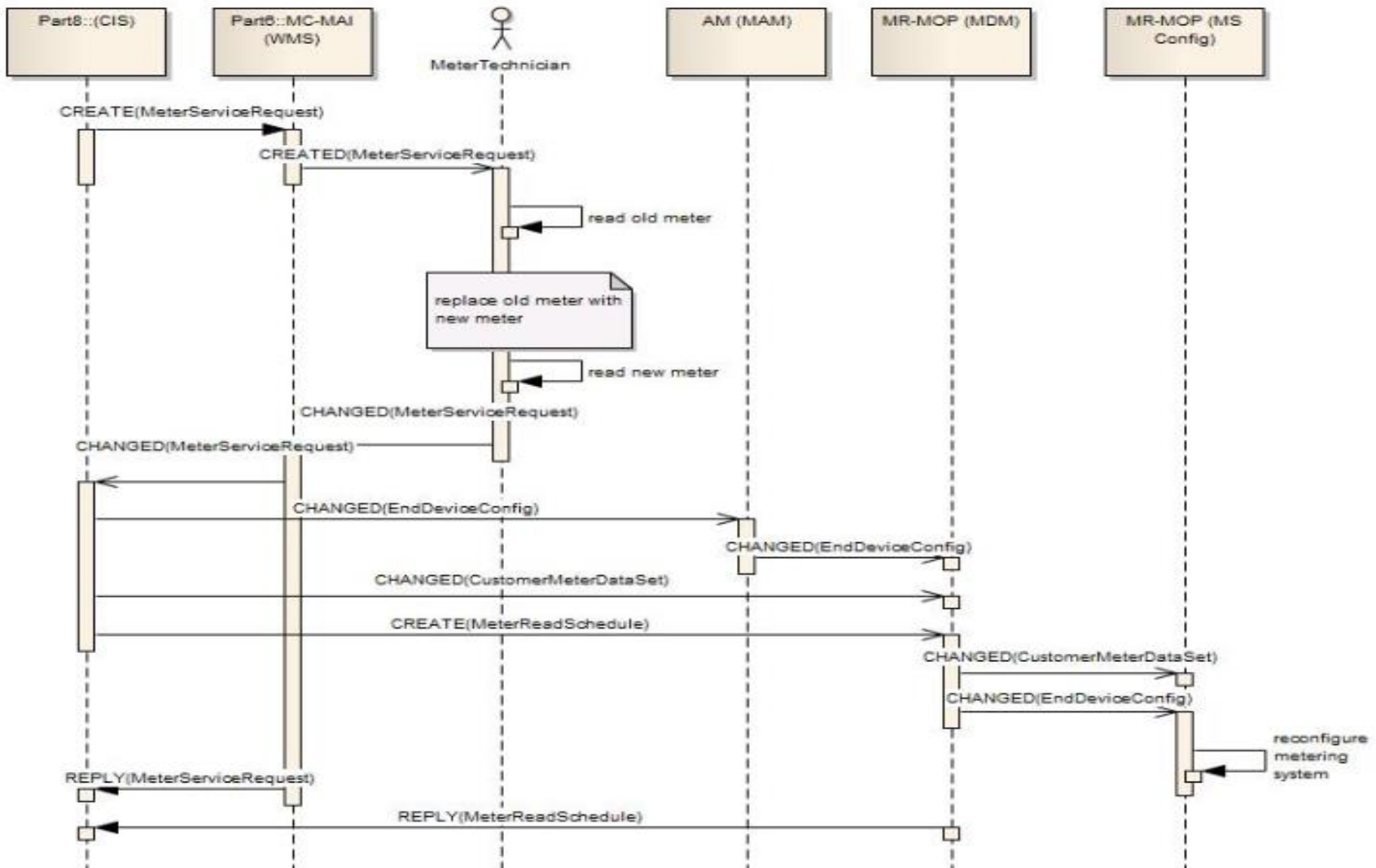
- May include one or more MeterServiceWork items
- Each item may refer to a max of two meters to provide a means to replace a meter.
- Meter readings can be obtained as a part of the work.
- A Meter Service Request occurs due to:
 - Adding a New Customer
 - Removing a Customer
 - Switching a Customer from one Supplier to Another
 - Change out a Meter due to a Problem (Alarm, Complaint or other event)
 - Change out a Meter for Recalibration

MeterServiceRequests Message

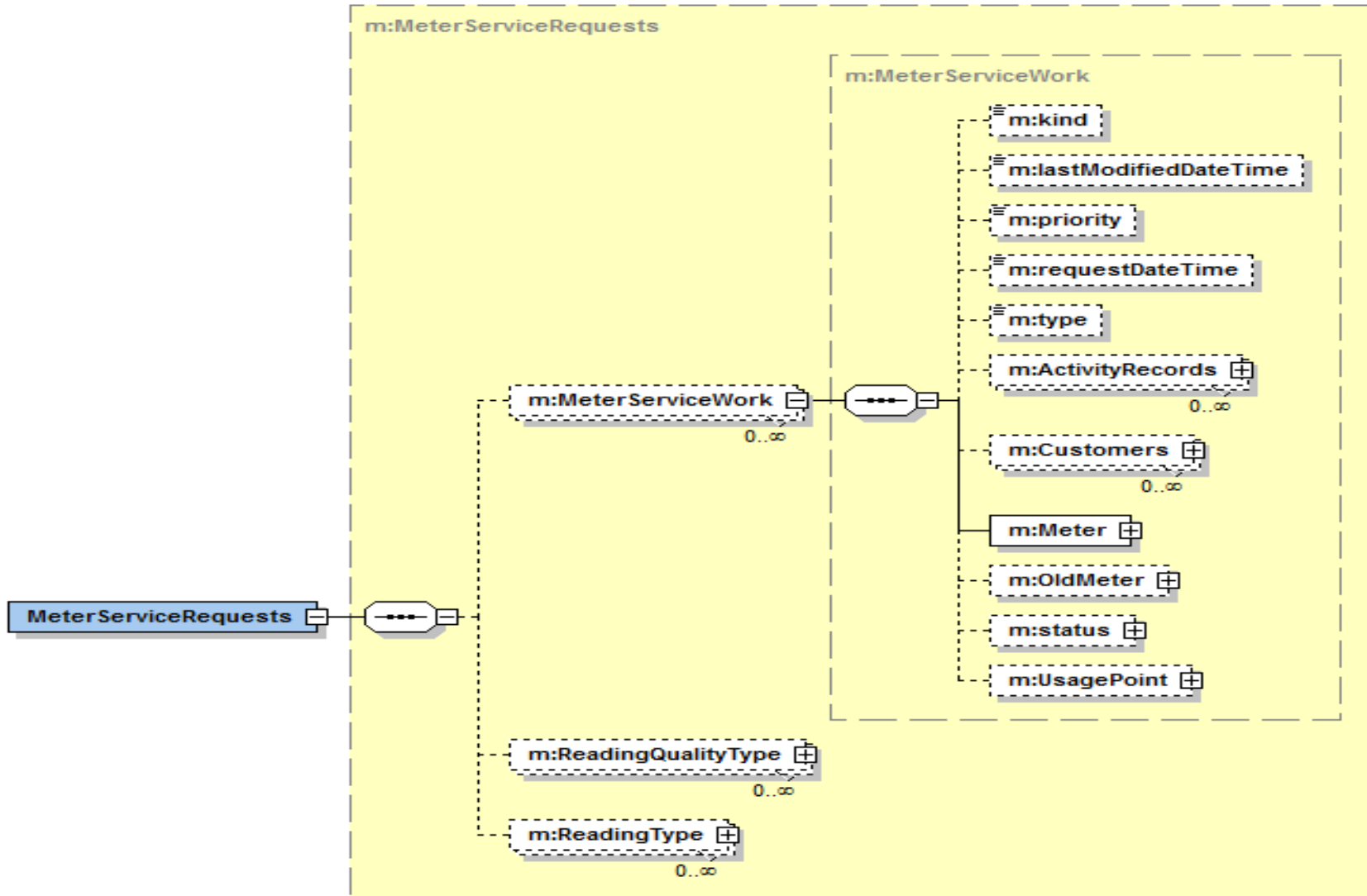


- When a Meter Change-Out is performed the following steps must occur:
 - Send a MeterServiceRequest to the WMS
 - Send a Meter Technician to:
 - Take the final Meter Reading
 - Remove the old Meter
 - Install the new Meter
 - Take the new Meter Reading
 - The following messages are sent/received to Configure the Meter:
 - EndDeviceConfig
 - CustomerMeterDataSet
 - MeterConfig
 - MeterReadSchedule

Change-Out Meter Work Flow



MeterServiceRequests Message



Meter System Event Messages



- Convey Metering system problems that cannot be conveyed with an EndDeviceEvent message
- Used when:
 - A more detailed description of the problem is required
 - A more elaborate schema must be used
 - The recipient is a human and requires a human-readable description of the problem
- Several configuration messages are used to convey Meter System Events

Configuration Messages



CustomerConfig	Payload configures into the MS information about customers that have end devices.
CustomerAgreementConfig	Payload configures information about customer agreements into the MS.
CustomerAccountConfig	Payload configures information about customer accounts into the MS.
AuxiliaryAgreementConfig	Payload configures information about customer debt for collection into the MS.
PricingStructureConfig	Payload configures information about pricing structures into the MS.

Configuration Messages - Continued



ServiceCategoryConfig	Payload configures information about the categories of service (electricity, water, gas for example) into the MS.
UsagePointConfig	Payload configures information about the usage points points into the MS.
MeterConfig	Payload configures information about the meters in service into the MS.
UsagePointLocationConfig	Payload configures information about the usage point locations into the MS.
ServiceLocationConfig	Payload configures information about the service locations into the MS.

Configuration Messages - Continued



ComModuleConfig	Payload configures information about the communication module into the MS.
EndDeviceConfig	Payload configures information about the end device into the MS.
MasterDataLinkageConfig	Payload configures the relationships between objects into the MS.
ServiceSupplierConfig	Payload configures information about the supplier (retailer or utility for example) of the service into the MS.

Questions & Contacts



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