OPENADE 1.0 SERVICE DEFINITION - COMMON

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Document History

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Revision Number	Revision Date	Revision By	Summary of Changes	Changes marked
0.5	2/25/10	Steve Van Ausdall	Initial draft discussion version.	N
0.6	3/1/10	Steve Van Ausdall	Additional details about defined resources	N
0.8	4/8/10	Steve Van Ausdall	Simplified, following approved plan	N
0.9	4/15/10	Steve Van Ausdall	Addressed comments raised in walkthrough and from Jeff Kenward.	N
0.92	4/22/10	Steve Van Ausdall	Additional changes from SD team	Y
0.93	6/17/10	Wayne Dennison Steve Van Ausdall	Additional Cleanup and Updates from F2F meeting and Review, new schema structure from PAP10	Y
0.94	7/13/10	Wayne Dennison	Updated Schema and streamlined service operation documentation.	N
0.96	7/28/10	Steve Van Ausdall	Updated from Detroit meeting and subsequent feedback and alignment with SEP2 and PAP10	N
0.97	8/6/10	Steve Van Ausdall	Updated ReadingType attributes to match base CIM terms unit and kind, updated IntervalReading definition	Y

Open Issues Log

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Issue	Issue Date	Provided By	Summary of the Issue
50	8/5/10	Steve Van Ausdall	OpenADE SD - General-purpose authorization mechanism

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1 INTRODUCTION

Access to energy management resources is of paramount interest to consumers and Smart Grid service providers. In order to provide access to customer data, energy service providers and 3rd Party consumers can use this best practice recommendation in order to develop early implementations. As the standards development organizations recommend alterations, stakeholders will decide how to handle these changes.

OpenADE represents the internet data service provided by energy service providers (Utilities). It is the goal of OpenSG to promote interoperability by providing an easy to use, simple set of commonly available technologies. Toward this goal, our direction is to define XML formats for payload data which can be used with; A resource-oriented architecture or service-oriented architecture.

This document is focused on the common payload definition. For information on service operations, refer to Appendix B.

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1.1.2 CIM Object Models

Information on the management of rights and governance for IEC can be found at the page below.
http://www.iec.ch/tctools/patent-guidelines.htm

The recommendations herein build on work owned by the IEC. Required extensions identified in this recommendation will be submitted to the IEC, and will be tracked for inclusion in the model.

1.1.3 Service Resource Definitions

If necessary, UCAIug is willing to work with standards development organizations to incorporate additional aspects of this recommendation into a standard, including the specification of how to use profiled (restricted) CIM objects within different environments, and possibly the information object definitions themselves.

1.2 REFERENCED SPECIFICATIONS

- [1] OpenADE B&UR 1.0 - http://osgug.ucaiug.org/sgsystems/OpenADE/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2fsgsystems%2fOpenADE%2fShared%20Documents%2fBusiness%20and%20User%20Requirements
- [2] OpenADE SRS 1.0 - http://osgug.ucaiug.org/sgsystems/OpenADE/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2fsgsystems%2fOpenADE%2fShared%20Documents%2fSRS
- [3] IEC CIM (TC 57 61968/61970) - http://tc57.iec.ch
- [4] IEC TC57 WG14 61968-1-2 – Profile for use of CIM with WS-I Basic Profile

1.3 REFERENCED GUIDANCE

- [G1] 3PDA – Security Profile for Third Party Data Access (ASAP-SG) http://osgug.ucaiug.org/utilisec/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2futilisec%2fShared%20Documents%2fThird%20Party%20Data%20Access%20Security%20Profile

1.4 NAMESPACES

The subject of namespaces is important, because the namespace identifies the domain managing the definitions of protocol resources and formats. OpenSG proposes to use the format below for the namespace.

```
http://osgug.ucaiug.org/ns/2010/06/oade
```

Extensions to the schema that are backwards and forwards compatible will not change the namespace, but will include a version number inside the definition.

2 RESOURCES

Some of the design decisions are being driven by the desire to provide an interface for the available data objects. For Example; objects could be exposed as resources and have operations which specify URL's and Object ID's (though they may not be required). Note: Alignment with the ZigBee Alliance Smart Energy Profile 2.0 is of interest, along with other related industry efforts, as documented in NAESB PAP10 recommendations.

Since this document is the first to define the general-purpose conventions, several resources were identified allowing consumers access to the resources they want. However, this document is not intended to provide details of all resources and service operations, but the currently identified resources are available in Appendix B for

reference. The following "data" objects are currently in scope, as defined in [1] OADE-B&UR and [2] OADE-SRS. They will be delivered via client services in a set of (chunked) batch XML files.

- **MeterReading** – Represents a collection of readings associated with a specific user key and meter point
  - **IntervalReading** – A durational measurement
  - **Reading** – An instantaneous measurement (future)
- **ReadingType** – Represents a type of reading (e.g. hourly kWh) used by a MeterReading
- **ServiceSupplier** – The supplier of utility service
- **CustomerAgreement** – Represents the agreement for service at a location
- **Customer** – The identifier for the customer associated with the data
- **CustomerAuthorisation** – Represents the agreement to share data with the 3rd Party
- **ServiceDeliveryPoint** – The logical point at which the readings were obtained
- **MeterAsset** – The physical measurement device that captured the readings

2.1 SECURITY

Because these services define resources that could be used to cause damage, access must be restricted to only those data objects that have been authorized. Security guidance is specified in [G1] 3PDA.

2.1.1 Authentication

Authentication is a process through which an identity is proven. Users may have an identity at each domain involved in sharing their data, or they may use a federated identity managed at a separate domain. These identities are associated at each domain with specific authorizations. OpenADE does not require a specific method for authentication, but does require an authentication method which provides a reliable, secure way for customers to protect access to their information.

2.1.2 Authorization

Authorization is the process of requesting and granting access to protected user resources. OpenADE shall allow for the creation and management of user access details. Consumer Request Parameters are addressed in subsequent documentation, please refer to Appendix B for additional information.

2.2 MESSAGE DOCUMENT FORMAT

"Message document" refers to the type of XML returned by resource requests. This initial release of OpenADE uses CIM-based XML, according to the schema provided.

2.3 PAYLOAD ENTITIES

Payload entities will conform to the message document schema. They will contain an XML representation of CIM classes.

The batch payload defined allows a number of object instances to be included in a single transfer. Subscription will be automatic, as defined in the implemented profile, based on the resources authorized by the user. For profile

details (subsequent associated reference documentation) please refer to Appendix B for additional information. All data elements are “create or update” so that if the ID does not exist, then the representation should be interpreted as a new instance of the type containing the ID. If the ID has been transferred previously, then it should be interpreted as an update to the fields specified, and elements not specified should not be modified.

A logical view of the schema for the initial payload structure is shown below. An XSD is provided as well in Appendix A. The model is also posted to the OpenADE SharePoint. This model was developed during initial PAP10 harmonization efforts, and will be refined within NAESB Smart Grid PAP10 Task Force. It shares structures with ZigBee Alliance Smart Energy Profile 2.0, for OpenADE internet services to eventually be accessed from devices or applications within the HAN environment. The model below is compatible with the PAP10 model.

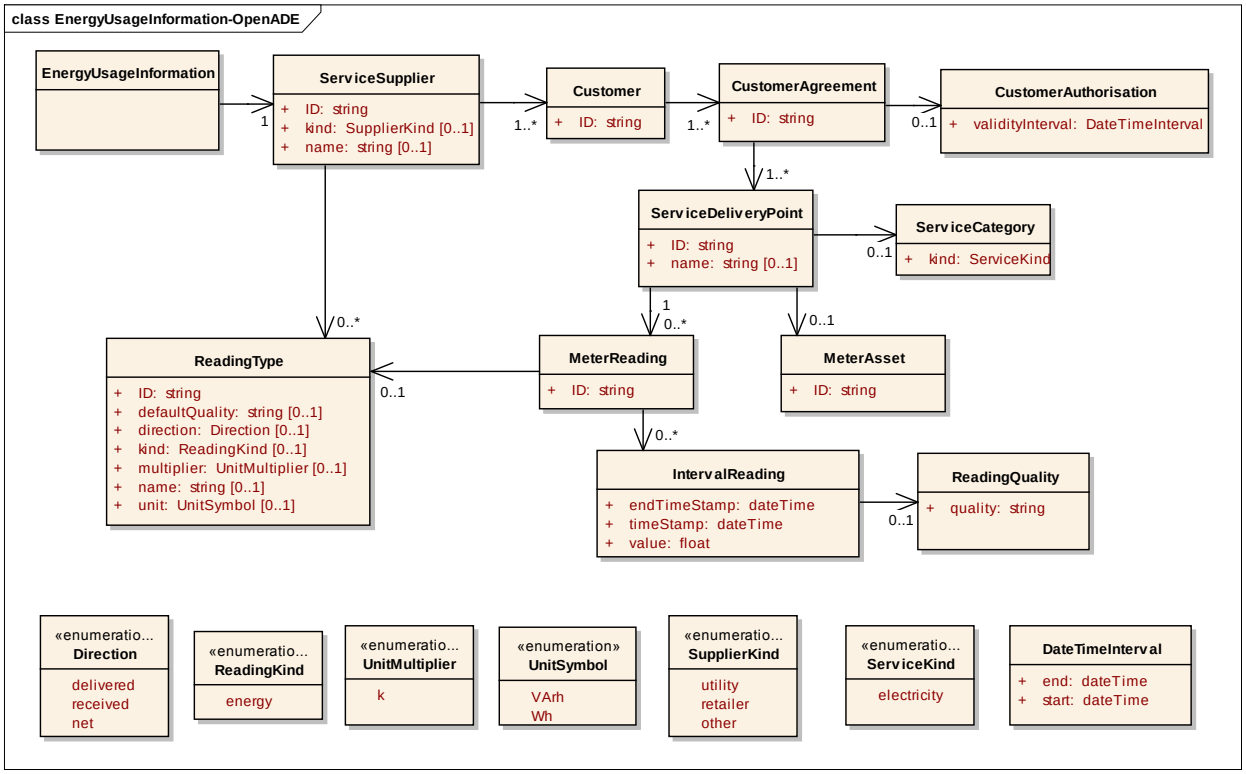


Figure 1: Batch Payload Logical UML Data Model Diagram

2.3.1 Usage File Format

Domain data objects build on the IEC CIM model. In general, complex type schema elements will be named using the CIM class. For listings of fields, see the details for each resource, defined in Section 8. The XSD for the format is included in the archive in Section 9.1, Consumption XSD and Example.

An example is shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
<EnergyUsageInformation
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://osgug.ucaiug.org/ns/2010/06/ade OpenADE-Schema.xsd"
  xmlns="http://osgug.ucaiug.org/ns/2010/06/ade">
```

```
<ServiceSupplier>
  <ID>123</ID>
  <Customer>
    <ID>12345678910</ID>
    <CustomerAgreement>
      <ID>56421587</ID>
      <CustomerAuthorisation>
        <validityInterval>
          <end>2011-12-17T00:00:00Z</end>
          <start>2010-12-17T00:00:00Z</start>
        </validityInterval>
      </CustomerAuthorisation>
      <ServiceDeliveryPoint>
        <ID>85945261</ID>
        <MeterAsset>
          <ID>19283746</ID>
        </MeterAsset>
        <MeterReading>
          <ID>1</ID>
          <IntervalReading>
            <endTimeStamp>2010-12-17T11:00:00Z</endTimeStamp>
            <ReadingQuality>
              <quality>interpolated</quality>
            </ReadingQuality>
            <timeStamp>2010-12-17T10:00:00Z</timeStamp>
            <value>0.0035</value>
          </IntervalReading>
          <ReadingType>
            <ID>1001</ID>
          </ReadingType>
        </MeterReading>
        <name>Guest House</name>
        <ServiceCategory>
          <kind>electricity</kind>
        </ServiceCategory>
      </ServiceDeliveryPoint>
    </CustomerAgreement>
  </Customer>
  <kind>utility</kind>
  <name>Utility Company</name>
  <ReadingType>
    <ID>1001</ID>
    <defaultQuality>validated</defaultQuality>
    <direction>delivered</direction>
    <kind>energy</kind>
    <multiplier>k</multiplier>
    <name>Energy Delivered kWh</name>
    <unit>Wh</unit>
  </ReadingType>
</ServiceSupplier>
</EnergyUsageInformation>
```

3 DISCOVERY

Discovery of available resources, retrieval of the supported operations and resource types are not specified in this document. Supporting documentation of Service Operation documentation may include these details. Refer to Appendix B for additional information

4 METADATA

No metadata publication is specified in this document, but supporting documentation of Service Operation documentation may include this information. Refer to Appendix B for additional information.

5 VERSIONING

As additional capabilities are added to the interface definition, the minor version number of the definition will be incremented. If compatibility with existing counterparts must be broken, the namespace and the major version number will be updated, as per [9] 61968-1-2. Namespaces shown below are temporary, and will be updated as determined by the participants.

```
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
           xmlns="http://osgug.ucaiug.org/ns/2010/06/ade"
           targetNamespace="http://osgug.ucaiug.org/ns/2010/06/ade" elementFormDefault="qualified"
           version="1.0">
```

6 EXTENSIBILITY

To enable backwards and forwards compatibility, schema validation should be turned off in operational systems to allow new schema elements to pass without update or rebuild. Previous incarnations are not capable of 100% guaranteed anticipation of future elements. As such, these unrecognized elements shall be ignored. Also, additional platform-specific handling features should be implemented to support compatibility.

7 CONCURRENCY

No data shall be directly editable by clients, so concurrency controls are not included in this document.

8 SERVICE RESOURCE DEFINITIONS

For details of available profiles, extensions, initiations, authorization, access methods and how to incorporate these details, please refer to Appendix B.

8.1 ENERGY USAGE INFORMATION

This data resource represents a collection of readings, related to a specific reading type at a specific service delivery point and metering device. Meters may provide readings of different values, such as KWh and Voltage. Each could be authorized separately or as a group by the user. Individual meter readings are represented by IntervalReadings, which represent a measurement over a specified time interval.

The structure presented here is similar to the schema developed within IEC 61968-9, however it is not directly compatible, due to the need for some additional data elements and structural differences. It is, however, conformant to the more general CIM UML model. Extensions to the model are marked with [ADE Extension] in the description.

8.1.1 CustomerAgreement

Agreement between the Customer and the ServiceSupplier to pay for service at a specific ServiceLocation. It records certain billing information about the type of service provided at the ServiceLocation and is used during charge creation to determine the type of service.

Name	Type	Description
ID	*string*	Object identifier

8.1.2 CustomerAuthorisation

Holds an authorisation for access to specific user-private data granted to a 3rd Party service provider. [OpenADE Extension - Specialization of "Agreement"]

Name	Type	Description
validityInterval	*DateTimeInterval*	Date and time interval this agreement is valid (from going into effect to termination).

8.1.3 DateTimeInterval

Interval of date and time.

Name	Type	Description
end	*dateTime*	Date and time that this interval ended.
start	*dateTime*	Date and time that this interval started.

8.1.4 Direction *«enumeration»*

Name	Type	Description
delivered		
received		
net		

8.1.5 EnergyUsageInformation

8.1.6 IntervalReading

Data captured over a specific interval of time. Data is typically captured in intervals of 15 or 60 minutes. However, longer intervals can be specified, including monthly or yearly readings. The meaning of the value is described by the associated ReadingType.

Name	Type	Description
endTimeStamp	*dateTime*	End interval timestamp
timeStamp	*dateTime*	The start date and time of an interval reading
value	*float*	Value in type of float

8.1.7 MeterAsset

Physical asset that performs the metering role of the ServiceDeliveryPoint. Used for measuring consumption and detection of events.

Name	Type	Description
ID	*string*	Object identifier

8.1.8 MeterReading

Set of values obtained from the meter.

Name	Type	Description
ID	*string*	Object identifier

8.1.9 ReadingKind *«enumeration»*

Kind of reading.

Name	Type	Description
energy		

8.1.10 ReadingQuality

Quality of a specific reading value or interval reading value. Note that more than one Quality may be applicable to a given Reading. Typically not unsed unless problems or unusual conditions occur (i.e., quality for each Reading is assumed to be 'Good' unless stated otherwise in associated ReadingQuality).

Name	Type	Description
quality	*string*	Quality, to be specified if different than 'Good'.

8.1.11 ReadingType

Type of data conveyed by a specific Reading.

Name	Type	Description
ID	*string*	Object identifier

defaultQuality	*string*	Characteristics of a data value conveyed by a specific Reading, which allow an application to understand how a specific Reading is to be interpreted.
direction	*Direction*	Specifies the direction of flow of the measurement.
kind	*ReadingKind*	Kind of reading.
multiplier	*UnitMultiplier*	Multiplier for 'unit'.
name	*string*	Name of an attribute.
unit	*UnitSymbol*	Unit in symbol

322 ### 8.1.12 ServiceCategory

323 Category of service provided to the customer.

Name	Type	Description
kind	*ServiceKind*	Kind of service.

324 ### 8.1.13 ServiceDeliveryPoint

325 Logical point on the network where the ownership of the service changes hands. It is one of potentially many service
326 points within a ServiceLocation, delivering service in accordance with a CustomerAgreement. Used at the place
327 where a meter may be installed.

Name	Type	Description
ID	*string*	Object identifier
name	*string*	Name of an attribute.

328 ### 8.1.14 ServiceKind *«enumeration»*

329 Kind of service.

Name	Type	Description
electricity		

330 ### 8.1.15 ServiceSupplier

331 Organisation that provides services to Customers.

Name	Type	Description
ID	*string*	Object identifier
kind	*SupplierKind*	Kind of supplier.
name	*string*	The human-readable name for the service supplier.

332 ### 8.1.16 SupplierKind *«enumeration»*

333 Kind of supplier.

Name	Type	Description
utility		
retailer		
other		

8.1.17 UnitMultiplier *«enumeration»*

The unit multipliers defined for the CIM

Name	Type	Description
k		Kilo 10**3

8.1.18 UnitSymbol *«enumeration»*

The units defiend for usage in the CIM

Name	Type	Description
VArh		Reactive energy in volt ampere reactive hours
Wh		Real energy in what hours

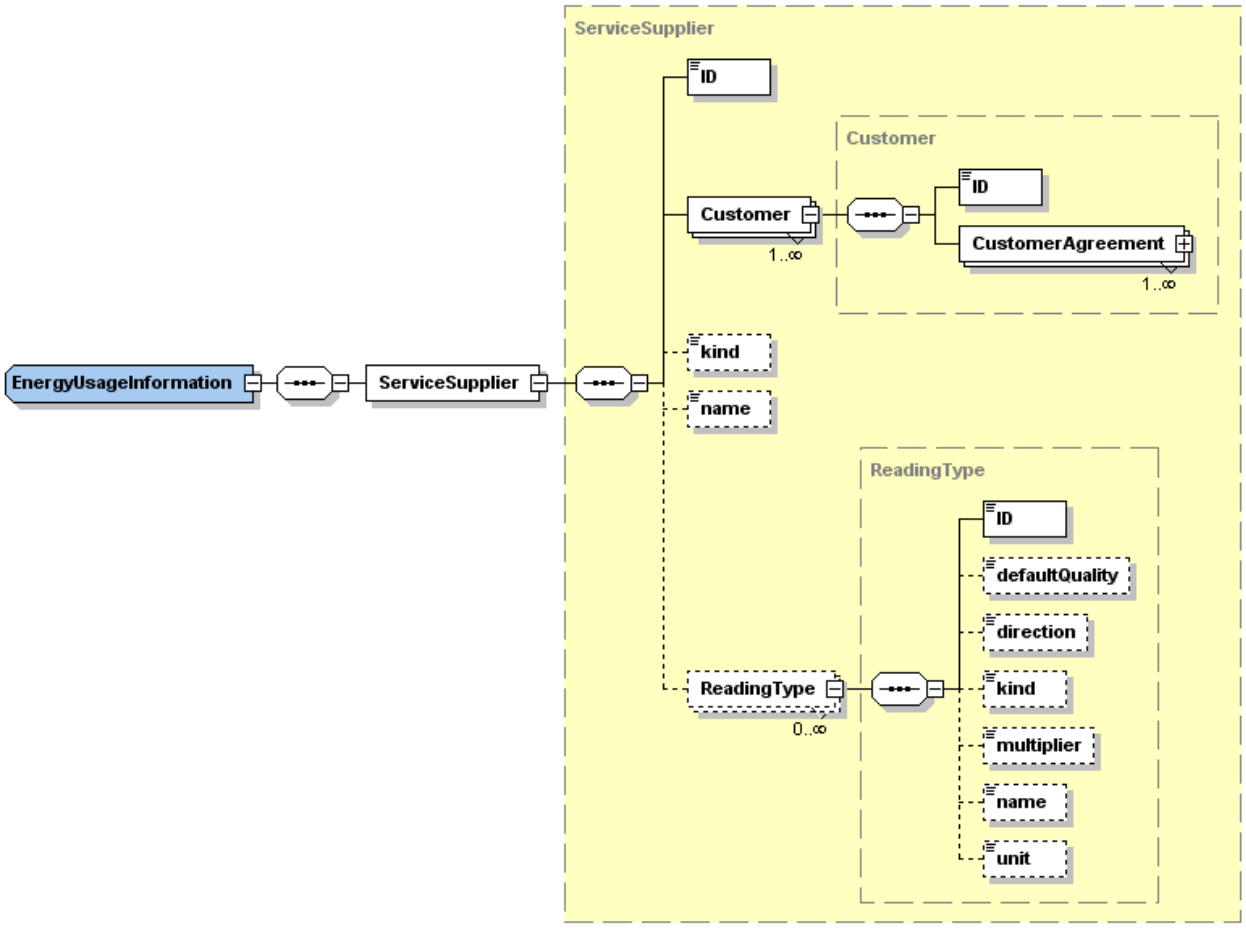
8.1.19 Customer

Organisation receiving services from ServiceSupplier.

Name	Type	Description
ID	*string*	Object identifier

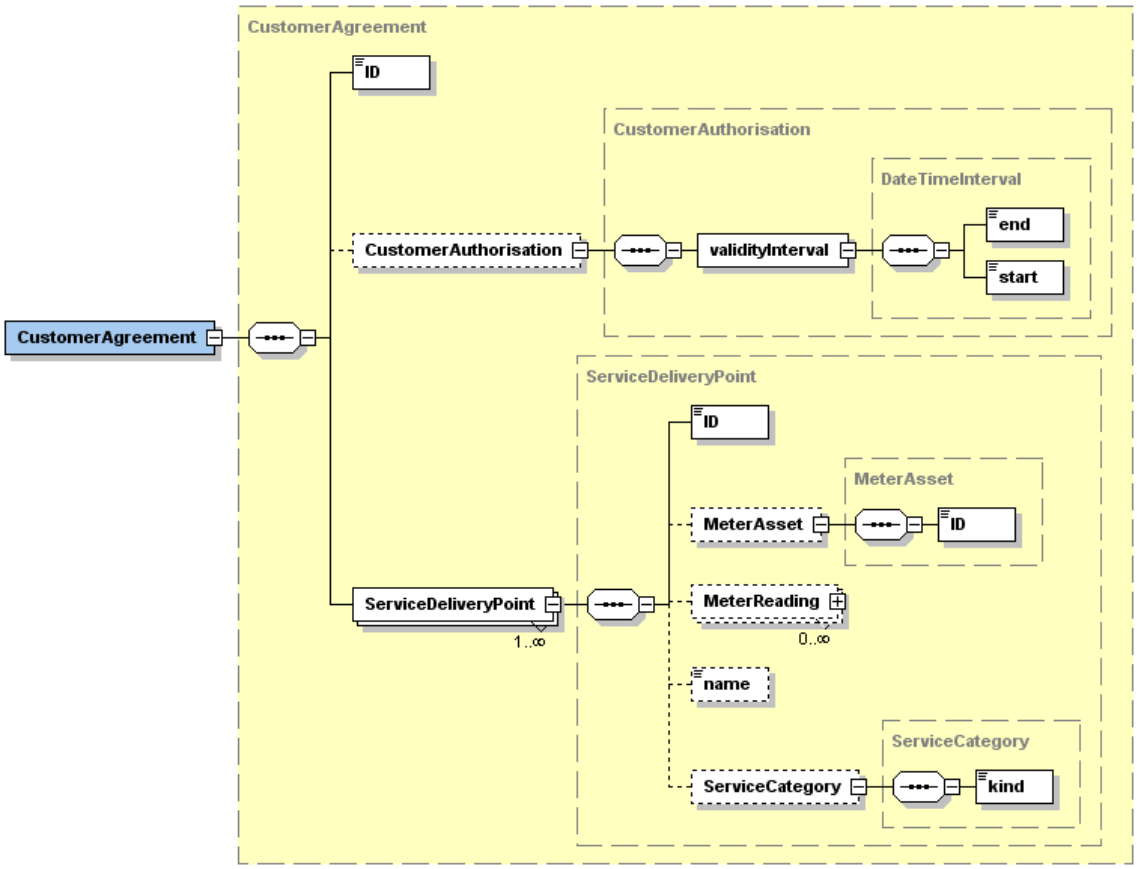
8.2 PHYSICAL SCHEMA DIAGRAMS

The XML schema for this resource is shown below.



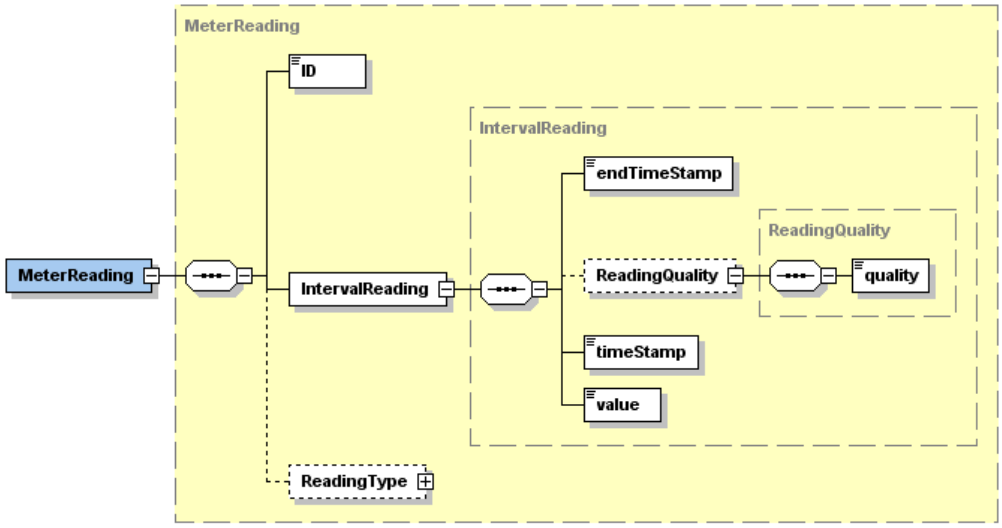
342

343 Figure 2: OpenADE Schema – Overview



344

345 Figure 3: OpenADE Schema – Expanded 1



346

347 Figure 4: OpenADE Schema – Expanded 2

9 APPENDIX A

9.1 CONSUMPTION XSD AND EXAMPLE

The files embedded below are the XML Schema Definition (XSD) described in this document, and the sample XML.

OpenADE-SampleMessage.xml OpenADE-Schema.xsd .

10 APPENDIX B

10.1 SUBSEQUENT ASSOCIATED REFERENCE DOCUMENTATION

Two reference documents were produced during development of this initial OpenADE guidance, to begin the specification of exchange mechanisms needed to orchestrate the flows of information required to implement the services, listed below and located in the OpenADE SharePoint document library.

- OpenSG OpenADE SD – REST
- OpenSG OpenADE SD – Web Services