# 1 Description of the Use Case

## 1.1 Name of Use Case

|  |  |  |
| --- | --- | --- |
| Use Case Identification | | |
| ID | Domain(s) | Name of Use Case |
| **D-11.1** | **Distribution** | **Power Quality Contracts** |

## 1.2 Version Management

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Version Management | | | | | | |
| Version Management Changes / Version | Date | Name Author(s) or Committee | Domain Expert | Area of Expertise / Domain / Role | Title | Approval Status  draft, for comments, for voting, final |
| Version 0.93  Updated use case numbering & naming in clustering list and use case description  Added short guideline on formulation of technical requirements and added priority indication to the technical requirements list | 24-8-2011 | Tim Sablon – ESMIG | Additional | AMI | Technical Assistant | For Comments |
| Version 0.94  Changed Secundary Use Cases: distinguish between reading of metrological or status meter data | 26-8-2011 | Willem Strabbing – ESMIG | Primary | AMI | Technical Director | For Comments |
|  |  |  | Additional |  |  |  |

## 1.3 Scope and Objectives of Use Case

|  |  |
| --- | --- |
| Scope and Objectives of Use Case | |
| Related business case |  |
| Scope | The scope of this Use Case is determined by the SM-CG functional reference architecture (SMCG Sec0041 DC) that describes the functional entities of the Advanced Metering Infrastructure (AMI) that is considered as the system used by defined external actors.  The objective is to take care that the consumer is correctly charged for his usage, by ensuring that all required information is at the disposal of the the actor responsible for the billing process (the Billing Agent) in a timely manner. |
| Objective |  |

## 1.4 Narrative of Use Case

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| Narrative of Use Case |
| Short description – max 3 sentences |
| The purpose of the power quality contracts enterprise activity is to enable a mechanism whereby energy service providers could lock in long term contracts with large industrial customers by providing service guarantees based on the quality of electric power supplied over a period of time. In return for signing a long term contract, the customer receives favorable long term rates as well as power quality performance guarantees from the energy service provider. This assures the industrial customer that the energy service provider will be responsive to their problems over the duration of the contract. |
| Complete description |
| **Industrial** *customers* are facing increasing energy costs and increasing competition. Energy service providers are facing increasing competitive threats from other ESPs in a deregulated environment. In order for industrial customers to lock in long term favorable rates and in order for ESPs to prevent customers from going elsewhere to obtain electric power, the concept of the power quality contract has emerged. In return for signing a long term contract whereby the industrial customer agrees to not seek power from other providers, the EnergyServiceProvider must guarantee a certain level of power quality and reliability. If the level of power quality and reliability is worse than an agreed upon level, the EnergyServiceProvider would owe penalty payments to the industrial customer. Therefore, the incentive exists for the EnergyServiceProvider to keep upgrading and improving the performance of the system. |

## 1.5 General Remarks

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| General Remarks |
| This Use Case is under development in the Smart Meter Coordination Group. Expected finalization of the work is Q1 2012. The Use case definitions are created with participation of all relevant CEN/CLC Technical Committees and will be forwarded to IEC TC8 for registration and maintenance. |

# 2 Diagrams of Use Case

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| --- |
| Diagram of Use Case |
|  |

# 3 Technical Details

## 3.1 Actors: People, Systems, Applications, Databases, the Power System, and Other Stakeholders

|  |  |  |  |
| --- | --- | --- | --- |
| Actors | | | |
| Grouping (Community) | | Group Description | |
| Energy Service Provider (EnergyServiceProvider) | | Provides the electric power | |
| Actor Name  see Actor List | Actor Type  see Actor List | Actor Description  see Actor List | Further information specific to this Use Case |
| Central Server | System | Downloads instruments located at service entrance of industrial customers under contract, accepts incoming calls from instruments, creates database of sag scores and calculates penalty payments. | Further information would go here. |
| Energy Service Provider | Entity | Provides the electric power | Further information would go here. |

|  |  |  |  |
| --- | --- | --- | --- |
| Actors | | | |
| Grouping (Community) | | Group Description | |
| Hardware and Software Vendors | | Provide instruments and software to enforce contracts | |
| Actor Name  see Actor List | Actor Type  see Actor List | Actor Description  see Actor List | Further information specific to this Use Case |
| Power Quality Instrument | Device | Captures and records power quality events and sends to central server | Further information would go here. |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Actors | | | |
| Grouping (Community) | | Group Description | |
| Customers | | Consumes electric power | |
| Actor Name  see Actor List | Actor Type  see Actor List | Actor Description  see Actor List | Further information specific to this Use Case |
| Customer | Person | Consumes electric power | Further information would go here. |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Actors | | | |
| Grouping (Community) | | Group Description | |
| Some irrelevant item | |  | |
| Actor Name  see Actor List | Actor Type  see Actor List | Actor Description  see Actor List | Further information specific to this Use Case |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Actors | | | |
| Grouping (Community) | | Group Description | |
| Customers | | Consumes electric power | |
| Actor Name  see Actor List | Actor Type  see Actor List | Actor Description  see Actor List | Further information specific to this Use Case |
| Some irrelevant item |  | Asklg;fjaflkgj |  |
| Some irrelevant item | Person |  |  |
|  | Person | fdlkgjdflkgj |  |
|  |  |  |  |

## 3.2 Preconditions, Assumptions, Post condition, Events

|  |  |  |  |
| --- | --- | --- | --- |
| Use Case Conditions | | | |
| Actor/System/Information/Contract | Triggering Event | Pre-conditions | Assumption |
| Central Server | “A” receives a request for periodic metering data for billing purposes. | Communication with the meter can be established.  The meter reading scheme and data collection scheme are available at HES level (optionally at LNAP & NNAP). | Some assumptions would go here |
| PQ Contract |  |  | An AMI Meter/Device is installed at the premise and operational. |
| Raw Power Quality Event Data |  |  | There is a valid contract between Consumer & actor A for collecting meter data |
| Some irrelevant item | Test validation of field |  |  |
| Some irrelevant item |  |  |  |

## 3.3 References / Issues

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| References | | | | | | |
| No. | References Type | Reference | Status | Impact on Use Case | Originator / Organisation | Link |
|  |  | CEN/CLC TC13 | IS |  | EN 62056-31:1999 Ed. 1.0, Electricity metering – Data exchange for meter reading, tariff and load control – Part 31: Use of local area networks on twisted pair with carrier signalling |  |
|  |  |  |  |  |  |  |

## 3.4 Further Information to the Use Case for Classification / Mapping

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| Classification Information |
| Relation to Other Use Cases |
|  |
| Level of Depth |
| **Primary (high**  **level) Use**  **Case** |
| Prioritisation |
| * Obligatory, must be supported by metering standards * Business need * To be finished in 2011   Final details might be different from country to country |
| Generic, Regional or National Relation |
| Generally applicable in Europe. Countries may add steps to include for example an extra access layer (such as DCC in the UK). |
| View |
| Technical |
| Further Keywords for Classification |
| Smart Metering, Meter Reading |

# 4 Step by Step Analysis of Use Case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Scenario Conditions | | | | | |
| No. | Scenario Name | Primary Actor | Triggering Event | Pre-Condition | Post-Condition |
| 4.1 | Normal | EnergyServiceProvider | A triggering event would go here | Must have adequate monitoring instruments pre-installed over a period of time in order to set up a baseline for calculation of penalty payments | **Must be able to create** sag score and penalty calculation from data collected as well as updating the baseline on a period basis |
| 4.2 | Alternative, Error Management, and/or Maintenance/Backup Scenario | EnergyServiceProvider | A triggering event would go here | Must have adequate monitoring instruments pre-installed over a period of time in order to set up a baseline for calculation of penalty payments | **Must be able to create** sag score and penalty calculation from data collected as well as updating the baseline on a period basis |
| 4.3 | None | Some irrelevant item | Test validation of row | Test validation of row | Test validation of row |
| 4.4 | None | Some irrelevant item | Test validation of row | Test validation of row | Test validation of row |
| 4.5 | None | Some irrelevant item |  |  |  |

## 4.1 Steps – Normal

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario | | | | | | | | |
| Scenario Name : | | Normal | | | | | | |
| Step No. | Event | Name of Process/ Activity | Description of Process/ Activity | Service | Information Producer (Actor) | Information Receiver (Actor) | Information Exchanged | Requirements , R-ID |
| 1 | Event Capture and Transmittal | Event Capture and Transmittal | If an **event** is triggered, the instrument calls back to the central server and the server downloads the data | CREATE | Power Quality Instrument | Central Server | Raw Power Quality Event Data | Customer / ESP |
| 2 | Sag Score Calculated | Sag Score Calculated | Based on events recorded, data is characterized and loaded into a database, then a sag score is calculated based on previously agreed algorithm | CREATE | Central Server | Customer | Sag Score | Customer / ESP |
| 3 | Penalty calculation | Penalty Calculation | Based on the previously agreed upon baseline or rolling average, the previous sag score is compared to the baseline and a penalty is then calculated | CREATE | Central Server | Customer | Penalty Payments | Customer / ESP |
| 4 | Sample read event | Sample read | This is simply a test case for checking the read method. | READ | Power Quality Instrument | Central Server | Some Data | Customer / ESP |
| 5 | Sample update event | Sample update | This is simply a test case for checking the update method. | UPDATE | Power Quality Instrument | Central Server | Some Data | Customer / ESP |
| 6 | Sample delete event | Sample delete | This is simply a test case for checking the delete method. | DELETE |  | Central Server | Some Data | Customer / ESP |
| 7 | Sample report event | Sample Report | This is simply a test case for checking the report method. | REPORT | Central Server | Power Quality Instrument | Some Data | Customer / ESP |
| 8 | Sample timer event | Sample timer | This is simply a test case for checking the timer method. | TIMER | Power Quality Instrument | Power Quality Instrument | Timeout Period | Customer / ESP |
| 9 | Some condition specified here |  | This is simply a test case for checking the repeat method. | REPEAT(5-8) | Power Quality Instrument | Central Server | Some Data | Customer / ESP |
| 10 | Sample report event | Sample report | This is simply a test case for checking the report method. | REPORT | Power Quality Instrument | Central Server | Some Data | Customer / ESP |

## 4.2 Steps – Alternative, Error Management, and/or Maintenance/Backup Scenario

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario | | | | | | | | |
| Scenario Name : | | Alternative, Error Management, and/or Maintenance/Backup Scenario | | | | | | |
| Step No. | Event | Name of Process/ Activity | Description of Process/ Activity | Service | Information Producer (Actor) | Information Receiver (Actor) | Information Exchanged | Requirements , R-ID |
| 1 | Event Capture and Transmittal | Event Capture and Transmittal | If an **event** is triggered, the instrument calls back to the central server and the server downloads the data | CREATE | Power Quality Instrument | Central Server | Raw Power Quality Event Data | Customer / ESP |
| 2 | Sag Score Calculated | Sag Score Calculated | Based on events recorded, data is characterized and loaded into a database, then a sag score is calculated based on previously agreed algorithm | CREATE | Central Server | Customer | Sag Score | Customer / ESP |
| 3 | Penalty calculation | Penalty Calculation | Based on the previously agreed upon baseline or rolling average, the previous sag score is compared to the baseline and a penalty is then calculated | CREATE | Central Server | Customer | Penalty Payments | Customer / ESP |
| 4 | Sample read event | Sample read | This is simply a test case for checking the read method. | READ | Power Quality Instrument | Central Server | Some Data | Customer / ESP |
| 5 | Sample update event | Sample update | This is simply a test case for checking the update method. | UPDATE | Power Quality Instrument | Central Server | Some Data | Customer / ESP |
| 6 | Sample delete event | Sample delete | This is simply a test case for checking the delete method. | DELETE |  | Central Server | Some Data | Customer / ESP |
| 7 | Sample report event | Sample Report | This is simply a test case for checking the report method. | REPORT | Central Server | Power Quality Instrument | Some Data | Customer / ESP |
| 8 | Sample timer event | Sample timer | This is simply a test case for checking the timer method. | TIMER | Power Quality Instrument | Power Quality Instrument | Timeout Period | Customer / ESP |
| 9 | Some condition specified here |  | This is simply a test case for checking the repeat method. | REPEAT(5-8) | Power Quality Instrument | Central Server | Some Data | Customer / ESP |
| 10 | Sample report event | Sample report | This is simply a test case for checking the report method. | REPORT | Power Quality Instrument | Central Server | Some Data | Customer / ESP |
| 10 | Some irrelevant item | Sample report | This is simply a test case for checking the report method. | REPORT | Power Quality Instrument | Central Server | Some Data | Customer / ESP |
| 11.1 | Some irrelevant item | Some irrelevant item | Test validation of row | X | f | dd | sdf |  |
| 11 |  | Some irrelevant item | Test validation of row | X | f | dd | sdf |  |
| 12 | Some irrelevant item |  | Test validation of row | X | f | dd | sdf |  |
|  |  |  |  |  |  |  |  |  |

## 4.3 Steps – ….

# 5 Information Exchanged

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| --- | --- | --- |
| Information Exchanged | | |
| Name of Information Exchanged | Description of Information Exchanged | Requirements to information data  R-ID |
| Raw Power Quality Event Data | Events and performance monitoring results captured by power quality instruments |  |
| Sag Score | Description of a Sag Score |  |
| Penalty Payments | Payments |  |
| Some Data | Description of some data |  |
| Timeout Period | Wait for a specified duration |  |
| Some irrelevant item |  |  |

# 6 Common Terms and Definitions

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| --- | --- |
| Common Terms and Definitions | |
| Term | Definition |
| Feeder Penetration | PV penetration is the rated capacity (KW) of the aggregated generation, including the proposed Generating Facility compared to the annual peak load (KW) as most recently measured at the substation or calculated for that portion of a public utility’s electric system connected to a Customer bounded by automatic sectionalizing devices or the end of the distribution line.  Units are % of peak on the feeder or portion of a public utility’s electric system  In Manuel’s discussions with the state, “Distributed Generation will be viewed by the rating of devices at point of common coupling.” |
| AMI | Advanced Metering Infrastructure. “AMI” for PNM for this project- refers to systems that measure, collect and analyze energy usage, and send information to the Customer through advanced electricity meters, via various communication media on request or on a pre-defined schedule. This infrastructure includes advanced electrical meters, communications, and Meter Data Management software.  The communication between the end use energy consumer and the utility is two way communications.  The AMI infrastructure and communications for the purposes of this project ends at the meter, which provides a Premise Interface to the Inverter or possibly the Home Area Network. |
| AMI Premise Interface | The Premise Interface is one of the communications radios “under glass” of the AMI Meter. (There are two radios built in to the AMI Meter. One is for the AMI System and is a longer range radio. The other is for the Premise Interface and it has a smaller range.) This interfaces to the Customer Inverter and the Home Area Network (if available). |
| Home Area Network | Any Customer side automation that can make use of utility signals to affect energy usage within the premises will be considered as the Home Area Network for this project. Home Area Network can affect DER, lighting, security, etc.  PNM will not own Home Area Network. |
| Smart Grid | The PNM perspective is that the “smart grid” is a grid that integrates the electrical grid with communications/ automation with a fully integrated IT infrastructure to enhance reliability, involve the consumer, and integrate distributed resources.  It is the seamless integration of the electric network, a communications network, and all the necessary software and hardware to monitor, control and manage the creation, distribution, storage and consumption of energy by any Customer type.  The smart grid of the future needs to be interactive, distributed, and extended to any consuming device. |
| Real Time Pricing (RTP) Model | An electricity pricing methodology that enables automatic Customer load response based on a pre-defined price matrix in response to a utility signal for hourly pricing. |
| Distributed Generation (DG) and Distributed Energy Resource (DER) | For this project Distributed Generation (DG) will be defined as utility or Customer provided photovoltaic generation or storage connected at the distribution voltage level (12.47kV) or service voltage level. Distributed Energy Resources (DER) on the other hand will include all Distributed Generation and demand response capability through the Home Area Network. |
| Electrical Storage | The definition for storage for this project will be considered electrical storage (providing a way to add electrons to the grid).  Alternate Scenario (and UC-3 – DR):  The definition for storage for this project will be electrical storage along with thermal storage (building envelop/thermal storage) and demand response techniques aligned with commercial and residential cooling and refrigeration systems in addition to innovative approaches to demand response aligned with data center energy consumption. |