

TECHNICAL DESCRIPTION OF THE SYSTEM

CONTENTS

TECHNICAL DESCRIPTION OF THE SYSTEM	1
CONTENTS	1
1. General description of the System	3
1.1. General information	3
1.1.1. Scope and system main characteristics	3
1.1.2. Software (s/w) language	3
1.1.3. General requirements.....	3
1.1.4. Main structure of the system	4
1.2. System operation.....	5
1.3. Normal operation	5
1.4. System capabilities.....	6
1.4.1. Meter data reading capabilities.....	6
1.4.2. Data sending to the meter capabilities	6
1.4.3. Data processing capabilities.....	6
1.4.4. System access and setting of operating parameters.	7
1.4.5. Data access.....	7
1.5. Requisite functions	7
1.5.1. Support of metering equipment.....	7
1.5.2. Software for remote data acquisition.....	8
1.5.3. Software for onsite data acquisition and meter parameterization	8
1.5.4. Software for additional capabilities.....	8
1.5.5. Export of data for their entry into the electricity bill issuing systems	9
1.5.6. Software for analysis, statistical purposes, and reports.	9
1.5.7. Data exchange between entities involved in the liberalized electricity market.....	10
2. Specific requirements for the AMM-MDM system	11
2.1. General Description	11
2.2. System components (modules).....	12
2.3. System Operatio	12
2.3.1. Customers - producers management	12

2.3.2. Management of metering points.....	12
2.3.3. Data collection - Communication - Management of telecommunications equipment.....	13
2.3.4. Metering data and load curve data management.....	14
2.3.5. Task scheduling - Process automation	14
2.3.6. System Users Management	15
2.4. WEB Application.....	15
2.5. Interface for tests	16
2.6. System security	16
3. Backup system.	17

1. General description of the System

1.1. General information

1.1.1. Scope and system main characteristics

The tender notice relates to the implementation of an Automated Meter Management (AMM) and Meter Data Management (MDM) system for meters of small enterprises and residential users.

The system shall be suitable for the acquisition of energy data for billing purposes and for processing of the metering data. The system shall also provide data relating to the system performance, enabling specific meter check applications.

The tender shall cover the design, supply, installation and commissioning of an integrated system, which shall be suitable both for Automated Meter Reading and Management and Processing of Energy Data, as well as for deducing results as described in the technical description. It shall include the delivery and installation of all hardware and software equipment required for system operation in order to meet the requirements specified in the tender notice issues.

1.1.2. Software (s/w) language

The user interface of all offered software shall be in Greek language. All reports and all system output data shall be in Greek language. The help file and the accompanying manuals shall be in Greek language. The technical manuals shall be in Greek language.

By exception, and with the consent of the supervising department, the manuals related to specific system software used for auxiliary operations (e.g. antivirus systems, etc.) may be in English language.

Training and all manuals related to the main daily workflow shall be in Greek language.

1.1.3. General Requirements

The system shall be based on standard software (which shall have already been developed and shall have been in commercial use in similar installations). The operating system shall be up-to-date and preferably in the most recent version, and suitable for applications of this size; the database shall be up-to-date and shall be selected by the manufacturer. The computer applications and the AMM and MDM software shall be of the latest version as developed by the manufacturer using a modern software development environment and programming language.

All software licenses required for system operation shall be included in the technical and financial tenders (e.g. operating system, server licenses, database licenses).

The data processing system shall ensure two-way data exchange with other systems using XML or ASCII files for the insertion and extraction of data, as well as API functions.

The two-way data exchange system must be compatible with the current computerized system (HERMES) of PPC S.A., with its successor system (SAP), as well as with computerized systems of alternative providers. The data exchange system shall be flexible enough to enable easy adaptation (at no additional cost) to future requirements, not only until the final acceptance of the project but also during the term of the maintenance agreement to be signed by the Contractor

following the final acceptance.

1.1.4. Main structure of the system

The system shall comprise separate modules to ensure the functionality and independence of its functions.

Separate modules are required for the following functions:

- Communication with the meters
 - Local / remote disconnection
 - Change of multiple tariff
 - Demand management functions
 - Limit Load Functions
- Data collection.
- Data management.
- System use.
- Online (Internet) communication
 - System supervision and monitoring
 - Fixed asset management
- Synchronization of the system time
- Real-time data recording on the In-Home Display (IHD)

The aforementioned list cites indicatively only the main modules of the system. The number of modules required for full System operation shall be defined in the study.

Both the Main System and the Backup System shall at minimum include six (6) operator workstations and two (2) system Administrator workstations. The communication connection of the Central and the Backup System shall be provided by the Contractor, after previously determining the requirements (communication speed, bandwidth, etc.)

1.2. System operation

The system shall implement two basic operations.

The first operation is the AMM (Automated Meter Management) application. Its main mission is to collect data from the metering points and to inform the meters using new software and multiple time-charge tariffs.

The system shall acquire data automatically, with no supervision, from all meters according to the technical specifications and the respective schedules.

The second operation is the MDM (Meter Data Management) application, which shall process data from the AMM and shall permit all necessary operations, such as data exchange with other systems, internal operations such as data totalized processing, data verification, replacement of any missing data, and preparation of reports.

The AMM-MDM system user licenses, both for each workstation, as well as any additional licences via the Internet, shall be included in the tender.

1.3. Normal operation

The data collection systems shall be competent to collect data. Guided by specific programmed schedules, the system shall perform data collection from all meters via preset communication channels (PSTN/ISDN or GSM/GPRS, etc.). The data resulting from this function shall be transferred to the main AMM-MDM system database.

The application shall automatically check the integrity of acquired data and shall

create a list and a corresponding report with all non-acquired or lost meter data. The AMM-MDM system shall check, validate and verify the data and shall automatically prepare all necessary reports according to its configuration. For any data that was not collected, was lost or has errors, a replacement procedure shall be in place, which shall be able to enter / insert data according to specific algorithms; such algorithms shall be thoroughly documented in the system study to be submitted.

It shall be possible for the users to access the data, depending on the access (security) level of the user group to which they belong. This shall enable users to create all types of reports or perform actions in accordance with their access level, and depending on the limitations imposed on them (geographical, administrative, etc.).

The acquired data shall be processed by the AMM-MDM system as specified and according to any user-defined tasks. It shall be possible to either print the results of data processing in the form of reports or to export them to other systems such as the energy suppliers billing system (HERMES, SAP, etc.).

Data export shall be performed in files with predefined format (e.g. ASCII, XML, CSV, etc.), and using APIs. The format of the data files shall permit automatic import thereof into databases of other systems.

1.4. System capabilities

1.4.1. Meter data reading capabilities

The system shall be able to read data from at least 200,000 meters per day. Such data shall include at least 2 load curves (profiles) as well as readings from registers (tariff data, events, energy quality data).

The period required for reading all such data shall be less than 8 hours (00:01 - 8:00).

The system, following a future upgrade, shall be able to read data from at least 8,000,000 meters per day. Such shall include 2 load curves (profiles) and readings from registers (tariff data, events, energy quality data). The period required for reading all such data shall be less than 8 hours (00:01 - 8:00).

It shall be possible to expand the system by adding suitable equipment in the 200,000-meter AMM-MDM system.

1.4.2. Data sending to the meter capabilities

The system shall be able to transfer software uploads to the meter and new tariffs, as well as to set meter functions (connection/ disconnection, etc.).

The data transmission speed shall be adequate to transfer data to all meters from the central system within less than 8 hours.

The functions of supply connection/ disconnection to the meter must be directly (in real-time) managed by the system.

1.4.3. Data processing capabilities

The offered AMM-MDM system shall cover the required number of load curves and registers programmed in each metering point. The system shall be able to read, group, compute, check, verify, replace and distribute data from 200,000 meters.

1.4.4. System access and setting of operating parameters.

The system shall be operated by users with different levels of access to its functionalities. The system administrators shall be responsible for defining user access levels and for creating different user groups by assigning different operational capabilities to each group.

It shall be possible to group the users and to provide group-level access to metering points determined by certain characteristics thereof, such as their geographic location, PPC administration division, energy supplier, type of meter point, etc.

Users should be identified by the system via a user name and a password.

Depending on the administrator-assigned capabilities, the users shall be able to set the system operation parameters.

System operation parameters shall be set by the system users. Suitable monitors / displays shall be available for management of the above settings. The contractor shall propose specific monitors / displays for the various operations and shall implement their installation upon approval by PPC.

1.4.5. Data access

Access to data stored in the system shall depend on users' access rights; such rights shall also determine the ability of users to transfer data to other systems.

It must be possible to access the system's saved data, even inside the database environment, ensuring that no changes are made to the data in the base.

No input or change of tariff data, load curve data and, in general, data that normally come from extraction from the meters, directly in the database, shall be allowed.

1.5. Requisite functions

The functionality, as provided for by the tender notice, shall be implemented in the system as follows:

1.5.1. Support of metering equipment

The AMM-MDM system, as a meter data acquisition tool, shall support a large number of meters of different types. It shall include the main meters available in the European market.

The AMM-MDM system shall support open communication protocols acceptable by CENELEC.

The list of data of low voltage customers which is required for the creation of a card for each customer concerning their integration into the AMM system shall be transferred in the form of file (open type eg. Csv) from the existing PPC's central system of customers.

1.5.2. Software for remote data acquisition

The AMM-MDM application shall include all functionality required for remote reading of meter data.

The possibility of safe communication between the metering points and the central system shall be ensured.

Furthermore, the system shall be able to adjust the meters' time (clocks), to reset billing periods. The above operations shall be performed in batch mode and it shall be possible to fully automate, monitor and integrate them for all metering points or for a selected number of metering points.

It is also important to describe in detail the system's ability to fill-in data (based on recommended algorithms) missing due to communication failure or temporary database malfunction, as well as all system's data safety devices.

1.5.3. Software for onsite data acquisition and meter parameterization

The Contractor shall provide software in portable devices for programming the meter via its optical port or/and data retrieval through the meter optical port. The remote data reading system shall be updated with data received from all newly installed or connected meters right after their installation. Furthermore, a software shall be provided for on site acquisition of metering data and their transmission to the central system. The software shall support all meters referred to in paragraph 1.5.1. "Support of metering equipment".

1.5.4. Software for additional capabilities

One feature of the system shall be its ability to support calculations for Energy Data Management (EDM) (also in real time, if required) and for the quality of supply, such as calculations for meter load curve sums for one or more than one area, identification of areas with low voltage quality, etc.

For example, it shall calculate the consumption curve and the voltage dip in a specific network area. Furthermore, if we have energy generated by RES in an area, it shall be possible to propose calculations, such as, e.g. subtracting from the energy injected the energy consumed by customers in this area, or a subtotal thereof.

It shall also be possible to consider as a virtual metering point the energy generated by a supplier or manufacturer in any area throughout the country, as well as the energy consumed by the customers of a given supplier or producer. For this purpose, each metering point shall be characterized based on the energy supplier or producer, or even based on the percentages of energy obtained from each supplier or producer so that the said calculations shall be performed automatically without user intervention. Given that these settings could change at any time, the software used shall be able to recognize/ support these changes, so that any charges can be easily calculated according to an analytical data history. This characterization shall be stored in a history file, enabling identification of each customer's supplier at any time.

Such virtual metering points shall be defined in the system, and their load data shall be available at any time in the same manner as the data from the actual metering points of the network.

Such virtual metering points must provide load data from grouped metering points at least for the following:

- All Regions of PPC S.A.
- All Areas of PPC S.A.
- All energy suppliers-producers, grouped by PPC S.A. Region and/or Area.

It is important to ensure that adequate processing power and memory shall be available at any time, in order to perform all these operations smoothly and without significant delay.

1.5.5. Export of data for their entry into the electricity bill issuing systems

The system shall be able to extract data from meter registers and from the load curve, taking into account the tariff schedule structure, which may be different between energy and power, or between active and reactive energy. All calculations shall take into account other factors as well, such as the transformation ratios. It shall be possible to automatically insert the results of such calculations into the electricity bill issuing systems. If it is required to adapt the format of the data for automated data transfer, such adaptation shall be made by the Contractor.

1.5.6. Software for analysis, statistical purposes, and reports.

It shall be possible to analyze and compare each load curve against history data for each metering point or against other existing statistical data for the said metering point.

The software shall be able to perform analytical processing and it shall contain algorithms for data checking via comparisons with specific models, or verification meters or/and via comparison with history data used for detecting e.g. possible power misappropriations.

1.5.7. Data exchange between entities involved in the liberalized electricity market

The system shall include features which enable the exchange of data with other entities or Services (e.g. RAE, IPTO, Operator of Electricity Market, Ministries, etc.). A typical data transfer mechanism shall be e-mails or similar exchange of files or API.

The Contractor is obliged to provide a convenient mechanism (e-mail server) enabling the user to create email messages that will be sent automatically by the system in case one or more situations (events) occur. These messages shall include a file (files) with the data to be transferred. The system shall have the possibility of signing messages through a certification, of sending messages, of handling different formats and recording all actions.

There shall also be the possibility of free formatting of data and messages, enabling adaptation thereof to the standardization requirements of the various involved entities.

The possibility of interconnection with other systems via SOA, API, supported by technologies of planning which are widely available (eg. Java, Net etc), in order to enable the quick, flexible and safe exchanges of data among the partial systems participating in the solution.

2. Specific requirements for the AMM-MDM system

2.1. General Description

The AMM-MDM systems can either be a single product or two separate applications that operate together in a manner transparent to the user, with a single interface.

It must operate using a modern operating system both for the central system and for the users' workstations. The system shall be able to manage and supervise data acquisition from the meters and subsequently store such data in a modern relational database. The data shall be available on line to the users for a period of 5 years at least. For history data collected prior to five (5) and up to

twenty (20) years ago, their permanent automatic save shall be provided at a suitable saving medium, as well as the procedure of data retrieval if required. The network architecture and user access via terminal stations shall be based on modern established standards.

The system shall be designed for fully operational implementation with 200,000 meters, with provision for expansion to 8,000,000 meters.

The architecture shall be fully scalable, enabling:

- Easy integration of additional system workstations.
- Easy integration of additional system users.
- Easy integration of additional devices for communicating with the meters.

It shall be possible for many users to be connected with simultaneous access to data and system services.

Both at the operating system level and application level, user's critical actions shall be confirmed prior to execution.

Moreover, the offered system shall support a flexible data model with versioned data and full possibilities of control in order to reinforce the possibility of data protection. Moreover, the system offered shall support a flexible data model with versions and full capabilities of control in order to reinforce data protection.

The system shall permit automation of all processes, enabling the data to be sent in the standard format required by the billing system or by any other involved entities. The application shall have a modern graphical user interface (GUI). This interface shall follow the operational logic of the Microsoft Windows operating system interface, which is familiar to most users. This facilitates users' training.

Another important feature is that it allows the user to schedule automatic data acquisition at predetermined times and intervals and through predefined communication channels, as well as automatic data extraction.

2.2. System components (modules)

The basic functional entities of the system shall operate in separate operational units. This means that separate servers shall be provided (indicatively and not limited) for:

- Two-way communication with meters
- Database management.
- Web Applications.
- Application servers.

The system shall operate harmoniously as a whole and any upgrades thereof shall not disrupt its overall operation.

2.3. System Operation

2.3.1. Customers - producers management

The system shall have a database including customers - power producers. Any customer or producer may have one or more meters. Historical measurement data from older meters that have been replaced must be kept.

The import - update of customer and producer data shall be carried out automatically, by inserting such data from other systems-databases containing the required information. It shall be possible to selectively perform such updates for individual fields and/or individual customers or producers.

The system shall group customers according to various user-selected features

thereof.

2.3.2. Management of metering points

The system shall have a database including all metering points. For each metering point the following data shall at minimum be stored, as well as any other data resulting from the system study:

- Customer number (ID) or unique number of metering point
- Meter number
- Telecommunication connection details (e.g. telephone number, IP address, GSM/GPRS signal power)
- Installation date
- Customer name, address, contact, pictures, geographical coordinates
- Transformation ratios
- Contracted power, meter seals
- Metering point status
- Suppliers and percentages/rates
- Customer history
- Other data, comments.

For many of these items, depending on the study, a history of changes shall be stored.

The metering point data (and the customer-producer data) shall be displayed in tree format, which shall be created automatically according to the characteristics of each metering point (and the characteristics of customers - producers respectively). Therefore, the user shall not be responsible for maintaining the tree structure since it shall be automatically updated when the characteristics of the meter point change. The user shall be able to select the type of the displayed tree structure, and several preset types shall be provided, such as:

- First level: Administrative division (Region, e.g. DAA)
- Second level: A more analytical administrative division (Area, e.g. Athens area)
- Third level: Supplier (e.g. PPC)
- Fourth level: Billing period end day (e.g. 15th day of the month)

Indicatively, some of the metering point characteristics that can be used to define levels are:

Geographical location, Administrative division, Supplier, Type of supply, Transformation ratio, Customer type, etc.

Alternatively, the display of metering points shall be carried out with the use of any user-friendly optical means, so long as it has advanced, user-friendly possibilities of finding, selecting and filtering metering points.

The aforementioned elements must be determined in detail in the system design and be implemented in a way providing the necessary flexibility to enable their modification if other requirements arise in the future.

2.3.3. Data collection - Communication - Management of telecommunications equipment

The system shall support different transmission networks for communicating with the meters and collecting data from them. It must support communication at least using the following technologies:

- PSTN-ISDN
- ISDN

- GSM 900/GPRS
- GSM 1800/GPRS
- GPRS
- TCP/IP , ADSL, SHDSL

The system shall perform meter reading operations with the most well-known open modern communication protocols.

The communication protocol selected by PPC S.A. for its already installed electronic meters is EN62056 and the system offered shall obligatorily support this protocol.

The main feature of the system shall be its ability to support a wide range of meters. It shall be possible to integrate new meters in the system by installing their respective drivers.

The collection of meter data is possible to be effected through their acquisition from other systems (using the respective manufacturer's software) and then to automatically insert such data into the AMM-MDM system.

Furthermore, the system shall be able to insert data from the following sources:

- Other available files
- Other AMM-EDM systems
- Data entered by the user

It shall be also possible to automatically insert data acquired from the meters using portable devices (e.g. handheld, laptops, netbooks).

The Contractor shall provide appropriate software for onsite data acquisition from the meters, portable devices and portable modern computers.

The acquisition and transmission of data to the central system shall be made automatically from the portable devices, without specialization from the part of their operator.

2.3.4. Metering data and load curve data management

All metering data shall be verified before being processed by the system.

All data shall be certified by the system, as provided for by the applicable standards and the current legal framework.

To this effect, suitable checks shall be performed in order to:

- Verify data identity
- Ensure data completeness
- Fill in the data
- Check data reliability

The system shall be able to process all data that may be provided by the meters, such as:

- Energy data
- Tariff data
- Load curve data
- Calendar data
- Energy quality data
- Event data (alarms, log files)
 - Meter status data etc.
 - History data

The system shall be able to give remote commands to the meters for basic operations, such as clock synchronization, connection/ disconnection and termination of billing period.

The system shall be able to process the certified data and to perform user-defined calculations.

The system shall be able to perform complete statistical processing of the energy quality data and provide results in the form required by each involved entity and by the law, either for individual customers or for customer groups.

The data of the metering points shall be analyzed in different tariff zones and to this effect the system shall be able to process the load curves.

The system shall plot load curve graphs using different colors for the various tariff zones. The graphs shall be able to provide details for the energy or power, and it shall be possible to perform different types of analyses per different periods of time.

The system shall support the output of processed metering data and shall include the necessary functions for the delivery of such data.

It shall be able to:

- Group the data to be sent, depending on the recipients.
- Configure them in the requisite data form of the recipient.
- Choose the data transmission method.

2.3.5. Task scheduling - Process automation

The system shall be programmed in order to perform automatically most of the work, minimizing user intervention as much as possible.

The data shall be mainly acquired from the metering points between 00:01 and 08:00.

Any attempts to acquire the metering data again due to previous failures shall be automatically programmed and executed. For all meters that did not eventually communicate with the remote reading center, failure reports shall be automatically created (e.g. low signal level); such reports shall be automatically sent to the department responsible for restoring the failure (e.g. Telecommunications Provider, PPC Area or Region).

The billing data and/or load curves shall be automatically extracted in the appropriate format and shall be automatically sent to the responsible entities in the specified format and via the specified medium. The system shall automatically detect any problems in the metering devices (meter malfunction, voltage dip, current imbalance, etc.) and shall create reports in predefined formats and send such reports to predefined recipients.

During automatic execution of the system functions, if deemed as necessary, a usercontrol and intervention stage shall be included (e.g. in order to avoid delivery of a communication failure report if it is known that the problem is due to the telecommunications provider in a given area).

The system shall also be able to remote control (open/close) the meter's output contacts for purposes of load management in certain Customer's circuits or for simple reading of the tariff zone, etc.

It shall also be able to manage the incoming alarm events, such as meter tampering etc.

2.3.6. System Users Management

System users shall be able to access the system via terminals connected with the servers through a LAN.

It shall also be possible to access the system remotely via VPN (Virtual Private Network).

Limited capacity to access the system shall be also provided via the Web

application.

Each user will have access rights depending on the group to which he/she belongs.

The system administrator shall define the access limits for each group and / or user. These limits define both the scope of access to the system data (which system elements shall be visible to the user) and the user's operational capabilities (which elements can be added, modified, deleted, executed by the user).

2.4. WEB Application

The system shall provide data access via the Internet, through appropriate equipment.

For external users who may have access via the Internet, a suitable security system shall be provided.

To ensure a higher security level for the center and its data, the web application shall not have direct access to the system's database.

Data access shall be permitted for the following:

- Each customer, for his load curve and tariff data
- Any parties/entities involved in the energy market
- Additional authorized PPC S.A. staff not belonging to the system operators.

A special application shall be provided for the customers and all involved parties/entities enabling them to access the energy quality data.

Indicatively, it is mentioned that this application shall include the indices SAIDI, SAIFI per metering point, geographical area etc.

The level of access of each customer to his data may be modified in batch mode depending on the grouping to which the customer belongs.

The software shall be installed in a different computer for security reasons and shall provide user access based on passwords.

Depending on the access levels provided to the users, they shall be able to:

- Monitor register data
- Display in graphs the load curves and the supply quality data
- Receive data in a standard format

The system shall be capable of sending messages, defined by PPC, to the users of Web application, as well as to the In Home Displays.

A special application shall be provided for management of Internet users; this application shall enable the user to change his/her personal password, and to be notified via email with a valid password in case the password is incorrect or lost.

The Contractor is obliged to ensure that the equipment has adequate computing power and bandwidth in order to serve the simultaneous access of a large number of customers via the Web application, without affecting normal operation of the Remote Meter Reading Center.

The calculation of required computing power and network bandwidth shall be based on a study, taking into account the total number of customers served by the Remote Meter Reading Center.

An appropriate interface between the Web application of the telemetering system and other applications, the application for the In Home Display, as well as smart phone applications, shall be provided so that the Customer can be also served by them.

2.5. Interface for tests

The remote meter reading center shall operate uninterruptedly in order to meet its objectives. At the same time its operation shall constantly be improved, and the system must be upgraded following any technological advances.

For this purpose it shall be possible to perform tests, either for installing new software versions or modifying the configuration of each version, in order to optimize performance. It shall also be possible to include - evaluate new applications, such as pilot LV applications, applications for new meters and combined operation with other metering systems (water, natural gas supply).

In other words, a separate interface shall be provided in the main and backup systems, where it shall be possible to carry out all required tests without affecting the normal operation of the Remote Meter Reading Center.

2.6. System security

The AMM-MDM system shall be equipped with all necessary protection devices against:

- Physical threats (fire, high temperature, over voltage, power failure).
- Unauthorized access.
- Malicious actions of Internet users.
- Erroneous actions of its users.

For the aforementioned reasons, the system must be equipped with all modern security systems, such as: Air conditioning, UPS, Firewall, Backup, antivirus, fire detection and fire protection, monitoring of Center's operating conditions (supply voltage, temperature, humidity, etc.) and administrator notification (by SMS, e-mail etc) in case of trouble.

The system shall also ensure that its data remains secure in cases of human error (ability to retrieve data in case of error in operations - deletes).

The Contractor shall submit a Security Architecture Study for the system. The target of this study shall be to record all technical and operational requirements and to design according to them a suitable security architecture both at the network and systems level and at the Web application level. The study shall ensure that all significant security parameters have been included in the implementation specifications of the overall IT system (Security by Design).

The Contractor is required to develop and implement Secure Configuration Guides. Thus it shall be possible for the system to be configured according to certain rules and optimum security practices. The target is to develop technical guidelines for secure configuration of all modules constituting the System and to implement thereof in the system prior to its integration in the production. In particular, safe configuration guidelines shall be developed and implemented at minimum for the following:

The databases

The Internet servers (e.g. IIS X.X Secure Configuration guide, Apache X.X Secure Configuration guide etc.)

The operating systems where the databases shall be hosted, and the Internet servers. The Firewalls

Prior to the integration of the system in the production, it is required to perform Penetration Tests, both at the system and network level (System & Network Penetration Test) and at the Web application level (Web Application Penetration Test). The profiles emulated by the Penetration Tests shall be at minimum:

1. System & Network Penetration Test:
 - a) External user without access rights
 - b) Internal user without access rights
 - c) Internal user with access rights

2. Web Application Penetration Test
 - a) User with access rights
 - b) User without access rights

Prior to the acceptance of the system it is also required to perform a Source Code Review.

The Contractor shall submit a system security manual describing in detail the procedures that should be followed to ensure that system security is in case reduced.

It is also considered significant to ensure the whole system's compliance with the guidelines relating to the protection of customers' personal data.

3. Backup system.

Since the system is considered critical for the operation of PPC, a reserve system shall be in place for emergency cases.

Therefore, a backup system shall be provided; this system shall be installed in a different building from the main system, and shall be ready to operate as main system if required.

To this end, the two systems are required to communicate, either in real time or at regular intervals during the day, in order for the backup system to remain updated and able to functionally replace the main system in case of an emergency.

An automated replacement scenario shall be in place and shall be ready to be implemented when necessary.

The backup system shall possess all the capabilities of the main system and shall be able to operate as main system within 24 hours following the decision for its conversion into main system.

At the end of the incident that required the backup system to operate as main system, an automated process shall exist for restoring the main system to normal operation following its update from the backup system with all data stored in the latter.

The backup system shall return to its normal operation as reserve system. The switch to normal operation for both systems shall be performed with the least possible interruption in their operation and in any case within less than 24 hours.