



Building Automation, Energy Management & Reporting System



Guide Specification



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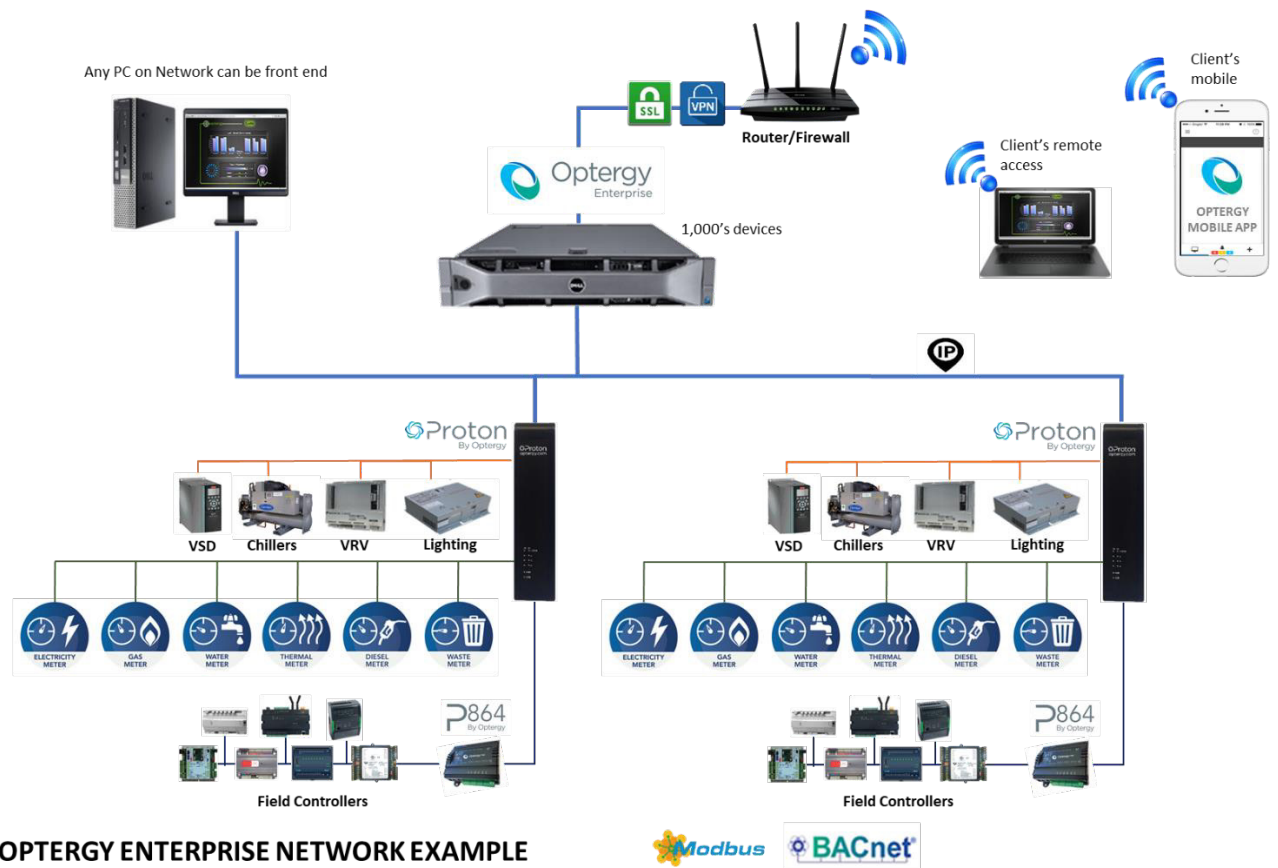
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1. GENERAL REQUIREMENTS



Optergy Enterprise is software only, downloaded from the Optergy support site. Hardware recommendations in Section 5 of this document.



The software shall provide the means to interface with the building automation field controllers and energy monitoring devices.

The software shall comply with the following requirements:

- Provide access to all functionality via a standard web browser over the internet
- Utilize a PostgreSQL database
- English language support with context sensitive help
- Factory provided e-learning (online training course)
- The communication protocols supported at a minimum shall be:
 - BACnet MSTP
 - BACnet IP
 - Modbus RTU
 - Modbus TCP/IP
- System shall reside on a LAN or WAN
- Users shall connect to using an on-board VPN (virtual private network) when using an internet connection to the system
- System shall require username or password authentication and can automatically manage the authorization or expiration of users
- Software shall support user and group authentication with the ability to restrict users or groups to only the actions an administrator allows
- The software will allow for custom graphics to be displayed complete with animations and the ability to view data in real-time
- Configurable automated system backup and/or on-demand
- Configurable file transfer using FTP or SFTP (file transfer protocol and secure file transfer protocol)
- Automated remote file transfer
- Report and trend log export to PDF (graphical) or CSV
- Communication with uninterruptable power supplies in order to perform orderly shutdown of operating system. Compliance of this will be via NUT (Network UPS Tools)
- <http://www.networkupstools.org>
- The software will have the ability to be pre-engineered and configured prior to set up and on site commissioning
- Software shall be easily identifiable via version number
- All software updates shall be made free and available for the period of the warranty/defects and liability period
- Will support an Application Program Interface (API) for third party integration trend logs, energy logs, users and groups
- The software shall be able to log maintenance requests
- The software shall have a companion mobile app for IOS and Android devices

2. LICENSING

- A license file page shall allow license files to be installed and show what functionality the current license enables
- System Hardware Key
 - The software shall generate a unique key for the hardware on which it is installed
 - The System Hardware Key shall be checked against license files on installation to ensure only a license file for the unique machine is being installed
- From the license page the user shall be able to download a copy of their license details in xml. format
- If there have been any previous licenses installed the software shall display a drop-down box. This box shall allow to select any previous license files to view and re-install if required. When re-installing a previous license the currently installed license shall become part of the previous license list and be available for re-installation in the future
- The software base licensing shall be a once off purchase and be perpetual with no subscription or annual fees
- The software shall have free regular updates including new features, improvements and bug fixes
- The software shall be upgradeable incrementally with additional features
- The software shall have the ability to remotely upload and download the license file through a web based GUI
- Once a license has been installed, the license and all of its inclusions shall be displayed on screen. If there are any trial features currently installed they shall appear similar on screen but shall also have a trial end date listed. Trials with more than a week to go shall be displayed in black. Trials with less than 7 days to go shall be display in maroon and those trials that have already ended shall be displayed in red
- The software shall be licensed by “devices” and not “points”
- The software base license shall include 150 devices, with additional device options available
- The software shall be scalable to incorporate 1000’s of devices
- Each device shall be counted as 1 device irrespective of how many points are integrated from that device. Devices shall include the follow:
 - Programable Logic Controllers (PLC’s)
 - Physical meters
 - Electrical
 - Gas
 - Water
 - Thermal (chilled and hot)
 - Diesel
 - Virtual meters
 - Aggregate meters
 - Apportion meters
 - Calculation meters
 - Manual meters
 - Forecast meters

- End of line sensors and actuators which are physically wired into binary inputs/outputs or analog inputs/outputs shall not be included in device count. Any device that communicates through BACnet or Modbus shall be included in device count

3. SYSTEM STATUS

- The software shall display through the GUI the following information at a minimum:
 - Software, webserver and Java versions
 - Hardware specifications including CPU and RAM
 - list of the partitions, size, space used, space available and percentage of the disk space used
 - The CPU (central processing unit) shall show the utilization of this system. As the load on this system increases so will CPU utilisation
 - Memory showing the amount of RAM that is currently being used
 - Network RX showing the amount of network data the system is receiving measured in Kilobytes Per Second
 - Network TX showing the amount of network data the system is transmitting measured in Kilobytes Per Second
 - Locally Hosted BACnet Objects
 - The counts of schedules, trendlogs, and alarms in the system
 - Current Devices Count
 - The total count of physical devices, meters, and unique unit virtual points in this system
 - Number of Hosted Alarms
 - Hosted on Analog Input 2400
 - Number Active Acknowledged Alarms
 - Hosted on Analog Input 2401
 - Number Active Unacknowledged Alarms
 - Hosted Analog Input 2402
 - Number of Events Today
 - Hosted on Analog Input 2403
 - Number of Events Yesterday
 - Hosted on Analog Input 2404

3.1. Portal Status Report

- The portal status report shall allow for portal status information to be emailed to particular users on a regular basis
- The software shall allow the user to select the pieces of information that are to be included in the status report:
 - Disk Space – shall detail the storage capacity for each disk partition
 - High Level Activity List - shall provide a brief summary of the number of distinct user interactions
 - Frozen Emails – shall provide a list of frozen email jobs that have been unable to be sent
 - Raised BACnet Alarms – shall provide a list of all the BACnet alarms that have been raised during the specified time period
 - Raised Meter Alarms - shall provide a list of all the meter alarms that have been raised during the specified time period

- Meter Status – shall provide a brief summary of each selected meter

3.2. System Maintenance

- The system maintenance page shall provide features for maintaining performance and operation including at a minimum:
- Optimise Database:
 - This feature shall optimise the statistics in the database, and can help improve on database performance
- Rebuild Database:
 - Shall reset the database to factory settings for the currently installed version, including trendlog and energylog data. When performing this action, the option shall also be provided to clear the user activity log
- Factory Reset
 - With the exception of the network settings, everything thing is deleted or reset to factory defaults (for the currently installed version). Specifically, it shall:
 - Clear all data in the database, including trendlog and energylog data
 - Delete all display files, user images, spectrum overlays, software updates, scrolling displays, log files, temporary files
 - Reset all system configuration settings, except for network settings
 - Remove all log files produced by the software

4. BUILDING AUTOMATION

4.1. Web-based Access

- The software shall be accessible via a web browser and be located on a local area network, a wide area network or the internet.
- The software shall allow an unlimited number of users to be assigned within the system.
- The software shall allow an unlimited number of concurrent web requests subject only to network bandwidth and hardware resources.
- No software plugins shall be required to be installed on the web browser used for access.
- The web presentation shall include a dynamic graphical user interface (GUI) with access to all historical data.
- All graphic displays and programming tools shall be built in allowing local and remote engineering and commissioning using a standard web browser through single sign on.
- Control programming shall be viewed and made live on demand using a standard web browser

4.2. System Navigation

- The software shall allow navigation via PC input device such as a mouse or touch screen.
- System menus are configured based on user, role and permission.
- The system shall have a search field to quickly filter and navigate menu options.
- The system shall have bookmarks to quickly navigate to any display or internet available web page.
- The system shall be able to embed web page links or images into custom displays using common URL links.

4.3. User Authentication and permissions

- Each user shall have a password and user authentication shall be enforced on log-on to the software.

- Users shall be able to be assigned to one or more permission groups which define access permissions.
- A user shall have defined access to each point and be able to specify read, write and modify levels where a data point is accessible.
- A permission group shall define access to display and the ability to add or modify users.
- The software shall have the capability to assign password change permissions and expiry date on a per-user basis.
- The user will be logged out automatically if there has been no activity after a predefined period of time.

4.4. Security

- The system shall support remote connectivity via a free open VPN connection.
- The software shall produce a client.ovpn certificate for authentication.
- Users shall connect to the system using an on-board VPN when connecting via the internet.
- The software shall regenerate the client.ovpn certificate every time the Public IP, Ports, or Protocol in the VPN Configuration is changed.

4.5. Data Storage

- Data shall be stored in an SQL compliant database adhering to as a minimum ANSI-SQL 92/99 standard.
- Data retrieval and archiving shall be an automatic function within the software and easily selectable and extracted via the user interface.
- Provide hard disk storage for minimum of 5 year's storage of trend log data and energy data including other meter parameters.
- Provide software database to create and maintain all meter data and parameters as BACnet objects. These BACnet objects shall be accessible from any BACnet system.
- The system shall include at a minimum a 120GB Solid State Hard Drive for long term data storage.

4.6. Alarm, Event and Trend Log Notification

- The software shall be able to receive BACnet alarm and event notifications and store these in the database in a BACnet format. This shall include the priority assigned to the notification.
- Where the notification is a trend log buffer-full notification, the software shall be able to read that trend log buffer from the BACnet system and store it in the database in BACnet format.

4.7. Alarms

- The software shall have the ability to create and edit BACnet alarms.
- The software shall allow users to view and respond to alarms.
- Users shall be able to view a list of all alarms, with the ability to acknowledge and or clear.
- Alarm escalation shall occur after a user configurable time period.
- Alarms summary shall be viewable on a summary toolbar.
- Alarm summary page shall have quick links to a custom graphic display.
- Alarms shall be made available on a companion mobile app for IOS or Android.
- Meter alarms shall be configurable, viewed and acknowledged through the user interface.
- Meter alarms shall be configurable with the following criteria at a minimum:
 - Grouped by user, group or meter.
 - Notifications shall be emailed or SMS (Short Messaging Service) messaged.
 - Meter status:

- Offline.
- Online.
- Meter parameter:
 - Consumption changes.
 - Instantaneous changes.
- Time of day consumption.
- Day of week and time delay.
- The system shall be capable of “alarm reporting” in report format (PDF) and searchable by the following criteria:
 - Date.
 - Message text.
 - Acknowledgment state.
 - Alarm state.
 - BACnet alarms:
 - Device.
 - Object type.
 - Object instance.
 - Meter alarms:
 - Meter.
 - Meter alarm type.
 - Meter alarm parameter type.

4.8. SMS Alarming

- The software shall allow the transmission of alarms via GSM network in the form of SMS. The communication via SMS shall be two way communication and will be capable of receiving acknowledgements via SMS.

4.9. Alarm Escalation

- The software shall allow the ability to receive acknowledgments of alarms, if alarms are not acknowledged the software shall have the ability retransmit alarms to the any number of predetermined recipients after a user defined time period has elapsed. A minimum of 12 escalation levels shall be supported.

4.10. Trend logs

- The software shall have the ability to create and edit trend logs, including BACnet compliant trend logs, this includes trend intervals and number of stored trend logs before archiving.
- The software shall also allow users to view trend logs in graphical form. Trend graphs can be modified to view multiple trends on one graph. The time period of the graph shall be adjustable.
- Trend views are trend logs with contextual information which can be saved as a snapshot in time. The software shall allow trend views to be saved and updated at a future point in time.
- The software shall allow for the following Graph Options:
 - Title: Title of graph that appears at the top of the page.
 - Show time period: This option determines if the graph time period will be displayed as a sub-heading e.g. 01/01/2013 12:00 AM - 07/01/2013 12:00 AM.
 - Shared Y-Axis on each point: Allow all trends displayed on graph to share the same Y axis, instead of having individual.

- Y Axis size: The software shall automatically determine the minimum and maximum Y axis value so as to display the graph at the highest resolution. Users shall have the ability to set a minimum and maximum Y axis if they choose.
- Zoom: The software shall allow users to select an area, zoom in on trend views and back out again.

4.11. BACnet Data Access

- The software shall be able to access BACnet data points in attached BACnet building automation controllers. If the BACnet point is writeable, then the software shall support writing user-entered data to the BACnet point.

4.12. Schedules & Calendars

- The software shall have the ability to create and edit BACnet schedules. These shall include standard weekly schedules, holiday schedules and special event schedules.
- The software shall also support calendars. Multiple schedules can be linked to a calendar. The calendar may have entered items like public holidays or special events that will override standard schedule entries.

4.13. Touch Screen, Kiosk and Scrolling Display Support

- The software shall support foyer display, kiosk and touch-screen systems which can be used for passive or interactive communications with specific building users, such as tenants, or the general public.
- The software shall support connecting a monitor, keyboard and mouse for the purpose of using the combined hardware and software as a user interface to the system for monitoring, engineering and control of the system.
- The software shall support scrolling displays being a list of accessible URLs which are displayed in order for a predetermined time similar to a slide show. The software shall support an unrestricted number of scrolling displays on a per-user basis.
- The software display source shall support:
 - Custom URL's
 - Custom Displays
 - Meter Displays
 - Bookmarks
 - Dashboards
 - Utility Reports
 - Embedded Video (e.g. Vimeo)
- The scrolling display support menu shall support manually navigating the displays, pausing and pinning the control menu.
- The end user shall have the ability to create scrolling displays, edit the content, set the timing and order.
- Any content in the system shall be able to be used as a scrolling display.
- The system shall be capable of supporting video output using HDMI or Display Port and VGA.

4.14. Weather Station

- The software shall be capable of communicating with a physical weather station. The weather data shall be made available via BACnet so as to be shared with other building services.

4.15. Online Weather Information and Weather Forecast

- The software shall allow the retrieval of online local weather data and weather forecast data. The weather data shall be made available via BACnet so as to be shared with other building services or used in the control programming.

4.16. Visualization and Custom Displays

- The software shall allow for the creation of custom graphics either within the web browser or offline with a graphics tool.
- Standard image file types that are visible on a standard web browser will be supported, such as JPG, PNG and GIF.
- The software shall also support animated graphics (GIF), for example to indicate a fan that is in operation.
- The software shall allow live trend graphs and live reports to be embedded into custom display pages.
- Any custom display created can be selected as the home page for any user or group.
- Custom display pages shall display links to other pages, for example to navigate to floors, zones or various equipment pages. The display pages shall allow for live point data to be viewed or written to. The point data shall allow engineering units to be displayed.
- Points where applicable, shall allow direct access to trends, alarms and schedules.

4.17. Graphics Library

- The software shall come with a graphical library of images for HVAC equipment. This shall, include graphics such as Chillers, Boilers, Air Handlers, Fan Coil Units and VAVs, and shall have incorporated applicable graphics such as fans, coils, dampers and pumps.

4.18. Automatic Software Backup

- The software shall allow for automatic backups to be created.
- The software shall back up the following at minimum:
 - Database/configuration, display files, images and documentation.
 - Control programming
 - Schedules
 - Alarms
 - BACnet trend logs
 - Energy logs
 - License

4.19. System Restore

- In the event of a hardware failure or damage, system backups shall be used to restore the system back to the state at the time of backup.

4.20. FTP / SFTP Remote Archiving

- The software shall allow auto and manual backups to be configured to be sent to a remote server, using either FTP or SFTP protocols.

4.21. User Activity

- The software shall allow for user activity reports detailing all the user activities within. User reports will be filtered according to user, date and different user activities.

4.22. Time

- System time shall be based on system location settings and will automatically update for daylight savings based on the locale.

4.23. Optimum Start

- Optimum Start mode offers an intelligent and adaptive algorithm to control warmup
- and cool down operations for a zone.
- Optimum Start mode shall respond to environmental and historical conditions dynamically.
- Users can enable (or disable) Optimum Start mode when warmup and cooling operations to intelligently adapt to changing conditions.
- The software shall enable a minimum of 10 Optimum Start Points.

4.24. Mobile Application

- The mobile application shall run on current versions of IOS or Android platforms.
- Updates shall be made to the application via normal IOS or Android updates.
- The system shall connect via a built-in Application Program Interface (API) to a mobile application that is dedicated for use with the building automation and energy management system.
- A feedback mechanism shall be made available to the end user.
- The mobile application shall use a dedicated Icon to start the application.
- Notifications shall be displayed on the Icon badge.
- Notifications shall generate audible alerts, that can be suppressed as desired by the user.
- Notifications shall generate when the Notices are sent or Alarms are generated.
- The mobile application shall not use a browser to navigate the system, it shall be a purpose-built companion application.
- The application shall use the same user/group permission structure.
- The application shall use the same password and authentication method.
- The system shall make use of the fingerprint authentication on devices.
- The number of users shall not be restricted.
- The users shall have the ability to change between sites without restriction.
- The users can add a site to the mobile app and preconfigured containers shall be accessible.
- Reports and graphs shall feature a zoom capability to increase the size to full screen.
- Reports and graphs shall allow the user to pinch zoom an area of the graph.
- Reports and graphs shall display a tool tip when an area is touched this includes:
 - Date
 - Time
 - Dataset name
 - Units
 - Values
- The mobile application configuration shall be part of the web based system and support containers that can be customized per user or per group. These include:
 - Alarms
 - Energy Reports
 - Trend logs
 - BACnet points
- The Mobile Application Management shall be a selectable permission

- The Mobile Application shall support at a minimum the following Facility Management capabilities:
 - Site information and contact details including a map.
 - Unrestricted number of sites supported.
 - Alarm notifications (unacknowledged, acknowledged, return to normal).
- Dashboard view of the system which includes unrestricted number of:
 - Energy reports
 - Trend log data
 - Live BACnet points (read and writeable from App)
 - Weather data
 - Weather forecast
 - After hours' override (on demand or scheduled).
 - Tickets (mechanism for users to notify Facility of problem condition).
 - Notices (messaging from facility management to some or all users).
- The mobile application shall support the following Tenant or Building Occupant capabilities:
 - Site information and contact details including a map.
 - Dashboard view of the system which includes unrestricted number:
 - Energy reports
 - Live BACnet points (read and writeable from App)
 - Weather data
 - Weather forecast
 - After hours' override (on demand or scheduled).
 - Tickets (mechanism for users to notify facility of problem condition).
 - Notices (messaging from facility management to some or all users).

4.25. Commissioning Tools

- The software shall have tools to aid in the commissioning and interrogation of the attached network devices.
 - Modbus Client: Allows for low level troubleshooting of Modbus hardware. It will allow for testing whether or not the software can communicate to a Modbus device, and determine parameter registers.
 - BACnet Read Property: Allows the properties of a BACnet device to be read. The results can optionally be exported to a CSV or PDF files.
 - Network Ping Utility: A low-level network diagnostic tool which is useful for checking if an IP address is currently reachable. Failures can indicate the remote device being off, there is misconfigured network settings somewhere, cables are loose, there is an equipment failure, and network or routing faults.

5. ENERGY MANAGEMENT

5.1. Metering Information

- The software shall retrieve at a minimum from each meter the Kilowatts (KW) and Kilowatt hours (KWh). This data is retrieved as it occurs for presentation, analysis, trending and reporting via the software package.

5.2. Meter Data Acquisition

- The software shall connect to electricity, water, gas and fluid energy meters via BACnet or MODBUS.
- The software shall also connect to pulse output meters using BACnet or Modbus.

5.3. Manual Data Input

- The software shall support CSV upload.
- The software shall support manual data entry.

5.4. Virtual/Calculation Meters

- The software shall allow the creation of calculation meters based on physical meters or other calculation meters.
- The software shall allow the following types of meters to be created:
 - Physical Meters: Adding of multiple physical meters.
 - Forecast Meter: The software shall allow for user defined forecast data to be entered. This will allow a forecasted value to be tracked against the actual for comparison.
 - Manual Meter: The software shall allow for manual entry of meter data, for example a meter that is created using data received from only monthly utility bills, which must be manually entered.
 - Calculation Meter:
 - Aggregate: An aggregate meter is the sum of all associated meters.
 - Custom: Custom calculation meters require the calculation expression or equation to be defined. Available calculation operators are +, -, *, /, ().
 - Portion: A portion meter is configurable to a specified percentage of a given parent meter.
 - Remainder: A remainder meter is the remainder of a parent meter minus its child meters.

5.5. Data Retrieval

- The software shall permit users to drill down to/from sub-meters to a selected meter following physical hierarchy or aggregate meter hierarchy.

5.6. Meter Condition Alarming

- The software shall allow for the configuration of alarms for a meter, and also enable notifications and emails to alert users of alarm events associated with given meter.
- Alarm Conditions to include:
 - Configuration Changed
 - Meter Online
 - Meter Offline
 - Condition Alarming based on settings such as:
 - Instantaneous maximum and minimum values
 - Consumption over interval

- Consumption over time
- Tolerance Levels
- The software shall allow the ability to specify the delay period of alarms.

5.7. Tariff Descriptions

- The software shall be capable of maintaining a detailed description of a tariff including, but not limited to, volume charges, demand charges, metering and supply charges and government levies and charges. These charges shall be able to be based on volume blocks, time of use, seasonal rates, peak and off-peak and other charging regimes in common use.
- Each meter shall be able to have an associated tariff which allows a utility bill to be created for that meter. This bill can be used to compare actual utility bills or to generate invoices for tenants for metered services.
- The software shall maintain in the database records of invoices sent and be able to generate a per-tenant statement of charges made.

5.8. Demand Limiting / Load Shedding

- The software shall support demand limiting / load shedding to ensure that electrical maximum demand is not exceeded.
- The software shall write to MODBUS or BACnet, in either binary or analog.
- Delay timers will be used to set the time before an event is triggered and before an event is returned to normal.
- The user shall be able to create a hierarchy of loads to be shed in a prescribed manner.
- The software shall provide a minimum of 10 demand limiting points.

5.9. Meter Commissioning

- The software shall allow commissioning actions to be entered and maintain a record of each commissioning activity. The Commissioning activities that shall be stored as a minimum are:
 - Comment:
 - Name/Initials:

6. REPORTING

6.1. Analysis

- The software shall at a minimum report on:
 - Hourly consumption.
 - Daily consumption.
 - Weekly consumption.
 - Monthly consumption.
 - Yearly consumption.
- Aggregate of multiple meters or meter parameters.
- Benchmarking
- Normalization (Square meters and number of people)
- Comparison between meters, buildings, time periods across all or some of the meters and buildings.
- Reporting (in tabular, graphical – charts & line graphs) for water, gas and electrical utilities.

6.2. Energy Trend logs

- Energy Breakdowns (gas and electric) as total energy usage
- Electricity breakdown into costs sections defined by the user.
- Breakdown of each meter as total energy.
- Power Factor
- Demand (kW)
- Real Time (kWh)
- Voltage
- Amps
- Upload energy data from external sources (.CSV).

6.3. Reports General

- The software shall support the generation of reports including text and charts. These shall be generated either as HTML displays than can also be generated as a PDF document. The generation of downloadable underlying data in the form of CSV files shall be provided where possible.
- The user shall also have the ability to email reports to other users on demand, or have the ability to create an automatic email. For example, a monthly report will be automatically emailed on the first day of the new month for the previous month.
- Custom reports that are created will also have the ability to be saved to a reports library and will be generated using the same time period as the original. For example, if report is created for the current week, then the following week when the report is run it will be for that current week.

6.4. Reports Library

- The software shall support preconfigured reports & shall be able to be generated as required and, to allow these to access the expected time periods, terms such as “yesterday”, “last week”, “last 3 quarters” and “last season” shall be supported.
- The software shall provide reports which show comparisons across multiple meters or across multiple time periods.

6.5. Custom Reports Generation

- The software shall support the creation of custom reports.
- The user shall have the ability to customize the report by selecting chart type, report type, utility type, and time period.

6.5.1. Chart Type

- Bar Chart
- Line Chart
- Scatter Chart
- Area Chart
- Pie Chart
- Ring Chart
- Tabular List

6.5.2. Report type

- Consumption/Generation
- Demand
- Greenhouse Gas (GHG) Emissions
- Degree Days
- Occupancy Analysis
- Trend log Comparison
- Tariff Costs

6.5.3. Utility Type

- Electricity
 - Active
 - Apparent
 - Reactive
- Water
- Gas
- Diesel
- Waste

Note: For the same utility type, multiple utility consumption sources will be supported. For example, multiple electricity active energy sources can be selected such as, Lighting, Mechanical general power. And all will be visible on the same report.

6.5.4. Time Period

- The time period that the utility report will include will be completely custom which will allow for current or previous period, and the periods can include daily, weekly, monthly, or yearly.
- The software will also support comparisons of previous period.
Example: Compare with previous years(s):
- Comparison of a selected period with the same period previous years. For Example, if this month is chosen and this option is selected, the graph will display

this month and the same month in the previous year. The number of previous years to be included will be selectable.

6.6. Reports Customization

- Target: The software shall allow the report to have lines inserted at fixed points. The lines selection will allow for dashed or solid lines, the line colour will be selectable. Multiple lines will be supported per report.
- Range: The software shall allow the report to have budget or forecast bands to be displayed in the reports. The band colour will be selectable. Multiple bands will be supported per report.
- Units: The software shall allow the user to customize the units shown in the report. For example, display GWh instead of kWh.
- Legend: The software shall allow for the graph legend to be hidden or its location to be specified.
- Colours: The software shall allow for the customization of graph colours, such as headings, legend, and axis'.
- Title: The software shall allow the report and graph headings to be altered and customized.
- Text Style: The software shall allow for the customization of report and graph text size and styles.
- Label: The software shall allow for the customization of graph label positions.
- Chart Axes: The software shall allow for the domain and range axes on the chart to be enabled or disabled.
- Custom Reports Library: The software shall allow for custom reports to be saved in a library that can be generated on demand, while retaining all the custom feature that were selected when it was created.

6.7. Auto emailing of reports at set frequency

- The software shall allow for saved reports to be automatically emailed at a user defined frequency to any user with email credentials.

6.8. Benchmarking

- The software shall have the ability to produce a Project Performance Statement which includes a brief snapshot of the energy usage savings, monetary status and stakeholder breakdown for any given project recorded in software.

6.9. Point Override Activity Report

- The software shall provide the ability to produce a report of the points that have been overridden.
- Reports can be filtered using any of the following criteria.
 - User
 - BACnet Device
 - BACnet Object
 - BACnet Object Instance
 - Property
 - Array Index
 - Result (Success/Failure/Both)

6.10. Afterhours Summary Report

- The software shall provide the ability to produce a report of the afterhours requests for each building tenant.

- The software shall record and report at a minimum:
 - Floor
 - Suit
 - Zone
 - Event start
 - Event end
 - Actual duration
 - Tenant

4.11. Object List Report

- The software shall provide the ability to run an object list report on BACnet devices that are save on the software.
- Reports can be filtered using any of the following criteria.
 - Object Types
 - Analog input
 - Analog Output
 - Analog Value
 - Binary Input
 - Binary Output
 - Binary Value
 - Multistate Input
 - Multistate Output
 - Multistate Value
 - Calendar
 - Event Enrolment
 - Schedule
 - Trend Log
 - Notification Class
 - Additional Properties:
 - Description
 - Present Value
 - Group By:
 - Device object
 - Object Type User
 - BACnet Device Properties

5. HARDWARE

- The system hardware shall be scalable dependant on project size and requirements. Hardware requirements are broken up into three main groups:

5.1. Premium Class

- *Suitable for projects that contain up to 500 meters and 1000 BACnet devices:*
 - Intel i5-3570K processor or better
 - 8GB RAM minimum, recommend 16GB
 - 2 x 1TB enterprise/server grade drive (E.g. Western Digital WD RE4)

- 1Gbit Fast Ethernet connection
- Case with at least a 300W power supply
- Supported UPS

5.2. Enterprise Virtual Environments

- *Suitable for projects that contain over 500 meters and over 1000 BACnet devices:*
 - Base installation of Debian Wheezy (64 bit)
 - Processor/Virtual Processor: 4 cores or more
 - Memory/Virtual Memory: 16GB RAM minimum, 32GB recommended
 - 1Gbit fast Ethernet connection
 - Remote root (or equivalent) access, web connection to Debian repositories for OS setup and configuration

5.3. Server Grade Enterprise System

- *Suitable for projects that contain over 500 meters and over 1000 BACnet devices:*
 - Dell PowerEdge R320/T320 or equivalent
 - Intel Xenon Processor E5 2.20 GHz, 10M Cache, 6.4 GT/s, 80W
 - 16GB RAM minimum, 32GB RAM recommended
 - 2 x 1TB (enterprise/server grade) drive
 - 1Gbit Fast Ethernet connection
 - Supported UPS
- All connectivity to the software hardware shall be through IP (TCP or UDP) and shall not require a keyboard and display to allow the platform to be installed in inaccessible areas such as a corporate server room.
- All software updates and changes to the software shall be capable of being performed remotely using the network.

6. COMMUNICATIONS

6.1. BACnet IP & MS/TP

- The system shall support:
 - Ports that can be enabled or disabled in software.
 - Operate in accordance with BACnet MS/TP protocol rev 14.
 - Each port can have adjustable baud rates (9.6k, 19.2k, 38.4k, 76.8k and 115k).
 - Use on board diagnostic tools for setup and troubleshooting.

6.2. BACnet Routing

- The system shall support:
 - Support BBMD with unrestricted number of BDT table entries.
 - Operate in accordance with BACnet protocol rev 14.
 - Support a configurable IP network.
 - Support a configurable IP and MSTP network number
 - Use on board diagnostic tools for setup and troubleshooting.

6.3. Modbus TCP/IP & RTU

- The system shall support:
 - Enabled or disabled in software.

- Operate in accordance with Modbus RTU.
- Can have adjustable baud rates (9.6k, 19.2k, 38.4k, 76.8k, 115k, 230k).
- Use on board diagnostic tools for setup and troubleshooting.

7. ENGINEERING TOOLS

7.1. Programming Logic-Direct Digital Control (DDC)

- The software shall support real time operating programming that:
 - Uses predefined logic blocks that have specific functions, those blocks are executed based on fixed values or values coming from other BACnet points.
 - Logic functions shall include at a minimum the following functionality:
 - AND Gate
 - OR Gate
 - Single Shot
 - Delay on Make
 - Delay on Break
 - Exclusive OR Gate
 - Latch Gate
 - Comparator / Hysteresis
 - Increment/Decrement
 - Transfer Data
 - Gated Transfer
 - Subtraction
 - Addition
 - Multiplication
 - Division
 - Within
 - Switch
 - High / Low Limiter
 - Runtime
 - Linear Converter
 - Two Input Linear Converter
 - High Selector
 - Low Selector
 - Input
 - Output
 - Comment
 - PID Controller
 - Allows the user to create custom function blocks that can have their own executable code.
 - Custom blocks shall be importable and exportable for re-use.
 - Operate in HTML5 environment using a common web browsers with no plugins needed to operate, configure, view live data, and publish the programming code.
 - The programming environment shall support four distinct environments in the web interface:
 - Toolbox (holds all the logic blocks).

- The Workspace (the area where the program elements are added).
- Logic Block Properties (permits user to adjust logic block configuration).
- Toolbar workspace tools (to manage viewing and file management properties).
 - The software shall have the ability to create and store multiple work spaces with the ability to link programming across workspaces.
 - The software shall permit the users to view the program elements live data both in the web user interface within the programming tool in the browser.
 - The software shall permit inserting a live programming workspace into custom display.
 - The software shall support using subroutine programming which is used to run the same programming across multiple devices.
 - The software shall support self-programming “validation” which can be run prior to publishing to check and advise of errors that need fixing before publishing.
 - The software shall support a file repository that can hold multiple files available from the web user interface or via remote file sharing (if enabled)
 - The files can be edited live on any device and exported to be used in another like device
 - The access to Control Programming shall be controlled by user and group permission
 - The manufacturer shall provide online help to assist using the system, and provide regular updates as new features, enhancements or fixes are made available
 - The manufacturer shall provide DDC programming content using online eLearning training to train users how to use the programming tool. The subjects covered shall include:
 - Introduction and Basics
 - Workspace and Function Blocks
 - Create and Publish
 - Subroutines
 - The manufacturer shall provide detailed browser based online Help that can be used to inform users how to use the programming tool. The help shall be updated with each update and shall be exportable to use as an operator’s manual
 - The Programming (DDC) online help content shall include:
 - DDC Introduction
 - DDC Environment
 - Workspace Menu and Canvas
 - Logic Blocks (functional description)
 - Null Values Interpretations

7.2. Display Tool

- The software shall come with a built-in display creation and editing tool operating in HTML5 using common web browsers with no plugins needed to operate.
- The tool shall allow users to create display’s, device templates and object templates.
 - Displays – single one off display page
 - Device templates – repeatable display, increments by device number
 - Object templates – repeatable display defining Binary or Analog object properties
- The software shall be compatible with .jpg, .gif, .png image files.

- Displays shall be saved in .xml format.
- The tool shall have the following toolbar features to create display pages:
 - Point permission defaults:
 - View level default
 - Write level default (binary)
 - Write level default (analog)
 - Write level default (other)
 - Common configuration editor for:
 - Visual properties
 - Display properties
 - Live text configuration:
 - BACnet properties
 - Device instance
 - Object types
 - Object instance
 - Property
 - Array index
 - Right click menu
 - Refresh
 - Change value
 - Live trends
 - Add Trend log
 - Alarms
 - View change activity
 - Device properties
 - Boolean properties configuration:
 - BACnet properties
 - Device instance
 - Object types
 - Object instance
 - Property
 - Array index
 - Right click menu
 - Refresh
 - Change value
 - Live trends
 - Add Trend log
 - Alarms
 - View change activity
 - Device properties
 - Range float properties configuration
 - BACnet properties
 - Device instance
 - Object types
 - Object instance
 - Property

- Array index
- Right click menu
 - Refresh
 - Change value
 - Live trends
 - Add Trend log
 - Alarms
 - View change activity
 - Device properties
- Range Elements:
 - Low
 - High
 - Image
 - Text
- Button properties configuration:
 - Text
 - Font size
 - Font
 - URL
 - Location
 - Size
 - Layer
- Check box properties configuration:
 - BACnet properties
 - Device instance
 - Object types
 - Object instance
 - Property
 - Array index
 - Right click menu
 - Refresh
 - Change value
 - Live trends
 - Add Trend log
 - Alarms
 - View change activity
 - Device properties
- Image properties configuration:
 - File path OR URL
 - Image click – link URL
 - Location
 - Size
 - Layer
- Group box properties:
 - Text
 - Font size

- Font
- Location
- Size
- Layer
- HTML properties configuration:
 - URL link
 - Allow scrolling on image size
- Spectrum overlay configuration:
 - BACnet properties
 - Device instance
 - Object types
 - Object instance
 - Property
 - Array index
 - Full colour spectrum
 - Stepped spectrum
 - Delta from-
 - Midpoint
 - Set point – BACnet point link
 - Dead band
 - Occupied space – BACnet point link
- Dial properties configuration
 - BACnet properties
 - Device instance
 - Object types
 - Object instance
 - Property
 - Array index
 - Scale factor
 - Face text
 - Face units
 - Face range
 - Coloured dial bands
- Select-box configuration (drop down menu)
 - Select meter type
 - Quick link to meter display pages
 - Live trend-log display configuration
 - Up to 5 BACnet points
 - Location
 - Size
 - Layer
- Alignment tool to:
 - Align left
 - Align right
 - Align centre

- Align top
- Align bottom
- Align middle
- Repeat tool to:
 - Replicate any selected item
 - Number of copies to make
 - Spacing
- Increment by:
 - Device number
 - Object instance
 - Array index
 - Text item

8. FACILITIES MANAGEMENT

8.1. Afterhours Billing

- The software shall provide the ability to produce bills (invoices) for payment by tenants for requested afterhours usage.
- Each tenancy afterhours bill (invoice) shall contain at a minimum the following information:
 - Ability for biller to insert company logo
 - Tenant name and address details
 - Tax invoice number
 - Date of issue
 - Total amount payable
 - Payment due date
 - Total amount payable after due date
 - Invoice charges breakdown
 - Sequence number
 - Floor
 - Suit
 - AC Zone
 - Event start
 - Event end
 - Actual duration
 - Billable duration
 - Chargeable rate per hour
 - Chargeable amount per instance
 - Applicable surcharges
 - Total charges
 - Total before GST.
 - GST.
 - Instructions on how to pay bill (invoice)

8.2. Utility Billing

- The software shall provide the ability to produce bills (invoices) for payment by tenants for utilities usage.
- The software shall record and show a summary of previously produced bills (invoices) and allow users to download for viewing or re-distribution at a later date.
- The software shall provide the ability to produce bills (invoices) for the following utility types:
 - Electricity
 - Gas
 - Water
 - Thermal Energy
 - Chilled Water
 - Heating Hot Water
- Each tenancy afterhours bill (invoice) shall contain at a minimum the following information:
 - Ability for biller to insert company logo
 - Tenant name and address details

- Tax invoice number
- Date of issue
- Total amount payable
- Payment due date
- Total amount payable after due date
- Meter Summary
- Meter Description
- Days covered by bill (invoice)
- Previous reading
- Current reading
- Usage between previous and current reading
- Summary bar chart showing previous 12months consumption
- Average usage per day
- Average usage for same time last year
- Time of use charge details including:
 - Off-peak
 - Peak
 - Shoulder
 - Peak demand
 - Time on/off
 - Rate applicable
 - Usage during period
 - Charges applicable
- Additional fees and charges
 - Service charge
 - Processing charge
- Total usage and supply charges
- Total before GST.
- GST.
- Instructions on how to pay bill (invoice)

8.3. BUILDING PERFORMANCE

8.3.1. Performance Summary Report

- The software shall contain a Performance Summary Report which allows for customised viewing of a summary of building/space performance in relation to both usage and savings.
- The user shall have the ability to select the following report information:
 - Enter a customised report title (optional)
 - Spaces to include in the summary
 - Utility types to include in the summary
 - Time period report will cover
 - Values to include in the summary
 - Calculated savings for each space - When including savings user must be able to select the method of calculation:
 - Previous Period (Calculates by comparing the selected period against the previous period (e.g. Comparing July this year against June this year)

- Same Period Previous Year (Calculates by comparing the selected period against the same period the previous year e.g. comparing July this year against July last year)
- The unit that savings shall be displayed in:
 - Consumption
(If selected, will include the total usage for the select time period for each space)
 - Consumption Per Area
(If selected, will include the total usage divided by the area for the select time period for each space. This data will only appear if the 'Area' has been configured in the space)
 - Associated Cost
(If selected, will include the cost associated with total usage for the select time period for each space, based on the tariff that has been configured in the space)

8.3.2. Progress Against Budget

- The software shall have the ability to track actual utility consumption against a budget. The user shall have the ability to enter manually or via CSV upload data to track actual consumption against
- The software shall allow three (3) report format types:
 - Web (graphical)
 - PDF
 - CSV
- The software shall allow the user to select the following report options:
 - Time period
 - Energy-log
(Allows user to select the energy-logs (meters) included in the graph to be selected)
 - Prediction
(Enables or disables the ability for energy-logs with missing data periods, to optionally have their data usage estimated. Select the calculation method that will be used to generate the missing data) – Options shall include:
 - Based on previous 12 months
 - Based on 6-month (adjustable) average
 - Based on same period last year including multiplication factor
 - Units
(Allows user customisation of the units the energy-logs are displayed in)
 - Colours
(Allows for the customisation of graph colours, such as headings, legend and axis')
 - Text Style
(Allows for the customisation of report and graph text size and styles)
 - Title
(Allows the report and graph headings to be altered and customised)
- The User must have the ability to save a Progress Against Budget Report
 - The software must have the ability to save a Progress Against Budget Report and add to the building performance reports library so it can be easily retrieved in the future. Adding a report to the library must save the energy-logs included in the report, along with any and all customisations made.

8.3.3. Space Comparison Report

- The software shall provide the ability to create and manage “spaces” with in a building and provide a report to compare spaces. The Space Comparison Report shall:
 - Rank the selected spaces against each other, ranking each space in order from best performing to worst performing.
 - Provide multiple options in which to rank on:
 - By Usage - based on the total usage, for the select time period, for each space
 - By Usage Per Space Size - based on the total usage divided by the area, for the select time period, for each space
 - By Cost - based on the cost associated with total usage, for the select time period, for each space, based on the tariff that has been configured in the space
 - By Savings - based on the calculated savings for each space. Calculation methods shall include at a minimum:
 - Compared to previous period
 - Compared to same period previous year
 - The software shall allow the user to select the unit that savings will be displayed in:
 - Percentage
 - Kilowatt hour
 - Litres
 - Meters cubed
- The user shall have the ability to select which spaces to compare together:
 - All configured spaces
 - All top-level spaces
 - All of a space type
 - Campus
 - Level
 - Room
 - Site
 - Building
 - Tenancy
 - General room
 - Meeting room
 - Floor
- The user shall have the ability to select which utility type to compare for each space:
 - Electricity
 - Gas
 - Water
 - Fluid energy
 - Diesel
 - Waste
- The software shall provide the following time period options to compare spaces:
 - This day, week, month or year
 - Previous day, week, month or year
 - Last (x) days, weeks, months, years from end of period or now

- Before (x) date
- After (x) date
- Between (x) date range
- Show comparison between previous periods
- Show comparison between previous years

8.4. PROJECT PERFORMANCE

- The 'Project Performance Module' shall provide the means to track and report on energy saving projects including energy savings and financial savings
- The 'Project Management' page shall be a central place to create, view and keep track of projects in the software
- The software shall allow the project's descriptive details to be entered including:
 - Title of the project – the title that will appear in the project management list
 - Description – a brief description of the project
 - Modifiable by others – shall indicate whether or not this project can be updated by other users besides the creator
 - Cost - an estimated cost of undertaking this project
 - Operational period - the time period (months, years, etc) in which this project is open
 - Savings Calculation – shall indicate the method in which any savings will be calculated. For specific method's there shall be additional fields which need to be entered:
 - Previous Period
 - Same Period Previous Year
 - Average Over Baseline Period - set the time period (months, years, etc) in which the average period will be taken. Both the start and end dates shall be specified for this savings calculation method
 - Include Custom Statement Logo – shall allow the user to specify a custom logo to appear at the top of the Project Statement instead of the default software logo
 - Billing Tariff - indicates the charge rules which will be applicable to usage saving calculations
 - Demand Meter - if the 'Billing Tariff' includes 'Peak Demand' changes and therefore the peak demand savings are to be reported; a meter that is logging the total usage of all the meters in the project shall be selectable to get the correct combined peak demand. This meter may be a physical meter or a calculation meter.
 - Ignore Negative Savings - shall only be applicable if a 'Billing Tariff' is selected. The software shall ignore any negative monetary savings when generating a Project Statement
 - Select the type of stakeholder - This shall be a user, tenant or facility manager stored in the Software
 - Percentage of Stake - The percentage in which this user, tenant or facility has a vested interest in this project. The amount shall be between 0 and 100%
 - Deductible from Project Cost - only applicable if a 'Billing Tariff' is select. This feature shall deduct the selected stake holder's monetary savings from the 'Project Cost'
 - Include Automated Emailing – shall Indicate whether or not this stakeholder will receive automated updated periodic saving statements regarding this project

- Frequency - the time period (daily or monthly) in which the automated saving statements shall be sent out
- The 'Project Performance Statement' page shall allow for generation of a statement which includes a brief snapshot of the energy usage savings, monetary status and stakeholder breakdown for any given project recorded in the software.
- The 'Project Performance Statement' shall be available in the following formats:
 - PDF
 - CSV

8.5. NABERS (Australia)

- The software shall have the NABERS (National Australian Built Environment Rating System) algorithm “built in” to provide a report showing indication of NABERS performance.
- The Software shall have the ability to perform the following four (4) types of NABERS ratings:
 - Base Building Rating for Energy
 - Tenancy Rating for Energy
 - Whole Building Rating for Energy
 - Whole Building Rating for Water
- The software shall include the following energy types in the NABERS calculation:
 - Electricity
 - Gas
 - Diesel
- The software shall record at a minimum the following information to carry out the required NABERS rating:
 - Base Building Rating for Energy:
 - Total Area (m2)
 - Address Details - at minimum state and postcode
 - Occupancy Schedule - with weekly schedule "on" times to indicate hours of occupancy
 - Associated Electricity, Gas & Diesel Meters
 - Tenancy Rating for Energy:
 - Total Area
 - Address Details - at minimum state and postcode
 - Occupancy Schedule - with weekly schedule "on" times to indicate hours of occupancy
 - Number of Computers
 - Associated Electricity, Gas & Diesel Meters
 - Whole Building Rating for Energy:
 - Total Area
 - Address Details - at minimum state and postcode
 - Occupancy Schedule - with weekly schedule "on" times to indicate hours of occupancy
 - Associated Electricity, Gas & Diesel Meters
 - Whole Building Rating for Water
 - Total Area
 - Address Details - at minimum state and postcode
 - Occupancy Schedule - with weekly schedule "on" times to indicate hours of occupancy

- Associated Water Meters - should also include externally supplied water (i.e. recycled water, rain water, grey water) as 'Generation' meters

8.6. CONTACT MANAGEMENT

- The software shall have a simple and easy way to manage clients, owners, and other relevant contacts pertinent to the system. The 'Contact Management' page shall be a central place to view and keep track of all contacts configured in the software
- All currently available contacts recorded in the system shall be shown in a main table. This main table shall store the following information at a minimum:
 - First Name
 - Last Name
 - Email Address Required
 - Company
 - Phone Number
 - Mobile Number

8.7. ASSET MANAGEMENT

- Assets shall be configured in the Software so they can be tracked, have their maintenance monitored and scheduled and fault handling logged. The 'Asset Management' page shall be a central place to create, view and keep track of all assets configured in the software.
- The software shall have the ability to record the following information for each asset at a minimum:
 - Name:
 - A unique name of the asset
 - Asset Category:
 - The category in which this asset will be classed as
 - Description:
 - A brief description of the asset
 - Asset Number:
 - Any sequence number or filing number applied to the asset
 - Is Operational:
 - Indicates whether the asset is currently in use
 - Make:
 - Specify the manufacturers of the assets details
 - Model:
 - Specify the model details applied by the manufacturers of the asset
 - Serial Number:
 - Specify the serial number applied by the manufacturers of the asset
 - Barcode:
 - Specify the barcode applied by the manufacturers of the asset
 - Current Physical Location:
 - Indicate where the asset is currently physically located
 - Current Serving Location:
 - Indicate which area or zone the asset is currently serving
 - Install Date:
 - Indicate the date in which the asset was installed or arrived on site
 - Commissioning Date:

- Indicate the date in which the asset was commissioned
- The software shall have the ability to link and associate “points” to assets and then enter at a minimum the following “point” information:
 - Description:
 - A brief description of the point that is being linked. Note: To search for existing descriptions available in the system, type search keys into the description entry box and a list of available options should appear underneath the field.
 - Host Device:
 - The host device of the point to be linked
 - Object Type:
 - The object type of the point to be linked
 - Object Instance:
 - The object instance of the point to be linked
 - Property Type:
 - The property of the point to be linked
 - Array Index:
 - The array index if the 'Priority Array' property is selected
- The system shall have the ability record relevant relationship details between assets and subsequently to track the relationships between assets. At a minimum, the software shall record the following asset relationship information:
 - Related Asset:
 - Select the asset that this relationship will apply to
 - Relationship:
 - Select the type of relationship that is being detailed
 - Parent
 - Child
 - Sibling
- The system shall have the ability record ownership details between assets and subsequently to track ownership information. At a minimum, the software shall record the following ownership information:
 - Type of Ownership:
 - Select the type of ownership this asset is held under
 - Owned
 - Leased
 - Client
 - Owner:
 - The owner can be one of three possible types. The first being an Unknown Owner, or a Software User or a Contact.
 - Purchase Price:
 - Indicates the purchase price of this asset.
 - Ownership Start Date:
 - Indicates the date from when this ownership is valid.
 - Ownership End Date:
 - Indicates the date when this ownership expires.
- The system shall have the ability record warranty information for each asset. At a minimum, the software shall record the following warranty information:

- Type of Cover:
 - Select the type of cover this warranty has been issued for
 - Parts only
 - Labour
 - Parts & labour
 - Complete replacement
- Cover Start:
 - The date in which this warranty becomes active
- Length of Cover:
 - Indicates the number of months this warranty is valid for from the start cover date
- Provider:
 - The name of the company that is supplying this warranty
- Supporting Documentation:
 - Software shall have the ability to store and attach documents that might be needed to support/provide details of this warranty cover
- The system shall have the ability record Insurance information for each asset. At a minimum, the software shall record the following insurance information:
 - Policy Id:
 - Indicates the Id issued by the insurer
 - Policy Amount (\$):
 - Indicates the policy amount
 - Cover Start Date:
 - Indicates the date from when this cover starts
 - Cover End Date:
 - Indicates the date from when this cover ends
 - Contact Name / Company:
 - Indicates the contact name / company
 - Contact Number:
 - Indicates the contact number
 - Supporting Documentation:
 - Software shall have the ability to store and attach documents that might be needed to support/provide details of insurance cover
- The system shall have the ability record supporting documentation for each asset. At a minimum, the software shall record the following information:
 - Description:
 - Enter a description of the document to be uploaded
 - Supporting Documentation:
 - Any document that might be needed to support/provide details regarding this asset
- The software shall have the ability to import multiple assets from a Microsoft Excel spreadsheet (Import Assets) from the 'Asset Management' page. This opens a 'File upload' dialog box.
- The software shall include functionality to export an asset list report. The list report shall be user configurable and contain the following options at a minimum:
 - Include asset number
 - Include asset name

- Include asset description
- Include asset category
- Include operational status
- Include current location
- Include install date
- Include commissioning date
- Asset reports shall be available in the following format options:
 - PDF
 - CSV
- The software shall include the functionality to generate a warranty status report. The warranty status report shall be user configurable and contain the following options at a minimum:
 - Include all assets currently covered by warranty
 - Include all assets not covered by warranty
 - Include all assets nearing warranty expiry in a set number of months
- The warranty status report shall be exportable in PDF format.

8.8. COUNTER MANAGEMENT

- The software shall have the ability to set up counters for monitoring and reporting purposes. Applications may include People Counting or Traffic Counting in a carpark area.
- The software shall be able to include:
 - Physical counters (which can be automatically read)
 - Manual counters (data is manually entered)
- The software shall record at a minimum the following counter information:
 - Enabled (Indicates whether the counter is enabled for logging)
 - Counter Name (A unique name of the counter)
 - Description (A brief description of the counter)
 - Serial Number (The identification number given to the counter)
 - Location (The location that is monitored by this counter)
 - Unit (The unit that this counter will be recording)
 - Trendlog Interval (Indicates how often the trend-log associated with this counter are logged. The default shall be 5 minutes)
 - Initial Offset (A number added to the initial counter when read for the first time, default shall be 0)
 - Parent counter (If this counter is a sub-counter, and the parent counter is known, then this should be set to the counter of which this counter is a sub-counter of)
- The software shall communicate with the counters using the following methods:
 - BACnet Driver
 - Read a counter via the BACnet protocol
 - Device Instance (The device instance of the BACnet device that contains the BACnet point(s) for the counter)
 - Existing Counter Type (Use this to select a count type that has already been specified that is also relevant for the current counter)
 - Object Type (The object type of the BACnet object to read)
 - Object Instance (The instance number of the BACnet object to read)
 - Scale (What the reading should be multiplied by to get the value that is specified in the unit)

- Modbus Driver
 - Read a counter via the Modbus protocol
 - IP Address (The IPv4 address of the counter)
 - Unit Number (The unit address of the modbus device)
 - Existing Counter Type (Use this to select a count type that has already been specified that is also relevant for the current counter)
 - Register (The register number for the counter)
 - Format (The format that the modbus register returns its value)
 - Endian (The ordering of the registers)
 - Scale (What the reading should be multiplied by to get the value into what is specified in the unit column)

8.8.1. Counter Alarms

- There shall be at a minimum 4 main counter alarm categories:
 - Configuration changed
If this option is selected then an alarm shall be raised whenever any of the basic details or alarm parameters for a counter have been changed
 - Counter online
If selected, then an alarm shall be raised whenever a counter appears online either for the very first time or if it has come back online after being offline status, for the days of the week specified
 - Counter offline
If selected, then an alarm will be raised whenever a counter goes offline (due to a number of failed read attempts), for the days of the week specified
 - Specific count alarms
This option shall raise alarms based on a reading of the counter
- The software shall allow the following Alarm types:
 - Count over interval
An alarm shall be generated when a given count is exceeded over a given number of minutes
 - Count over time
An alarm shall be generated when a given count is exceeded between a start and stop time
- The software shall allow the user to import historical count data through two (2) methods
 - Upload CSV File
 - Manual Input
- All counter displays shall include basic counter details such as the name and description
 - Online status
 - Total Count
 - Count graph
- Once counters have been configured the system shall provide a Commissioning Action Report including the following information:
 - Value (If the selected commissioning action requires a status value then this field will appear)
 - Comment (A brief comment about the action)
 - Name/Initials (Either the full name or initials of the person/user who is recording the action)

- If the appropriate action is not already in the list, the software shall allow the user to create additional commissioning actions on the fly at any stage

8.8.2. Counter Report Management

- Counter reports shall be available in three (3) formats: web (graphical), PDF and CSV.
- From the web graph counter report the user software shall display the desired counter information as a graph on a page within the web-browser
- From this page, the user shall have the ability to customise the report, save the report for future use and export to PDF and CSV.
- Available customisation options shall include:
 - Time: Allows for the graph time period to be altered
 - Previous/Next: Allows for quick time period navigation
 - Counter: Allows the counters included in the graph to be altered
 - Chart: Allows the chart type to be altered
e.g. Bar graph, line graph, pie chart
 - Dimension: Allows the chart's dimension to be altered
E.g. 2D or 3D
 - Legend: Allows for the graph legend to be hidden or its location to be specified
 - Colours: Allows for the customisation of graph colours, such as headings, legend and axis
 - Title: Allows the report and graph headings to be altered and customised
 - Text Style: Allows for the customisation of report and graph text size and styles
 - Label: Allows for the customisation of graph label positions
 - Chart Axes: Allows for the domain and range axes on the chart to be enabled or disabled
 - Zoom: Bar and Line charts, allow for users to zoom

8.9. AUDIO PAGING SYSTEM

- The 'Audio Paging System' page shall provide a way to create and manage audio file entries within the software
- The software shall support an audio notification system that permits the user to upload/edit/delete/send up to 500 pre-recorded messages
- The pre-recorded audio file shall be an 8 khz sample .WAV audio format is stored in the local storage
- The software shall trigger automatically and send the pre-recorded audio file upon transition of the associated BACnet point from Inactive to Active. When a BACnet binary value is triggered the corresponding audio notification entry broadcasts an audio file (e.g. pre-recorded message) across a compatible public-address system that supports SIP/Multicast protocol
- The software shall play/rename/delete audio files previously uploaded by a user and playback through a common web browser
- The software shall prevent deletion of audio files that are currently linked to BACnet points (actively used)
- The audio notification system shall integrate into existing infrastructure that has compatible TCP/IP audio amplifiers
- Audio messages (with associated BACnet points) can also trigger BACnet Alarms for the purpose of alerting Facilities Management and have an audit trail

- The 'Audio Paging System' page shall load a list of all the Audio Notification entries that are currently stored in the software
- To remove an Audio Notification entry, the user shall select one (or more) rows from the 'Audio Paging System' page, and click remove to permanently remove the entry from the system
- The software shall accommodate up to 1 GB of storage for files in use or as a repository
 - The software shall use a protocol called SIP/Multicast, and the recipient must be a TCP/IP amplifier that supports:
 - Multicast Address: is the IP address used for the broadcast (a valid multicast IP must be between 224.0.0.0 and 239.255.255.255)
 - Multicast Port: is the port used for devices (such as paging amplifiers) to listen on (a multicast port should be an even number)
- The following information for Audio Notification entry's details shall be entered by user and available for view:
 - Audio Filename – shall display the name of the audio file that will play when the page is triggered
 - Multicast Address - is the IP address used for the broadcast (a valid multicast IP must be between 224.0.0.0 and 239.255.255.255)
 - Multicast Port - is the port used for devices to distribute the Audio announcement to the collection of relevant paging amplifiers to listen on. The multicast address and port pair shall specify a unique set of amplifiers to receive the announcement
 - Trigger Binary Value – shall be the BACnet Binary Variable which is hosted in the software. This Binary Value shall trigger the broadcast of the announcement when it becomes set to ACTIVE. It shall automatically be relinquished at the command priority which caused it to become active when the announcement has been triggered