

MY VERY OWN DATA CENTER

Guideline of Requirements for Building Management Services and Energy Management Services

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MY OWN Data Centre Project

Guideline of Requirements for Building Management Services

1. EXECUTIVE SUMMARY

Headquartered in Tokyo My Own Data Centre KK is planning to build multiple Data Centers in the Kansai and Kyushu regions of Japan.

We require you to provide a cost for 1,000 intelligent (soft) points and 350 hard wired points **for each MW** of IT power. You must work out the number of points based on the total IT capacity of the Data Center. The aim is to reduce hard wired points as much as possible. **Your input into how this can be achieved in this project will be an added qualification.**

The selection of the Building Management System is critical to the success of these Data Centers and must provide the capability of monitoring multiple sites from one central location.

Accordingly, the selected BMS supplier and installer is presented with an opportunity to provide BMS systems for the first DC and if terms and conditions are acceptable, for subsequent DCs.

This **Guideline of Requirement** has been produced to support the Request for Information (RFP) and provides detailed requirements by MY OWN DATA CENTRE and the expectations from the BMS total solution. This document needs to be read in conjunction with the issued RFP terms and conditions.

2. GENERAL REQUIREMENTS OF BMS TOTAL SOLUTION

MY OWN DATA CENTRE's goals and objectives for this project are to identify and select a single Original Equipment Manufacturer (OEM) to undertake the design, supply, management of installation of a Building Management System (BMS) for the MY OWN DATA CENTRE Azabu Juban Data Center

MY OWN DATA CENTRE is looking for the BMS to be a total integrated building management solution which would be resilient, robust, futureproof, scale proof and with latest technology to meet all parameters required.

- The BMS solution shall fulfil MY OWN DATA CENTRE's engineering, environmental and security requirements.
- The new system should be in currently in production and proven. It cannot be near the end of its expected life. In fact, the system will need to be able to support the facility for a minimum of 15 years and be updateable. The BMS partner is to demonstrate the product roadmap.
- The proposed "total solution" should be comprehensive, cost effective, secure, and capable of meeting all current and future control, monitoring and energy management needs of MY OWN DATA CENTRE.
- The proposed "total solution" should be flexible, expandable and supportable.
- The proposed "total solution" should have latest released operating system (OS), anti-virus and with up to date patches however future upgrade, patches update and ongoing support to be considered in the lifecycle of product.
- The BMS vendor shall be able to provide services like training, ongoing support and maintenance throughout the system life period.
- The proposed "total solution" shall have the ability to integrate and interface with all future building services systems, equipment and third party devices at the MY OWN DATA CENTRE Azabu Juban Data Center.
- The BMS should work in the principle of open protocol .
- The BMS solution will have distributed control and be the hub for management, information, energy, alarms, high level interface and monitoring.
- The proposed "total solution" shall able to provide an energy management tools, software, dashboard and reporting features that are in-line with the latest industry standards.
- The proposed "total solution" shall include all software, hardware, operator workstations, network devices, communication infrastructure and all relevant field equipment and devices.
- The BMS solution network infrastructure will be robust, resilient and stand alone.
- The BMS vendor shall work with MY OWN DATA CENTRE's designers, general contractor and project consultants at all times.
- The BMS vendor shall install the main and standby servers diversely to ensure the continuous operation of the system at all times.

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- The BMS servers shall be designed, installed and programmed on hot-hot redundancy to provide reliability and alternative to any failing condition
- The BMS solution communication infrastructure shall be kept secure and safe from unauthorised access and should be managed independent of any other network connectivity in the DC.
- The BMS vendor shall be able to provide details of security certifications, validation practices, cybersecurity and external threat mitigations employed to ensure that the BMS is safe and secure
- The BMS vendor shall be capable to set up an integrated Command Control Center at AZABU JUBAN data center with multiple screens to monitor critical functions of the Data Center.
- The Network Equipment Supplier Partner should be qualified and capable to carry out the works and should be available for maintenance support during the life time of the system.
- The Network Installer Partner should be qualified and capable to carry out the network installation and shall possess experience of working on similar kind of projects in Japan .
- The BMS network communication infrastructure should be secure at all times and will be subjected to periodic penetration tests.

3. GENERAL SYSTEM REQUIREMENTS FOR BMS SYSTEM

This section describes general system requirements in brief to understand client expectations for the BMS.

System Requirement

- The BMS must work on a Windows based Server operating system and use Microsoft sequel server for data base architecture. The use of free OS is not permitted.
- To get comprehensive monitoring information on all installed systems the Building Management System solution will consist of following subsystems at the minimum and must be provided for in your BMS estimate.
 - 1,000 intelligent (soft) points and 350 hard wired points **for each MW** of IT power.
 - Two temperature and humidity sensors per Cold aisle
 - Two temperature and humidity sensors per Hot aisle
 - Energy Management
 - Data hall heat rejection system monitoring and control.
 - Data hall temperature and humidity monitoring.
 - Office and storage area air conditioning
 - General area (corridors etc.) air conditioning
 - Electrical Systems
 - Fire Services (Alarms only)
 - Generator Fuel tank Services
 - Gas fire suppression monitoring
 - Water Management
 - Leak detection monitoring
 - Chiller & CRAH Management
 - Weather station and weather based Facility Management
 - Battery Management, Cell watch type alarms
 - Lighting Control System for DC halls, office, storage and general areas.
 - Alarm & Response Management (Not security)
- The BMS solution must be resilient and have built in redundancy to ensure that system is working and in operational condition at all times.
- The BMS solution must be capable of integrating or interfacing with future MY OWN DATA CENTRE facilities in Japan.
- The BMS main and standby servers will be allocated space in the Data Center to operate, monitor and control functions.
- The BMS solution should be able to provide complete graphic screens for each system. The screens shall fully display monitoring operation and indicate in real time, all analog inputs & outputs, digital inputs & outputs.
- The BMS partner shall include all necessary electrical protection to prevent unusual voltage spikes, EMI, RFI, static pick up etc. from affecting any sensitive BMS components.

Control Methodology

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- The system will utilise distributed control methodology in that actual control of plant and equipment will be by local controllers which have a high level interface with the BMS.
- All systems will be configured to fail safe in normal operation conditions.
- Equipment will be purchased with controllers where necessary, these will be to be integrated with the BMS.

Alarms

- As a minimum requirement for the BMS solution, the following needs to be implemented
 - Overall dash board for alarms
 - Selected facilities alarms at MY OWN DATA CENTRE AZABU JUBAN Data Center
 - Set up Central Command Center
 - Alarm Management for all critical systems
- All critical and high level alarms should be notified to the Data Center management team and other personnel in near-instant text message alerts.
- The BMS solution shall be able to display critical alarms on a pop up window for the quick resolution by the Facilities Management Team
- The system needs to identify when equipment and plant are running, ON and OFF and provide alarms when system fails or running outside expected parameters.
- The ON and OFF indication colours must conform to Japanese standards, which are the reverse of Western colour standards for On and Off indicators.

Monitor

- The BMS will be required to monitor the status of building systems and provide the Facilities Management Team with a clear overview of the building environment and operational status.
- The information will need to be able to be displayed in a clear logical manner on operator's screen which should provide a full overview of each system and able to deal with individual elements and sub systems.
- The system needs to identify when equipment and plant are running, ON and OFF and provide alarms when system fails or running outside expected or pre-set parameters.

Network & Security (See also Section 5)

- The Network Equipment Supplier Partner and network Installer Partner shall be qualified and capable to carry out the works and should be available for support during the maintenance of system life time.
- The BMS solution communication infrastructure shall be kept secure and safe from unauthorised access.
- The BMS shall be employed with security certifications and validation practices to ensure that network is safe and secure from external threats.
- The BMS servers should be located at diverse locations to ensure the continuous operation of the data Center without any risk of failing.
- The BMS network communication infrastructure should be secure at all times and will be subject to periodic penetration tests.
- The BMS solution shall ensure fast & effective communication speeds and connectivity when monitoring equipment and trending live data values.
- The BMS solution shall be installed as an independent network solution and will not be integrated with any other MY OWN DATA CENTRE IT or Phone networks or internet or any external system.
- The BMS shall be independent solution which can have following access security layers
 - o Alert for password change every 3 months
 - o Automatically capable to delete user credentials in 6 months if user has not used the system for this timeframe
- The BMS solution must meet the Information Security Requirements and comply with acceptable standards.
- The BMS partner should demonstrate security certifications and validation practices employed to ensure that the systems are secure.

Deliverables

- Major Project Deliverables
 - Develop a detailed design with the general contractor which shall include system architecture, riser and panel layout.
 - Supply and Install network infrastructure including network switches to field devices where required.

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- Supply and Install BMS hardware and software
- Supply and Install Operator Workstations and Graphical User Interfaces (GUI's) to provide a fast, efficient and user friendly monitoring platform for all building services.
- Where possible use Direct Digital Controllers (DDC's) with new Direct Digital Controllers (DDC's) as required, rather than I/O Units.
- Supply and Install DDC's and field devices where required.
- Design and implement resilient control logic for all building systems to independently operate in the most efficient manner possible.
- Prepare the deliverables for technical training and arrange training for onsite personnel
- Submit the O&M manual and relevant documents as per the MY OWN DATA CENTRE specifications to the Project Manager.

4. DESIGN REQUIREMENTS

- The BMS partner must complete engineering/detailed drawings showing all devices, terminal numbers, schedules, legends, labels, etc. as required to properly displaying the system to be installed and to allow easy troubleshooting in the future.
- The detailed design must include riser and floor plans, calculations, sensor locations, DDCs panel layout, field devices drawings, network layouts and system architecture as a minimum.
- The engineering drawings should include diagrams indicating panels, LCD display panels, network infrastructure, field devices and interlocking wiring details.
- As a part of the design submittal, the BMS partner will have to provide a written sequence of operation for each system and or system component.
- The design submittal should also include equipment data sheets for all major controller's, field devices but not limited to;
 - Damper Actuators
 - Local area networks (system architecture)
 - Stand-alone DDC controllers
 - Application Specific Controllers
 - Temperature sensors
 - Electronic sensors
- The BMS partner must comply with the general specifications for servers and workstation's set by companies such as Microsoft and IBM.
- The BMS partner has to produce detailed design to review with the Project Manager to verify if it is complying with the MY OWN DATA CENTRE requirement.
- All designed drawings shall be submitted to Project Manager appointed by MY OWN DATA CENTRE in PDF and DWG file format.

5. NETWORK REQUIREMENTS

- Within the Data Center there shall be a dedicated LOOP network to connect the BMS monitoring systems together and provide a high speed highway with all elements of the system being robust and resilient.
- The proposed "total solution" should have the latest release operating system (OS), anti-virus with up to date patches, however future upgrades, patch updates and ongoing support to be considered in the lifecycle of product.
- The BMS solution must be resilient and have built in hot redundancy to ensure that system is working and in operational condition at all times.
- The BMS solution should be resilient for servers, network communication infrastructure, DDCs and field devices for the continuous operation of the building in any critical situation.
- The BMS contractor shall install a high speed fibre optic network in the Data Center for all BMS system requirements including battery management, power management and Monitoring and Controls.
- The BMS solution shall ensure fast & effective communication speeds and connectivity when controlling equipment and trending live data values.
- The Network Equipment Supplier and Installer Partner shall be qualified and capable of carrying out the works and should be available for support during the maintenance of system life time.

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- The new network communication infrastructure shall be kept secure and safe from unauthorised access.
- The BMS solution communication infrastructure shall be maintainable without network connectivity.
- The BMS network communication infrastructure will be subjected to periodic penetration test, which is also one of the requirements of the system.
- All network devices proposed for the communication infrastructure for this project should be capable enough to communicate with the main and stand by servers at more than Giga bytes per second speed.
- The BMS partner must comply with the specifications for servers and workstation's standards set by companies such as Microsoft.
- The main and stand by server for the BMS solution shall be located separately with built in resilience to make sure that the system is working without any interruption to the building operation.
- The communication infrastructure for system shall be separate from any other IT network in the data center and not allowed to connect externally to internet by any means

6. CYBERSECURITY REQUIREMENTS

- The BMS solution shall comply with all global cybersecurity standards.
- The BMS solution shall be kept safe and secure from all external threats.
- The BMS solution shall be protected using most current MS Windows OS security features.
- The BMS vendor shall manage the system security without the network connectivity.
- The BMS shall be able to store and display application and OS level audit logs whenever required.
- The BMS software and server shall be capable of storing automated scheduled backup for all system components.
- The BMS solution shall be possible to configure client users to auto-log off within 30 minute period of inactivity.
- All USB ports at servers and workstation's shall be locked out to prevent any virus spread in the system.
- All software's and devices proposed for the project shall be set as default to maximum security settings.
- Access to the server shall be allowed only via the engineering workstation located at the BMS room.

7. SECURITY REQUIREMENTS

- The BMS solution must meet the Information Security requirements (ISR) to comply with the standard set by the leading cloud services companies
- The BMS shall be installed with security certifications and validation practices to ensure that network is safe and secure.
- The BMS shall be total independent solution which can have following access security layers
 - o Alert for password change every 3 months
 - o Automatically capable of deleting user credentials in 6 months if user has not used the system for this timeframe
 - o Password Blacklist
- The BMS partner should demonstrate security certifications and validation practices employed to ensure that the systems are secure.
- The BMS partner shall responsible for software updates and patches for operating system and anti-virus in the system life cycle.
- DVD's and USB's are not allowed as the backup data strategy. A dedicated hard drive should be kept at site for periodic back up from the BMS or a RAID type array installed.
- All BMS data at the server level must be maintained for at least 24 months.

8. ENERGY MANAGEMENT REQUIREMENTS

- The BMS will contain an Integrated Energy Management System in the building. So that real time energy consumption data from any selected blocks can be collected, stored, trended, analysed and reviewed so that the combined information can be provided to the building management team.
This information will provide accurate energy consumption and carbon data that will provide MY OWN DATA CENTRE with information on the total energy consumption and allow energy saving initiatives to be identified, instigated and tracked.
The system provided should be comprehensive, cost effective, secure, resilient and capable of meeting all current and foreseeable future energy management needs of the MY OWN DATA CENTRE.

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- The BMS must display PUE calculations to determine total amount of energy used in a data center hall to the energy delivered to server racks.
- As a part of the BMS total solution, the energy dashboard must be capable to generate daily, weekly and monthly reports in customised format as per requirements.
- The BMS solution must connect with the weather monitoring system to control the temperature inside the facility based on the outside weather.
- The BMS partner shall provide the necessary transducers or any other interfacing devices to monitor, log and generate reports on the energy management system wherever required.
- **Power meters shall be installed by the Electrical Contractor.** The BMS energy management system must show 3-phase voltage (V1, V2 & V3), 3-phase current (I1, I2 & I3), Kw, Kwh and PF as a minimum on the screen with the trending for 1-30 days of the particular month to analyse energy consumption in the Data Center.
- The reporting provided from energy management system shall be accurate, up to date, easy to read and tailored to suit different levels of user needs.
- The Energy Management system should able to demonstrate at least the following components on the platform so highest levels of monitoring can be achieved.
 - Total Carbon Foot Print of the site
 - Generator fuel consumption
 - Monthly Carbon Emission
 - Energy Consumption of each DC Hall
 - Kwh per Sq. M demand and consumption.
 - Kwh for whole building for any given period.
 - Energy Cost Breakdown (Daily, Weekly, Monthly and Yearly)
 - Energy consumption profile
 - Power consumption reports by month
 - Increase in electricity consumption demand and trends

9. INSTALLATION REQUIREMENTS

- The BMS partner shall supply and install all field related devices such as network devices, hubs, switches, relays, transceivers to accommodate the approved sequence of operation.
- The BMS partner will provide all wiring & cabling and complete all terminations to panels as required to permit the BMS to work in a proper and meaningful manner.
- The BMS partner shall install wiring for the LAN, sensor inputs and outputs directly related to the DDC controllers.
- The BMS partner will provide complete start-up and field calibration of the building system. It would be the responsibility of the BMS partner to set all initial monitoring points and values to assure a properly functioning of system on day one.
- All electrical devices, controllers, sensors and network infrastructure shall be properly labelled.
- The BMS partner shall install field devices in safe locations which is to be accessible for maintenance.
- The BMS Partner shall provide a complete set of commissioning documentation for all field devices and sequence of operations upon completion of installation.
- The BMS Partner shall participate fully in the Testing & Commissioning process and the Integrated System Testing prior to hand over of a hall or any section thereof.

NOTE:

- **All embedded conduits will be the responsibility of the General Contractor**, but the BMS partner must provide their requirements in a timely manner to ensure the required conduits can be laid before concrete or dry walls are constructed.
- Such requirements shall be made clear on drawings, working together with the general contractor.
- Cabling and fibre laying shall be the responsibility of the BMS partner alone.

10. INTEGRATION WITH PQM etc.

- The BMS solution shall have open protocol which can integrate and interface with all planned and future building services systems, equipment and third party devices at the Data Center.
- The BMS solution should be able to integrate or interface with the lighting control system and air conditioning system with programmed logic.

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- The BMS solution must be capable to support MY OWN DATA CENTRE's requirement of Integrated Command Control Center at AZABU JUBAN Data Center.
- The BMS solution shall be integrated with VESDA alarms which can be included as high level interface to get early notification of the VESDA signal to prevent spread of fire in the building premises.
- The BMS partner shall integrate with all Power Quality Meters and Multi Meters and where required, install additional dedicated PQM software and server to obtain Monitoring and Metering reports such as:
 - A V W var VA varh Wh PF Hz unbalance
 - A W var VA demand
 - Load shedding
 - Power factor control
 - Pulse input totalizing
 - Ia Ib Ic In
 - Va Vb Vc Vab Vbc Vca
 - V I unbalance
 - True PF crest and K factor
 - Hz W var VA
 - Wh varh VAh W cost
 - Demand: A W var VA
 - Harmonic analysis with THD and TIF
 - Harmonic Distortion
 - Event recorder - 150 events
 - Waveform capture
 - Data logger
 - Voltage Disturbance Recorder (VDR)
 - Sag & Swell Monitoring
 - Frequency Variations
- The BMS partner has to integrate variable speed drives for Chiller's and CRAHs with the system to manage the energy demands effectively.
- The BMS partner shall able to design and integrate the system to accommodate future third party requirements on the network with no noticeable reduction in transmission speed.
- The BMS solution should be able to integrate with generator tank fuel level indicator panel to monitor the tank level status at the BMS.
- The BMS solution shall be able to show alarm and fault signals for the UPS battery charger system.
- The BMS solution shall be integrated to Battery Monitoring System with an alarm signal transmitted as a critical alarm.
- All chiller controls shall be standalone. The BMS shall have monitoring capability of the chiller only.
- All water services shall be metered with BMS interfaces.
- All Sump pumps shall be provided with the necessary alarms linked to the BMS system.

11. ONGOING SUPPORT REQUIREMENTS

1. The BMS partner should provide comprehensive annual maintenance contract value for the first 5 year in the tender stage itself.
2. The BMS partner shall provide the basic and continuous training to operators prior to the Data center going live and from then on whenever required.
3. The network Equipment supplier and installer partner should be available for support during the network communication infrastructure system life time.
4. The BMS partner to include the mandatory spare parts and call out for the support to system at critical times.

12. CONCLUSION

This **Guideline of Requirements** document is provided as guide to selected BMS vendors and must be taken as a basic document only, the BMS vendor should provide more details based on their own system capabilities/

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