APC by Schneider Electric

StruxureWare Operation Suite v7.1
Data Center Infrastructure Management System Specification

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WHERE REFERENCE IS MADE THROUGHOUT THIS SECTION TO "PROVIDE", "INSTALL", "SUBMIT", ETC., IT SHALL MEAN THAT THE CONTRACTOR, SUBCONTRACTOR, OR CONTRACTOR OF LOWER TIER SHALL "PROVIDE", "INSTALL", SUBMIT", ETC., UNLESS OTHERWISE INDICATED.
THIS SECTION IS WRITTEN TO INCLUDE THE 2004 MASTERFORMAT AND THE 1995 MASTERFORMAT VERSIONS. WHERE APPLICABLE, THESE ITEMS ARE BRACKETED AND, IN EACH CASE, UNLESS OTHERWISE INDICATED, THE FIRST CHOICE APPLIES TO THE 2004 MASTERFORMAT AND THE SECOND CHOICE APPLIES TO THE 1995 MASTERFORMAT.

SECTION [26 62 00]

DATA CENTER INFRASTRUCTURE MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1   RELATED DOCUMENTS

A.   Drawings and general provisions of the Contract, including General Conditions, [Division 01 - GENERAL REQUIREMENTS] [Division 1 - GENERAL REQUIREMENTS], and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2   SUMMARY

A.   **Scope:** This specification describes the operation and functionality of a Data Center Infrastructure Management system (DCIM) hereafter referred to as the DCIM. The DCIM software shall be delivered to the owner as an ISO image. The DCIM shall be installed on a physical server or as a virtual appliance or as part of a cluster setup of up to 4 servers to provide redundancy and load-balancing. Each server or virtual guest shall have a minimum of 2 multi-core CPUs, 16GB RAM, and 40 GB hard disk storage. DCIM shall depend on other monitoring systems such as StruxureWare Central for real-time data collection. The DCIM system shall be on the same LAN as the StruxureWare Central.

B.   **Section Includes:** This specification shall describe how DCIM provides insights and drives performance throughout the data center, including data center assets and physical infrastructure. DCIM shall enable the monitoring and collection of low-level infrastructure data to enable intelligent analysis by individuals with domain expertise (e.g., operations, capacity planners and facilities planners), as well as a holistic analysis of the overall infrastructure. DCIM shall enable the integration of information technology (IT) and facility management disciplines to centralize monitoring, management and intelligent capacity planning of a data center's critical systems.

C.   The DCIM shall operate in conjunction with an existing network infrastructure to provide system management of the systems described above.

1.3   APPROVED PRODUCTS

SECTION [27 80 00]
DATA CENTER INFRASTRUCTURE MANAGEMENT SYSTEM

The Data Center Infrastructure Management system (DCIM) shall be StruxureWare Data Center Operation, designed by Schneider Electric. Substitutions shall only be permitted subject to 2.1, below.

1.4   SYSTEM DESCRIPTION

A.   **Design Requirements:**
1. All material and equipment used shall be standard components, regularly manufactured, available and not custom designed especially for this project. The data center infrastructure system, including the DCIM, shall previously be thoroughly tested as a system, and proven in actual use prior to installation on this project.
2. The DCIM shall be installed on a physical server, or as a virtual appliance, with a specified HTTP or HTTPS connection to access the user interface (DCIM client), and standard TCP protocol connections for communications with the monitoring system.
3. The DCIM system-level redundancy and load-balancing shall be provided using a server-level cluster setup. Up to 4 servers can be setup in a cluster to gain performance improvements.
4. The DCIM shall enable vendor-neutral inventory management with real-time device failures and data shown within a data center physical layout. Graphical floor layout and rack elevation view shall be supported.
5. The DCIM tool shall provide location-based drill-down views providing a structured overview of data center locations, from a global to local view down to single assets.
6. A Power Usage Effectiveness (PUE) dashboard will provide information on daily energy use.
7. Inventory report provides structured information on all rack-mount devices, organized by device type, age, manufacturer, and properties for quick overview of all current devices within a particular data center.
8. The DCIM tool shall have a search capability to allow data center operations to quickly locate a piece of equipment in the rack layout and floor layout.
9. The DCIM tool shall provide public web services API to allow third-party applications to access the inventory database, alarms and events, capacity and cooling analysis data, and PUE information.
10. The DCIM shall provide provisions to predict the optimal location for physical infrastructure and rack-based IT equipment based on the availability and requirements of physical infrastructure capacity and user defined requirements such as redundancy, network, and business use grouping.
11. The DCIM shall provide provisions to reduce stranded capacity and enable informed decision making and planning by proactively analyzing the impact of future moves, adds, changes before they occur, ensuring that the physical infrastructure provides the required space, power, and cooling capacity for current and future needs.
12. The DCIM shall be capable of hosting additional add-on modules that allow a user to perform Energy Efficiency and Energy Cost Management, Inventory Management, Power and Cooling Capacity Management, and Change Management.
13. The DCIM shall provide read-only smart phone applications to get a high level status of the data center operations and KPI.
14. The DCIM shall be capable of integrating with additional plug-ins that supports Cisco UCS Manager, BMC Remedy ticketing system, Microsoft System Center Virtual Machine Manager 2008, and VMware vCenter (version 4.0 and higher).

B.   **System Characteristics:**

1. The DCIM shall be deployed on the following physical server and system requirements:
   a. The DCIM software shall be delivered as an ISO image.
   b. The server should have a minimum of 2 multi-core CPUs, 16GB RAM, and 40 GB hard disk storage.
   c. LAN (10/100/1000 base T) network ports.
   d. USB ports for installation and upgrades.
   e. Debian 6 as the server operating system.
   f. DCIM PostgreSQL database 8.4.9 as the internal database.

g. JBoss Application Server 5.1 as the Java application server.
h. Monitor / keyboard port for field service diagnostic purposes only.

2. The DCIM shall meet the following virtual appliance requirements:
    a. The virtual appliance shall be delivered as an ISO image.
    b. The virtual hypervisor shall be supported on VMware, Microsoft Hyper-V, and Redhat KVM.
    c. The virtual guest shall have a minimum of 2 multi-core CPUs, 16GB RAM, and 40 GB hard disk storage allocated to it.
    d. Will support LAN network adapters.

3. The DCIM client workstation shall have the following requirements:
    a. CPU: 2 GHz Intel Core 2 Duo (or equivalent), hard disk: 500 MB free hard disk space for installation, memory (RAM): 4 GB and display: 1024x768 screen resolution with 16 million colors.
    b. Microsoft® Windows XP Service Pack 2 or Microsoft® Windows Vista or Microsoft® Windows 7 (Recommended 32-bit) or Linux.
    c. Browser: Internet Explorer (v7 and up), Chrome, and Firefox.
    d. Java™ Plug-in (JRE) version 1.6.0_22 or higher.
    e. Administrative rights on the workstation.

4. The owner will supply the following information to facilitate system implementation:
    a. Network configuration settings (IP addresses, subnet mask) necessary for the DCIM to reside on the owner's public or private network.
    b. E-mail addresses and SMTP settings for e-mail notification.
    c. Open the following ports in the firewall for DCIM server and client communication - Port 80 for HTTP, Port 443 for HTTP using SSL, Port 4457 for JMS binding port, Port 4459 for JMS binding port using SSL, port 4460 for JMS control port, Port 4462 for JMS control port using SSL.
    d. Provide details of the monitoring system, the BMC Remedy ticketing server, the VMware vCenter server and the Microsoft System Center Virtual Machine Manager.

C. **Management System Vendor Responsibilities**
    1. Provide the software as an ISO image via the apc.com website.
    2. Provide system installation, configuration and operator orientation by factory employed Field Service Engineer depending on the services purchased.
    3. Provide 7 x 24 technical support through a toll free number per the Software Support Contract.
    4. Provide upgrades as per Software Support Contract.

1.5   SUBMITTALS

A. **Proposal Submittals:**
    1. As bid system bill of materials
    2. Product brochures
    3. Product guide specifications
    4. High-level system architecture diagram
    5. Installation information, including requirements

B. **Delivery Submittals:**
    1. Online help available at http://dcimsupport.apc.com for the installation, configuration and troubleshooting of the DCIM, which shall be translated from English into the following languages:

1. Japanese
2. Simplified Chinese
3. Traditional Chinese
4. Russian
5. French
6. Italian
7. German
8. Korean
9. Brazilian Portuguese
10. Spanish

1.6 QUALITY ASSURANCE

A. **Qualifications:**
1. **Software Designer Qualifications:** The software designer shall be a firm engaged in the development of data center infrastructure management systems whose products have been in satisfactory use in similar service for a minimum of 5 years.
2. **Installer Qualifications:** Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing data center infrastructure management systems similar in type and scope to that required of this Project.

B. **Pre-Installation Conference:** Conduct pre-installation conference in accordance with [Section 01 31 19 - PROJECT MEETINGS] [Section 01200 - PROJECT MEETINGS]. Prior to commencing the installation, meet at the Project site to review the material selections, installation procedures, and coordination with other trades. Pre-installation conference shall include, but shall not be limited to, the Installer, and any trade that requires coordination with the work. Date and time of the pre-installation conference shall be acceptable to the Owner and the Architect/Engineer.

1.7 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.

1.8 WARRANTY

A. **General:** See [Section 01 77 00 - CLOSEOUT PROCEDURES] [Section 01770 - CLOSEOUT PROCEDURES].

B. **Additional Owner Rights:** The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

1.9 MAINTENANCE

A. A complete offering of software support contracts and licenses for the DCIM shall be available from the manufacturer, and shall be required to provide ongoing technical support and allow future software updates. Contract work shall be performed by factory-trained service personnel.

PART 2 - COMPONENTS

2.1 MANUFACTURERS

A. **Basis of Design:** Product specified is "APC StruxureWare Data Center Operation v7.1" as designed by APC by Schneider Electric. Items specified are to establish a standard of quality for

design, function, materials, and appearance. Equivalent products by other manufacturers are not acceptable. The Architect/Engineer will be the sole judge of the basis of what is equivalent.

2.2   MODES OF OPERATION

A.   **System Overview:** The DCIM shall be a centralized server appliance that is accessed remotely from client workstations/servers via a HTTP or HTTPS connection. No client-based services shall be used as a substitute. StruxureWare Operation, Operation Capacity, Operation Change, Operation Energy Cost, Operation Energy Efficiency, Operation Insight, and Operation Vizor modules shall be offered by the DCIM. Microsoft System Center Virtual Machine Manager, VMware vCenter, and BMC Remedy integration shall be supported. A Web Services Open API guide shall be made available by the DCIM vendor.

B.   The DCIM server console must support the following:

    a.   Microsoft® Windows XP Service Pack 2 or Microsoft® Windows Vista or Microsoft® Windows 7 (Recommended 32-bit) or Linux.
    b.   Browser: Internet Explorer (v7 and up), Chrome, and Firefox.
    c.   Java™ Plug-in (JRE) version 1.6.0_22 or higher.

C.   The DCIM read-only StruxureWare Vizor smart phone application must be supported on the following platforms:

    a.   Apple iOS 4.3.2 – 4.3.3.
    b.   Android OS Ice Cream Sandwich

D.   **StruxureWare Operation:** The DCIM software shall provide the methodology to create visual view of the data center floor layout, add the racks view and the equipment within, and manage network connectivity. This module shall also map the alarms to the appropriate device on the floor layout. The DCIM software shall support the following capabilities -

1.   **Floor Layout**
    A.   The DCIM tool will have the capability to add locations and rooms of different types to the data center model to represent the actual physical enterprise infrastructure.

    B.   The DCIM tool will have the capability to configure a bird's eye view of the room layout to ensure the layout in the data center model accurately represents the real-world physical environment of the room. This includes any physical attributes of the room such as size, shape, doors, windows and walkways.

    C.   The DCIM tool will have the capability to see multiple rooms in a layout pane at the same time allowing a user to compare or drag equipment between them – for modeling.

    D.   The DCIM tool will have the capability to export the complete or filtered data center inventory into a delimited file (.csv file).

    E.   The DCIM tool will have the capability to render the floor layout in both 2D and 3D view.

2.   **Rack elevation View**
    A.   The DCIM tool will identify how much weight has been placed in a rack / room compared to the predefined load bearing capability settings of the rack.

SECTION [27 80 00]
DATA CENTER INFRASTRUCTURE MANAGEMENT SYSTEM

B. Illustrate the weight of the equipment added to the rack in the rack layout compared to the maximum equipment loading capability of the rack.

3. **Network Management**
A. The DCIM tool will be able to model the configured network connections and allows a user to setup new network routes between the configured equipment.

B. Network port properties will have the capability to be imported from a product catalog and/or will be user configurable.

C. Ability to configure network routes for selected network equipment in the layout, for example between a server and a switch or a switch and a switch. A route is defined as a connection from a piece of equipment (communication endpoint, such as a server or layer 2/3 network gear, such as a switch) to the first piece of equipment that is a communication endpoint or layer 2/3 network gear.

4. **Product Catalog**
A. The DCIM tool will be able to provide a product catalog that contains up-to-date floor and rack mounted data center equipment.

B. The DCIM tool will be able to allow a user to add floor and rack-mountable equipment to a rack, server room, electrical room or store room.

5. **Dashboard Key Performance Indicator (KPI) View**
A. Provide a map view to monitor the data center operations in a quick overview, including any alarms in different locations and rooms.
B. From the map overview, one can drill down to locations > rooms > racks > servers for details or troubleshooting.
C. Display capacity KPIs for each data center in the map view. The KPIs should include the status of the Power, Cooling, U-space and Network utilization.
D. Power is represented as the percentage of the available load (kW) that is utilized by the IT equipment in the location or room.
E. Cooling is represented as the percentage of the available load (kW) that is utilized by the IT equipment in the location or room.
F. U-space is represented as the percentage of the available U-positions (U-pos) that is populated with equipment in the location or room.
G. Network is represented as the percentage of the available Network ports (ports) that is utilized by networking equipment in the location or room.

E. **Operation Capacity:** The DCIM software shall provide capabilities to perform capacity planning, create capacity groups, perform power and cooling analysis as per the following details:

1. **Capacity Planning**
 The DCIM software will provide provisions to recommend the best location for a server in the rack layout, utilizing available space, cooling, and power capacity to optimize capacity utilization and avoid stranded capacity:
A. Impact simulation: Generates a list of equipment that would be impacted if the selected piece of equipment, e.g. a UPS or cooling unit, was to fail.
B. Measured Load: Display measured load data for UPS and racks in the floor layout that identify how much of each UPS or rack's maximum kW power is in use. This requires communication to power monitoring devices or servers.
C. Power Capacity: Ability to assign planned capacity for each rack and illustrates rack capacity consumption compared to the planned recommended values for that rack. Provide information such as remaining power, the amount exceeding the recommended capacity.
D. Power Path: Ability to model power connections between the equipment supplying and delivering power and the equipment requiring power. This includes power path from

switchgear, UPS, main PDU with modular circuit breaker mapping, rack RPDU and to individual servers.

E. Rack U Space: Ability to monitor and display rack U space utilization of each rack.

2. **Capacity Groups**
Ability to model capacity groups that allows a user to group equipment's, placing it in groups of racks with similar power capacity requirements to match the IT equipment with availability needs and avoid stranded space, power, and cooling capacity. For example, group a set of high-density racks together for optimized power and cooling configuration.

3. **Power Analysis**
Ability to detect the following list of configuration issues regarding data center power configuration and provide recommended actions:

A. Connection has not been configured between PDU and power supply: A power connection is missing in the data center model from this PDU to the power supply from which it should receive power.

B. Equipment connected to this PDU draws more power than is supported by the power supply breaker: The breaker does not provide sufficient power to cover the power requirements of the equipment connected to that PDU.

C. Equipment is connected to a rack PDU outside this rack: The power connection setup for this equipment is not optimum as it is setup to be supplied by a rack PDU that is not positioned in the same rack as the equipment.

D. Internal redundancy setup for UPS and group must match: The internal redundancy setup for the UPS and group does not match, for example N and N+1.

E. Rack is without rack PDU or a rack PDU is not powered: The rack is without rack PDUs or its rack PDUs are not connected to a PDU, remote distribution panel (RDP) or power panel.

F. The breaker configuration does not support rack's estimated load: The equipment in the rack draws more power than the breaker supports. In case of 3 phase equipment, the problem shall be indicated even if only one of the phases is overloaded.

G. The input voltage setting required by the equipment is not available in current rack: In the data center model, the server's input voltage requirement cannot be supplied by the rack PDU in the rack.

H. The measured load exceeds the estimated load per phase designed for the rack: Connected devices in the rack use more power than the estimated load per phase in the rack shall be indicated in the data center model.

I. The measured load exceeds the total estimated load configured for the rack: Connected devices in the rack that use more power than the total estimated load in the rack shall be indicated in the data center model.

J. The measured load of the UPS exceeds the total estimated load of the connected equipment: Devices connected to the UPS use more power than design capacity or they have not been assigned to the correct UPS in the data center model layout to correctly represent the physical infrastructure. In case of 3 phase equipment, the problem shall be indicated even if the measured value is only too high for one of the phases.

K. The phase configuration for the connected server is not supported by the rack PDU: The phase connection configured for this server is not valid. This message will occur if a power connection had been configured to this server but subsequently changes have been made to the phase configuration.

L. The Rack PDU output voltage setting does not match the output voltage of the connected PDU / Power Panel: The power connection is invalid because the voltage required by the rack PDU is not available from the power distribution component.

M. The server must be supplied from the same phase from both distribution units: The redundancy setup requires identical phase distribution setup for A and B feed.

N. The UPS in the layout does not supply enough power to match the configured load of connected equipment in the layout: The load of the equipment connected to the UPS is higher than the load that the UPS can supply. In case of 3 phase equipment, the problem shall be indicated even if only one of the phases is overloaded.

4. **Cooling Analysis**
   A. The DCIM software shall be able to calculate cooling performance of datacenters in real-time with CFD-like simulation, provide calculated inlet and exhaust temperatures per rack plus capture index (percentage of heat captured by cooling devices) per rack.

   B. Ability to present the calculation results visually in the floor layout.

   C. Ability to alarm cooling configuration issues and provide recommended actions. For example, a room has no perforated tiles for the Computer Room Air Conditioning (CRAC) unit airflow (one or more CRACs have been added to the floor but no perforated tiles have been added), or there is no perforated tile airflow (one or more perforated tiles have been added to the room but no CRACs have been provided to supply any airflow).

   D. 2D plenum airflow and pressure view: Provide a 2D under-floor plenum view that shows airflow vectors and Cubic Feet per Minute (CFM) based on the height of the raised floor, the placement and type of perforated tiles and cooling devices. When a cooling unit or a perforated tile is moved around, the flow vectors and airflow CFMs shall update instantly.

   E. 3D temperature and airflow view: Provide a 3D view showing max/average inlet/return temperature and airflow above the raised floor. Calculate velocity vector and temperature in real-time (seconds) to allow customers to try what-if scenarios. Ability to slide the temperature and velocity plane in all three dimensions.

   F. Ability to simulate failure of one or more cooling units and examine impacts to IT equipment.

F. **Operation Energy Efficiency:** The DCIM shall provide the following functionality from the data center Energy Efficiency point of view:

1. The DCIM tool will provide current and historical Power Usage Effectiveness (PUE) values and full insight into current and historical energy efficiency.

2. It will present how much power is devoted to driving the installed IT-equipment compared with the total facility consumption.

3. Identify efficiency losses and enables improved PUE at the subsystem level.

4. Provide insight into energy losses and cost of energy at the subsystem level, providing details of which subsystem draws the most costs.

5. The DCIM tool will have a web-based dashboard view which includes efficiency data on current and historical PUE, as well as detailed subsystem cost analysis.

6. The DCIM tool will provide a report on current and historical PUE values.

7. The DCIM tool will provide energy efficiency analysis, PUE and DCiE (Data Center infrastructure Efficiency) reporting.

G. **Operation Change:** The DCIM shall provide the following change management functionality to keep track of additions, movements, maintenance or deletions in a data center:

1. The DCIM tool will enable operators to gain control over the data center environment by implementing organized moves, adds, and change work processes by providing an automated workflow system that can develop and assign work orders, reserve space, track status, and provide a historical audit trail.
2. Ability to assign deadline and person to each work order.
3. Ability to create multiple tasks and track task status for each work order.
4. Ability to create work order templates that can be used for recurring work types like maintenance activities or standard procedure for installation of a certain type of server.
5. Support workflow management that will allow for easy implementation and tracking of organized moves, additions, and changes.
6. Support device catalogs of floor and rack-mountable equipment.
7. Support audit trail reporting that would show asset moves, additions, and changes by date/time, owner, and work orders.
8. Support high-level single "glass pane" report of changes done to the data center in specified time period.

H. **Operation Insight**: The DCIM software shall support a report design tool that has the ability to:

1. Configure and design custom reports in addition to the standard built-in reports.
2. Define new data sources including other JDBC, Web Services, XML or Text–based databases for data integration.
3. Define customized report layout and provide a comprehensive list of report elements for users to choose: Text, Label, Image, Table, List, Chart, etc.
4. Support customized equation and calculation.
5. Save a finished report design as a template for other users to use.
6. Output reports to the following formats: HTML, Word Doc, PowerPoint PPT, PDF, POSTSCRIPT or Excel file.

I. **Operation Dashboard**: The DCIM software shall support high-level KPI dashboard via a web interface:

1. Provide a dashboard that displays key performance indicators (KPIs) of managed data centers.
2. Ability to modify the dashboard with different themes, data sources, graph types and KPIs.
3. The following KPIs should be made available for users to choose: Total UPS load, Used UPS load, Measure A/B-feed peak and average, Total cooling capacity, Used cooling capacity, Total network ports, Used network ports, Total/Used/Available U-space, Ambient and Inlet temperature, Energy Efficiency PUE/DCiE number and trend.
4. The dashboard needs to be accessible via a Web page.
5. Supports dynamic web dashboard that periodically switches between different pages.

J. **Operation Vizor**:
1. Shall support Apple iOS (iPhone, iPad, iPod Touch, etc) and Android devices.
2. Ability to access the complete data center assets from a mobile device.
3. Ability to scan barcode and audit equipments and racks from a mobile device.
4. Ability to view capacity utilization summary on a mobile device.
5. Ability to view the KPI dashboard on a mobile device.

K. **Reports**: The DCIM software shall be able to support the following standard report templates out-of-box:
1. Energy Cost Report: The DCIM tool will provide an Energy Usage Report, which shows energy consumed within the data center by the kWh and cost per kWh, detailed to the rack level. The report will include data based on the filter selections of time period, Rooms, Organization, the entered kWh price, the entered overhead factor or Power Usage Effectiveness (PUE). The

calculations are based on measured load values, if the IT devices have been setup to report live measured data. Otherwise, the estimated load value will be used.

2. Inventory report: The DCIM software shall generate an Inventory report that lists the contents of the filtered item or items of the entire inventory.

3. Power Capacity report: The DCIM software shall generate a Power Capacity report with power data, i.e. available estimated load and planned estimated load.

4. Rack U-Space Report: The DCIM software shall generate a rack space report that displays the amount of available positions in specified racks for equipment that takes up one or more U positions.

5. Audit Trail report: The DCIM software shall generate an Audit Trail report that lists actions recorded in the application, whether those actions were in response to work orders, or changes made to the data center model.

6. Network Report: The DCIM software shall generate a network report that lists the usage of network ports on each server and network devices. It shall also present all network routes in the data center.

7. Capacity History: The DCIM software shall generate a capacity history report that shows the capacity change history for one or more data centers over a user-specified period of time. Allow users to choose data from various capacity categories including power, cooling, space, network and energy efficiency, etc.

8. Work Order List: The DCIM software shall generate a work order list report that shows work order number, deadline, status, priority, summary and assignee information for user selected work order number ranges.

9. Work Order Details: The DCIM software shall generate a work order detail report that shows all the tasks associated with the work order and the status of each task

2.3   Data Center Infrastructure Management System Security

A. **Authentication and Encryption:** The communication between the client and the DCIM shall be secured via a Secure Sockets Layer (SSL) 168-bit Triple-DES (Data Encryption Standard) encoded connection.

B. **OpenLDAP and Active Directory:** The DCIM shall have Open Lightweight Directory Access Protocol and Active Directory support.

C. The log in to the user interface of DCIM shall use Secure Socket Layer (SSL) or Secure Socket Handling (SSH) authenticate. The web launch to devices shall occur through a HTTP or HTTPS connection. To increase security, the HTTP or HTTPS connection and the HTTP or HTTPS port shall be user configurable for each device, through the DCIM user Interface.

D. The DCIM shall allow the user to create user accounts ranging from Administrator Access to View Only Access. The DCIM shall have no specified limit to the number of user accounts that can be created. Each of these accounts shall have their own unique login user name and password. An administrator shall have full read/write access to all the DCIM's functionality. The access other users can be, limited to specific rooms, specific features, as well as provide view only access. The "Read Only" access user shall not be allowed to change the DCIM configuration.

PART 3 - EXECUTION

3.1   EXAMINATION

A. **Verification of Conditions:** Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect/Engineer, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
  1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2   INSTALLATION

A. **General:** Preparation and installation shall be in accordance with reviewed product data, final shop drawings, manufacturer's written recommendations, and as indicated on the Drawings.

B. **Factory-Assisted Start-Up:** If a factory assisted DCIM installation and start-up is requested, factory-trained service personnel shall perform the following inspections, test procedures, and on-site training:
  1. **Installation:**
     a. Installation to the physical server.
  2. **Mechanical Inspection:**
     a. Check the network connections to the DCIM.
     b. Check the network connections to all managed/monitored devices.
     c. Ensure the DCIM is powered and verify power to the optional DCIM Hub (if installed).
  3. **Functional Inspection:**
     a. Ensuring owner can log in to the DCIM.
     b. Ensure any additional license keys are installed on the DCIM.
     c. Verify the configuration of the various modules.
     d. Ensure the owner's defined users are added in the DCIM.
  4. **On-Site Operational Training:** During the factory-assisted installation, operational training for site personnel shall include log in to the user interface, navigation through the menu options, device discovery, generation of reports, creation of groups, creation of users, and setting up alarm notification.

3.3   FIELD QUALITY CONTROL

A. **General:** See [Section 01 45 23 - INSPECTING AND TESTING SERVICES] [Section 01410 - INSPECTING AND TESTING SERVICES].

B. **Manufacturer Field Service:**
  1. **Worldwide Service:** The DCIM manufacturer shall have a worldwide service organization available, consisting of factory-trained field service personnel to perform start-up, preventative maintenance, and service of the DCIM system and power equipment. The service organization shall offer 24 hours a day, 7 days a week, 365 days a year service support, according to the Statement of Work for the specified region.
  2. **Updates and Bugfixes:** Software patches and updates shall be available on regular basis delivered to the Owner via apc.com website, if software maintenance contracts are included in the purchase.

3.4   MAINTENANCE CONTRACTS

A. **A complete offering of Software Support Contracts** for the DCIM shall be available. All DCIM systems under this software support contract shall be entitled to Technical Phone Support, all Software Updates, Feature Enhancements, and development of Multi-Vendor device support during the duration of this contract.

SECTION [27 80 00]
DATA CENTER INFRASTRUCTURE MANAGEMENT SYSTEM

B.   **A Statement of work for the Software Support Contracts** shall be made available for the DCIM detailing vendor responsibilities and customer responsibilities.

3.5   DEMONSTRATION

A.   **General:** Provide the services of a factory-authorized service representative of the manufacturer to provide start-up service and to demonstrate and train the Owner's personnel.

B.   **DCIM Training Workshop:** A DCIM training workshop shall be available from the DCIM manufacturer. The training workshop shall include, but shall not be limited to, a combination of lecture and practical instruction with hands-on laboratory sessions. The training workshop shall include a combination of lecture and practical instruction with hands-on laboratory sessions. The service training workshop shall include instruction DCIM operational theory, configuration and operation, report generation, and troubleshooting.

END OF SECTION