SECTION 25 1313
BUILDING LEVEL CONTROLLER

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes Building level controllers for DDC systems

B. A Building Level Controller is gateway between the building controls system server and local control units. It normalizes data points, stores short term data, performs supervisory control, data logging, alarming, scheduling and network management functions and is a webserver.

C. Related Sections:
   1. 25 1219 Integration Protocols
   2. Stanford Network Architecture diagrams (MC-01)

1.2 REFERENCES

A. ANSI/CEA Standard 709.C LonTalk protocol

1.3 DEFINITIONS

A. Refer to 25 0000 Integrated Automation

B. JACE JAVA Application Control Engine. A variety of headless embedded platforms. Typically a Jace runs on a Flash file system and provides battery backup or other means of orderly shutdown upon sudden power loss. Jaces usually host a Station and a Niagara Daemon process, but not Workbench. Jaces typically run QNX as their operating system. On Stanford Network Architecture diagrams (MC-01), the Building Level Controller is a JACE. The Distech-specific brand name for a JACE is EC-Bos.

C. Workbench Tridium’s brand name for the Niagara configuration tool, a Java VM which hosts Niagara plugin components. The Distech-specific brand name for Workbench is EC-NetAX Pro.

D. Programming Interface Tool Software utilized to set up, configure, and program custom control or application logic that is loaded into a Local Control Unit.

E. Web Browser Software application for retrieving and presenting information resources on the World Wide Web or Intranet. In Niagara, any standard web browser such as IE or FireFox, shall function as a Thin Client that hosts one of Niagara’s web user interfaces or Alarm Portal.

F. Web Server An information technology that processes requests via HTTP, the basic network protocol used to distribute information on the World Wide Web. The term can refer either to the entire computer system, an appliance, or specifically to the software that accepts and supervises the HTTP requests.

G. WebUI The Niagara-specific name for Web Server.

H. Web Workbench Technology which enables the standard Niagara Workbench to be run in a web browser.

I. Station A station is the main unit of server processing in the Niagara architecture. A station runs the components of the Niagara Framework and provides the access for client browsers to view and control these components. The primary parts of a station include components and services. It is the combination of a database, a web server, and a control engine. The station either runs on a Web Supervisor PC or a JACE controller. Often the term Supervisor or Jace will be used interchangeably.
with station. Technically the term station describes the component runtime environment common to all platforms, and Supervisor and Jace describe the hosting platform.

1.4 SYSTEM DESCRIPTION

A. There are 2 Application Scenarios for Building Level Controllers. The Part 3, Execution requirements differ for each scenario.

1. A DDC project is specified with a Building Control Systems Server and at least 1 Building Level Controller. This is the standard application scenario for DDC control systems at Stanford University.

2. A DDC project is specified without a Building Control Systems Server but at least 1 Building Level Controller. There is a clear migration path to add a Building Control Systems Server sometime in the future. Adding the Building Control Systems Server is not part of this project's scope of work, however, there are additional Part 3, Execution requirements to easily facilitate moving some of the functions temporarily performed in the Building Level Controller to the Building Control Systems Server. This application scenario occurs when converting an existing floor, wing or lab to a DDC control systems, with the intent of converting the rest of the building to DDC at a future date. This application scenario also occurs if converting a stand-alone building or facility to a DDC control system, but the size or scope of the total project does not justify a dedicated Building Control Systems Server.

B. For a project that is specified with a Building Control Systems Server and at least 1 Building Level Controller: Building Level Controller shall perform the supervisory control, data logging, alarming, scheduling and network management functions. Data will be stored on a temporary basis in the Building Level Controllers. At specified intervals, trend and alarm data will be archived to Building Controls System Server. Graphics will reside on the Building Controls System Server.

Note: In this scenario Building Level Controllers will be connected to the Building Controls Network. Stanford will connect Building Controls System Server with Campus Master DDC Server.

For a project that is specified without a Building Control Systems Server but with at least 1 Building Level Controller, the Building Level Controller shall perform the supervisory control, data logging, alarming, scheduling and network management functions and is a webserver. Graphics will reside on the Building Level Controller. All graphics and dependent Niagara proxy points shall include Niagara Network Export Tag extensions to easily facilitate moving to the Building Control Systems Server at a future date.

1.5 SUBMITTALS

A. Refer to section 25 0000.

1.6 QUALITY ASSURANCE

A. Refer to section 25 0000

PART 2 - PRODUCTS

2.1 BUILDING LEVEL CONTROLLERS

A. Manufacturers: Distech

B. JACE Brand Name: EC-Bos

C. The Building Level Controller connects to high speed building level control network, serves as communications hub for local control units on LON TP-FT10, BACnet IP or BACnet MSTP, and has sufficient processor capabilities and RAM to store trending, alarms, configuration, graphics, reports as required.

D. The Building Level Controller shall hold all trending for the Local Control Units that are connected to the Floor level Network. Trends stored in the building level controller shall be archived in the Building Controls System Server at specified intervals.
E. Global calculations (such as reset, or cooling/heating demand) must be performed in the Building Level Controller that has the Delta V – Modbus connection. It is not acceptable to have global calculations and trend extensions reside in the Building Controls System Server.

F. System Configuration & Definition
1. Changes made at the Building Controls System Server shall be automatically recorded and downloaded to the appropriate Controller. Changes made at the building level controllers shall be automatically uploaded to the Building Controls System Server, ensuring system continuity.

G. Include uninterrupted real time clocks capable of time of day, week, and year information to the system as needed to perform software functions.
1. Clocks in multiple Building Level Controllers shall be synchronized to automatically match Building Controls System Server utilizing Niagara Network Time Protocol (NTP) service. Niagara Timesynch Service is obsolete; is superseded by NTP; and is not acceptable.
2. Accuracy shall be within 1 second per day.
3. The Building Level Controllers shall have the ability to perform all of the following routines:
   a. Time-of-day scheduling
   b. Calendar-based scheduling
   c. Holiday scheduling
   d. Temporary schedule overrides
   e. Start-Stop Time Optimization
   f. Automatic Daylight Savings Time Switch-over
   g. Night setback control
   h. Peak demand limiting
   i. Alarm Management
   j. Trending

H. Provide Flash Memory on board for database storage, trend storage and system software (Minimum 256 MB RAM)

I. Maintain volatile memory and real time clocks for a period of at least 72 hours during power failure.
1. Batteries shall have minimum life of 2 years.
2. Upon power restoration, the following occurs automatically:
   a. Orderly startup of controlled equipment (user defined)
   b. Continuation of control algorithms
   c. Database revision
   d. Logging of power interruption and restoration times
   e. Battery recharging
3. Provide local visual indication and system annunciation of low battery power for each battery.

J. The Building Level Controllers shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.

K. Support firmware upgrades without the need to replace hardware.

L. Include at a Minimum of (2)100 MB Ethernet ports

M. Communication: Provide all communication interface cards and drivers as required by the project to support communication protocols, which may include serial RS-232 and RS-485, LonWorks, BACnet and Modbus.

N. Communication Speed: Controllers shall communicate at a minimum of 10 – 100 MBps using Ethernet CAT5 cable.
O. Where required for life safety, controllers shall include an internal or external UPS power supply unit to insure reliability of network communications through any power outage event. The UPS shall be complete with batteries, external bypass and line conditioning.

P. Processor speed: minimum 524 MHz.

PART 3 - EXECUTION

3.1 BUILDING LEVEL CONTROLLERS

A. Provide Building Level Controllers as needed to accommodate network architecture and cable design.

B. Provide communication cards, repeaters, connectors, jumpers, terminals, and other hardware for complete system.

C. Building Level Controllers shall be named JpxxbxxxAxJACExx, as designated by Owner to match existing Campus naming scheme for Building Level Controllers.

D. All programming and configuration in Building Level Controllers requires approval of FESO.

E. All trending shall reside in the Station of the Building Level Controller that directly supervises the controllers that are on a LON network connected to that Building Level. Trends stored in the JACE shall be archived in the Supervisor Station.

F. Global calculations (such as reset, or cooling/heating demand) must be performed in the JACE that has the Delta V – Modbus connection. (Modbus JACE) It is not acceptable to have global calculations (such as reset, or cooling/heating demand) and trends reside in the supervisor station.

G. Building Level Controller shall be configured to never exceed a CPU % of 70% for more than any 10 second period, as measured by the Station Resource Monitor. Prior to project acceptance, if the CPU % exceeds 70%, at no additional cost to Owner, the Contractor shall install a larger capacity Building Level Controller or otherwise reconfigure the network as required to achieve a CPU % of less than 70% for any 10 second period.

H. Building Level Controller shall be configured so the Used Heap shall never exceed 75% of the Max. Heap, as measured by the Station Resource Monitor. Prior to project acceptance, if the Used Heap exceeds 75% of the Max. Heap, the Building Level Controller shall be considered overloaded and, at no additional cost to Owner, the Contractor shall install a larger capacity Building Level Controller or otherwise reconfigure the network as required to achieve a Used Heap that is less than 75% of the Max. Heap.

I. Only Services published by Distech, Tridium or Vykon may run in the Building Level Controller. Services not published by Distech, Tridium or Vykon require written approval from FESO to run in the Building Level Controller. Proprietary Services are not permitted to run in a Building Level Controller.

J. Alarm extensions reside in the Building Level Controller only. Alarms report to the Building Level Controller Alarm Console and Critical Alarm Console. Alarms are forwarded to the Alarm Console and Critical Alarm Console in the Building Controls System Server. If project scope does not include a Building Controls System Server, Alarm Console and Critical Alarm Console will be in the Building Level Controller.

K. Licenses

1. Provide a complete set of product licenses for systems and third party software used in system development, including documentation for all applications, databases, browsers, communications software etc.

2. Stanford University shall be the named license holder of all software.

3. All Niagara Station software licenses shall have the "accept.station.in=*", "accept.station.out=*", "accept.wb.in=*", and "accept.wb.out=*", section of the software licenses. Software features shall include: ui="true" ui.wb="true" ui.wb.admin="true" Contractor shall ensure that the installed products are completely open for future integration, at no additional cost to Owner.
4. All features shall indicate expiration="never", schedule.limit="none", point.limit="none", history.limit="none", device.limit="none".

L. Provide all software for a complete system.

M. For a project that is specified without a Building Control Systems Server but at least 1 Building Level Controller, the Building Level Controller shall perform the supervisory control, data logging, alarming, scheduling and network management functions and is a webserver (WebUI licensed). Niagara Workbench functionality shall be via Web Workbench. Graphics will reside on each Building Level Controller. All graphics and dependent Niagara proxy points shall include Niagara Network Export Tag extensions to easily facilitate moving to the Building Control Systems Server at a future date. Specific Niagara Network Export Tags include: PxViewTags, PointTags, HistoryImportTags, SystemHistoryImportTags, ScheduleImportTags, ScheduleExportTags, FileImportTags, and ComponentTags. Contractor shall submit list of Niagara Network Export Tag extensions for FESO review and approval before proceeding with Building Level Controller configuration.

N. Schedules reside in the Building Level Controller(s) to ensure time scheduling when Supervisor PC is off-line, Supervisor PC is not required to execute time scheduling.

O. Coordinate final controller locations prior to installation.

P. Conform to the point & Building Level Controller naming conventions furnished by Owner. No deviation in naming convention will be accepted.

Q. Contractor shall be assigned a range of static IP addresses by Owner for Contractor to apply to IP network devices. Ensure that all Building Level Controllers appear in Workbench Tree View in the correct (ascending) order. The lowest number IP Address shall be assigned to the building level controller with the lowest number floor. Each incremental floor's building level controller shall be assigned an IP Address that increments by 1 number.

R. Route commands from the Building Controls System Server to local control units for such functions as:
   1. Overrides
   2. Schedules
   3. Interlocks
   4. Adjustments

END OF SECTION