

SECTION 13850 (28 31 00)

FIRE DETECTION AND ALARM SYSTEM

ENGINEERING SPECIFICATION INTELLIGENT REPORTING FIRE DETECTION SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION

- A. This specification includes the furnishing, installation, connection, and testing of a PC based graphical facilities monitoring system; including Underwriters Laboratories (UL) listed application software and hardware complete and ready for operation.
- B. The basic system shall be Underwriters Laboratories (UL) listed for the following:
 - 1. No. 864 Control Units for Fire Protective Signaling Systems (9th edition)
 - 2. No. 1076 Proprietary Burglar Alarm Units and Systems
- C. The system shall comply with requirements of NFPA Standard No. 72 for Proprietary Signaling System Receiving Unit except as modified and supplemented by this specification.
- D. The system and associated equipment as specified herein shall be manufactured 100% by a single U.S. manufacturer (or division thereof).
 - 1. The manufacturer shall be of the highest caliber and quality.
 - 2. An ISO 9001 certified company shall manufacture the system.

1.2 SCOPE

- A. A PC based graphical facilities monitoring system shall be installed in accordance to the project specifications and drawings.
- B. The PC based graphical facilities monitoring system shall include, but not be limited to, one or more PC based graphical workstations, all input/output devices, network communications media, control equipment, auxiliary control devices, power supplies, and wire / fiber optic media as shown on the drawings and specified herein.
- C. A supervised interface to NOTIFIER fire alarm control panels and NOTI-FIRE-NET shall be made available.
- D. The system shall employ an advanced technology network to monitor and control various fire, security, and CCTV and other facility information over a LonWorks network.
- E. The system shall include an interface to digital alarm communicator receivers for wide area network monitoring.

- F. The system shall allow a mixture of different technologies and manufacturers' equipment to operate on the same network and provide the operator with a consistent look and operation for all monitored equipment.
- G. The system shall support a variety of topologies and media and shall provide an industry standard open architecture transport layer protocol.
- H. Using standard RS 232 ports on existing and future monitoring and control systems used by the facility, the system shall connect to and interpret status change data transmitted from the ports and provide graphic annunciation, control, history logging and reporting as specified herein.
- I. Proprietary network systems that cannot interface to existing addressable fire alarm systems at the facility or systems requiring the use of a "dry contact" or "voltage monitoring" interface shall not be accepted.
- J. The system shall be electrically supervised and monitor the integrity of all conductors.

1.3 SUBMITTALS

A. General

1. Ten copies of all submittals shall be submitted to the architect, engineer, and owner for review.
2. All references to manufacturer's model numbers and other pertinent information herein are intended to establish minimum standards of performance, function and quality.
3. Equivalent compatible equipment (UL listed) from other manufacturers may be considered as a substitution for the specified equipment as long as the minimum standards are met.
4. Substitute equipment proposed as equal to the equipment specified herein shall meet or exceed the minimum specified standard. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Wiring diagrams shall indicate all wiring for each item of equipment and the interconnections between the items of equipment.
3. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.

C. Manuals

1. Submit simultaneously with the shop drawings & submittals; complete operating manuals and technical data sheets.
2. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.
3. Approvals shall be based on complete submissions of manuals together with shop drawings.
4. Provide a list of monitoring systems by model number including Fire Alarm, Security, and CCTV systems currently UL listed to standard to operate with the proposed Facilities Monitoring System.

D. Certifications

1. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer and factory trained on all equipment contained in the submittal. Include names and addresses in the certification.
2. Provide NICET Certification documentation for factory authorized field technicians performing field final connections and system programming.

E. Applicable Publications

1. The publications listed below form a part of this specification. The publications are referenced in text by the basic designation only.
2. NFPA No. 70 – National Electric Code (NEC).
3. NFPA No. 72-2002 – National Fire Alarm Code.
4. UL No. 50 – Cabinets and Boxes.
5. UL No. 864 – Control Units for Fire Protective Signaling Systems.
6. UL No. 1076 – Proprietary Burglar Alarm Units and Systems.
7. UL No. 1481 – Power Supplies for Fire Protective Signaling Systems.
8. Local and State Building Codes.
9. All requirements of the Authority Having Jurisdiction (AHJ).

F. Approvals. The system shall have the following UL/ULC listings:

1. No. 864 Control Units for Fire Protective Signaling Systems (9th edition)
2. No. 1076 Proprietary Burglar Alarm Units and Systems
3. Control Units for Fire Alarm Systems (ULC)

1.4 GUARANTY

- A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one-year period shall be included in the submittal bid.

1.5 WORKSTATION PERFORMANCE

- A. The network will interface and report the individually monitored system's status via a user-friendly Graphical User Interface (GUI) based software workstation.
- B. The software shall operate under Microsoft® Windows® XP Professional as manufactured by Microsoft Corporation.
- C. The GUI based software must be capable of graphically representing each facility being monitored with floor plans and icons depicting the actual locations of the various systems; and / or sensors' locations.
- D. The software shall use a 1024 X 768 GUI display capable of showing a large primary floor plan display, a key map representative of a larger view of the primary display and its relationship to the facility being monitored, the current operator, number of fire, supervisory, pre-alarms, troubles, and security events within the network as well as outstanding events and acknowledged events.
- E. The workstation shall have the ability to support graphic printing of all data including graphical floor plans, system activity, history, and guidance text. A Windows compatible printer shall be supported for the graphics and report printer options.
- F. The workstation software shall permit automatic navigation to the screen containing an icon that represents the system or sensor in the event of an off-normal condition.
- G. The system/sensor icon shall indicate the type of off-normal condition and shall flash and change to the color associated with the off-normal condition (e.g., RED for ALARM and YELLOW for TROUBLE).
- H. The software shall allow the attachment of text (TXT) files, sound (WAV) files, image (BMP) files and video (AVI) files to each system or sensor icon allowing additional information to be provided to the system operator for responding to the off-normal condition.
- I. The software shall allow the importation of externally developed floor plans in Windows Metafile (WMF), JPEG (JPG), Graphics Interchange Format (GIF) and Bitmap (BMP) format.
- J. The software shall provide auto-navigation to the screen containing the icon of any system or sensor when an event is initially annunciated. In addition, operator navigation to screens containing outstanding events shall be accomplished by "clicking on" the event from either the acknowledged or unacknowledged event.
- K. History Manager. The software shall contain a History Manager, which shall record all system events with a time and date stamp as well as the current system operator's name.
 - 1. The system shall provide for the ability to store all off-normal events experienced by the various sub-systems that are monitored by the system.

2. All events shall be recorded with a time and date stamp and the system operator shall be provided with the ability to log a pre-defined response or a custom comment for each off-normal event and have that comment stored in the history file with the time, date and operator name.
 3. Provide for the ability to conduct searches and generate subsequent reports, based on all events for a single system / device address, a specific node, a specific type of off-normal condition and date range (mm/dd/yy to mm/dd/yy) or combinations of these search parameters. The number of entries in the history file that match the determined search criteria will be displayed.
 4. The History Manager shall signal a need to back-up the history file at 100,000 events and then remind the operator at intervals of 100 events thereafter.
 5. It shall be possible to pre-select data fields for reporting and then saving the report as a template with a file name. It shall also be possible to schedule the pre-defined report to print at a designated time.
- L. Alarm Monitoring. The system shall provide for continuous monitoring of all off-normal conditions regardless of the current activity displayed on the screen.
1. If an operator is viewing the history of a sub-system and an alarm condition should occur, the system shall automatically navigate to the graphic screen showing the area where the off-normal event is occurring.
 2. The system shall prioritize all off-normal events as defined by Underwriter's Laboratories into the following categories: fire alarms, troubles, supervisory alarms, pre-alarms and security alarms.
 3. The system shall display a running count of all events by type in an alarm event counter window. The event counter window shall include five counters, defaulted to Alarm, Trouble, Security, and Supervisory events.
 4. The system shall show a running list of all unacknowledged events and acknowledged events and allow the system operator to acknowledge an event by "double-clicking" on that event in the Unacknowledged Events box. The Unacknowledged and Acknowledged Events boxes shall contain an abbreviated description of the off-normal condition.
 5. The details of the condition may be viewed by selecting event in the unacknowledged events box.
 6. The system shall allow the attachment of user-definable text files, image files and sound files, to each device / system monitored in order to facilitate the operators and response personnel's response to the off-normal condition.
 7. The system shall record all events to the system's hard drive. A minimum of 100,000 events may be stored.
- M. Reports & Logs:
1. The system shall provide for the ability to generate reports based on system history.
 2. The system shall allow the system operator to enter custom comments up to 255 characters for each event and have those comments recorded in the system's history file.

N. Boolean Logic

1. An automated event response application shall be provided to automatically perform actions across the entire system based on network activity.
2. The event response application shall allow event responses (actions) based on predefined user conditions using simplified Boolean logic.
3. Actions shall be configured to be executed immediately or timed as required.

O. Control Aspects of System Software

1. The system shall provide for the direct control of all outputs associated with Input / Output dry contact relay points on Network Input/Output Nodes (NIONS). In addition, the system shall have the ability to control and program a sub-system Notifier AFP-1010, AM-2020, or AFP-400 Fire Alarm Panel through a terminal mode window (ASCII terminal type connection) interface to microprocessor-based sub-systems via an RS 232 serial NION if available as an ancillary feature.
2. The system shall have the ability to monitor and control NOTIFIER® Fire Alarm Panels: AFP-1010, AM2020, AFP-200, AFP-300/400, and ONYX® series control panels.
3. Discrete I/O NION interfaces allow the system operator to initiate a change of state for the associated dry contacts.
4. A scheduling utility shall be included with the workstation to configure the I/O points on these NIONS for automated activate/deactivate, and Arm/Disarm (depending on device type) status.
5. The workstation shall provide configuration utilities for monitoring and control profiles. These profiles shall be user definable for distribution of monitoring and control allowances for operators per workstation.
6. Terminal mode interfaces using serial NIONS (if available for the specific system) shall be available to allow full programming and control of the system being monitored and shall provide the operator with the ability to take advantage of all features supported by a CRT attached to the associated individual sub-system.
7. Under no condition shall any sub-system be required to rely on the network for any data processing required to perform its particular function. Each individual sub-system shall be in effect "stand-alone" as to insure it's continued operation should a disruption in communication with the system be experienced.

P. The software shall be password protected and provide for the definition of security profiles for operator access control.

Q. The software shall contain provision for defining monitoring profiles of pre-selected NIONS for monitoring. This shall include provision for status types within the selected NODES.

R. The software shall contain provision for defining control profiles of pre-selected NIONS for control.

1. The system administrator shall be provided means to select which signals can be controlled by selected Workstation.
- S. The software shall support live voice paging for mass notification to NOTIFIER voice evacuation system over Internet Protocol (IP).

PART 2 PRODUCTS

2.1 GENERAL

- A. The product(s) shall be manufactured by as provided by NOTIFIER®. Model numbers specified are those of NOTIFIER® and are to establish the minimum standard of operating characteristics and quality.
- B. Substitute equipment proposed as equal to the equipment specified herein shall meet or exceed the minimum specified standard. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.
- C. All equipment and components shall be new, and the manufacturer's current model. The materials, equipment and devices shall be tested and listed by a nationally recognized approval agency.

2.2 WORKSTATION

- A. The system shall be an ONYXWorks™ Facilities Monitoring System.
- B. The system shall operate on an IBM compatible UL listed Intel Pentium III processor operating at no less than 800 MHz on the Microsoft® Windows® XP Professional platform.
- C. The workstation shall have: no less than 256 megabytes of RAM, a hard drive with no less than 20 Gigabytes of storage space, a minimum of 8 megabytes of video RAM, a CD-R/W for system backup, internal supervisory CPU watchdog board with audible annunciator, 100 Base-T Ethernet NIC card, a 104 key keyboard, and a mouse type pointing device.
- D. The workstation shall come equipped with all necessary gateway modules to allow connection to the network it monitors as standard equipment. All workstations shall support Ethernet communications when multiple workstations are required.
- E. The workstation shall support an SVGA monitor and be supplied with a 17" flat screen LCD monitor.
- F. The computer shall be capable of networking to additional computers and these computers shall be capable of operating as workstations and/or gateways for local area or wide area networks.

- G. Alarm annunciation shall appear on all workstations and may be silenced at each local workstation.
 - 1. Only one workstation and operator shall be in command of the system for global alarm acknowledgement at any time.

2.3 PRINTER

- A. Support one or more Windows® compatible printers to be located and connected each workstation for graphics and report printing.
- B. Support one model PRN-5 (or PRN-6), 80-column dot matrix tractor feed industrial grade printer for event and date-stamped printouts of off-normal events and status changes per workstation.

2.4 NOTIFIER® MONITORING NETWORK

- A. The NOTIFIER® monitoring network shall consist of a network based on proven ARCNET® technology.
- B. The network shall have the ability to use fiber optic cable (single-mode and multi-mode), wire (twisted pair copper media in a style 4 or style 7 configuration), or combination wire/fiber communications with support of up to 103 nodes.
 - 1. Wire networks shall support 12 AWG, 1 Pair Shielded to 24 AWG, 4 Pair Unshielded following the manufacturer's guidelines.
 - 2. Fiber optic networks shall support 62.5/125µm cable 8dB limit (50/125µm cable 4.2dB limit).
 - 3. Wire to fiber conversions using repeaters.
- C. High-speed data communications (312,500 BPS)
- D. True peer-to-peer communications.

2.5 INTEGRATION NETWORK

- A. The integration network shall be capable of monitoring a minimum of 100 nodes (NIONS and routers) on an integration gateway consisting of, but not limited to:
 - 1. Intelligent or conventional fire alarm control panels.
 - 2. Competitor's intelligent or conventional fire alarm control panels.
- B. Up to 99 gateways shall be connected via Ethernet for a total local area combination of up to 12672 (99x128) nodes.
- C. Local area networks shall consist of a free topology network using twisted pair copper media in a bus, star, T-tap, or ring style 7 configurations at 78 Kilo baud. Transmit/receive twin fiber (multi-mode 62.5/125 µm) strand FT-10 point-to-point topology and bi-directional FO-10 networks shall also be available. Wide area networks shall be supported by the use of network expansion routers.

1. Free topology (FT-10 style) wire network run allows multiple T-taps within a 1,500-foot (457.2 m) radius; 8,000 foot (2438.4 m) point-to-point using twisted pair; or 6,000-foot (1828.8 m) bus topology.
 2. Free topology (FT-10 style) fiber network can also use fiber-optic cabling. Operates at 78.5 Kbaud.
 3. Fiber optic (FO-10 style) network allows bus or ring topology using only fiber-optic cabling; node-to-node distance of over 10,000 feet (3048 m) with message regeneration. FO-10 style operates at 1250 Kbaud and utilizes multi-mode bi-directional fiber media (single fiber strand) in a bus or loop configuration.
- D. Provide routers, repeaters or bridges where required to increase distance, alter network configuration or change media or to extend to remote facilities over alternate communications media including UL listed dial-up PSTN telephone, leased line, multimode fiber or Ethernet connectivity.
1. Dial-up units shall dial a local number and stay connected. Upon loss of carrier, a supervisory alarm shall be indicated at the workstation and the units shall automatically redial to connect.
 2. Network expansion routers shall support public switched telephone circuits, two-wire or four-wire leased lines, and CAT5 Ethernet networks.
- E. Network interface software shall be by the same manufacturer as the hardware portion of this specification.
- F. The integration network shall utilize Network Input / Output Nodes (NIONs) to interface between the individual buildings' systems to be monitored by the integration network. The NIONs shall act as a translator from the building system's specific panel communications protocol to the integration network protocol as well as serve as a transceiver from the building system panel to the integration network.
1. NIONs shall be available in configurations that will allow transparent communications via RS 232 serial data ports with intelligent fire alarm control panels, security systems, and CCTV systems.
 2. NIONs shall be available in configurations that will allow monitoring of dry contacts, switched voltages, conventional security devices, access control panels and conventional fire alarm control panels using scheduled, automated and manual control.
 3. NIONs shall be UL listed to Standard 864 and 1076 and be provided with their own enclosure or be available in chassis mount configurations.
 4. NIONs shall operate at 24 VDC and obtain their power from the monitored control panel or a UL listed battery backed auxiliary power supply. All terminals shall be transient protected to 2400V and LEDs shall be provided for status, service and diagnostics.
- G. Digital Alarm Communicator Receiver Network
1. The system shall provide a digital alarm communicator receiver (DACR) gateway with a RS 232 interface to the following digital alarm

communicator receivers for wide area event reporting: Ademco 685, Silent Knight 9500 and 9800, Radionics 6600.

2. Each gateway shall support up to 10 digital alarm communicator receivers for alarm and trouble information from reporting devices.

H. Workstation Network:

1. Computers shall be networked using Ethernet supporting the use of TCP/IP protocol for local area systems.
2. The network shall be capable of supporting multiple clients (e.g., workstations, configuration applications, automated response applications) and up to ninety-nine (99) gateways.
3. A UL listed Ethernet Hub shall be provided for connection of multiple workstations, gateways, clients, and/or network printers.
4. System shall be UL listed to communicate between clients and gateways over a business computer network (shared IP).

I. System Expansion. Additional software and hardware modules shall be currently available by the system manufacturer to provide for:

1. CCTV with on-screen Pan/Tilt/Zoom and live video on-screen.
2. Supported systems shall include the following CCTV switch manufacturers, Pelco, Burle/Phillips and Vicon. The ability to support all listed CCTV switch units simultaneously on the same system shall be supported.

PART 3 EXECUTION

3.1 GENERAL

- A. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring & fiber optic diagrams, schematics, physical equipment sizes, etc., before beginning system installation. Refer to the riser/connection diagram for all specific system installation / termination / wiring data.

3.2 CONDUIT AND WIRE

- A. Conduit shall be in accordance with the National Electrical Code (NEC), local and state requirements.
- B. Where possible, all wiring & fiber optics shall be installed in conduit or raceway.
- C. Cable must be separated from any open conductors of power, or class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.
- D. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

- E. Conduit shall not enter the control equipment, or any other remotely mounted control panel equipment or back-boxes, except where conduit entry is specified by the FACP manufacturer.
- F. All system wiring shall be new except as allowed herein and approved by the manufacturer for intended communications using NOTI-FIRE-NET or Echelon's LonWorks.
- G. Wiring & fiber optics shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors & fiber optics shall be as recommended by the fire alarm system manufacturer.
- H. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system except as specified herein.
- I. All communication wire to nodes or to computers shall consist of minimum manufacturer's recommendations and approved wire specification supporting speeds of 78Kps to 10mB/sec communications.

3.3 TERMINAL BOXES, JUNCTION BOXES, AND CABINETS

- A. All boxes and cabinets shall be UL listed for their use and purpose.
- B. The PC based workstations shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FACILITIES MONITORING SYSTEM. PC workstation power wiring shall be 12 AWG and grounded securely to either a cold water pipe or grounding rod. Where required, a UL 864 listed UPS system shall be provided.

3.4 SYSTEM SETUP & CONFIGURATION

- A. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Field technicians shall be NICET Level 1 (minimum) certified.
- B. The factory trained technician shall install initial data and artwork at each workstation including:
- C. Distribution of monitoring, control and security profiles as requested by owner.
- D. Area diagrams, floor plans, key maps and screen titles.
- E. Auto-navigation criteria.
- F. Guidance text as provided by owner.

3.5 FINAL INSPECTION

- A. At the final inspection a factory trained representative of the manufacturer of the major equipment shall demonstrate that the system function properly in every respect.

3.6 INSTRUCTION/TRAINING

- A. Provide instruction as required for operating the system. Hands on demonstrations of the operation of all system components and the entire system including user-level program changes and functions shall be provided. A factory trained and certified representative shall provide instruction.

END OF SECTION