

# TECHNICAL SPECIFICATIONS

# **TECHNICAL SPECIFICATIONS FOR INTEGRATED BUILDING MANAGEMENT SYSTEM (IBMS)**

## **SECTION A : Building Management system (BMS) Specification**

### **1. General**

The Building Management System (BMS) supplier shall furnish and install a fully integrated building automation system, incorporating direct digital controllers (DDC) for energy management, equipment monitoring and control, suitable for the building usage. The control strategies shall be developed to ensure that the specified environmental conditions are maintained, whilst giving due regard to minimising of energy consumption.

The system design shall utilise the latest technology in “open” network architecture, distributive intelligence and processing, and direct digital control. The BMS system offered should be from the latest offerings and should be of freely programmable management and automation stations for the full spectrum of today’s building application services.

All peripheral equipment e.g. sensors, pressure switches, control valves and actuators, shall be of the same manufacture as the direct digital control modules and outstations.

The system offered shall be completely modular in structure and freely expandable at any stage from the smallest system through to large distributed systems. Each level of the system shall operate independently of the next level up.

The system shall fully be consistent with the latest industry standards, operating on Windows XP or later, allowing the user to make full use of the features provided with these operating systems.

To provide maximum flexibility and to respond to changes in the building use, the system offered shall support the use of BACnet/Lon, LONworks, Profibus and Ethernet TCP/IP communication technologies.

The MEP contractor shall establish the number of equipment to be controlled / monitored by the BMS from the drawing/ schedule/ specifications. This information shall be furnished to the BMS supplier. All plant and equipment requiring control and / or monitoring functions shall be fitted with all necessary interfacing equipment readable by the BMS network. The MEP contractors shall co-ordinate and ensure that this equipment shall provide the required signals to the BMS.

### **2. Essential functions of system**

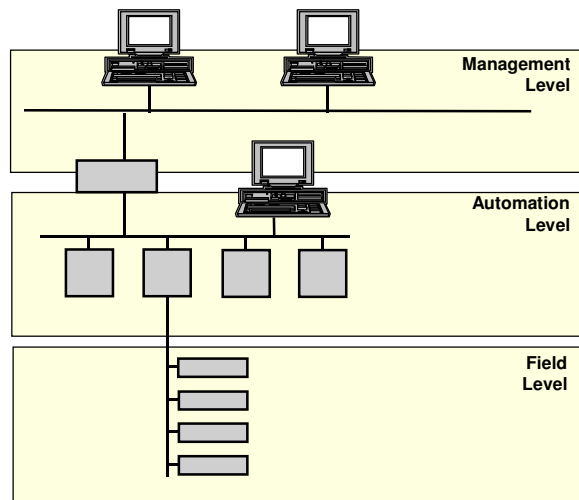
The system comprises the supply, engineering, testing and commissioning of an integrated building management system by a specialist manufacturer.

The essential functions of the system are as follows:

- Centralised operation of the plant (remote control)
- Dynamic and Animated Graphic details of Plant and building
- Early recognition of faults
- Faults statistics for identification
- Trend register to identify discrepancies, energy consumption, etc.
- Preventive maintenance and plant servicing
- Optimum support of personnel
- Control optimisation of all connected electrical and mechanical plant
- Prevention of unauthorised or unwanted access
- Own error diagnosis integrated system

### 3. General System Architecture

The system shall be logically structured into three distinctive levels, which are Management Level, Automation Level, and Field Level. Each level shall be autonomous from the other. Peer to peer communication shall be possible on all system levels and the system design shall be modular in structure to allow straightforward extensions.



### 4. Use of communication standards

Only the following standards are appropriate to be used at the three levels.

- Management level - BACnet, Ethernet TCP/IP
- Automation level - BACnet on LonTalk, BACnet on ETHERNET/IP
- Field level - LonTalk with LonMark profiles

### 5. Management Level

The head-end management and operation of the plant shall include process visualization, data analysis, and exchange of data with 3<sup>rd</sup> parties. At the management level, it shall be possible for communication to flow in all directions, across networks and via direct connections.

Personal computer based operator management stations shall be provided for plant supervision and operation, alarm management, information and database management function. All real-time control functions shall be resident in the DDC controllers to facilitate greater fault tolerance and reliability.

The operator management station should be capable of multi-tasking 32-bit programs by utilising a Microsoft Windows 2000 or XP operating system.

The management level of the system shall consist of one, and shall be capable of handling more management station PCs and the associated software modules.

The management station shall be capable of the following:

- Display of graphical representations of the plant overlaid with live data
- High quality dynamic graphics with true multitasking of all active pages
- Monitor and operate / influence process devices
- Receiving of alarm messages from the process level and directing them to the appropriate reporting device e.g. printer, pager, fax, e-mail
- Monitor process devices for communication problems and other device faults.

- Alarm handling – all the alarms shall be displayed in a graphical tree structure in order located alarms quick and easily.
- Adjusting time strategies in the process level.
- Long term storage of logged data from the process devices
- **Multi level user access control for individual access to sites, applications, functions and objects**
- Display graphically the logged data
- Custom application programming
- Use of graphical genies to allow manipulation of data.
- **The user interface shall be based on a basic taskbar, which is always visible.**
- **History logging for alarms, user actions, system events and messages**
- Alarm handling – all the alarms shall be displayed in a graphical tree structure in order located alarms quick and easily.
- Simultaneous connection of at least of 4 sites via serial connections / 50 sites via LAN/WAN connections for a comprehensive overview on geographically distributed projects

***For maximum fault tolerance, the management stations connect to the process level via point-to-point communications. This shall be via RS232, Ethernet/TCP/IP LAN / WAN or via AutoDial links.***

#### 6. Automation Level

General Purpose controllers shall be used for monitoring / controlling equipment which have to perform based on a customized logic, such as AHUs, Chillers, Chilled water pumps, Cooling towers, Lifts, signals from Fire Alarm panels, generators, transformers etc.,.

At the heart of the DDC system shall be the Microprocessor based modules, which can be individually programmed according to the functional requirements.

**The automation level DDC controllers shall monitor and control the main plant in the building. The DDC controller outstations shall be freely programmable and have the ability to perform all the following routines**

- Process control & interlock functions.
- Generate alarms/events based on comparing measured values against know parameters.
- Time control strategies
- Runtime totalisation.
- Trend logging of specific data-points with transmission of the logged values to the management level
- Energy calculations
- Backup of the data/program ( >= 5 years)

The DDC controllers shall be selected from either a modular or compact type of unit to suit the most economic inclusion of all the data points specified. Each control module shall be capable of operating on a stand-alone basis without control from a central computer.

The input/output connection to Modular controllers shall be via individual plug-in modules suitable for the particular peripheral device. The digital modules shall have visual indication of the status of the input/output. Digital input modules shall be capable of accepting control voltages up to 230vac and will have integral status indication.

It shall be possible to integrate both types of control module onto the same BACnet communication network. Each controller performance shall be to 0.5% control accuracy with sample rates of less than one second.

Main plant DDC controllers shall be 32 bits freely programmable. Controllers meant for VAV controls cannot be used as DDC controllers.

All DDCs must be UL approved, must have an in-built real time clock and be suitable for PID control.

The products used in constructing the BMS management and automation levels shall conform to BACnet protocol for building automation and control networks. All controllers shall have attained a BACnet Testing Laboratories (BTL) listing and display BTL logo.

Room units shall utilize a two-wire communication link at each controller for the acquisition of room temperature and local set point. These will also provide an integral temperature/set point digital display. Up to 5 room units shall be able to use the same two-wire communication link

The system shall have the facility for a Web server to be added to allow full operation of all automation station control modules connected to the Lon Talk BACnet network via a standard thin client/web browser. Functions to include

- *Display of graphical representations of the plant overlaid with live data*
- Data point display and operation of all measured values, set points, plant States, operating states and parameters
- Alarm monitoring with acknowledgement and visual and audible alarm Indication.
- Alarm and event history
- Alarm transmission via SMS and e-mail
- Operation of all time schedules, exception calendar and heating curves.
- Reading of trend data with facility to export data to Microsoft Excel.
- Multi user level access protection
- Ethernet or Modem connection

#### *DDC Control Module Specification*

The DDC controllers shall be selected from either a modular or compact type of unit to suit the most economic inclusion of all the data points specified. The DDC controllers being used should confirm to the following specifications as a minimum:

- Based on ANSI/ASHRAE standard 135-2001 (BACNet), ENV13321-1
- Operation standalone or as part of Lon Talk (clause 11) system network TP/FT-10, 78kBits with Built in BACnet/Lontalk interface or ETHERNET / IP
- Optional connection to operator terminal, management station and via Web browser with Web server device.
- Freely Programmable
- Flash ROM, real time processing and multi tasking
- 32 bit processor system, 1.5 MB program memory, No 8 bit or multiple of 8 bit
  
- Supply voltage AC 24V +/-20% 50/60 Hz
- Event driven data transmission
- Automatic mains recovery
- PPS2 connection
- Digital output to be 250V 2A rated changeover contacts
- Historical data memory storage
- Software application stored in non volatile memory
- Battery back up >= 5 Years

For the generation of the application programs, the following function elements are required as a minimum.

- Reset functions
- Set point jump
- Positioning time
- P-controller (reverse or direct acting)
- P1-controller (reverse or direct acting)
- PI-controller with I-deletion (reverse or direct acting)
- PID controller (reverse or direct acting)
- 2-point controller (reverse or direct acting)
- Proportional additional sequences (reverse or direct acting)
- Data transmitter (digital or analogue)
- Data converter (analogue-digital or digital-analogue)
- Ring Counter
- Timer (switch on or switch off)
- Logic operations:
  - \* logic "AND" (2,3 or 4)

- \* logic "OR" (2,3 or 4)
- \* logic "EXOR"
- \* logic "NOT"
- Comparative operations:
  - \* Maximum values (2,3 or 4)
  - \* Minimum values (2,3 or 4)
  - \* Average values (2,3 or 4)
- Enthalpy calculation
- Optimiser
- Mean value calculation
- Hysteresis
- Output steps (digital or analogue)

Digital outputs shall be potential free outputs. Analog outputs shall be true analog outputs (0-10 V DC, 0-20 ma & 4-20 ma)

Above blocks shall be resident in the DDC Controllers and independent of any high level interfaces/controllers.

Further, the DDC unit software must have the following additional functions:

Free selection of range and unit (dimension) of all signals (measured values, accumulated values, calculated values, etc.)

Free allocation of access protection in accordance with operating priorities

Free definition of manual override priorities (software) from operator terminal and/or management station.

Wherever control logic is required for equipment such as AHUs, the DDC controller offered shall have a digital display on the fascia. This display shall be capable of displaying 2 categories of 3 parameters each. In the event of an alarm, the display shall switch over to an 'alarm' indication. In all, the controller shall have the capacity to indicate 8 different alarms. In case more than one alarm is active at the same time, the controller shall display a coded alphabet, to alert that there is more than one alarm in the controller.

Each DDC Controller shall have a resident real time clock with a battery back up for a minimum of 4 years.

All DDC controllers shall be housed in IP 54 enclosures with proper termination of peripheral devices at the terminal strip and not directly to the controller.

## 7. Field Level

Individual terminal unit controllers for autonomous room – by – room comfort control, based on application specific logic written on the controllers. All the terminal unit controllers shall fulfil following general requirements:

- LONMARK communication
- AC230 V power supply
- Mountable with screws or DIN rail
- Optional terminal cover for local installation without cabinet
- Downloadable application software /adjustable parameter set, The type of Use shall be defined by downloadable pre-tested application software.

Common functions like grouping, scheduling, etc., shall be realised within a master controller on automation level.

***All terminal unit controllers supplied on the project shall have the facility for local setpoint adjustment via a room unit.***

Application specific controllers shall be used for terminal devices such as Fan Coil Units and the like. These controllers shall be with Lon Mark compatible bus communication. Any failure problem in communication bus should not affect the working of the FCU controller. A dedicated stand-alone controller shall be provided for each FCU. A common controller for FCUs serving different areas shall not be acceptable. These controllers shall be looped with a bus cable and connected to the BMS.

In general they shall comply with the following specifications

- ◆ For 2 or 4 pipe FCUs, with or without changeover
- ◆ PID control
- ◆ Downloadable application software over the BUS cable
- ◆ LonMark compatible bus communication
- ◆ To be integrated to the management station software
- ◆ Control of AC 24 V PWM valve actuators, 3 point AC 24 V valve and damper actuators, or electric heating coils
- ◆ Volt-free relays for fan control
- ◆ Operating Voltage → 230 V
- ◆ Internal fuse, thermal, automatic reset
- ◆ Connectable to 1 room unit via local bus, 2/4 wire unscreened twisted pair @ 4.8 KBPS

The application specific controllers shall be capable of working in conjunction with the following type of room controllers. The specific type of room controller to be used in specific applications shall be selected from any one of the following types to meet the description written in the sequence of operation.

#### TYPE 1

- ◆ Integrated room temperature sensor

#### TYPE 2

- ◆ Integrated room temperature sensor
- ◆ Dial for temperature set point

#### TYPE 3

- ◆ Integrated room temperature sensor
- ◆ Dial for temperature set point
- ◆ Rocker switch for off/auto<sup>1</sup> mode (single speed fan)

#### TYPE 4

- ◆ Integrated room temperature sensor
- ◆ Dial for temperature set point
- ◆ Rocker switch for off/auto<sup>1</sup> mode and fan speeds (3 speed fan)

#### TYPE 5

- ◆ Integrated room temperature sensor
- ◆ Dial for temperature set point
- ◆ Rocker switch for off/auto<sup>1</sup> mode and fan speeds (3 speed fan)
- ◆ LCD display of measured temperature

#### TYPE 6

- ◆ Integrated room temperature sensor
- ◆ Rocker switch for temperature set point (raise/lower)
- ◆ Rocker switch for off/auto<sup>1</sup> mode and fan speeds
- ◆ LCD display of measured temperature
- ◆ Communication with controllers via Lon bus
- ◆ Exchangeable rocker switches for lighting and blinds
- ◆ Selection of downloadable software applications for the operation of lighting and blinds
- ◆ Operating mode 'auto' –comfort, 'off' – standby or economy

### FCUs FOR CORRIDOR/ LOBBY AREAS

Each FCU control assembly shall consist of a dedicated controller mounted near the FCU and temperature sensor mounted in the return air path.

The FCU controller shall automatically change the FCU motor speed based on the temperature deviation. The FCU shall continue to operate at the low speed when the temperature conditions are achieved. It shall be possible to switch OFF the FCU motor either from the ON/OFF switches of the room unit or via BMS PC.

The temperature set point shall be selected through the set point provided on the controller fascia or via communication bus/ BMS PC. It shall also be possible via the communication bus to operate the controller in comfort mode (normal operation)

stand-by mode (short break periods like lunch time etc.) and energy hold off mode (night mode or non-office hours) through time channel programming.

***The FCU controller shall modulate the modulating valve to meet the desired temperature condition.***

Incase multiple FCUs are serving the same common area/ lobby a common controller can be used if suitable from the site conditions.

#### **FCUs FOR TYPICAL OFFICE/ PLANT ROOM ETC**

Each FCU control shall consist of a dedicated controller mounted near the FCU above the false ceiling, a room unit with inbuilt temperature sensor, set point adjuster and 3-speed/OFF switch.

The FCU thermostat shall operate the modulating valve to meet the desired temperature condition. The FCU thermostat shall be connected to the BMS to enable temperature set point override etc.

#### **8. Networks & File Servers**

Wherever the building configuration supports in - built network cables, the system shall be able to accommodate several PCs hooked up at locations designated by the user at a later date. The management station software shall support the two leading network systems, Windows 2000/2003 server.

The management station(s) shall be set up on the network in two different ways, either operating independently or as client management stations in conjunction with an (optional) file server.

To facilitate central storage of data and programs, the file server is envisaged. Central management of user-specific information such as passwords and protected access to data and programs shall thus be made easily possible. The file server shall also support software updates and changes in the project data. The file server shall also support consistent central archiving of alarms, off-line trend data, log data, graphics, data backup etc.

#### **9. Printing**

It shall be possible to connect printers either directly to the management station or to the file server.

#### **10. Remote Monitoring and Control**

It shall be possible, with additional hardware if necessary, to interrogate the system remotely via the following possible methods:

- Telephone connection
- Building IT network
- Web browser technology with password access via IT networks accessing information stored on dedicated embedded web server device installed on automation controller network.
- Alarm reporting to mobile pagers/phones/e-mail etc
- Energy usage monitoring and control via Building Management Systems.

#### **11. BMS – Records**

General

**The details of the building automatic system shall include all the manufacturers Technical Data Sheets and User Manuals. Control valve schedules shall be provided the flow rates; valve pressure drop and system design basis on which the particular valve type was selected.**

DDC Control System Software Strategies

Controller strategies shall be provided, in both hard copy and on CD-ROM, for inclusion in the Operating & Maintenance Manuals.



Copies of all the preliminary strategies, in both hard copy and on CD-ROM, shall be supplied to the Engineer prior to commencement of control systems commissioning.

Copies of all the 'As Installed' strategies, in both hard copy and on CD-ROM, shall be supplied to the Engineer within three months of hand over of control systems.

### **BMS Software and Licences**

All Licence rights to the control systems manufacturers software packages shall be transferred to the client at the time of hand over. User Registration must be made on behalf of the client, direct to the control system manufacturer by the specialist System House Partner.

Copies of all of the control system manufacturers Monitoring or BMS software shall be provided on CD-ROM, or other mass storage device, together with copies of any graphics and databases that may be required to re-install the system after a fatal computer failure.

Integration of secondary systems

**Integrations shall be carried out at the most appropriate level within a system, depending on the functions and interaction required. The following integrations must be possible.**

- Lon Works
- Lon Mark
- BACNet /LonWorks
- BACNet/IP
- OPC
- Integration of standard proprietary buses : Modbus, M Bus, KNX.

As part of the requirements for an open system devices with a Native BACnet protocol shall be connected onto a common field bus backbone network directly without any Gateway/Protocol converter device. If interaction is required between different sub-systems, the integration shall be carried out at either the automation or field level. The integration must not occur at the management level. Link to a third party software package such as a Planned Preventive Maintenance package or a Energy Monitoring package shall be carried out at the management level. When sharing alarm and historical information with Maintenance Management and Energy Management packages, the management system shall provide the information in a standard commercially available format e.g. MS Access and using standard mechanisms e.g. ODBC .Real-time "live" information shall be transferred from the management system to a third party package e.g. MS Excel, either by a standard inter-application mechanism e.g. DDE or OPC or by developing a connection by using a documented API for the management system. Where a physical connection is required between a 3rd party device and the management system, the sub-system supplier shall provide the necessary line drivers and cables, documentation and support to make the connection into the device that will provide the protocol conversion.

## 12. Software Modules

The management station software shall be modular, object oriented, clearly structured and shall be based on Windows XP (or later) standard 32 bit technology.

The main software applications shall, as a minimum, include

- ◆ Plant Viewer : Graphics based operation of the plant
- ◆ Trend Viewer : Logging and display of measured values
- ◆ Alarm Viewer : Display of alarm messages
- ◆ Alarm Router : Automatic routing of alarms
- ◆ Log Viewer : Logging of alarms, system events and user activities

The Task Bar

The task bar shall be the 1<sup>st</sup> and last point of contact for all the interactions between user and system.

In addition to obtaining quick overview of vital system information, users shall be able to click on various icons in the task bar to switch from one program to another in the multi-tasking operating system. In systems, which include remote sites, the task bar shall be used to switch between sites (subject to user's access privileges).

To make the system easier for new users, the system shall support user-specific start-sequences with access to selected programs.

### **Features Of The Task Bar**

- ◆ Control of access privileges and security mechanisms for access to program modules and 3<sup>rd</sup> part software at log-in and log-out.
- ◆ User-and-password dependent access to systems and sub-systems
- ◆ Automatic user-specific start sequences
- ◆ Display of alarm and system message status, site connection status, time and date
- ◆ Facility to connect and terminate connection at various sites
- ◆ Simultaneous connection to a maximum of 4 sites

### **Plant Viewer**

The plant viewer shall support the following features

- ◆ Hierarchically linked, animated high-resolution bit-map colour graphics (XGA 1024 x 768 pixels)
- ◆ Choice of 2D and 3D symbols with animation based on status
- ◆ Direct access to setpoints, parameters, operating modes, alarms, time-programs, on-line and off-line trend data features
- ◆ Dynamic multi-tasking with all active pages
- ◆ Monitoring and operation of plant at several levels
- ◆ Flexible operation of multiple pages using plant viewer navigation bar combined with standard handling of windows
- ◆ Navigation to all other management station software applications
- ◆ User-definable page size
- ◆ Jump tags for jumps on the same level or between levels
- ◆ ToolTips for all dynamic objects, with the option of 'User', 'Technical' or 'System' information
- ◆ Context-specific information (eg. data sheets) can be attached to any dynamic object
- ◆ Capable of graphics to be printed in colour or monochrome
- ◆ All 32 bit graphic file formats supported by Windows can be imported (eg → AutoCAD, PCX etc.,)
- ◆ Dynamic display of the Psychrometric chart, enabling easy simulation of the air - conditioning processes.

### **Alarms Handling & Alarm Viewer**

As a minimum, the system shall support the following features

- ◆ Operation and manipulation of alarms (based on user privileges)
- ◆ Alarm message printing
- ◆ Alarms printed independently of the management station (direct connection at automation level)
- ◆ Automatic pop-up windows for immediate display and operation of alarms (including pop-ups in 3<sup>rd</sup> party programs)
- ◆ Audible or multi-media alarm indication
- ◆ Continuous overview of all active alarms from site (updated automatically, displayed in order of priority, option of personalized view)
- ◆ Graphics based topological view of alarms
- ◆ Chronological alarm view
- ◆ Option of displaying detailed information
- ◆ Direct access to associated plant graphics
- ◆ Comprehensive filter and search criteria (time, date, priority, discipline, alarm status etc.,)
- ◆ Colour coding based on alarm priority / alarm status (screen and printer)
- ◆ Alarms for out of limit values (high, low), change of state, run-time limits exceeded etc.,
- ◆ Option of repeating unacknowledged alarms at regular intervals
- ◆ Creation of reports, with facility to print or export alarm data to 3<sup>rd</sup> party programs for further analysis
- ◆ Facility to save user-defined filter criteria
- ◆ User-specific configuration of the alarm view including on-line configuration

## Alarm Routing

In order to monitor alarms round – the – clock, alarm routing is an important feature of the BMS. The BMS shall have the following features

- ◆ Routing of alarms to alarm printer, fax, pager or mobile phone
- ◆ Time schedule for each message recipient
- ◆ Alarm routing based on priority
- ◆ Alarm routing based on discipline (HVAC, Security etc.,)
- ◆ Alarms routing to person responsible at site
- ◆ Alarm routing based on text
- ◆ Alarm routing to person(s) responsible for specific equipment or systems
- ◆ Option of manual transmission of messages from the management system

## Time Scheduling

The time-scheduler shall have the following features

- ◆ 7 day time programs
- ◆ Exception programs (local, building-wise or system-wise)
- ◆ Direct display of time programs within Plant viewer graphics
- ◆ Simple graphics programming of switch times
- ◆ Graphics based overview of all time programs in the system
- ◆ Graphics based overview of a 7 day programme including all exception programmes
- ◆ Graphics based overview of all plant points affected by a time programme
- ◆ Direct entry of various operating modes (comfort, stand-by, energy hold-off)
- ◆ Easy creation, modification and deletion of all time programmes
- ◆ Scroll features for fast access to specific weeks or days
- ◆ Storage and processing independent of management station
- ◆ Automatic synchronization of all time programmes in a system
- ◆ Support of different time zones (remote managed sites)
- ◆ Option of synchronization via radio clock
- ◆ Printed reports in various display forms

## Trend Viewer

The Trend Viewer shall have the following features

- ◆ On-line or off-line real-time data
- ◆ Simultaneous display of up to ten signals per window
- ◆ Absolute or relative time intervals
- ◆ Zoom, scroll and cursor features for faster data analysis
- ◆ Flexible, easy-to-use scaling feature with charts displayed in 2D or 3D
- ◆ Drag-and-drop feature for trend views with automatic scaling and data export
- ◆ Off-line data logging triggered manually, automatically, or on a time or event basis
- ◆ Logging and intermediate storage of off-line trend data operates independently of the management
- ◆ Automatic upload from automation level to local or remote management stations
- ◆ Management station display and archiving of on-line and off-line trend data
- ◆ Print-outs of trend data
- ◆ Easy export of data to 3<sup>rd</sup> party software
- ◆ Facility to export trend data directly to auxiliary programs such as ADP (Advanced Data Processing) or to 3<sup>rd</sup> party software such as MS-Excel
- ◆ Trend Viewer time base can be used directly as a filter creation in Log Viewer

## Log Viewer

The Log Viewer shall be categorized into the following sections

ALARM LOG → contains all incoming alarms in chronological order

SYSTEM LOG → shows at a glance if a printer somewhere in the system has run out of paper, or a hard disk is full. Communication events are also recorded here, showing for example when communication was established or terminated

USER LOG → lists all the activities carried out by the user at the management station, unauthorized attempts, modification of parameters, set points etc.,

STATUS LOG → to check the status of all incoming messages

The Log Viewer shall have the following features

- ◆ Storage of alarms routed to the management station
- ◆ Storage of all system messages (from printer, communications, management station, modem etc..)
- ◆ Storage of all user activities performed at the management station
- ◆ Facility to enter and store user comments on events and activities
- ◆ Facility to display, at a keystroke, detailed information on every entry
- ◆ Extensive filter options to focus and reduce the volume of information displayed
- ◆ Comprehensive search features for fast access to information
- ◆ Facility to display an overview of data for a given day or week
- ◆ Once defined, filter and search criteria can be saved for future re-use
- ◆ Compact archiving of virtually un-limited number of entries (depending on hard-disk capacity)
- ◆ Automatic data management and archiving functions
- ◆ Facility to create and print log summaries
- ◆ Export of log entries for further analysis with 3<sup>rd</sup> party software (eg –MS access)
- ◆ User specific configuration of log view can be adapted directly on line

## Internet Log Viewer

This is an optional application, which offers users even greater freedom in the management of a site. A browser such as Microsoft Internet Explorer or Netscape Navigator, for example, provides the user with access to the log database from any PC with an Internet connection. Just as with standard log viewer, the user can then obtain an overall view of all the plant and events stored or monitored by the system.

The Internet Log Viewer shall be started without any special management station software on the user's PC. Access to the Log Viewer can be password protected.

## A Web Control

The system shall have the capability to connect to remote sites through a web control module. Individual DDC general purpose communication trunks (described elsewhere) shall have the feature to be connected to this web control module. This should facilitate viewing and controlling the DDC general-purpose controllers trunk via a remote PC / laptop. All parameters as appearing in the Portable Operator Terminal (described elsewhere) shall be available from this remote PC / laptop. The system offered shall have the facility to control / monitor the plant and equipment connected to these communication trunks via password protection.

## Integration Of 3<sup>rd</sup> Part Software And Exchange Of Data

The system shall support the use of standard interfaces and drivers that make it easy to integrate to 3<sup>rd</sup> party software directly at the management station level, or to make common use of data from the system, eg via ODBC (Open Database Connectivity). DDE (Dynamic Data Exchange) shall enable current data to be loaded continuously into a spreadsheet program such as MS Excel, so that constantly updated graphs can be created for further processing.

## Object Viewer

To make operations easier, the software shall have two viewing modes.

System View → Provides hierarchical view of the system network.

User Designation View → Gives a hierarchical breakdown of user addresses based on the system database.

In general, the system shall support the following features

- ◆ Fast navigation through the system
- ◆ Fast location of objects and alarms
- ◆ Detailed information of all objects
- ◆ Display of current values from the process level
- ◆ Modification of set points and parameters
- ◆ Users with appropriate access levels can also override outputs manually
- ◆ Two display modes → system view and user designation view
- ◆ Search features
- ◆ Jump features and bookmark features as in various internet browsers
- ◆ Modification of users designation and alarms texts
- ◆ Customization of users addresses with a maximum of 10 hierarchical levels and up to 40 characters
- ◆ “Find” function to locate system objects

## Reports

Reports shall provide the user with the latest information from the system at specific times or when specific events occur. The following features shall be supported

- ◆ Reports routed on basis of time and / or priority
- ◆ Manual or automatic triggering
- ◆ User-definable or standard reports
- ◆ Facility to integrate 3<sup>rd</sup> party report programs into the management station software

## Access Protection

The management station shall grant access to the system only to authorized users. The system administrator shall tailor an environment to match the individual requirements of each user. The access protection facility shall define the buildings (sites) and equipment to which a given user has access, the software modules and functions available to that user within the site. The system shall support the following features

- ◆ User name / password
- ◆ Individual access privileges covering access to sites, subsystems, program functions down to individual objects in Plant Viewer
- ◆ Up to 1000 users grouped into 100 user groups
- ◆ Automatic log – out (after period of inactivity)
- ◆ Encrypted passwords
- ◆ Network security provided by Windows

## 13. Hardware Requirements

### *DESKTOP COMPUTER*

Processor : Intel C2D 2.5 GHz  
RAM : 2 GB  
Hard Disk : 250 GB HDD  
Monitor : 17” TFT  
52X DVD RW, multimedia kit, modem card etc.

#### **14. BAC net Routers**

In addition to exchanging data with the management station and the other Controllers in the same network, a further capability of transferring global data between DDC modules in different groups (i.e. on different buses).

The BMS offered must be capable of being extended with controllers on the BACnet protocol and the LON bus.

The BMS must allow integrating future BACnet controllers on the process level and providing inter-process communication with existing controllers.

The BMS must allow to be extended with controllers on the BACnet protocol and the LON Talk technology.

The BMS must allow for integration of BACnet devices on the process level via LON bus and on the management level via Ethernet TCP/IP.

#### **15. DDC LON network**

This network shall allow the DDC modules to communicate with each other and provides the user with access via the operator terminal to all the connected DDC controllers.

The DDC controllers, wherever used, within the same enclosure, should be connected to each other via twisted bus cable and it should have the DATA network cable between distant controllers.

Upto 30 DDC modules, and a maximum of 15 operator terminals may be connected to one DDC LON network.

Data must be kept even in the event of power failure. Power failures and peak loads must not cause data loss.

Permanent self-monitoring of the system must be ensured by integrated test and service functions.

Suitable interfaces and appropriate in/outputs must allow the integration of all electrical and mechanical plants.

#### **16. Central setting of parameters/structuring and programming**

It must be possible to enter and/or amend all parameters (setpoints, control algorithms, time, etc.) and the structure diagrams (control and interlock programs) into the lower levels system controllers and DDC units-centrally from the management station and/or the operator terminal from the system controller with a download function. The system manager must be able to read and write all data centrally.

It must be possible to set the parameters and structure the application programs by using a graphic and element oriented programming language.

#### **17. Portable Operator Terminal (Pot)**

Each DDC Controller shall have a dedicated service port to plug in the portable operator's terminal (POT). It shall be possible to read, write and change any parameters on a bus by plugging the POT to any one of the Controllers on the communication trunk. The portable operator's terminal shall have a visual and audible alarm with mute facility on its fascia. The POT shall have minimum three password levels. Separate cabling for connecting the POT shall not be acceptable. Changing the parameters locally from any Outstation shall be done by POT which is truly portable and hand held and not via Laptops.

**A local operator terminal shall allow full operation of all DDC control modules connected to the LonTalk BACnet network. Functions to include**

- Alarm monitoring with acknowledgement and visual and audible alarm indication.
- Pop up window with detailed message for alarms and events
- Alarm and event history
- Data point display and operation of all measured values, setpoints, plant states, operating states and parameters
- Graphic based display and operation of all time schedules, exception calendar, online trending and heating curve.
- User specific configurable overview of main values in plant
- Multi user level access protection

The operator terminal shall have a high resolution six line illuminated display for graphics and text, keys for operation and a visual and audible common alarm indication. The textual information displayed must reflect the layout of building and plant with clear text English descriptions of up to 40 characters

#### *18. Documentation*

In order to have clear system documentation, the following documents have to be provided:

- ◆ System diagram
- ◆ Wiring diagram
- ◆ Lists of parameters

For hand-over all documents must be up to date and provided with the date.

#### *19. Services*

The type and scope of the required services are described below.

The rates for engineering, commissioning and adjustment must contain all services required to ensure optimum operation of the plants.

#### *20. Engineering/Planning*

In addition to the required, complete documentation, the service must include:

- ◆ analysis of all functions together with the contractor
- ◆ binding information about conditions of connection of equipment
- ◆ scheduling and co-ordination with the contractor and design engineer

#### *21. Commissioning/Adjustment*

Function-oriented commissioning includes the following services, which are to be provided by BMS specialist:

- ◆ verification of the external connections of the equipment
- ◆ verification of the data transfer channels of the system
- ◆ loading and testing of all basic and user programs belonging to the equipment
- ◆ optimisation of the control parameters

#### *22. Electric & Electronic Related Equipments*

##### **Ambient Conditions**

All controls shall be capable of operating in ambient conditions varying between 0-40°C and 90% r.h. non-condensing.

##### **Conduit Entry**

All control devices shall, unless provided with a flying lead, have a 20 mm conduit knockout. Alternatively, they shall be supplied with adapters for 20 mm conduit.

## **Ancillary Items**

When items of equipment are installed in the situations listed below the BMS/ Control Specialist shall include the following ancillary items:

### **Weather Protection**

All devices, which are exposed to the atmosphere, are to be weatherproofed. All controls, peripherals and associated accessories serving Chillers, Roof Mounted Air Handling Units and other equipment which are exposed shall be protected from Dust, Rain and Solar Radiation. Adequate protection shades etc., shall be provided by the MEP contractor

### **Pipe work Immersion**

Corrosion resisting pockets of a length suitable for the complete active length of the device, screwed 1/2" or 3/4" BSPT suitable for the temperature, pressure and medium.

Duct Mounting (Metal or Builders Work)

Mounting flanges, clamping bushes, couplings, lock nuts, gaskets, brackets, sealing glands and any special fittings necessitated by the device, shall be provided by the MEP contractor.

### *Samples*

Samples of all types of room mounted equipment (i.e. detectors, thermostats, etc.) shall be provided by the BMS/Controls Specialist for approval by the Consultant/Engineer.

### *Accuracy*

Control and measuring devices shall have the following limits of accuracy:

Temperature	:	+/- 1°C over the range of 0°C to 50°C
Pressure	:	+/- 1.5% of measured value
Humidity	:	+/- 5% r.h over the range of 10 to 90% r.h

### *23. Averaging Elements*

Averaging elements shall be used on supply air ducts having a cross-sectional area exceeding 1.6m<sup>2</sup> and shall have a minimum capillary length of 8.2 m.

The capillary element shall be serpentine across the whole duct.

Where the span of the element is less than 1 m then it shall be fixed with purpose-made clips and may be unsupported across the duct.

Where the span of the element is above 1 m then it should be supported on Unistrut or similar rigid support. The element shall be clipped every 200m and the supports and hangers shall be adequate to prevent vibration of the element.

### **24. Pressure switches for Air Systems**

Pressure switches for Air Systems shall be diaphragm operated. Switches shall be supplied with air connections permitting their use as static or differential pressure switches.

The switch shall be of differential pressure type complete with connecting tube and metal bends for connections to the duct. The housing shall be IP54 rated. The pressure switches shall be available in minimum of 3 ranges suitable for applications like Airflow proving, dirty filter, etc. The setpoint shall be concealed type. The contact shall be SPDT type with 250 VAC, 1A rating.

Shall be supplied suitable for wall mounting or mounting on ducts in any plane. It should be mounted in such a way so that the condensation flow out of the sensing tips. Proper adapter shall be provided for the cables.



The setpoint shall fall within 40%-70% of the scale range.

Shall have differentials adjustable over 10%-30% of the scale range.

#### 25. Air flow Switches

The Airflow switches shall be selected for the correct air velocity, duct size and mounting altitude.

Where special atmospheric conditions are detailed in the Motor Control Panel Equipment Schedules, the parts of the switches shall be suitably coated or made to withstand such conditions. Any variations from standard shall be detailed in the Tender.

Shall be suitable for mounting in any plane.

#### 26. Water flow switches

Water flow switches shall be selected for the correct water velocity and pipe size and mounting attitude.

#### 27. Room Temperature/Humidity Detectors

The temperature sensor shall have sensitivities such that a change at the detector of 0.2°C from the stabilised condition is sufficient to start modulating the corrective element.

The temperature sensor shall be with silicon sensor having positive temperature coefficient. The sensor shall be field wired using an unscreened cable to a base plate. The sensor housing shall plug into the base so that the same can be easily removed without disturbing the wiring connections. The protection standard shall be IP30 in accordance with IEC 144, DIN 40050. These should be generally mounted 1.5 m above the floor level. These should not be mounted near the heat sources such as windows, electrical appliances, etc. The final location shall be as per the consulting engineers' approval. The sensor shall be linear over 0°C to 50°C.

Shall operate on extra-low voltage and be suitable for mounting on British Standard conduit boxes.

The humidity sensor shall be in an independent housing or be combined with the room/duct type temperature sensor in the common housing. The sensor should be electronic type with capacitive sensing element. As a minimum it should have a range of 10 to 90% RH.

#### 28. Immersion/temperature detector and duct mounted temperature/humidity detectors

The temperature sensor shall have sensitivities such that changes at the detector, for 0.3°C and 0.2°C respectively, from the stabilised conditions, are sufficient to start modulating the corrective element.

The humidity sensor shall be in an independent housing or be combined with the room/duct type temperature sensor in the common housing. The sensor should be electronic type with capacitive sensing element. As a minimum should have a range of 10 to 90% RH.

The temperature sensor shall be with silicon sensor having Positive Temperature Coefficient. The sensor shall be field wired using an unscreened cable to a base plate. The sensor housing shall plug into the base so that the same can be easily removed without disturbing the wiring connections. The protection standard shall be IP43 in accordance with IEC 144, DIN 40050.

The wiring terminals shall be plug-in type for easy installation and maintenance. The sensor shall be mounted in the duct based on the guidelines given by the specialist control supplier. The sensor shall be linear over 0°C to 50°C.

#### 29. Pressure Detectors (for liquids and gaseous media)

Pressure detectors shall be suitable for the medium and the working temperatures and pressures. The pressure detector shall be capable of withstanding a hydraulic test pressure of 2 times the working pressure.

Connections shall be suitable for 1/2 to 1/8th in o.d. copper tube.

Ductwork versions shall be supplied with the air connections permitting their use as static or differential pressure detectors.

The setpoint shall fall within 40%-70% of the sensing range of the detector.

The detector shall have a sensitivity such that a change of 1.5% from the stabilised condition shall cause modulation of the corrective element.

The static pressure sensor shall be rated for IP65 and the differential pressure sensor shall be as a minimum IP54.

The principle of operation should be based on a hall-effect transducer. The diaphragm should be copper benyium type.

The sensor must be pressure compensated for a medium temperature of -10 to 80°C with ambient ranging between -25 to 60°C.

### **30. Air Pressure sensor:**

The pressure sensor shall be differential type. The construction shall be spring loaded diaphragm type. The movement of the membrane in relation to the pressure should be converted by an inductive coupling, which would electromagnetically give an output suitable for the controller. The pressure sensor shall in a housing having IP54 ratings in accordance with IEC529. Suitable mounting arrangement shall be available on the sensor. The sensor shall come complete with the PVC tubes, probes, etc.

### **31. Level Switch/Transmitter**

Level switches shall be directly vessel mounted type with either top or Side mounted as required. These shall be float type. Process connection shall be flanged.

### *32. Actuators*

Shall be installed in accordance with the manufacturers' recommendations.

Shall have a sufficient torque to open and close valves and dampers against the maximum out of balance pressure across them.

#### *Control Damper Actuators*

Control Damper Actuators shall be of the type where the damper spindle passes through the actuator and is secured by a U clamp.

Rotary type damper actuators shall be used on the project. The actuators shall not require any maintenance. The actuators shall have sufficient torque ratings to operate the dampers of various sizes.

These should be available in spring return versions as specified elsewhere in the document. Limit switches, if required/specified shall be provided for.

The actuators shall be suitable for On/Off and modulating operations.

#### *Actuator Additional features*

Actuator Additional features are required when detailed in the Motor Control Panel Equipment Schedules or the Performance Section of the Specification.

### **Auxiliary Switches:**

For On/off applications, the actuators shall have changeover contacts suitable for 220 VAC. 2 amp rating.

Auxiliary switch packs containing at least one, if specified two, electrically independent switches one for each end of the motor travel, adjustable for operation over at least half the motor travel.

#### Feedback signal

0 to 10 V dc. signal should be available from the modulating damper actuator for parallel operation or as feedback. Please refer the data point schedules / sequence of operation/ drawings to incorporate this feature wherever asked for.

### **33. CONTROL VALVES (MODULATING)**

#### **General**

All control Valves with Kv lesser than or equal to 4 shall have RG5 gunmetal / red bronze body. Actuators shall be PWM or 0-10v dc modulating motor type or 3 point reversible motor type. PWM actuators shall be used in conjunction with controllers having in-built PID algorithm.

Control Valves with Kv = 6.3 shall have RG5 gunmetal / red bronze body. Actuators shall be 3 point reversible motor type or 0 – 10 V dc modulating motor type. Actuators shall have manual override hand-wheel.

Control valves with Kv >6.3 shall have RG5 gunmetal / CI. Actuators shall be magnetic / or 0 – 10 V dc modulating motor type. Actuators shall have manual override hand-wheel.

Valves up to including 40 mm shall be rated for 16 bar Nominal Pressure. Valves for 50 mm and above shall be rated for nominal pressure of 10 bar, provided the operating pressure of the system is not greater than 6 bar. Valves above 100 mm shall be rated for 16 bar Nominal Pressure and actuators shall for these valves be magnetic / electro-hydraulic / motoric working a 0-10v DC modulating signal. Actuators for valves 100 mm dia and above shall have spring return feature as well as manual override hand-wheel.

All valves 15mm and above shall have rangeability > 100.

#### *Authority*

All 3 port modulating valves shall be selected to have an authority between 0.4 and 0.68.

For systems using 2 port modulating valves, the MEP contractor shall furnish the controls' supplier details such as Pressure drop across the index circuit based on which the pump head was calculated, the pump head calculation, the design head of the pump ordered for the project, the available pressure on the system and the nodal pressures on each branch circuit of each AHU / FCU.

Based on these data, the controls' supplier shall submit the working principle for valve selection.

#### **Butterfly valves**

Butterfly valves shall be manufactured by the Controls Manufacturer or alternative, approved by the Consultant / Engineer.

### **34. Occupancy detector:**

The occupancy detector should be microprocessor based passive infrared detector for control of lighting equipment and VAV boxes in the room. The detector shall operate at 230VAC and will give a potential free output of minimum rating of 2 amps at 230VAC for control of lighting and VAV boxes for maximum energy savings and demand dependant controls. It should have a adjustable switch on delay of minimum 0...300 sec and a adjustable switch off delay of minimum 0.5...30 minutes. The detector should cover a minimum zone of 6 X 12 meters. The detector should be capable of detecting a moving infrared source. It should be optimized to detect the low level of sedentary workers. The detector should have minimum sensitivity of 50cm physical movements. The detector should be minimum IP50 with CE conformance.

### **35. BTU meters:**

The flow meter used in the above meter should be based on the ultrasonic principle with no moving parts. The temperature sensors used in the above meter should have a measuring range of 0...130 deg C with a resolution of 0.1 deg C. The BTU meter should have a built in minimum 8 digit LCD display for display of parameters, values and faults. The meter should be compatible with the BMS system. The minimum functions to be provided by the BTU meter is as under:

- Calculation and storage of maximum values
- Storage of billing data
- Measurement of tariff dependent data
- Storage of 13 monthly cumulative energy/volume values in EEPROM.
- Detection of faults

- Display of values , parameters and faults
- Selectable scope of display
- Test and service functions.

The BTU meter should have a minimum sampling time for flow every 3 seconds and temperature 24 seconds. Possible displays to be indicated are KWH, MWH, GJ, MJ, KW, m<sup>3</sup> , m<sup>3</sup>/hr ,h and Deg C. The heat meter should have a minimum accuracy of class 2 with CE conformance.

### 36. DDC PANELS

The out-station panel housing the DDC controllers shall be located inside the conditioned area. Proper care shall be taken to ensure that there is no induction problem between the control and power cables. These panels shall be IP54 and supplied by the specialist controls supplier.

The DDC controllers located inside these out-station panels shall provide the required signals to the various equipments connected to these DDC controllers. The DDC controllers shall be capable of accepting digital input signals in the form of volt-free contacts from Motor control centres. The MEP contractor shall co-ordinate this activity.

All these outstations shall be connected with a communication bus cable and terminated to the BMS central station. The BMS supplier shall supply these bus cables.

It should be possible to connect the Portable hand held terminal to be connected to any of these panels and talk to any other DDC controllers on the same bus.

### 37. Training

All training shall be by the BMS contractor and shall utilise specified manuals and As-Built Documentation

Operator training shall include total seven sessions each of six-hour encompassing:

- Modifying text and graphics
- Sequence of operation review
- Selection of all displays and reports
- Use of all specified OS functions
- Use of portable operators terminals
- Trouble shooting of sensors (determining bad sensors)
- Password assignment and modification

The training shall be under taken in two phases. One training session shall be conducted at system completion, and the other shall be conducted within forty-five days of system completion.

## Section B : Intellegent Addressable Fire detection System

### 1.0 GENERAL

This General Technical Specification (G.T.S) covers the technical requirement for MICROPROCESSOR BASED ADDRESSABLE TYPE INTELLIGENT FIRE DETECTION AND ALARM SYSTEM.

### 2.0 INTENT OF SPECIFICATION

The intent of this specification is to provide guidelines to be followed in design, engineering, manufacture, packing & supply, erection, installation, testing & commissioning (as described in the scope of work) by the Tenderer of the following system, MICROPROCESSOR BASED ADDRESSABLE TYPE INTELLIGENT FIRE DETECTION AND ALARM SYSTEM.

### 3.0 SCOPE

The scope of work includes complete design, engineering, supply, storage at site, laying, erection, installation, testing, and commissioning of MICROPROCESSOR BASED ADDRESSABLE TYPE INTELLIGENT FIRE

DETECTION AND ALARM SYSTEM, described in this specification on TURNKEY basis as per the department-wise Technical Specification annexed to this document.

The scope shall broadly cover the following and also shall include such of those items and accessories not mentioned here but required for satisfactory operation of the system.

#### **4.0 EXCEPTIONS**

The exceptions as specified in NFPA Code-72 or relevant standard are applicable for the complete system.

#### **5.0 SYSTEM DESCRIPTION & REQUIREMENTS**

- The system shall comprise of Heat detectors, Multi-sensor detectors, Optic fiber based Linear Heat sensing cable and other types of detectors as per the design criteria. The major components of the FDA system shall be **UL / FM** approved/listed. However, the specific standard will be as indicated in TS.
- MAIN FIRE ALARM CONTROL PANEL (FACP) along with accessories to integrate with the fire fighting system for automatic actuation.
- A pull station type addressable manual call points with provision of resetting.
- Electronic Hooters, Strobe lights or combination of both.
- Response indicators where required for above false ceiling detectors, below false floor & normally closed rooms.
- Power supply equipment.
- Battery back - up for 24 hours, in case of power failure, shall be provided.
- U.P.S systems for PC based work stations.
- Siren and Accessories.
- All types of cables (FRLS) and cabling accessories.
- Erection materials
- Earthing Materials & Earthing (if not available).
- GI pipes /GI conduits and other accessories wherever required for laying of cables.
- Furniture, Racks, ACs etc.
- All erection accessories, consumables and miscellaneous material not indicated in specification but required for completing the job in all respects.
- Commissioning spares till handing over of the system.
- Detector cleaning and testing kit for smoke & heat detectors with consumables required for two years use.
- Two years maintenance spares
- Special tools & tackles for testing & maintenance of the system

#### **5.1 DESIGN REQUIREMENTS**

- a) All equipment & component shall be new & MANUFACTURER'S latest model.
- b) The computer aided microprocessor based addressable type Fire Detection and Alarm system shall be software controlled automatic system and shall provide necessary programmed functions and various controls. The system shall consist of 32 bit central processing units (CPU), various man machine interface module communication system, microprocessor based intelligent fire alarm control panels, printers, video display units with data download facility, Addressable intelligent automatic sensors and interface unit as specified in BOQ.
- c) The system basically comprises of Detectors, Indicators, Manual Call Points(MCP), Fire Alarm Control Panels, Repeater Panels, Interfacing Units, Power supplies and other accessories required for completing the system.
- d) All the panels (including components), the detectors, Optic fiber based LHS & field devices shall have listing of internationally recognised laboratories.

- e) The detectors, modules, isolators, manual call points etc to be used in the system shall be of electronic addressable type.
- f) Pull station type manual call points with provision of resetting
- g) Electronic hooter, strobe light, siren associated with fire alarm system.

Actuation of any automatic fire detectors / manual call points or fault/open circuit shall cause:

- Annunciation of alarm condition, type and location of acknowledged detector / MCP.
- Audible signal with flashing of strobe light.
- Indication of Alarm / trouble location on the Main Fire Alarm Panel and in the local Graphics computer in the control rooms.
- Printing of history logins at both the ends.
- Suitable number of N.O & N.C potential free contacts (min. 10 nos.) in each panel shall be provided for interlocking with automatic fire fighting systems.
- Panel shall incorporate 40 programmable function switches in each panel for interlocking with automatic fire fighting systems, signals to field devices etc.
- Origination of fire alarm shall also be transmitted to the concerned ventilation and A/C equipment, so that the ventilation system and A/C system is switched off.
- A distinctive audible and visible signal indicating the occurrence of a fault within the system (for example break in circuit, short circuit, fault in power supply etc.)
- Cross zoning should be implemented in the software before raising any alarm from any detector.

## 5.2 SYSTEM FEATURES

- a) The system shall be self diagnostic type, involving application specific detection and with facility of alarm on any fault or open circuit in the system.
- b) The System shall be capable of handling detectors, modules, Manual call points etc on the same loop. However the sounders / flashers shall be powered by a separate wire from the respective fire alarm panel.
- c) The fire alarm panel shall have an inbuilt battery charger to charge SMF Lead acid batteries up to 100 AH.
- d) The basic system shall have capability to address up to 250 intelligent detectors in a loop. Further to system shall be expandable up to 2500 intelligent initiation devices.
- e) Isolation of line in case of line faults and alarm indication.
- f) Audio visual alarm for fuse blown out.
- g) Release of loud alarm /siren under the control of operator.
- h) Resetting of the system.
- i) Alarm response time shall be less than 3 seconds. Also the loop polling time shall be less than equal to 0.3 seconds.

**5.3 FIRE ALARM CONTROL PANEL (FACP) shall be intelligent, network able, with its own microprocessor and memory in each every card.**

The control panel as a built-in feature shall have minimum of two loop modules & each module without adding any card shall be able address up to 250 intelligent detectors in a loop. Further to system shall be expandable up to 2500 intelligent initiation devices Control panel shall have facility to expand up to 10 modules. Every card will be dedicated for single loop only.

The control panel shall have necessary loop modules, alarm modules and control outputs for various control functions.

The control panel shall have facility to process the input signals and also have facility to control all the input data received from addressable type detectors /addressable interface unit.

Fire alarm control panel shall have number of electronic filters to ignore false alarm and increase sensitivity to real fires from sensors. The electronic filters shall recognize the unwanted alarm from detectors due to electrical spikes.

The fire alarm control panel shall have separate 6” Large LCD Graphics display preferably with touch screen and with enough area to indicate the details of each device and clear text about the location of alarm / trouble. Incase if fire alarm system does not support touch screen an adjacent touch screen with required features is also acceptable. In either case the touch screen shall be well protected against unauthorized access. Vendor to consider suitable UL listed enclosure for the same.

The touch screen shall prompt for necessary action and shall also provide more information about the location, type, address, etc of each and every device connected to the fire alarm panel. This is required to facilitate operation and control of the fire alarm panel without any difficulty.

It shall be possible to program text message up to 200 characters each area.

In order to save time to fight and extinguish fire and also reduce loss to life & property the fire alarm system shall have a feature of providing the information regarding fire protection equipments available in the risk area along with contact number of the concerned authority. If the risk area contains any hazardous material the information of the same shall also be available at the fire alarm panel as well.

Suitable door + locking arrangement shall be provided in order to void unauthorized access to the panel front display. If the same is not a part of standard design, a suitable sized enclosure with glass front of reputed make shall be offered. Vendor to specify make of the panel enclosure.

The Fire Alarm panel shall be connected to a local graphics work station and also to the graphic work station at Fire Service control room. Each graphic work station shall comprise of PC, Printer, Keypad, Mouse, original software, HMI, peripherals, furniture etc.

Fire alarm Control panel shall have the following features:-

- Logging an alarm, time, address and action text on printers.
- Status check of disabled alarm addresses before they are restored.
- Storing of alarm and the possibility of internal organization of alarms.

- Large LCD display unit showing all necessary details like address, location, contact person and phone number, fire fighting equipments in risk area, etc. in the event of fire.
- End user compatibility.
- High degree of flexibility with the possibility of expanding to a bigger system with several control panels and control and information units.
- Programmable activation of control output relays for tripping ventilation system, AC system and closing of fire doors, Water spray systems etc in the event of fire.
- Area-wise controlled, monitored alarm outputs for external hooters, lamps, fire exits etc.
- Facility for programming and test features.
- The status check of each detector, interface units for alarm, prior warning, trouble, disabling shall be possible from control panel.
- Memory login for last events and an alarm counter for number of alarms occurred after the control panel is installed.
- Individual LEDs & manual actuation button for Deluge valves shall be part of the Fire Alarm panel in the form of integrated annunciator modules. This is required in addition to automatic actuation by the panel.
- Sounder silence, reset, acknowledge buttons and also push buttons for user menu structures.
- The Power Supply to the control panel shall be 240 V $\pm$ 10%, 50 Hz $\pm$ 6%, Single phase, AC supply.

The system shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.

The display assembly shall contain, and display as required, custom alphanumeric labels for all addressable modules, and software zone for easy identification of fire location.

The system display shall provide over 600 character back-lit Graphical Liquid Crystal Display (LCD) with touch screen as mentioned earlier. It shall also have LEDs to indicate the status of the following system parameters: AC POWER, SYSTEM ALARM, DISPLAY TROUBLE, SIGNAL SILENCE, CPU failure etc.

Different pass word levels shall be provided through the display interface assembly to prevent unauthorized system control or programming.

The system display shall include the following operator control switches: SIGNAL SILENCE, LAMP TEST, RESET, SYSTEM and ACKNOWLEDGE.

#### 5.4 System expansion

The main FACP shall have minimum two no. of additional loop cards in separate slots so that the system can be expanded in the future without disruption or replacement of the existing control panel. This shall include hardware capacity, software capacity and cabinet space.

#### 5.5 Field Programming



The system shall be programmable, configurable and expandable in the field itself by use of dedicated programming software. In order to avoid unauthorized access programming via panel keyboard is not acceptable.

The field programmability shall allow changes in various system parameters as per their operation philosophy.

All programming shall be accomplished through PC / Laptop. The program (software) used to configure the Fire Alarm Panel shall be submitted in a CD along with other submittals during training and handover.

All field defined programs shall be stored in non-volatile memory to ensure no data is lost during the power loss.

## 5.6 Specific system operations

**Smoke Detector Sensitivity Adjust:** Means shall be provided for adjusting the sensitivity of all addressable smoke detectors in the system. Sensitivity range shall be within the allowed NFPA code. This allows for higher sensitivity at high fire risk area.

**Alarm Verification:** Each of the Addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector. The alarm verification function shall be programmable as per as per relevant standard and each detector shall be able to be selected for verification during the field programming of the system or any time after system turns ON. Alarm verification shall not require any additional hardware to be added to the control panel. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands. To eliminate generation of false alarms due to dust or cigarette smoke, detector should facilitate application specific programming.

Activation of any system fire, security, supervisory, trouble, or status initiating device shall cause the following actions and indications on LCD screen

### Fire Alarm Condition:

- Sound an audible alarm and display a custom screen/message defining the area in alarm and the specific alarm point initiating the alarm on the display. The display shall provide standard NFPA graphical symbols indicating hazardous materials. Hazmat ICONs must conform to NFPA standard 170 format
- Log to the system history archives all activity pertaining to the alarm condition.
- Print to system printer (where required) alarm condition information.
- Turn the hooters / hooter strobes on in the respective areas.
- Audible signals shall be silenced from the fire alarm control panel by an alarm silence switch.
- The alarm information shall be displayed on a Graphic Annunciator located where all the information shall be displayed in Autocad drawings with graphics.
- HVAC shut down shall, be accomplished by system operated duct detectors as per local requirements.

### Supervisory Condition:

- Display the origin of the supervisory condition report at the local fire alarm control panel LCD display.
- Activate supervisory audible and dedicated visual signal.
- Audible signals shall be silenced from the control panel by the supervisory acknowledge switch.
- Record within system history the initiating device and time of occurrence of the event.
- Print to the system printer (where required) the supervisory condition.

### Trouble Condition:

- Display at the local fire alarm control panel LCD display, the origin of the trouble condition report.
- Activate trouble audible and visual signals at the control panel and as required.
- Audible signals shall be silenced from the fire alarm control panel by a trouble acknowledge switch.
- Trouble reports for primary system power failure to the master control shall be optionally delayed for a period of time not greater than 200 seconds. Trouble conditions that have been restored to normal shall be automatically removed from the trouble display queue and nor require operator intervention. This

feature shall be software selectable and shall not preclude the logging of trouble events to the historical file.

- Record within system history, the occurrence of the event, the time of occurrence and the device initiating the event.
- Print to the system printer (where required) the trouble condition.

Security Condition:

- Display at the local fire alarm control panel LCD display, the origin of the security condition report. A dedicated security LED shall flash until the alarm has been acknowledged, then revert to a steady "ON" state.
- The control system shall be capable of bypassing the alarms from an individual security system installed within selected areas. The pass code allowing this function shall be assignable to individual security personnel and each bypass action shall be logged to system history. Intrusion alarms occurring during a bypass period shall be logged to history and displayed but no audible alarm shall occur at the control panel.
- Print to the system printer (where required) the security condition.
- The Local Fire Control Panel shall be "UL" 1076 listed for security purposes.

**5.7** Point read

The system shall be able to display the following points status diagnostic functions without the need of peripheral equipment. Each point shall be annunciated for the parameters listed.

- A: Device status
- B: Device type
- C: Custom Device Label
- D: Software Zone Label
- E: Device Zone Assignments
- F: Detector Sensitivity
- G: All Program Parameters.

**5.8** System history Recording and reporting

The fire alarm panel shall contain a history buffer that shall be capable of storing minimum 1000 system output/input/control activations. Each of these activations, shall be stored and time and date stamped with the actual time of the activation, until an operator requests that the contents be displayed and/or printed. The contents of the history buffer may be manually reviewed, one event at a time, and the actual number of activations may be displayed and/or printed.

The history of buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable.

**5.9** Automatic Detector Maintenance Alert

The fire alarm control panel shall automatically indicate various level of dust accumulation in each detector (address wise). Disabling of any detector shall not affect the normal loop functioning.

**6.0 APPLICATION STANDARDS**

<b>SN</b>	<b>CODE NUMBER</b>	<b>DESCRIPTION</b>
1	IS-2189-1988 Reaffirmed in -1998 (second	: Code of practice for selection, installation and maintenance of automatic fire detection and alarm system

revision –Amendment-II)

- |    |   |   |  |
|----|---|---|--|
| 2  | NFPA – 72 or as per relevant standard       | : | For selection of Fire Alarm Panel, all detectors & field devices.  |
| 3  | IS-5-1994                                   | : | Color for ready mixed paints and enamels (Fourth Division)   |
| 4  | IS-9537PART-II-1981                         | : | Specification for conduits for electrical wiring.  |
| 5  | IS-694-1990                                 | : | PVC insulated cables for working voltages upto and including 1100V (Third revision-Amendment-I)                                |
| 6  | IS-1554 PART-I-1998                         | : | PVC insulated (heavy duty electric cables part-I for working voltages upto & including 1100V (Third Edition-Amendment-I)       |
| 7  | IS-10810 PART-53-1984<br>Reaffirmed in 1991 | : | Method of test for cables part-53-flammability test  |
| 8  | IS-1255-1983<br>Reaffirmed in 1991          | : | Code of practice for installation and maintenance of power cables upto and including 33KV rating (Second revision-Amendment-I) |
| 9  | IS-3043-1987<br>Reaffirmed in 1991          | : | Code of practice for earthing  |
| 10 | UL & FM                                     | : | Listing / certification of major components  |

The system shall comply of the following recognized agencies.

NFPA – National Fire Protection Association.

## **7.0 SYSTEM COMPONENT SPECIFICATION**

### **7.1 All Detectors**

#### **Detectors shall be compatible to function in industrial environment.**

Detectors shall be addressable type with features like device mapping, environment compensation, self-diagnosis, sequential history logging, and integral memory to store the detector's address & other critical operating parameters, which include the assigned program values for alarm and trouble thresholds etc.

The detectors shall have LED indications for Normal, Fault & Fire, it shall be possible to switch off the blinking of LED in normal condition in selected areas, this setting is intended for applications where the periodic green flash would be a nuisance or distraction. If detector cannot indicate fault indication via integrated LED, then a separate fault indicator shall be provided for a group of 10 detectors in each loop.

The detector shall be a self-testing device. The detectors shall have provision for connecting repeat response indicator. The repeat response indicator shall be of the same make as that of the detector, fire alarm panel. Third party response indicators are not acceptable.

The unit shall be electronically / field addressable. After assigning the address to the detector, it shall be possible to test the detector at site before physical installation on the loop. In order to reduce chances of failures the testing should be done before powering the Main Fire Alarm panel. Some device test unit or A One loop Addressable type fire alarm test panel shall be included in the scope of supply. After commissioning the same shall be handed over to the client for carrying out regular testing and maintenance

In degrade mode all the output devices on a loop shall activate when the communication with the Processor of control panel fails and the Node's common alarm bus becomes active.

### 7.1.1 Heat Detectors

*Fixed temperature cum Rate-of-Rise temperature elements:* These shall be designed to operate on a combined decision of rate of rise (15 degree in 1 min.) and fixed temperature (57 degree). However, for areas having higher ambient temperature, fixed temperature detectors of higher temperature ratings shall be fitted. The detector shall allow user to disable the rate of rise alarm criteria for selected areas.

The detectors shall be plug in type and shall have common base.

The visual alarm LED shall be clearly visible from outside by a flashing light. The detectors shall have LED indications for Normal, Fault & Fire. If detector cannot indicate fault indication via integrated LED, then a separate fault indicator shall be provided for a group of 10 detectors in each loop.

The detectors shall have provision for connecting repeat response indicator. The repeat response indicator shall be of the same make as that of the detector, fire alarm panel. Third party response indicators are not acceptable.

The detector shall be suitable for 24V D.C operation.

The unit shall be electronically / field addressable. After assigning the address to the detector, it shall be possible to test the detector at site before physical installation on the loop. In order to reduce chances of failures the testing should be done before powering the Main Fire Alarm panel. Some device test unit or A One loop Addressable type fire alarm test panel shall be included in the scope of supply. After commissioning the same shall be handed over to the client for carrying out regular testing and maintenance

### 7.1.2 Multi-sensing Detectors

- The detector shall have photoelectric sensor for smoke along with a programmable heat detector. It shall be possible to use the detector as a Smoke detector only by isolating the heat element.
- The detector should support triple confirmation of fire before giving an alarm.
- The detector communications shall allow the detector to provide alarm input to the system and alarm output from the system within the stipulated time as specified in relevant standard.
- Detectors shall be programmable as application specific, selected in software for the environmental fire profiles unique to the installed location. These fire profiles shall eliminate the possibility of false alarms caused by dust, moisture, chemical fumes and air movement while factoring in conditions of ambient temperature rise, obscuration rate changes and hot/cold smoke phenomenon into the alarm decision to give the earliest possible real alarm condition report.
- Under normal conditions the detectors might be exposed to dirt and dust, in order to set exact levels of pre-alarms that the detector generates, the detector shall support auto learn feature in order to set the pre-alarm levels, the auto learn time shall vary from 1 day as a minimum and shall be possible to set upto 14 days.
- Detector shall be capable of providing three distinct outputs from the control panel. The outputs shall be from an input of smoke obscuration, a thermal condition, neural net or a combination of various conditions.

- The unit shall be electronically / field addressable. After assigning the address to the detector, it shall be possible to test the detector at site before physical installation on the loop. In order to reduce chances of failures the testing should be done before powering the Main Fire Alarm panel. Some device test unit or A One loop Addressable type fire alarm test panel shall be included in the scope of supply. After commissioning the same shall be handed over to the client for carrying out regular testing and maintenance.
- Detectors shall be listed for use as open area protective coverage, in duct installation and sampling assembly installation and shall be insensitive to air velocity changes.
- The detector shall be designed to eliminate calibration errors associated with field cleaning of the chamber. The detector shall support the use of a relay, or LED remote indicator.
- The detector should be intelligent enough to discriminate between deceptive phenomena and an actual fire.
- It shall be possible to install the devices and detectors in the same loop.
- The unit shall be electronically / field addressable. Its address and circuit status i.e normal, open, short are communicated to the control panel. An integral LED blinks each time the controller scans the device and LED blinks in a different colour in case of change of status. The device LED shall be capable of indicating three different statuses i.e. Normal, Fire & Fault.
- If detector cannot give fault indication via integrated LED, then a separate fault indicator shall be provided for a group of 10 detectors in each loop.
- It shall be possible to switch off the continuous blinking of the detector for confirmation of normal condition. However the Led shall flash in its dedicated colour for indicating Fault or Alarm condition.

## 7.2 Manual Call Point (MCP)

MCP's shall be manually operated addressable device used to initiate an alarm signal.

The Manual Call Point shall be Pull station type and the same shall be constructed of durable molded polycarbonate material with red finishing on the body and white lettering for clear identification. The housing shall accommodate a pull down lever, which, when operated, shall lock in position indicating the manual pull station has been activated. The pull down lever shall remain down and locked until the manual pull station is reset. Manual pull stations shall contain the intelligence for reporting address, identity, alarm and trouble to the fire alarm control panel. The manual pull station communications shall allow the station to provide alarm input to the system and alarm output from the system within less than four (4) seconds. The unit shall be electronically / field addressable. Due to maintenance issues, break glass type MCP's are not acceptable.

The manual call points shall be available in **whether proof / flame-proof** enclosures also for outdoor / specific installations. The same shall also be pull type only. In case of conventional weather proof or flame proof MCP used, the same shall be interfaced with a suitable input module. The input module shall be placed inside a weatherproof / flameproof junction box with double compression cable glands.

All the MCP located in outdoor areas shall be supplied with a suitable pedestal and canopy in order to allow the MCP to be free standing and accessible at height of 1.4 meters in the field where wall mounting is not possible.

Manual call points shall be installed near exit / entrance doors, stair cases or outdoor locations where automatic fire detectors cannot be installed.

## 7.3 ADDRESSABLE INTERFACE UNIT

The interface unit shall be suitable for interfacing normally open type alarm / supervisory devices such as pressure switch, flow switches, level switches, potential free contacts etc. in the addressable loop, if required.

The interface unit shall be a sealed electronic unit. It shall be housed in a metallic / high impact plastic enclosure and suitable for indoor / outdoor installation. The operation voltage shall be 24 V D.C. The unit shall be electronically / field addressable.

An integral LED blinks each time the controller scans the module and LED blinks in a different colour in case of change of status. The device LED shall be capable of indicating three different statuses i.e. Normal, Fire & Fault. If device cannot give fault indication via integrated LED, then a separate fault indicator shall be provided for a group of 10 detectors in each loop.

#### **7.4 ADDRESSABLE CONTROL CUM MONITOR MODULE**

The control devices shall form part of loop devices. Control module shall supervise and controls indicating devices and their associated wiring. The module shall provide SPDT switching action for other locally powered equipment.

The unit shall be designed to monitor a normally open or normally closed dry contact. Also the output relay of the unit shall be activated upon receipt of the input. This unit shall be used for alarm activation via hooters, strobes, Deluge valve applications, MVWS systems, HVWS Systems, Pump interfaces, coal conveyor applications, etc.

The input and the output component of the device shall be separately programmable. In case if the same is not possible, vendor may consider separate input and separate output modules in their offer.

The interface unit shall be a sealed electronic unit. It shall be housed in a metallic / high impact plastic enclosure and suitable for indoor / outdoor installation. The operation voltage shall be 24 V D.C.

The unit shall be electronically / field addressable. An integral LED blinks each time the controller scans the module and LED blinks in a different colour in case of change of status. The device LED shall be capable of indicating three different statuses i.e. Normal, Fire & Fault.

If device cannot give fault indication via integrated LED, then a separate fault indicator shall be provided for a group of 10 detectors in each loop.

#### **7.5 FAULT ISOLATION MODULE**

Fault Isolator Module shall be used on panel intelligent loop communication circuits along with other modules and sensors. It detects a wire-to-wire short and electrically isolates that condition from the circuit so that communication is maintained with unaffected devices on the same circuit.

The isolator shall be placed preferable every 15 devices in the loop. It shall be housed in a metallic / high impact plastic enclosure and suitable for indoor / outdoor installation. The operation voltage shall be 24 V D.C.

#### **7.6 FIRE EXIT BOARD**

Self illuminating "FIRE EXIT" sign boards shall be provided indicating escape routes to escape under fire condition. The type of sign board shall be as per site condition.

#### **7.7 RESPONSE INDICATOR**

The response indicator shall comprise of indicator lamp with flashing enclosed in a red plastic cover and fitted to the M.S. box and engraved "FIRE" on the plastic cover.

The Response Indicator shall be of the same make as that of the detector, Fire alarm Panel.

## **7.8 ALARM SIRENS, HOOTERS AND STROBE LIGHTS**

The siren shall be of rugged construction, have weather proof protection and suitable for outdoor mounting. It shall have adequate range to cover a radius upto 1 K.M diametric range and shall be dual tone. The operator at the fire station / security control room shall have facility to energize the siren.

The siren shall be suitable for 240 V +/-10%, 50 Hz +/-2Hz single phase A.C. Frequency shall be as per standards. The siren shall have rain canopy. The siren shall have IP-65 enclosure.

### **Hooters**

The electronic sounder / loud speaker being located at vital places shall have minimum 90 dB output.

The Hooters shall be of the same make as that of the detector, Panel.

### **Strobe lights**

The electronic strobe light being located at vital places shall have a high intensity flasher light for a visual alert from a distance.

The Strobe Lights shall be of the same make as that of the detector, Panel.

## **7.9 POWER SUPPLY, CABLING AND WIRING AND CONTROL CENTRE**

### **Power Supply & Battery back up:**

The power to the Graphics computers shall be derived from a suitable UPS of reputed make. The power to the Deluge valve actuation system shall be derived either from fire alarm panel (24VDC) or shall be locally generated in the field from supervised Battery and Charger system.

Power supply internal to the panel shall be UL & FM approved power supply with capability of delivering 10 Amps output for powering the hooters, Sounders, Solenoids etc located in the field. It shall be possible to expand the panel power supply up to 20 Amps. If expansion in the same is not possible, 20 amps external power supply with battery charger shall be considered in the offer.

The panel power supply shall be incorporated with a battery charger. The charger shall be capable to charge up to 100Ah of SMF Lead Acid batteries. Charging shall be done in Bulk Charge, Trickle charge and float charge modes. The charging shall be automatically selected by the panel processor and no manual intervention shall be allowed. If the standard panel power supplies do not support multiple charging modes, vendors shall provide external UL & FM approved power supply cum battery charger with the requested charging modes.

All the necessary battery calculation shall be submitted along with the offer. Back up time shall be 24 hrs in normal condition and 1 hr with full load in alarm condition. For battery sizing consider ageing factor as 0.8 and temperature as 10°C

Wiring type for fire alarm device loop: Style - 6 – 4WIRE – FAULT TOLERANT only.

## **7.10 CENTRAL PROCESSING UNIT (CPU) of FIRE ALARM PANEL.**

CPU shall communicate with various microprocessor based fire alarm control panel /peripherals of the system and execute /receive FIRE & FAULT alarms, control the activation of outputs. CPU failure should be indicated by an LED on the front facial.

CPU shall also communicate with printer and PC based Graphic workstation through RS-232C or equivalent connectivity.

Indications / information received from detectors /field devices, switches etc to CPU shall be available at the central graphic workstation.

The CPU shall be state-of-the-art 32 bit processor which shall serves as central processor, system software shall be designed specifically to monitor status; processing alarms according to priorities, controlling / processing communications with operator peripherals; and synchronizing all system activity.

For reason of reliability and preventing inadvertent changes, system shall be maintained in non-volatile memory. System shall permit reprogramming by authorised personnel only via dedicated Laptop.

The CPU shall indicate post dates for carrying out detector pooling. Alternatively, detector shall report its proper functioning to the panel. The same will have a history logging in non-volatile memory which should also be available at the panel end. The same shall have printing and monitoring facility through HMI. The CPU shall derive power from panel Power supply.

The looping scheme, scheme of detector connections shall be software programmable.

## **8.0 DOCUMENTATION**

### **8.1 INFORMATION TO BE FURNISHED BY TENDERER ALONG WITH OFFER**

- BILL OF MATERIALS with make and model no. of equipment.
- Duly Filled questionnaire
- Fire Alarm System schematic diagram.
- List of deviations.
- Power requirement & Battery Calculation (in the specified format).
- General View of diagram of panel with details.
- Manufacturer's original product catalogues.
- Manufacturer's authorization certificate.
- Any other requirement mentioned in TS.

### **8.2 DRAWINGS AND DOCUMENTS TO BE PREPARED BY SUCCESSFUL TENDERER**

#### **9.2.1 FOR APPROVAL**

- Schematic of Fire alarm system.
- Location scheme of detectors.
- External connection diagrams.
- Equipment layout drawings with mounting arrangement, termination details etc.
- Cable routing.
- Specification data sheets for equipment and cables.
- Panel general view.
- Cable and pipe schedule.
- Quality Assurance Plan for equipment & cables.



## 9.2.2 FOR INFORMATION AND REFERENCE

- Wiring Diagram Of Panel
- Details of Panel and Installation.
- List of Components in Panels.
- Operation & Maintenance Manuals
- As-Built Drawings.
- Circuit diagram and PCB layout drawing
- Component pin connection details
- Listing of components

## 9.0 TEST & INSPECTION

Joint inspection shall be held by the FDA operating committee for pre-erection acceptance of equipment, cables etc & any deviation raised during such inspection shall be complied to by the tenderer as part of his work.

All equipment shall undergo type and routine tests at manufacturer's works. All tests shall conform to relevant standards as specified in TS. Factory Test certificates shall be submitted when requesting for inspection. The material shall be dispatched only after issue of inspection or waiver certificate and after getting dispatch clearance. Detailed inspection requirements as per TS.

## 10.0 TRAINING

The tenderer shall arrange for training of purchaser's personnel for operation & maintenance of the **Fire Detection & Alarm System** at manufacturer's premises and site as well.

The tenderer shall give detailed training program mutually agreed as per requirement well in advance prior to the commencement of training. The tenderer shall supply all training materials, instructions & other connected literature in six copies to the purchaser in English language. In addition each trainee shall also receive a copy of the same.

## QUESTIONARIES

Sr. No.	Description	Vendors to confirm compliance	
	<b>Vendor to confirm compliance with the following points</b>		
<b>A</b>	<b>General</b>		
1	Intelligent Addressable Fire Alarm System is offered. Analogue addressable is not acceptable.	YES	NO
2	All the system components are UL / FM approved	YES	NO
3	Two years maintenance spares considered. Vendor to furnish the quantity of the same	YES	NO
4	All necessary commissioning tools and tackles are in vendors scope	YES	NO
5	A set of maintenance tools shall be considered as a part of the offer. Vendor to confirm compliance and furnish the details of the same.	YES	NO
6	Original Programming software with license has been offered, vendor to confirm compliance	YES	NO
7	Device Programming & test unit or 1 loop addressable fire alarm test panel considered in scope. Vendor to confirm compliance	YES	NO
<b>B</b>	<b>Fire Alarm Control Panel</b>		
<b>1</b>	<b>General</b>		
A	Intelligent addressable type panels are offered	YES	NO
B	All the cards are individually approved by UL / FM / VDS	YES	NO
C	Dedicated processor for each panel card	YES	NO

D	Main processor and panel cards communicate via internal RS-485 network	YES	NO
E	Processor should be able to identify Loss / Failure of any card associated with the processor (local / remote)	YES	NO
F	Degraded mode operation supported	YES	NO
G	NFPA72D proprietary configuration supported	YES	NO
H	Two loop cards have been provided as spare inside the fire alarm panel	YES	NO
I	Event history for min 1000 events	YES	NO
J	Alarm Response Time $\leq 3$ sec	YES	NO
K	Polling time $\leq 0.3$ sec	YES	NO
L	10 nos. of Potential free contacts are considered inside each panel for tripping AC / Ventilation / etc systems	YES	NO
M	40 programmable function switches considered along with each panel	YES	NO
<b>2</b>	<b>Processor &amp; Display</b>	YES	NO
A	Panel shall provide a large graphical LCD screen to enable comfortable viewing of events	YES	NO
B	Multiple events display on one screen, preferably min. 4-5 events at a time	YES	NO
C	Touch screen display with suitable locking arrangement for enabling fire fighters to have easy command and control over the system is considered along with each fire alarm panel.	YES	NO
D	Text message up to 200 characters shall be able to be programmed for each area devices	YES	NO
E	Touch screen LCD display shall inform regarding fire protection equipments installed in the risk area along with contact number of the concerned authority	YES	NO
F	The panel processor shall be capable of handling upto 10 loops in case of expansion.	YES	NO
G	In case of any future expansion the panel processor shall be capable of addressing up to 2500 devices	YES	NO
H	Capability of communicating with loop cards, relay cards, etc mounted in a remote enclosure	YES	NO
<b>3</b>	<b>Loop Card</b>		
A	Max. 250 intelligent detectors can be installed per loop.	YES	NO
B	The Loop card shall be capable of handling detectors, modules, Manual call points etc on the same loop	YES	NO
C	It shall be possible to mount the loop cards remotely i.e. away from panel, in order to save loop cabling and maintenance cost.	YES	NO
D	Activation of output devices in degrade mode i.e loss of communication with the main panel processor	YES	NO
E	Remote fault indicators considered in each loop, for every 10 detectors / devices for indication of fault in a group of detectors / devices	YES	NO
F	Loop Resistance supported by loop card is $\geq 50$ Ohms	YES $\geq 50$ Ohms	NO $\leq 50$ Ohms
G	2c x 1.5 sq. mm untwisted, unshielded, copper armoured FRLS cable is considered for loop wiring	YES	NO
H	2c x 2.5 sq. mm untwisted, unshielded, copper armoured FRLS cable is considered for loop wiring	YES	NO
I	Min. 2c x 2.5 sq. mm untwisted, unshielded, copper armoured FRLS cable is considered for power	YES	NO
<b>5</b>	<b>Power Supply</b>		
A	Inbuilt Power supply upto 10 Amperes alongwith suitable battery charger to charge Lead Acid SMF batteries is considered	YES	NO
B	SMF lead acid batteries are compatible with power supply / charger offered	YES	NO

C	UL / FM approved Power supply & Battery charger with Bulk, Trickle, float charging modes considered	YES	NO
D	24 hrs normal condition and 1 hr alarm condition battery back up considered	YES	NO
E	Battery calculation is attached	YES	NO
F	Ageing factor of 0.8 is considered for battery sizing	YES	NO
G	If Power Supply is not expandable upto 20 Amps, external UL /FM / VDS approved power supply cum battery charger with capability of delivering 20 Amps is considered in offer	YES	NO
<b>6</b>	<b>Enclosure</b>		
A	Suitable door + Locking arrangement shall be provided in order to void unauthorised access to the panel front display / graphical touch screen display. Vendor to specify make of the panel enclosure.	YES	NO
<b>7</b>	<b>Programming</b>		
A	Field Programming of the fire panel using dedicated software shall be possible via Laptop	YES	NO
B	Windows based Upload & Download programming Utility	YES	NO
<b>D</b>	<b>Field Devices</b>		
<b>1</b>	<b>GENERAL</b>		
A	All the detectors, Sounders, Response Indicators, Manual call points, etc. shall be of same make as that of the panel	YES	NO
B	Fault indicator for a set of 10 addressable devices in each loop considered	YES	NO
<b>2</b>	<b>MULTISENSOR DETECTOR</b>		
A	Application specific detection capability	YES	NO
B	LED indication at detector head for fire, fault and normal condition	YES	NO
C	LED indicator shall be Blinking LED type	YES	NO
D	Detector blinking controllable for individual detector	YES	NO
E	Devices shall be Electronic addressable	YES	NO
F	Testing of detector before physical installaion via test panel / unit	YES	NO
G	UL listed, FM approved	YES	NO
H	Minimum 7 levels of sensitivity shall be available	YES	NO
I	Triple confirmation of alarm	YES	NO
J	Auto learn feature in the detector	YES	NO
<b>2</b>	<b>MANUAL PULL STATION</b>		
A	All Manual call points are Pull type only	YES	NO
B	Manual call points for out door applications shall be WEATHER PROOF / FLAME PROOF rated as per specification and shall be interfaced to FAP using suitable monitor module	YES	NO
C	Free standing arrangement for outdoor MCP using Pedestal and canopy with double compression cable glands is considered with MCP	YES	NO
<b>3</b>	<b>MODULES</b>		
A	High impact plastic enclosure - IP 55 / IP 56 type along with double compression cable gland is provided along with each input / output module.	YES	NO
B	Single input with relay module considered for addressable control cum monitor module in the BOQ. If not separate monitor module and control module shall be provided. Vendor to confirm compliance	YES	NO
C	The input and output component of control cum monitor modules shall be separately programmable.	YES	NO
D	Fault isolator module shall not occupy an address on the loop wiring	YES	NO
E	Fault isolator module shall be located after every 15 devices	YES	NO
	<b>MISCELLANEOUS</b>		

D	Vendors are requested to conduct site visits and gather the necessary data to enable them to make the firm proposal.	YES	NO
E	No deviations shall be excepted at a later stage.	YES	NO

## **SECTION C: Public Address System, Voice Communications System and Emergency Voice Communication System**

### **A) Public Address System**

#### **1.0 Objective:**

The Public Address System is designed to serve the multi purpose of playing the music or to make general announcement or to transit the fire tone under fire condition. These different signals are transmitted through the same set of speakers hence different levels of priorities are allotted to different signals. The music is with the least priority and the fire tone is having next priority and the emergency announcements are having the highest priority level.

#### **2.0 Functionality:**

- 2.1** All control consoles shall be placed in the IBMS room. Announcement and background music shall be played from the IBMS room and car calling mike shall be provided in the reception area.
- 2.2** An EPABX will be provided in the control center. It shall be possible to 'page' to designated zones within the specified group from the EPABX extensions.
- 2.3** The System shall have pre-recorded message to be announced in all the groups/zones in case of fire. A signal from fire alarm panel shall initiate such announcements. This announcement shall have highest priority.
- 2.4** The system shall have a chime module. The chime module shall generate two types of signals consisting of either a two-note chime or a single gong tone to capture attention before paging.
- 2.5** Normally background music shall be played in the lobbies and other common areas paging will receive a higher priority and the highest priority shall be accorded to emergency announcements initiated by the fire control panel.
- 2.6** The speakers are distributed in the entire building and are configured in different zones. The announcement can be made in individual mode i.e. one zone at a time or to all the speakers simultaneously in ALL CALL mode.

#### **3.0 Components**

##### **3.1 SPEAKERS**

**3.1.1.** Speakers are in wooden or metal enclosures. All the speakers are with its associated line matching transformers. The speakers are interconnected in the zone configurations. The types of speakers to be used in various areas are

- I. Lift lobbies and Datacenter Area and office area with false ceiling – 6 W flush mounting ceiling ring speakers"
- II. Staircases – 20 W Column speakers.

##### **3.2 PUBLIC ADDRESSING AMPLIFIERS**

These amplifiers are designed to accept the input sources i.e., Microphone/CD Player/Fire tone generator. The output is having a 100 Volts line to take care of line drop. The Amplifiers are stacked inside the rack system. Tone control circuit is provided to alter the quality of the output as per the users requirement.

##### **3.3 RACK ASSEMBLY**

Rack assembly is to stack the public addressing amplifiers. This is factory prewired and is having different channels for AC mains cable and Audio signal Cables. The rack is provided with wheels for easy maintenance. One lockable rear door is provided. The rack assembly is operating on 230 VAC.

### **3.4 CONTROL CONSOLE**

The heart of the entire public addressing system is the Console. The selection of Music or Announcements is done through the console. The system shall make provision for dual channel output i.e both music and audio announcement shall be made for the entire system in which either music or audio announcement shall be selected through a hardware or software switching facility. The announcements can be made through the control console zone wise such as Music, Fire tone or Announcements. The console is provided with keypads on a sloped surface. The switches are having respective LED's.

## **4.0 The different modes of transmission in P.A System are as follows:**

### **4.1 MUSIC**

**4.1.1.** The music is through the CD Players can be fed to the amplifiers. The music transmission is having the least priority. That is if FIRE condition occurs, then the Alert tone overrides the music in the speaker. If any announcement is made, then the music will be stopped till the time of announcement and continues after pressing key.

**4.1.2.** To play music a separate switch MUSIC is given and by operating this switch, the music is transmitted to all departments/zones.

### **4.2 ANNOUNCEMENTS**

**4.2.1.** Announcements can be made through the microphone and by selecting the required zones.

**4.2.2.** Announcements can be made in following modes:

- I. 1.Individual mode
- II. 2.All Call mode

**4.2.3.** In this mode announcement can be made to all the speakers simultaneously. This is useful when any common message to be passed to all. Also this is more convenient and fast to address the people during emergencies.

## **5.0 SYSTEM INTERCONNECTION**

The speakers in each zone are connected in parallel and are connected to the relay and switching unit. The cables from each zone are separately routed and are terminated in the relay-switching unit.

## **6.0 TECHNICAL SPECIFICATION**

### **6.1 3 Disc CD changer carousels/DVD/MP3:**

Program up to 30 selections from 5 different CDs Up to 3 discs can be changed while one is playing. Skip, search, shuffle, reappear and quick play function. Dedicated remote control.

### **6.2 Dual auto reverse cassette deck:**

Type: Auto reverse 4 – track, 2-channel recording and playback setup, double cassette deck.

### **6.3 Power Amplifier:**

Type: Dual channel audio amplifiers.

- 6.4 Ceiling Ring Speakers:** Flush mounting ceiling ring with attractive grill, spring loaded mechanism for clamping with in built line matching transformer.  
Power: 6 W with taps
- 6.5 Column Speakers:** Suitable for wall mounting the columns shall direct sound in the horizontal plane.  
Power: 20 W with taps

## **B) Emergency Voice Communication System (EVC System)**

### **1.0 Functionality:**

- 1.1** EVC System shall provide Announcements for evacuating people during emergency on receipt of signal from fire alarm system.
- 1.2** Two way communication between handsets at the following areas:
- I. All service corridors
  - II. Ventilation fan, treated fresh air units room
  - III. All AHU room
  - IV. All Electrical rooms
  - V. All security rooms
  - VI. Fire control center (IBMS Room)

### **2.0 Components**

#### **2.1 Hand Sets**

- 2.1.1.** Handset stations shall be
- I. Indoor wall / Column mounting type
  - II. Indoor wall / column mounting pilfer proof type and shall be provided in all staircase area.
- 2.1.2.** All switches shall be dust proof encapsulated micro-switches. The relays shall be dust proof encapsulated reed relays having guaranteed long life
- 2.1.3.** For Desk/Wall/Pole mounting, indoor-outdoor type handset stations, the mouthpiece receiver unit shall rest on cradle switch. On lifting the mouthpiece receiver unit off the handset station, the cradle switch shall automatically cut out the associated loudspeaker.
- 2.1.4.** For Pilfer proof type handset stations, the mount piece microphone shall be completely enclosed in the handset station.
- 2.1.5.** Handset microphone shall be the low-impedance, dynamic type designed for close talking and minimum acoustic feedback. The handset shall pick-up only the operator's voice, and shall shield out extraneous noise.
- 2.1.6.** Each mouthpiece/receiver unit shall be provided with retractable-coiled cord type of cable of length not less than two metres.
- 2.1.7.** Handset cord shall be terminated at the mild steel box on PVC terminal blocks.
- 2.1.8.** Handset mouthpieces shall be protected from dirt and other foreign particles by means filters.
- 2.1.9.** Cradle switch and all associated equipment shall be completely assembled and wired at factory
- 2.1.10.** Rugged weatherproof and corrosion proof enclosures, fabricated out of 2mm mild steel sheets shall be provided for handset stations. Wall/Pole mounting facility shall be provided on the enclosure, earthing terminal, cable glands for terminating cables shall be provided.
- 2.1.11.** The handset stations shall have an enclosure with a clear indication as "Emergency Communications Centre". Access to this shall be only by authorised fire alarm personnel.

## **2.2 EVC CONTROL PANEL**

**2.2.1.** The EVC control panel shall have the following features:

- I. Continuous monitoring of the telephone circuits and trouble indications.
- II. Announcements /Instructions to selected speakers
- III. Indication- audio & visual when any handset station is activated
- IV. EVC shall have provision for making pre recorded evacuation messages on getting signal from fire alarm system and it shall stop when it is reset at the fire alarm panel. It shall also be possible to over ride this and make an impromptu announcement from the IBMS Control room.

## **2.3 WIRING**

- 2.3.1.** Microphone level circuits, line level circuits, loudspeaker circuits and power circuits shall run in separate conduits. The conduits shall be medium duty PVC when run concealed and metal conduit when run exposed.
- 2.3.2.** All audio lines, including microphone, line level and loud-speaker lines shall be floating with respect to ground, neither side of the audio lines shall be grounded. No equipment employing single ended input shall be used in the system. If equipment has a single ended input, it must be provided with an input transformer to provide for floating condition.
- 2.3.3.** Cables for both internal wiring and external connections shall be of high conductivity stranded annealed copper conductor. PVC insulated, Extruded PVC inner sheathed, overall extruded PVC sheathed conforming to applicable standard. Voltage grade, size, no. of cores and screening shall be consistent with circuit requirements and shall be furnished by the CONTRACTOR. All outdoor cables shall be armoured.
- 2.3.4.** The cables shall be run in cable trays in the communication shaft and in conduits upto the handsets/loudspeakers in each floor. The installation of the cable trays and conduits shall be in line with the requirements given in the electrical installation write-up.

**Sub Section G (IBMS and BAS): Access Control System**



## **System Description**

The Integrated Access Control System's (ACS) primary function shall be to regulate access through specific doors, gates or barriers to secured areas of the facility. It shall also have the provision of capturing cardholder images and producing access cards used to provide this access.

The system shall use a single seamlessly integrated database for both its access control and badging functionality. This integration shall be provided under one operating environment.

The system shall provide a multi-tasking environment that allows the user to run several applications simultaneously. The ACS software shall run on a Windows XP 32 bit operating system and be licensed by Microsoft under the Windows XP Logo program. Such licensing shall ensure that the application was specifically designed for the Windows XP platform and follow Microsoft's development guidelines for this operating system. The ACS shall be able to run in conjunction with other Windows XP applications such as MS Word and Excel while concurrently annunciating on-line access and security alarms and monitoring information.

The system shall operate on a Windows XP multi-tasking, multi-threading 32-bit operating system. The System software shall be a true native 32-bit application built 'from the ground up' for Windows XP. The System shall NOT be ported over from another operating system (i.e. UNIX, DOS, or OS/2) and shall not be a Win-16, UNIX, QNX or OS/2 program using a Windows NT Server. In addition, the system shall not be a UNIX or QNX Server using a Windows XP client.

All system application modules, features, and functions shall be generated from a single source code set. In addition, the source code must be designed using object-oriented software development techniques and compiled into native 32-bit applications. There shall not be separate source code bases for access control and ID badging. All system features and functionality listed in the proceeding pages shall ship with each system. Features and functionality available to the "Owner" shall be determined through licensing and shall be controlled by a software license key. The "Security Contractor" shall work with the Owner to develop and configure the system.

## **Glossary of Terms & Abbreviations**

ACS	Access Control System, incorporates the entire access control and security network, including the Server, Workstations and Intelligent field or system controllers.
ISC	(Intelligent System Controller). The hardware components of the system to which the physical components (input devices, entry devices, and output devices) of the access control system connect. The ISC communicates with the ASC Server.
MMI	Man Machine Interface. Also known as the Graphical User Interface (GUI).
NIC	Network Interface Card.
DRIM	Dual Reader Interface Module
SRIM	Single Reader Interface Module
GEM	Graphics Editing Module (GEM)

## Compliance & Standards

**2.4** The “Tenderer” shall be regularly engaged in the manufacturing, installation and maintenance of ACS systems and shall have a minimum of **ten (10)** years of demonstrated technical expertise and experience in the manufacture, installation and maintenance of ACS systems similar in size and complexity to this project. The tenderer shall also be a maintained service organisation consisting of at least **ten (10)** competent service people for a period of not less than **ten** years and be able provide a list of **five** projects, similar in size and scope to this project, completed within the last **five** years.

**2.5** The Intelligent System Controllers (ISC's) shall comply with at least two standards from the following compliance regulations:

- CE
- C-Tick
- UL

The purpose of these regulations is to maximise the operational useability of the product and to ensure minimum standards within the access control system development have been maintained. These standards will also ensure electromagnetic interference between electronic products are minimized as these may diminish the performance of electrical products or disrupt essential communications.

## **Installation**

- 2.6** The ACS shall be designed, installed, commissioned and serviced by manufacturer employed, factory trained personnel.
- 2.7** All materials supplied by the Security Contractor shall be new and shall comply with the latest published specifications and recommendations of the manufacturer in all respects unless otherwise indicated. The Security Contractor shall supply the latest model available for all equipment items. Unless otherwise indicated in the specification, all electronic equipment shall be a standard, unmodified production model.
- 2.8** Equivalent products may not be substituted for previously approved products unless the Architect has approved a written request from the Security Contractor. All requests for substitute equipment must reflect a complete description of the proposed substitute equipment, including manufacturer's technical descriptions, drawings and technical performance.
- 2.9** The Security Contractor shall be responsible for providing complete and operational subsystems, including but not limited to all hardware, software, wire, cable, conduit and boxes, power circuit connections, terminal blocks, labour, management, engineering, training, testing, relocation adjusting and connection to NIC work and devices.

## **System Requirements**

### ***System Architecture***

**2.9.1.** The system shall be of a Server / Client architecture with the option to configure the Server and client ACS software on different PCs residing on the same computer network. Full network functionality shall be available over remote links between the Server and any workstation, using the following protocols:

- NetBEUI
- IPX/SPX
- TCP/IP

**2.9.2.** Dial-in capability from remote workstation to the Server using a remote access service shall also be available.

**2.9.3.** Encryption between the Server and each Client is configurable and safeguarded using IPSec, to ensure the integrity and security of the data transferred.

## **Intelligent System Controllers**

The system shall be configured with the ACS software connected via an Ethernet link to any configurable number of Intelligent System Controllers.

### ***Distributed intelligence***

- 2.9.4.** The system shall employ a distributed architecture so that all access decisions are made locally at the Intelligent System Controller (ISC). All decisions to grant access shall be made by the local ISC.
- 2.9.5.** An Intelligent System Controller (ISC) shall link the ACS software to all other field hardware. It shall provide full distributed processing for access control and alarm monitoring operations. Access levels, hardware configurations and programmed alarm outputs assigned at the administrative workstation shall be downloaded immediately to the ACS software. All access granted/denied decisions shall be made at the ISC to provide fast responses to card reader transactions.
- 2.9.6.** The ISC shall be required to operate in a stand-alone and peer-to-peer mode in the event it loses communication with system software. It shall continue to make access granted/denied decisions and maintain a log of events. Events shall be stored in local memory, and then uploaded automatically to the system when communications are restored.

Furthermore, an individual ISC shall be able to communicate with another ISC to distribute cardholder locations, and to perform scheduled and alarm events.

### ***Ethernet Communications***

- 2.9.7.** The ISC shall communicate with the ACS via any standard WAN / LAN communications link. The ISC shall provide integrated onboard port for direct Ethernet connection. This connection shall not be an RS-485 communications channel that has simply been converted into an Ethernet connection using a "Terminal Server" or similar conversion device.
- 2.9.8.** The ISC shall be IP addressable and support standard TCP/IP transmission.

### ***Dial-up capabilities***

- 2.9.9.** The system shall be capable of communicating with remotely located ISCs using dial-up modem connectivity. The system shall provide the capability to download database changes to such a controller incrementally.
- 2.9.10.** The ISCs shall also provide the additional functionality of dialling into the ACS Server to communicate alarm events, and other events deemed severe enough for this activity. All other transactions that occur at the remote ISC shall be stored in its internal buffer until that buffer reaches 80% capacity or the server requests the buffer contents, at which point the ISC will upload the entire contents of its transaction buffer.

### ***Redundant Communications***

- 2.9.11.** In the case of main communications line failure with the host system, the ISC shall be able to activate an alternative communications method. This alternative method will be activated automatically and ensure that all critical events and alarm messages are forwarded to the host.

### ***Internal Memory***

- 2.9.12.** The ISCs will be supplied complete with internal non-volatile memory. This memory will allow all program, access permissions, time schedules and the current date and time data stored in the ISC memory to be retained during periods of power failure. The purpose is to ensure the ISC returns to full operation after the event of absolute power failure. In addition, the ISC memory will not require the connection of a battery to permanently store system information.

### ***Local Alarm Input and Output***

- 2.9.13.** The ISC shall support the onboard direct connection of a tamper input. This input connection shall be reserved for connecting a tamper switch of the equipment cabinet in which the ISC has been installed.

Upon the Tamper input being triggered the ISC shall also provide a local output that is capable of connecting an output device that can be triggered as a result of cabinet tempering.

***LED diagnostics***

- 2.9.14.** As a minimum the ISC shall provide at least 15 separate LEDs that can be easily viewed for diagnostic purposes. These LEDs shall indicate the state of power and communications at any given time.

### ***Dual Reader Interface Module***

A Dual Reader Interface Module (DRIM) shall be available for each controlled door and provide the ability to connect up to two card readers or entry devices. This DRIM shall:

- Monitor the door position (door contact)
- Allow the connection of a Request-to-Exit (REX) switch for exit
- Control an electric door lock or strike
- Provide the facility for up to 3 auxiliary input devices to be connected
- Allow the connection of an alarm buzzer that can be triggered in the case of an alarm event, or more specifically locally trigger a buzzer for a door held event before this alarm is registered at the host.

All events that occur at the door must be reported from the DRIM to the ISC.

To allow for situations where an entry and exit reader may be required at the one door a DRIM will allow two readers to be connected. However, in circumstances where a door shall only require one reader the DRIM can be configured to operate in a two door mode, whereby a reader, door lock and door monitoring device can be connected for each door.

In addition, the DRIM shall also provide connection for single advanced reader that connects via an RS-485 or Wiegand / Clock/Data connections.

Finally, the DRIM shall also provide the ability to work offline in cases where communications with ISC has have been lost and still continue to accept a set of specified cards as being valid to the door(s) which it controls.

### ***Single Reader Interface Module***

A Single Reader Interface Module (SRIM) shall be available for each controlled door and provide the ability to connect a single card reader or entry device. This SRIM shall:

- Monitor the door position (door contact)
- Allow the connection of a Request-to-Exit (REX) switch for exit
- Control an electric door lock or strike
- Provide the facility for up to 3 auxiliary input devices to be connected
- Allow the connection of an alarm buzzer that can be triggered in the case of an alarm event, or more specifically locally trigger a buzzer for a door held event before this alarm is registered at the host.

All events that occur at the door must be reported from the RIM to the ISC. In addition, the SRIM shall also provide the ability to work offline in cases where communications with ISC has have been lost and still continue to accept a set of specified cards as being valid to the door(s) which it controls.



### ***Eight Reader Interface Module***

An Eight Reader Interface Module (ERIM) shall be available for each controlled door and provide the ability to connect up to eight separate card readers or entry devices. This ERIM shall:

- Monitor the door position (door contact) for each door
- Allow the connection of a Request-to-Exit (REX) switch for each exit
- Control an electric door lock or strike for each door
- Provide the facility for up to 16 auxiliary input devices to be connected
- Allow the connection of an alarm buzzer that can be triggered in the case of an alarm event, or more specifically locally trigger a buzzer for a door held event before this alarm is registered at the host.

All events that occur at any door must be reported from the ERIM to the ISC.

To allow for situations where an entry and exit readers may be required at a door the ERIM will allow two readers to be used for single door control and provide the possibility to use the following combinations of door control:

- Eight single reader doors
- Six single reader doors and one dual reader door
- Four single reader doors and two dual reader doors
- Two single reader doors and three dual reader doors
- Four dual reader doors

The ERIM shall also provide connection for up to eight advanced readers that connect via an RS-485 or Wiegand / clock/data connection.

The ERIM shall also provide emergency override that supports wire supervision, to ensure that false fire override conditions are not triggered.

### ***Input Control Module***

A hardware module shall be available to independently monitor up to 32 alarm input devices and report line fault conditions, alarm conditions, power failure and wire supervision. When an alarm input is activated, the condition shall be reported to the ISC and subsequently to the ACS host. The same module shall also provide the ability to connect up to four control devices and support emergency override capabilities.

The emergency override shall additionally support wire supervision, to ensure that false fire override conditions are not triggered.

### ***Elevator control module***

A hardware module shall be available to monitor up to 16 independent input devices and reports line fault conditions, alarm conditions, and power failure. When an alarm input is activated, the condition shall be reported to the ISC and subsequently to the ACS workstation. The same module shall also allow the control of up to 16 output devices, that can be controlled via the change in state of an input (monitor point) or a command received from the ACS Server. These outputs shall support fire override operation.

The emergency override shall additionally support wire supervision, to ensure that false fire override conditions are not triggered.

### ***Input / Output control module***

A hardware module shall be available to monitor up to 8 independent input devices and reports line fault conditions, alarm conditions, power failure, and wire supervision. When an alarm input is activated, the condition shall be reported to the ISC and subsequently to the ACS workstation. The same module shall also allow the control of up to 8 output devices, that can be controlled via the change in state of an input (monitor point) or a command received from the ACS Server. These outputs shall support fire override operation.

### ***Diagnostics***

Each ISC and hardware module shall provide a series of visible Light Emitting Diodes (LEDs) that display the status of the controller or module, and can be used as visual diagnostic indicators. As a minimum, the following diagnostic LEDs should be available:

- Communications
- Monitor point (input) status
- Control point (output) status
- Power

### ***Housings & equipment tamper switches***

All access control hardware components shall be housed in a lockable metal cabinet that is fitted with equipment tamper switches and meets the appropriate environmental requirements. The ISC shall allow the connection of equipment tamper switches to detect access to security equipment and shall consist of a spring loaded switch assembly. Any movement of the cabinet door shall cause the switch contacts to transfer. Tamper switches shall incorporate SPDT contacts and be mounted within each cabinet containing security equipment such that the switch cannot be disconnected or disabled from the cabinet exterior.

### ***Firmware Download***

All access control hardware components shall be supported by a built in firmware download and configuration utility from the ACS. This utility shall be included within the MMI and not via an external dedicated tool only.

## **Communications**

The system shall use TCP/IP communications techniques over Ethernet, whilst employing proprietary communications protocols. The encryption between the ACS host and each ISC shall use implementation of the Advanced Encryption Standard (AES) to encrypt all messages and ensure data security.

### ***ACS communications***

- The connection between the ACS Server and each MMI workstation shall use standard Ethernet communications.
- The communications protocol to transfer messages to or from the ACS Server to any MMI workstation in the system shall be of a proprietary nature to the manufacturer providing the highest level of security.
- In addition, the communications protocol shall allow an encryption mechanism to be configured, that ensures the transfer of data cannot be interpreted.

### ***ACS / ISC communications***

- The connection between the ACS Host and the ISCs shall use standard Ethernet communications. All communications between the ISCs and sub-devices shall be based upon the standard RS485 transmission techniques using a proprietary protocol.
- The communications protocol to transfer messages to or from the ACS Host to any ISC in the system shall be of a proprietary nature to the manufacturer providing the highest level of security.
- In addition, the communications protocol shall incorporate an error checking routine that checks the integrity of the messages that are transferred on this line.

### ***ISC communications***

- The connection between an ISC and a series of entry devices using Reader Interface Modules (RIMs), or system extension boards shall use standard RS485 communications techniques. The communications protocol to transfer messages to or from the ISC to any connected device shall be of a proprietary nature to the manufacturer providing the highest level of security possible.
- In addition, the communications protocol shall incorporate an error checking routine that checks the integrity of the messages that are transferred on this line.
- Each ISC shall be capable of communicating with at least 96 of these devices at any one time, using four separate channels to co-ordinate the communications process and share the load across different channels.

## **Man Machine Interface (MMI)**

As a minimum the ACS shall provide the ability to connect up to 255 workstations to the server. Each workstation shall have the capability of displaying an easy to use MMI, from which all system operation, including programming, control and operation can be accomplished. The MMI shall employ a standard Windows XP look and feel and provide both an intuitive menu and button driven navigation system.

The MMI shall be registered with the Microsoft Corporation under its Windows XP logo program to ensure that the MMI is designed specifically for the Windows XP operating system and conforms to the stringent rules outlined by Microsoft.

### ***On-line help***

The MMI shall provide a comprehensive on-line help system, which shall be available at anytime and from any screen. The help system shall describe the use of all system functions and provide a comprehensive glossary of terms. In addition, the help system shall provide the standard windows help contents listing, index listing and key word or phrase search functionality.

### ***Navigation***

The MMI shall use standard Windows XP controls, including:

- Mouse control
- Menu functionality
- Button navigation
- Keyboard equivalent mouse shortcuts

### ***Toolbar Customization***

The MMI shall use allow for the customisation of an operator specific toolbar. This shall provide the ability to create a custom toolbar that only includes those buttons (links to parts of the ACS) that are most commonly used or required for the operation of the system.

In addition, the operator shall be able to display the look and feel of the toolbar buttons that allow them to perform tasks quickly and efficiently including the text size and placement and size and position of icons displayed.

### ***Windows look and feel***

- The MMI shall support a user friendly, Windows Graphical User Interface (GUI) that shall be intuitive. All messages and interface text shall be in English prose unless another language has been specified and installed. All functions shall be either keyboard or mouse driven to allow the System Operators to choose the method of navigating through the screens. In the alarm-monitoring module of the system software, all major functions (opening a door, acknowledging alarms, etc.) shall be accomplished using a minimum number of mouse clicks.
- The operator workstation interface software shall minimise operator training through the use of language prompting, on-line help, and industry standard PC application software.

### ***Languages***

- The system shall support the installation of multiple language versions.
- In addition, the manufacturer shall be able to provide the tools to translate the ACS into other languages as may be required.

### ***Installation***

- The MMI and ACS shall use standard Windows installation processes and employ a software installation that is similar in look and feel to other Windows XP applications.

The installation licensing shall allow for the selection of software installations that cater for the size and functionality of the facility at which the system is being installed. As a minimum the following package types should be available as default:

- Basic
- Intermediate
- Advanced

## **System Operators**

The system will only permit authorised operators, who have been given permissions to log on to the ACS at a workstation, to administer aspects of the system. The functionality available to these operators shall be fully configurable via the comprehensive partitioning architecture.

### ***Authentication***

The system shall request an operator's user name and password before entry to the MMI is granted. The password must be fully encrypted on-screen to prevent it from being easily copied. The MMI will not be displayed until the identification of the operator has been verified and access to the ACS is granted. Authentication may be based on a pre-defined time schedule for certain groups of operators.

In addition, the ACS shall allow the entry operator passwords up to 32 characters in length, which may include any combination of upper and lower case letters and numbers as required.

Finally, operator authentication may also be performed using the standard Windows logon identification. Therefore the currently logged in Windows User's details can be used to verify their permission to log into the ACS.

### ***Partitioning***

- Operator specific password access protection shall be provided to allow the user/manager to limit workstation control, display and database manipulation capabilities as deemed appropriate for each user, based upon an assigned password. Operator privileges shall "follow" the operator to any workstation logged onto (an unlimited number of operator accounts shall be supported).
- The System shall employ an application partitioning design so that applications are broken into separate distinct programs capable of running independently to other System applications. Applications shall include, but not be limited to, alarm monitoring, system administration & configuration, cardholder management, graphics, ID card printing, and cardholder forms designing modules. Each client workstation shall have the ability to be installed with any combination of the above listed modular applications.
- The system shall allow partitioning to be assigned on the basis of groups of cardholders. The currently logged on operator shall only be able to view the records and events relating to those cardholders belonging to the groups to which the operator has been assigned privileges.
- The system shall prevent the currently logged in operator from viewing the details, regarding any alarms triggered by a system component to which they have not been assigned privileges, including:
  - Audit trail alarm entries
  - Audit trail reports, which include alarm details
  - Audible and visual alarm annunciation

The alarm information associated with any system component to which an operator has been assigned privileges will be displayed.

- The system shall allow partitioning to be assigned on the basis of custom audit trail reports. The currently logged on operator shall only be able to create those reports to which they have been assigned privileges.

The system shall also prevent the currently logged in operator from printing reports that include those system components to which they have not been provided privileges.

- The system shall also allow partitioning to be assigned on the basis of custom cardholder pages, such that each individual custom page can be assigned as a separate privilege level.

### ***Privilege levels***

When assigning a function to an operator, the system shall allow the level of assignment to be specified. These levels include:

- Read only. This type of privilege level does not allow the operator to create or modify components in the specified area of the system. However, they are allowed to view those records.
- Modify. This type of privilege level does not allow the operator to create components in the specified area of the system. However, they are allowed to view and make modifications to existing records.

- Full. This type of privilege level allows the operator to create, modify and view components in the specified area of the system.

### ***Operator profiles***

The ACS shall support multiple operator profiles such that preferences are retained for individual operators, irrespective of the workstation that they log onto. The display colours and data layout shall be configurable (and be saved) per operator.

### ***Operator journal***

A system operator journal shall be available to log important daily events. The operator is required to select a journal subject from a pre-defined list. The ACS shall allow an administrator to set the names to comprise this list of subjects. The system shall also allow all journal entries relating to a particular subject to be recalled and viewed on-screen, printed or both.

### ***Workstation auto-lock***

All ACS workstations shall automatically lock if left idle for a configurable period of time - requiring the operator to identify him or herself by re-entering their password. The operator shall also have the capability of manually locking a workstation at any time. Any system initiated or manual workstation locks shall be logged in the ACS audit trail.

## **Cardholders**

The system shall include a cardholder management component that is integrated with the access control system. The system must support at least 1,000,000 cards – all of which are downloaded and retained in the memory of each ISC. This cardholder management functionality must allow the enrolment of cardholders into the database, capturing of images and import/export of employee data. This functionality shall also allow a system operator to assign or modify the access rights of any cardholder.

### ***Cardholder data***

As a minimum, the ACS shall allow up to 196 configurable fields to be customised by the system administrator to suit the needs of the facility owner. The system shall provide a Graphics Editing Module (GEM) that gives operators the ability to modify any standard field to customise the cardholder screens as desired. Once these fields have been defined, the ACS shall not permit these (database) fields to be changed.

### ***Searching***

The system shall allow the search of all programmed cardholders, based on the criteria supplied by an operator. Operators shall only be able to search and retrieve cardholder records to which they have assigned privileges.

As a minimum, the search criteria shall include:

- Card number
- Name (first and / or last)
- Work Group
- Title
- Address
- Contact Numbers (phone, mobile, and pager)
- Payroll Number
- Vehicle Details (registration, colour, model)

Searching shall not only be limited to entire word matches. An operator may also search for cardholders by entering data that appears in the beginning of a word or string.

If more than one cardholder in the system meets the specified criteria, the operator shall be displayed a list of all matching records, from which they can select a particular record.

### ***Cardholder images***

- The ACS shall support the capturing of a high quality image of a cardholder from any workstation. The system operator shall have the option of capturing images in real-time or alternatively by importing an existing image.



- If capturing images in real-time, the operator shall be able to use an appropriate capture card or use a USB digital video camera. If cardholder images already exist, the operator shall be able to import images of all standard formats including jpg, bmp, gif, and tif.

Once an image has been captured or imported, the operator shall be able to preview in full colour, the cardholder image complete with the card, as it will appear when printed. The Operator shall have the ability to crop and resize the image and adjust the brightness and contrast.

- The cardholder image shall be able to be recalled at any time from any workstation to verify the identity of any cardholder on the facility.

### ***Cardholder Signatures***

- The ACS shall support the capturing of cardholder signatures from any workstation. The system operator shall have the option of capturing signatures in real-time or alternatively by importing an existing signature.
- If capturing signature in real-time, the operator shall be able to use a USB signature capture pad. If cardholder signature already exists, the operator shall be able to import images of all standard formats including jpg, bmp, gif, and tif.

### ***Card Trace***

The ACS shall record the last visited access point (with date and time) for every cardholder. A special trace function shall be available for operators to track activity of specific cardholders. When the trace has been applied, all card activity relating to that cardholder will be highlighted in the audit trail. A report may also be generated that details the locations visited by the traced cardholder.

### ***Grouping cardholders***

The ACS shall allow the grouping of cardholders into specific configurable entities. This shall facilitate voiding of a large number of cards with a single action and also assist with operator partitioning.

### ***Cardholder violations***

- The system shall monitor every card presented at each reader in the system and prevent access at the reader (door) if any of the following access violation conditions exist:
  - The card has not been assigned access permission at the current time.
  - The card has not been assigned permission at the reader.
  - The cardholder has been voided in the system.
  - The cardholder belongs to a group of cardholders that has been voided.
  - Entry to or exit from an area governed by anti-passback control has been violated.
  - A card belongs to a group of cards that has been disabled.
  - A card was presented at a reader that has been disabled or taken out of service.
    - The card has been presented before its allocated start date, or after the card's designated end date.
    - The card presented does not belong to the site, which includes an invalid card number, an invalid site number or a card containing an invalid facility code.
- In addition, a message will be logged in the audit trail indicating the card use violation, and if configured, a visual and audible alarm will also be displayed.

### ***Cardholder Data Import / Export***

- The system shall provide an external software tool that can be used to import or export cardholder data from another application via text file.

This manipulation of data shall be governed by the same login rules applied to a standard operator of the system and shall also be capable of synchronising data over a period of time.

### **Assignment of access**

- The system shall allow an infinite number of combinations of access permissions to be assigned to any cardholder programmed in the system. The system shall allow access permissions to be assigned to access points, areas, elevator floors and groups of any of these.
- In addition, the system shall provide the ability to schedule the times during which cardholder access to each separately allocated resource is permitted.
- Access shall also be extended to output points, whereby a cardholder presenting their access badge not only unlocks a door, but can also easily change the state of any output in the system.
- Upon changing or assigning access to any cardholder, the details shall be immediately propagated to all on-line ISCs.

Access privileges shall be assignable on the following basis:

- Access based upon group privileges
- Access based upon individual privileges
- Access based upon a temporary privilege
- Any combination of the above

### **Time Schedules & Holidays**

- The ACS shall allow up to 65,000 configurable time schedules to be defined. Each time schedule can consist of up to 20 independent time periods including up to 2 holidays. For ease of configuration, the operator shall be able to select from week days, weekends, or specify a particular day or time. The ACS shall have the intelligence to check whether the time periods are valid and not conflicting with existing credentials.
- A time schedule can be configured to include or exclude holidays. Upon changing a time schedule record, the ACS shall immediately propagate the appropriate changes to all affected ISCs.

## **Card Readers and Cards**

Card Readers shall read encoded data from the access card and transmit that data back to the ISC. The card reader or entry device should give an audible and visual indication of each read.

### ***Supported cards and technologies***

- The system shall be compatible with all major card and access entry technologies, including (but not limited to):
  - Proximity cards and readers
  - Biometric readers
  - Bar code cards and readers
  - Magstripe cards and readers
  - Wiegand cards and readers
  - Smart cards and readers
  - Optical cards and readers
  - Transmitter and infra-red cards and readers
  - Keypads and PIN pads
- In addition, the ACS manufacturer shall be able to provide a number of different encoded card technologies, which use sophisticated algorithms. These algorithms shall be proprietary in nature to the manufacturer, and should be sophisticated enough that they increase the security of the installation. The support for these formats will be in addition to any format perceived to be an industry standard. These shall include at least one proprietary format in each of the following:
  - Bar code
  - Magstripe
  - Wiegand (output protocol)
  - Smart Card
  - RS-485
  - Clock & Data

### ***Ability to produce cards with bar codes, magnetic stripes, smart cards***

The system shall be able to create and print either magstripe, bar code, or smart cards using an integrated printing function.

When creating bar code cards the user must have the option to choose the type of barcode that suits their facility. The user should be able to specify the bar code ratios, character length and position on the card.

### ***Ability to support multiple cards***

As a minimum, the ACS system shall support the use of at least 65,000 different card technologies. As such, each tenant within an allotted environment may bring their own card technologies with them.

### ***Ability to support MIFARE smart cards***

The ACS system shall support the use of MIFARE smart card technology. As such the system shall provide the ability to encode smart cards including the ability to program the following:

- Specify a custom format including length, facility, company, card number and parity.
- Program each sector / block on a MIFARE (1K byte) smart card for access control and non-access control applications
- Specify sector keys and the way in which these keys interact with the sector for the reading and writing of information
- Specify the output type and data type of the information stored on the card

- Program database information for each block / sector

### **Host Event Processing**

The ACS shall be capable of processing events in the system as they occur, and distributing this information throughout the entire access control and security network.

#### ***Immediate propagation***

- Changes made using the ACS software shall be automatically recorded to the ODBC compliant database and downloaded to the correct ISC(s) using the appropriate communications channel. In addition, the ACS software shall also provide the tools to manually download all appropriate database information, allowing the full initialisation of each ISC.

All database changes shall be performed while the workstation is on-line without disrupting other system operations.

- Changes made at the ISC equipment shall be automatically uploaded to the ACS server, to ensure system continuity. Each ISC shall be capable of reporting all changes in status, system events, and actions performed, to the ACS in real-time. These messages shall be displayed immediately in the ACS audit trail. The affect of each message must be reflected throughout the system as they occur, such as, the immediate changing of the colour of a symbol located on a site plan to indicate a change in point status.

#### ***Local event buffer***

The ISCs shall maintain a buffer of all events that occur locally. This buffer shall store all messages until they are uploaded to the ACS server. If the communications between the ISC and the ACS server are lost, the buffer will be retained until communications is restored, at which point all logged events shall be uploaded to the ACS server.

#### ***Database accessibility***

All System data must reside on a single database on the network and must be accessible in real-time to every / any system workstation. This shall allow for automatic change propagation to all workstations on the system as well as a common database to consolidate all information and allow for better disaster recovery.

## **Real time Audit Trail**

The system shall log all events that occur to both an on-screen audit trail window and a retrievable disk based log file or database. These events must be logged on-screen as they occur (in real-time). All system changes, alarm events, entry / exit conditions, point state changes, exception messages, miscellaneous system messages, or any information relating to the access control system in general shall be logged to this audit trail.

### ***Partitioned display data***

The system shall be capable of filtering all displayed audit trail messages based upon the currently 'logged in' operator's assigned privileges. Only those events to which the operator has been assigned privileges will appear on-screen or any audit trail report printed whilst that operator is logged on.

### ***Operator audit trail profile***

- The system shall allow the operator to select which information columns are displayed and which information columns are not displayed on-screen in the audit trail window. The system shall also allow the operator to change the width of any displayed audit trail column by simply using the mouse to drag the column wider.
- The system shall allow the operator to select the colours in which certain events are displayed in the on-screen audit trail window. The operator shall also be able to select the background colours displayed behind these entries. As a minimum, the system shall allow the following audit trail component colours to be configured:
  - Alarm message text colour
  - Normal message text colour
  - Alarm message background colour
  - Normal message background colour

In addition, it shall be possible to display each alarm with an individual alarm colour, this will allow alarms of a similar type to be instantly recognised.

### ***History View***

The system shall provide the ability to switch to an audit trail history mode that allows history events to be easily searched. This view shall allow events to be searched based upon any text contained in the audit trail messages that have been recorded.

### ***Event short-cuts***

The system shall facilitate a quick link (short-cut) from any event appearing in the audit trail. As a minimum, there shall be a link to the cardholders and the point location relating to the audit trail event. This will enable easy access to the respective record, allowing the operator to change the details of that record, if necessary.

### ***Dual window***

- The ACS shall allow any operator to scroll through past events without losing the ability to monitor new events. This shall be easily achieved via a split-pane audit trail window. Both viewers shall display all events as they occur. The upper viewer shall allow the operator to scroll-back and view previous events that have occurred at the facility, but have scrolled off screen as other events are logged. The lower viewer shall display the latest logged events at all times.
- The two viewers shall be separated by a movable partition that allows the operator to change the viewable area by simply using the PC mouse. In addition, the system shall allow the operator to select the number of entries that are retained in each on-screen viewer at any time.
- Any older events that cause the viewer to exceed the configured entry limit, will be removed and must be logged to a permanently stored log-file that can be recovered by creating an audit trail report.
- The currently logged in operator shall also be allowed to determine the order in which events are displayed (ie: latest event appearing at the top or the bottom of the audit trail).

### ***Real-time audit trail printing***

The ACS shall allow the system administrator to configure the type of events to print to a dedicated printer in real-time. The administrator shall have the option of selecting to print all events or only alarm events. This can be in addition to displaying the events on-screen.

### ***Filtering***

The MMI workstation shall allow the audit trail messages displayed on-screen (in history mode) to be filtered. The filter options will include, but will not be limited to:

- Date and Time
- Type and Category of event
- Point Information
- Group
- Name
- Employee ID



## **Advanced Alarm Management**

The ACS shall provide an advanced alarm management system. This system shall allow the visual and audible annunciation of alarm events as they occur, in real-time. The annunciation of an alarm shall take priority over all other system functionality to ensure the alarm is registered immediately upon occurring.

### ***Alarm annunciation***

- The system shall provide an audible and visual annunciation of all appropriate alarm situations as they occur. Each alarm annunciation shall be configurable, so that it requires positive action to be taken by the System Operator when acknowledging it, and always appears in the foreground of the MMI.

Immediately following the visual and audible annunciation of an alarm, a field shall become available where the system operator can enter comments regarding the alarm situation, and shall prevent the alarm from being cleared until an entry in this field has been made. Once entered the System Operator shall be allowed to acknowledge the alarm.

In addition, pre-defined alarm responses shall be available. These responses are specific to the facility and can be selected from a drop-down list to ensure quick and efficient acknowledgement of an alarm situation, in lieu of typing a message.

- After an alarm has been announced, the system shall allow the operator to silence the alarm for a selected period of time. After this time period has elapsed the alarm annunciation will be regenerated.
- Upon an alarm being announced, the System Operator shall be provided with the facility to view an alarm queue before taking further action. Alarms with the highest priority shall be placed at the head of the queue. As a minimum the alarm queue will display the following alarm attributes:
  - Priority of the alarm
  - Date and Time at which the alarm occurred
  - Name of the system component that caused or initiated the alarm
  - Current status of the system component that caused or initiated the alarm
- The system shall provide the ability to outline unique emergency instructions to be specified for each type of alarm. These instructions should be displayed on request before the alarm is actioned, in order to help the Operator understand the requirements and necessary routines for clearing the alarm. These alarm instructions should be able to contain any combination text or graphics and if appropriate contain a windows video (\*.avi) that can be played on request of the system operator.

In addition, these instructions should appear in a dialog that allows the system operator to enter a log in relation to the alarm and acknowledge the alarm, whilst simultaneously viewing the instructions.

### ***Visual alarm graphics***

The system shall be configured so that the activation of any alarm provides text and audio instructions outlining the procedures to follow in responding to the alarm, at the Alarm Monitoring Workstation and automatically calls up associated maps upon grabbing the alarm.

The alarm-handling portion of the system shall provide dynamic colour alarm graphic maps. These maps shall allow the operator to respond to and clear alarms from the alarms graphics screen.

The system shall allow the creation of colour graphic floor plan displays and system schematics for each piece of equipment, including card readers, inputs (monitor points), and outputs (control points) to optimise system performance, analysis and speed alarm recognition.

The MMI shall allow users to access the various system schematics and floor plans via a graphical penetration scheme, menu selection or text-based commands.

The system shall allow the equipment state to be changed by clicking on the point block or graphic symbol and selecting the new state. In addition symbol colours shall be used to indicate status and change as the status of the equipment changes.

Real-time, dynamic graphical maps will mean that the map screen will not have to re-paint or refresh each time a new alarm or event condition occurs.

### ***Multimedia alarming***

The system shall extensively integrate and use multimedia throughout the ACS. The system shall provide owner customisable voice alarm annunciation and a flashing coloured system icon for each alarm in the System. In addition, the System shall provide customisable voice instructions so that each alarm or event in the System can have both sets of text instructions and/or pre-recorded audio voice instructions.

### ***Alarm re-activation***

The ACS shall allow each alarm to be configured with an internal timer that re-activates the alarm annunciation if the change in status that initially caused the alarm to be announced has not been rectified. This timer shall only accompany those alarms where the status of the system component can be restored to a normal state.

### ***Alarm Queue***

The ACS shall place each outstanding alarm in a queue with the highest priority alarm at the top of the queue. The alarm queue shall be able display different alarms with unique colours to allow for easy and quick identification of any outstanding alarm.

In addition, each entry in the queue as a minimum, will display the alarm location, its current status, and the date and time at which the alarm first occurred. The alarm queue will also provide the ability to clear alarms when necessary.

### ***Alarm configuration***

- The ACS shall allow each alarm to be fully configurable. As a minimum the System Operator shall be able to configure alarms in response to changes in state or messages received from the following system components:
  - Access Points
  - Areas or zones
  - Communications
  - Elevator floors
  - Input points
  - Output points
  - Intelligent System Controller (ISC)
- As a minimum, each alarm created shall allow the operator to define the following attributes:
  - Whether or not the alarm is required to be acknowledged when announced
  - Alarm priority, with up to 1,000 priority alarm levels
  - The colour of each alarm priority level
  - Instructions to be associated with the alarm
  - Sound to be played when the alarm is visually announced
  - Alarm re-activation time
  - State change or event that will trigger the alarm or return the system component to normal
  - Description of each status
  - Symbols to represent the alarm and normal status of the component on a graphical map
- The system shall also allow alarms to be forwarded to an alternative alarm handling solution. The methods in which alarms can be forwarded include:
  - To a mobile phone using SMS
  - To a pager
  - Via email
  - From one ACS server to another (in the same security network and communications structure)
  - To an OPC (Alarm and Events) compliant system

## **Printers**

All printers can reside on the same network as the access control and security system.

### ***Dedicate printers by function***

The system shall be capable of configuring dedicated printers for each specific task that requires the use of printed results. As a minimum the system shall allow the following printer types to be specified:

- Audit Trail printing
- Card printing
- Plan printing
- Report printing

### ***Reports***

The system shall be capable of configuring a dedicated printer specifically for the task of printing audit trail, database, or operator journal reports. This facility shall provide the selection of a default printer for this task and the ability to change the printer characteristics to suit the printing requirements.

### ***Real time printing***

The system shall be capable of printing all audit trail entries as they occur, using a dedicated printer specifically for this task. This facility shall allow the filtering of audit trail messages that are printed, including alarm messages only or all messages. In addition, the system shall allow the printer type used to be selected, be it 132 column, 80 column, or other printer types.

### ***ID card printing***

The system shall support any card printer with industry standard Windows drivers. It shall support double-sided full colour printing, edge to edge printing with the additional ability to encode magnetic stripes or bar codes on cards.

***Plan printing***

- The system shall be capable of configuring a dedicated printer specifically for the task of printing graphical site plans. This facility shall provide the selection of a default printer for this task including the ability to select the following type of printers:
  - pen plotters
  - inkjet printers
  - bubblejet printers
  - laser printers
  - electrostatic printers
- The ability to change the printer characteristics to suit the operator's requirements shall also be available.

### **Archiving System**

The system shall be capable of archiving the programmed database information, the logged audit trail data, operator journal entries, graphics, alarm sound files, alarm instructions and custom designed reports. Once archived, the system shall provide the tools required to restore this data at a later time if necessary.

### ***Archiving medium***

The system shall provide the ability to select the location of the archived data, be it using a local hard drive, another hard drive located on a machine in the same computer network, a floppy drive or any other mass storage device as deemed acceptable.

### ***User-definable archiving parameters***

- The archiving facility shall allow the operator to select what information is to be stored. When archiving database information, the operator should be able to independently or collectively select the following information for storage:
  - All programmed database records
  - All system graphics, including site plans, symbols, alarm instructions and drawings
  - System parameters
  - Operator profiles
  - Cardholder images
  - Reports
- Upon restoring the archived data, the system operator shall have the same flexibility in choosing which components are to be restored if more than one component was part of the archived file.
- When archiving audit trail information, the operator should be able to independently or collectively select specific dates for storage. Upon restoring the archived data, the system operator shall have the same flexibility in choosing the dates for which audit trail entries are to be restored.

### ***Automatic Archive***

The system shall provide the mechanisms to create an automated backup. This will allow a backup schedule to be implemented for the ACS data and will include scheduling for one off date and time, day of the week, or monthly. In addition it shall be possible to specify the type of data to be automatically archived

## **Reporting**

The system shall be capable of providing detailed reports regarding the information contained in the database, audit trail, or operator journals, without the need for programming skills. The operator shall be able to select the specific system components on which to base a report, and order the report according to any logical criteria.

The report generator shall provide the capability for the operator to create complex sort and filter rules for each report and save these rules for recall at a later time. The system shall also provide a function to preview a report on-screen before it is printed.

In addition, the system shall provide the capability for the configuration and set-up of a specific system printer for printing reports, and allow the use of network printers. The system shall also exclude those records from any report to which the currently logged in System Operator has not been assigned privileges to view.

### ***Design custom audit trail reports***

The system shall provide the tools necessary for the operator to create custom audit trail reports. This customization shall allow the selection of audit trail fields, the date range of audit trail entries, and filtering based on data in the audit trail.

### ***Save & open queries and sorting***

- The system shall provide the facility for the operator to select the order in which information appears in a report.
- In addition, the operator should also be able to filter the information included in a report based on specific, selectable criteria. Once created, the system shall be capable of saving the filtered query so that it can be recalled and a new report generated based on the same selected criteria from any workstation in the access control and security network.

### ***Print to reports printer***

The system shall provide the functionality to configure and setup individual printers for each different system task that may require printed results. This includes the ability to configure a printer specifically for the purpose of creating printed reports. In addition, the printer configuration shall allow for the setup of local or network printers for these tasks.

### ***Print reports automatically***

The system shall provide the tools to automatically generate reports, based upon a defined schedule without operator intervention. These automatically generated reports shall be saved to disk and can be viewed at any later time while still saved.

### ***Database reports***

The system must be able to generate reports on demand regarding the programmed information residing in the system database. As a minimum, the system shall allow the user to easily obtain the following types of reports:

- A general listing of all or selected points in the access control and security network
- A List of all time schedules
- A List of all system functions
- A List of all system holidays
- A List of all outstanding alarms
- A list of all system ISCs
- A list of all available site plans
- A list of all system areas or zones
- A list of all cards issued to cardholders
- A list of all system operators
- An elevator configuration report
- A list of cardholder information
- A list of cardholder access privileges
- A list of all cardholder's last known locations
- A list of all scheduled events
  - System diagnostic reports including a database analysis report



**Scheduling**

The system must provide the capability for an operator to define specific times, during which certain events and system control will occur. The system must be capable of handling at least 65,000 distinct time schedules. These schedules must be operator customisable, so that, they can schedule events across an entire week, with up to twenty distinct time periods during that week. Primarily, the time schedules must be able to handle holidays, provide access at certain times, and schedule or permit events during the specified times.

***Holidays***

The system must be capable of defining over 100 holidays in advance of them occurring. A defined holiday will override the normal timed schedules where configured and allow other system functions to behave as normal.

***Public floor access***

The system must be capable of scheduling specific times when access to floors in an elevator system are taken 'off' security and are accessible to the general public. At all other times the system shall secure those floors and provide access only to valid cardholders.

***Access per door***

The system must be capable of scheduling specific times when a cardholder is permitted to access a specified door, barrier or gate. At all other times the cardholder will be prevented from gaining access at that door.

***By specific date & time***

The system shall be capable of scheduling certain programmable events to occur on specific dates or during specific times of the day.

***By certain event***

The system shall be capable of scheduling certain programmable events to occur in response to the activation of another event or system status change. The event or status changes that trigger this response shall be fully configurable.

## **Anti-passback**

The system shall be capable of providing anti-passback control, whereby, a cardholder that uses their card at an entry reader must not be able to re-enter until they have first exited using the specified exit reader. The system must also be capable of operating in either a soft or hard anti-passback mode

The anti-passback control should also be flexible so that cardholder's that have violated anti-passback rules or have lost their access card can be forgiven by a system operator.

### ***Soft Anti-passback***

The system shall provide the selection of a soft anti-passback mode, which permits entry at a door or barrier (to a valid cardholder) when the anti-passback rules have breached. However, the system will still generate an alarm in response to this anti-passback violation.

### ***Hard Anti-passback***

The system shall provide the selection of a hard anti-passback mode, which does not permit entry at a door or barrier (to a valid cardholder) when anti-passback rules have been breached. In addition this type of breach will also generate an alarm.

### ***Peer-to-Peer Anti-passback***

The system shall provide full anti-passback capabilities across multiple ISCs without the need to consult the ACS host. This will allow full anti-passback capability even when communications with the host has been lost.

In addition, peer-to-peer anti-passback operation shall provide a fail-safe mode, whereby entry or exit to a secure area will be permitted when communications between controllers has been lost.

### ***Mustering Area***

The system shall provide the facility via the anti-passback functionality to designate specific mustering areas. These areas shall allow reports to be generated that display all those cardholders currently logged into that area.

### ***Area Limits***

The system shall allow each area to be defined with a maximum cardholder count. Once this limit has been reached the area will be considered as being "Full". Once the full capacity has been reached, the system shall allow:

- The prevention of further cardholders from entering the area
- The triggering of an output device, for example a "Parking Lot Full" sign

### ***Cascading Anti-passback***

The system shall allow single reader doors to be created within an area. These doors will not fall under normal anti-passback control, however, entry will not be permitted unless the anti-passback conditions assigned to the surrounding area have been previously observed.

### ***Four Eyes Access***

The system shall allow an area to be nominated as a “Four Eyes” location. An alarm in a four eyes location shall be raised when a single cardholder has entered that location and resided within the location for a specified amount of time without a second or subsequent cardholder entering. A four eyes area will also allow an alarm to be raised when no cardholders reside within the location.

### ***Timed Re-entry***

The system shall allow an entry point(s) to be nominated as a timed re-entry point. Once a cardholder has used their card at a timed re-entry access point, that cardholder will not be permitted to re-use their card again to gain access to that location within a specified time period.

### **Parking Lot Management**

- The system shall allow a parking lot or similar location to be configured, whereby, entry to that location is governed by access privileges set in the system.
- The system shall count the number of entries and exits from that location and when the specified limit has been reached, will raise a visual and audible alarm and prevent any further cardholders from accessing the parking lot. The system should also be capable of triggering an event when the car park limit has been reached, allowing a sign or other visual indicator to be turned on.
- The system must also be capable of producing a report that provides the details of all cardholders with a vehicle currently parked within the parking lot.

## **Intrusion Detection**

The system shall have the ability to provide intrusion detection. When the system has been armed, any detection point that is breached will automatically raise a visual and audible alarm.

### ***Intrusion Capabilities***

The intrusion detection system shall provide as a minimum the following capabilities:

- Automatic zonal arming and disarming based on a pre-defined schedule.
- Independent arming and disarming of discrete zones within the facility.
  - The last cardholder to leave the facility shall be able to automatically arm the entire facility when they arm their specific zone.
  - The system shall allow zones to be graphically depicted on a site plan that indicates their current status in real-time.
- Configurable entry and exit timers, that allow passage prior to alarm activation.
  - Cardholder specific override privileges on alarm points (sectors) that cannot be secured because that point is in an alarm state at the time of activation.
  - The system shall intelligently handle zones, so that any locations within that zone, which are also common to other system zones, are not armed till all the associated zones have already been armed. This intelligence shall allow the securing of the entire facility and intruder alarm detection system.

### ***Sectors***

The intrusion detection shall be capable of including many sectors (detection devices) in multiple zones. Each of these zones should be able to be independently or collectively controlled by the assigned cardholders.

### ***Grace Period***

The system shall be capable of sounding an audible alarm during the entry or exit period, to alert the user that they can now enter or exit the detection zone without generating a nuisance alarm. This entry or exit time shall be customisable.

### ***Arming***

The system shall provide entry and exit devices that allow users to arm or disarm a zone (group of detection devices) as they exit or leave a facility. This entry / exit device, shall display provide the necessary tools for the cardholder to make the appropriate selections and carry out the task of arming or disarming.

**Duress**

- The system shall allow cardholders to indicate whether they are requesting access under a forced or duress situation and thus communicate a potential emergency to the ACS. When such a duress action has been registered, the cardholder will be permitted access and a duress alarm will be announced on the system, without arousing suspicion.
- In addition, the system shall allow the configuration of a duress button, which, when triggered shall raise a visual and audible alarm at each ACS workstation.

### **Time and Attendance Recording**

The system shall be capable of recording the entry and exit of cardholders at designated card readers or groups of card readers.

- Once recorded the system shall allow for the export of the time and attendance information to a third party T7A or HR application. This export shall be available in a “.CSV” or “tab delimited” format to a pre-defined file location and file name.
- In addition, the exact information contained within the export file shall be selectable and extend to at least the following required information:
  - First Name
  - Last Name
  - Date of record
  - Time of record
  - Location that the record was logged

## **Elevator Management**

The system shall be capable of providing access control and security for elevator systems.

- The elevator management shall provide floor access control, with the ability to provide security during nominated times (after hours) and general access during busier times of the day.
- The system shall also provide the mechanism, whereby, a fire emergency or override system can be turned on either automatically via a trigger from another system or manually using the MMI.
- In addition, the system shall provide the option of configuring remote access buttons that allow visitors to be granted entry to both the facility and selected floor from a remote location.
- The system shall also provide the option of configuring fail-safe or fail-secure operation after power-loss or system reset has occurred.
- The system shall only allow one valid floor selection (to a secured floor) each time a card reader is presented at the elevator.
- The system shall provide a “Wizard” like configuration for elevator components. This will ensure the quickest possible method for adding elevator floors to the ACS.



## **Graphics**

The system shall support a graphics module that allows the design, import and construction of site plans, drawings, dynamic symbols, alarm instructions and card templates. This graphics module shall support the standard ACS partitioning, to prevent those System Operators without the appropriately assigned privileges from accessing graphical objects.

### ***Graphical Maps***

- The system shall allow the design, import, and construction of site plans, which can be used to visually handle alarms, control access, and generally monitor the facility. Each site plan shall be updated dynamically as the status of system components change. The symbol representing each component will automatically update in colour, alerting the operator of its change in status.
- The system shall provide a pre-defined library of symbols that represent the most common access control and security components. In addition, the system shall allow the operator to create their own library of symbols that represent the devices installed at the facility.
- The system shall provide a built-in suite of graphics tools that can be used to create or modify a site plan. As a minimum, these tools shall include:
  - Import of existing site plans, including AutoCAD, bmp, jpg, wmf, tif, and most other raster type images.
- Common Windows text tools, such as alignment, font, and style.
- Colour tools to change the fill and border colour of components in a plan.
- Drawing tools, so that lines, boxes, circles, arcs, and free-hand lines can be drawn.
- Alignment tools, to align separate components in a site plan.
  - Shortcuts that add a button to a site plan that, when clicked automatically open a new site plan or trigger a system action, such as opening a door.
- Grid or crosshairs that aid in the alignment and scale when creating a site plan.
- Each site plan shall have the ability to unlock a door to allow entry, control points at the click of a button, retrieve point information at the click of a button, and create shortcut buttons to other plans in the system or frequently used system commands.
- In addition, the ACS shall allow partitioning for each graphical map. This partitioning shall allow only those System Operators that have been assigned the appropriate privileges to the graphical map, to view it and control points located on that map.

### ***Symbols and Drawings***

- The system shall provide a clipart library of access control components and symbols including doors, car park boom gates, and PIRs. The user shall have the ability to add custom symbols or design new symbols for this library. Once created, these symbols shall be able to dynamically change colour in response to a change in status of the component which they represent.
- The system shall also allow the importing or creation of drawings that can be used in other parts of the system. The graphical editor will provide the tools necessary to import and add features to these drawings.

## **Control and Monitor Points**

The system shall provide a mechanism to define both control and monitor points. These points will allow the system to link input devices with output devices, trigger event generated tasks, and be used to override general system operation through the use of the MMI.

### ***Monitor Point Parameters***

As a minimum, when programming a monitor point in the ACS, the System Operator shall be able to:

- Enter a unique name for each point. This name will be used in Audit Trail messages regarding the status of the monitor point.
- Select the mode of operation for each point from the MMI, based on the desired reporting and general alarm activation for that point.
- Define the specific conditions that cause the point to go into alarm and the type of annunciation parameters associated with that alarm.
- Select the specific delay times for each monitor point programmed in the system.
- Select the time schedule that will be applied to the monitor point.

### ***Control Point Parameters***

As a minimum, when programming a control point in the ACS, the System Operator shall be able to:

- Enter a unique name for each point. This name will be used in Audit Trail messages regarding the status of the control point.
- Select the time schedule that will be applied to the control point.
- Define the specific conditions that cause the point to go into alarm and the type of annunciation parameters associated with that alarm.
- Select the specific delay time for each control point programmed in the system.

## **Event Routines**

The system shall allow an Operator to create their own event driven routines based on any required system operation. These event routines shall run automatically without the need for human intervention or the workstation MMI being operational.

The ACS shall be able to trigger event routines from the ACS host or from an individual ISC. Routines initiated by an ICS shall be able to trigger outcomes affecting other ISCs without the need for ACS host intervention. This scenario will allow peer-to-peer routines to run even when communications with the host are lost.

## **Event Triggers**

As a minimum, the Operator shall be able to configure event routines that can include any of the following individual event triggers:

- System Components, including access points, input devices, and output devices
- Specific time
- Communications channels (lost / resumed)
- Date

## **Event Actions**

As a minimum, the Operator shall be able to configure event routines that can include any of the following system actions in response to an individual trigger:

- Change the state of any of the following system components; access points, input devices, output devices, and areas.
- Send commands to the CCTV equipment that manipulate the movement of cameras or images displayed on a monitor.
- Start DVR recording processes.
- Send specific commands to a system ISC.
  - Automatic program execution. Which includes any executable program on the host PC or that is accessible on the network on which the host PC resides. This should also allow for the inclusion of additional parameters to start that program, if required.
- The control of external third party systems, such as lighting control etc.
- Send messages to mobile phones, pagers or via an email system.

## **Host Events**

The ACS shall be capable of imitating host based event routines. These routines shall be able to target physical devices, but also extend to communication with third party products such as Windows Applications, CCTV systems, DVR systems etc. The triggering of the majority of these events will rely upon communications of the ACS with the field hardware devices for status information.

## **ISC Events**

Each ISC shall be capable of imitating event routines. These routines shall be able to target physical devices in the access system. In addition, these event routines shall be able to operate in a peer-to-peer mode. This means that a single ISC can control the operation of a device on another ISC as a direct result of the routine.

- The system shall allow an Operator to define a message that will appear in the audit trail when the event is initiated. This message will indicate that the event task has been activated.

**(Point) Grouping**

- The system shall be able to collectively group components of the same type for the purposes of controlling those components as a single entity. As a minimum, the components that can be grouped shall include:
  - Access points - card readers and other entry devices
  - Input devices (monitor points) – detection and monitoring devices
  - Output devices (control points)
  - ISCs – field controllers
  - CCTV monitors
  - CCTV cameras
  - DVRs
  - Elevator floors
  - External third party system points
- The system shall allow the visual and audible annunciation of a group alarm. This alarm shall be triggered when a pre-defined number of group members have individually initiated alarms within a configurable time period.

## System Status

- The system shall provide a status bar that indicates the current status of system components. As a minimum the system shall be capable of displaying the status of the following components in that status bar:
  - System messages      Small text messages that indicate relevant information to the process currently being performed.
  - Alarm count            Indicates the number of outstanding system alarms that are waiting to be either acknowledged by an Operator or returned to a normal state.
  - ISC communications    Indicates the number of ISCs that are currently on-line and communicating with the ACS server.
  - Workstation status     Indicates the status of communications between the workstation being used by the logged in Operator and the ACS server.
  - Locked workstation    Indicates when the workstation has been locked, indicating that an authenticity check is required before the workstation can be used again.
  - Zoom                    Indicates the zoom ratio of any graphic that is opened and displayed on-screen.
  - Date and time          Indicates the current date and time.
- In addition, the status bar shall provide short tool tips when the mouse pointer is placed directly over the icons contained in this bar.
- A full system status screen shall also be available that provides a summary of points defined in the system. This screen shall be able to provide a summary at a glance providing full system counts. It shall also be able to provide the status of both physical and logical points currently in alarm, including:
  - Complete system summary
  - Physical points in alarm
  - Logical points in alarm
  - Door status

### **System Overview**

- The system shall be able to display a full architecture of the access control and security network in a Windows™ Explorer type view. By simply clicking on any component in the system, the operator shall be able to display the full details regarding that component.
- Furthermore, by right clicking on a component the operator shall be able to open its property dialog, from which, its basic properties can be changed.

### **Video Imaging / Badging & Card Printing**

The ACS shall include a state-of-the-art, 32-bit, ID badge creation and production system that is integrated with the cardholder management system. This shall allow for the creation of different badge types based on a database field and the linking of that field to a badge type to automate the process of credential production.

In addition, the use of security colours, graphic images, photos or signatures shall be supported to allow security officers to quickly identify personnel access authority by the badge design.

The ACS shall incorporate into a single, seamless integrated system, imaging technology and personnel management, which is written from the same source code as the access control and alarm-monitoring functionality. The system shall generate and store personnel records as well as monitor badge use throughout the facility.

The system shall allow badges to be fabricated at any system Workstation, based on data and images that are input and captured at the time of enrolment.

Images are to be digitised using industry standard JPEG image compression, and printed using a direct card printing process. A record for each cardholder shall be created in the badging module of the system by entering the required data. Once all fields have been entered, the system shall store the cardholder's record in the system database.

### ***Card Design***

The System shall provide a badge layout creation and editing facility to allow for the creation of custom badge designs. The System shall support credit card, government, and custom ID card sizes in either a landscape or portrait format.

The ACS shall also allow for the incorporation of bar codes or magnetic stripes onto the card template. This shall be visible at run-time from the respective cardholder record.

### ***Image capture from Live Video Source***

- The system shall allow live image capture using a Windows compatible video source including support for USB type image capture devices (using either live video or still digital picture). If required, the image capture shall be able to be performed on any Windows 2000/XP Workstation connected to the ACS.
- These captured images shall then be saved to the cardholder's record in the ACS database with the ability to be recalled at any later time. The system shall also provide the necessary tools to import existing images into each cardholder's record.
- Once an image has been captured or imported to the ACS, the Operator shall be able to crop the image or select the appropriate image aspect to be printed on a card using a simple click and drag graphical mask.
- The System Operator shall be able to preview in full colour, the badge, as it will appear when printed. As a minimum, the System Operator shall have the ability to:
  - crop images
  - adjust the image intensity
  - adjust the image contrast
  - adjust the image saturation
  - adjust the image sharpness

### ***Cardholder Verification***

The system shall allow a cardholder's record to be recalled from the audit trail window. The System Operator must be able to display a cardholder record with the stored cardholder's image. This feature shall be provided at the MMI, to assist the System Operator in determining access rights of an employee who may have lost their badge.



## **CCTV High Level Interface (HLI)**

The ACS shall be able to provide a CCTV High Level Interface (HLI). This HLI will allow for the remote surveillance of the facility using the ACS to monitor and control the operation of CCTV components.

CCTV functionality shall be available only to those operators who have been granted the appropriate permissions to either configure CCTV functions or operate the CCTV equipment. The CCTV interface shall be an integrated component of the ACS and shall not be a separate application.

### ***High Level Interface***

The CCTV system shall be facilitated via a high level interface (HLI) to a range of matrix switchers. As a minimum, the CCTV HLI shall support one of the following matrix switchers:

- Siemens SIMATRIX
- Pelco 9760/9740
- Pelco CM6800
- Pelco CM6700
- Pacom 2030

### ***Cameras***

The Security Operator shall have full control of all camera functions directly from any ACS workstation. As a minimum, the operator shall have pan/tilt/zoom control, iris control, focus, pan/tilt speed. Camera control shall be via mouse, keyboard or a combination of both.

### ***Live video***

The system shall allow the operator to view live video input from within the ACS and be able to manually control the appropriate cameras from this view. This shall be achievable via either mouse or keyboard control.

### ***CCTV Configurations***

As a minimum, the ACS shall allow the configuration of the following CCTV functions directly from the MMI:

- Presets            A defined, recallable position for a camera. A preset allows a PTZ camera to be automatically moved to a pre-defined co-ordinate position.
- Patterns           A defined, moveable camera routine. A pattern allows a PTZ camera to continuously move in a pre-defined manner using pan, tilt and zoom functions.
- Sequences        A defined series or presets, patterns and stop or pause times (dwells).

In the case of communications being lost, the ACS shall be able to restore all CCTV functions to normal activity when communications are restored.

### ***Switching in response to certain events***

The ACS shall be able to do any of the following CCTV actions in response to a specific event:

- switch a camera to a specific monitor
- run a pattern
- run a sequence

### ***CCTV MMI***

The ACS shall provide an intuitive easy-to-use operator MMI. This MMI shall be an integrated component of the ACS interface and allow the configuration and operation of the CCTV system directly.

When controlling the CCTV equipment the System Operator shall be able to view CCTV images on-screen in real time. This on-screen display shall allow the System Operator to easily control both PTZ and fixed CCTV cameras using the PC mouse. As a minimum, the following CCTV control functions should be available using the mouse pointer or left click of the mouse button:

- image display (including specific monitor and camera selection)
- camera movement
- zoom-in and zoom-out
- open-iris and close-iris
- focus-near and focus-far
- pan / tilt speed
- image / screen size

### ***CCTV Macros***

The ACS shall also provide the ability to run macros hosted by the CCTV processor in response to conditions within the access control system. This will also include the ability for the CCTV system to send alarms to the ACS, include alarms for the detection of video signal loss at any camera configured within the system.

### ***Video Loss***

The CCTV system shall be able to report a loss of video signal from any camera hosted in the system and raise this as an alarm within the ACS.

### ***Video Verification***

In conjunction with the CCTV system the ACS shall be able to display a live video signal together with the stored cardholder photograph upon a valid card badge. Using these two images the system operator shall be permitted to allow or deny access to the cardholder attempting to gain entry at the door.

## **Digital Video Recorder (DVR) Management**

The ACS shall be able to provide an interface to multiple DVR units via an Ethernet link. This management of DVRs will allow for the remote surveillance of the facility using the ACS to monitor and control the operation of DVR components.

The DVR functionality shall be available only to those operators who have been granted the appropriate permissions to either configure DVR functions or operate the DVR equipment. The DVR interface shall be an integrated component of the ACS and shall not be a separate application.

### ***High Level Interface***

The DVR system shall be facilitated via a high level Ethernet interface to a range of DVR unit types. As a minimum, the DVR HLI shall support DVRs from the following corporations:

- Kodicom
- Dedicated Micros
- Siemens

### ***Cameras***

The Security Operator shall have full control of all camera functions directly from any ACS workstation. As a minimum, the operator shall have pan/tilt/zoom control, iris control, focus, pan/tilt speed, heater and wiper controls. Camera control shall be via mouse, keyboard or a combination of both and be integrated into the ACS MMI.

### ***Live video***

The system shall allow the operator to view live video input from within the ACS and be able to manually control the appropriate cameras from this view. This shall be achievable via either mouse or keyboard control.

### ***DVR Configurations***

As a minimum, the ACS shall allow the configuration of the following DVR functions directly from the MMI:

- Presets            a defined, recallable position for a camera. A preset allows a PTZ camera to be automatically moved to a pre-defined co-ordinate position.
- Patterns           a defined, moveable camera routine. A pattern allows a PTZ camera to continuously move in a pre-defined manner using pan, tilt and zoom functions.

In the case of communications being lost, the ACS shall be able to restore all DVR functions to normal activity when communications are restored.

### ***Switching in response to certain events***

The ACS shall be able to do any of the following DVR actions in response to a specific event:

- switch a camera to a specific monitor
- run a pattern
- run a sequence
- begin recording

### ***DVR MMI***

The ACS shall provide an intuitive easy-to-use operator MMI. This MMI shall be an integrated component of the ACS interface and allow the configuration and operation of the DVR system directly.

When controlling the DVR equipment the System Operator shall be able view live images on-screen in real time. This on-screen display shall allow the System Operator to easily control both PTZ and fixed cameras using the PC mouse. As a minimum, the following DVR control functions should be available using the mouse pointer or left click of the mouse button:

- image display (including specific monitor and camera selection)
- camera movement
- zoom-in and zoom-out
- open-iris and close-iris
- focus-near and focus-far
- pan / tilt speed
- heater control
- wiper control

### ***DVR Playback***

The ACS operator shall be able to playback any recorded event stored on any connected DVR unit by simply selecting the appropriate unit and camera and then entering the date and time at which the event occurred. Once these options have been specified it shall be possible to playback the recorded image within the MMI.

### ***Video Verification***

In conjunction with the DVR unit the ACS shall be able to display a live video signal together with the stored cardholder photograph upon a valid card badge. Using these two images the system operator shall be permitted to allow or deny access to the cardholder attempting to gain entry at the door.

## **Guard Tour**

The system shall be able to provide guard tour functionality. The guard tour functionality shall be an integrated component of the ACS. It shall take advantage of existing card readers or inputs, to allow a guard to conduct specific tours around the facility using these devices to register their attendance at pre-defined stops and monitor their progress as they conduct their tour.

The system shall be capable of registering alarms to indicate breaches in a tour or notify the System Operator of potential safety conflicts. The guard tour functionality shall allow the user total flexibility over the configuration and programming of guard tours using any combination of access points or input devices that have already been programmed in the system.

- As a minimum the guard tour operation shall include the following:
  - The Operator must also be able to start tours independently and if required abort a tour already in operation.
  - Once a tour is operational, the system must be able to initiate alarms when a guard arrives early, arrives late or fails to arrive at a designated checkpoint.
  - An Operator shall be able to print a report that details all the checkpoints to be visited by the guard and the order in which these checkpoints should be visited
  - The system shall provide a window from which the movements of guards and the tour, which they are currently conducting, is displayed.
  - The system shall allow tour recovery after power failure has occurred.
- In addition, the guard tour specifications must meet or exceed the following:
  - Allow a minimum of 100 tours to be defined in the system.
  - Allow each tour to contain up to 30 independent stop points.
  - Allow up to 20 tours to run simultaneously.
  - Allow at least 500 guards to be programmed in the system.

## **Visitor Management**

The system shall include a visitor management component that is integrated with the access control system. The system must support at least 100,000 visitor cards. This visitor management functionality must allow the enrolment of visitors into the database, capturing of images and import/export of visitor data.

### ***Visitor data***

As a minimum, the ACS shall allow up to 196 configurable visitor fields to be customised by the system administrator to suit the needs of the facility owner. The system shall provide a Graphics Editing Module (GEM) that gives operators the ability to modify any standard field to customise the cardholder screens as desired. Once these fields have been defined, the ACS shall not permit these (database) fields to be changed.

The visitor module shall also enable additional fields not used with other system cardholders including:

- Visited Cardholder – selected from a list of existing cardholders in the system.
- Card Status – card issued to or returned by visitor
- Card issue time and date
- Card return time and date
- Visitor profile
- Visitor's Company
- Reason for visit
- Visitors drivers license
- Visitor's email address

### ***Searching***

The system shall allow the search of all programmed cardholders, based on the criteria supplied by an operator. Operators shall only be able to search and retrieve visitor records to which they have assigned privileges.

As a minimum, the search criteria shall include:

- Card number
- Name (first and / or last)
- Profile
- Reason for visit
- Driver's Licence
- Email Address

Searching shall not only be limited to entire word matches. An operator may also search for cardholders by entering data that appears in the beginning of a word or string.

If more than one visitor in the system meets the specified criteria, the operator shall be displayed a list of all matching records, from which they can select a particular record.

### ***Visitor images***

- The ACS shall support the capturing of a high quality image of a visitor from any workstation. The system operator shall have the option of capturing images in real-time or alternatively by importing an existing image.
- If capturing images in real-time, the operator shall be able to use an appropriate capture card or use a USB digital video camera. If visitor images already exist, the operator shall be able to import images of all standard formats including jpg, bmp, gif, and tif.

Once an image has been captured or imported, the operator shall be able to preview in full colour, the visitor image complete with the card, as it will appear when printed. The Operator shall have the ability to crop and resize the image and adjust the brightness and contrast.

- The visitor image shall be able to be recalled at any time from any workstation to verify the identity of any visitor on the facility.

***Visitor violations***

- The system shall monitor every card presented at each reader in the system and prevent access at the reader (door) if any of the following access violation conditions exist:
  - The card has not been assigned access permission at the current time.
  - The card has not been assigned permission at the reader.
  - The visitor has been voided in the system.
  - The visitor's card has not been issued.
  - The visitor belongs to a group of visitors that has been voided.
  - Entry to or exit from an area governed by anti-passback control has been violated.
  - A card belongs to a group of cards that has been disabled.
  - A card was presented at a reader that has been disabled or taken out of service.
    - The card has been presented before its allocated start date, or after the card's designated end date.
    - The card presented does not belong to the site, which includes an invalid card number, an invalid site number or a card containing an invalid facility code.
- In addition, a message will be logged in the audit trail indicating the card use violation, and if configured, a visual and audible alarm will also be displayed.

### ***Restricted Visitors***

- The system shall provide the ability to restrict specified visitors and visitors that belong to a specified company from being issued a visitor card. When an operator attempts to add a visitor from a restricted company a warning will be displayed.

### ***Visitor Card Issue and Return***

- The system shall provide the ability to log the issue and return of visitor cards. This functionality will include:
  - Enabling of the card once it has been issued in the ACS.
  - Automatic voiding of the card once it has been returned in the ACS.
    - Full date and time recording of card issue and return.



### **Multiple Facility Linking**

- The system shall be capable of connecting multiple independent facilities to build a complex access control and security network and provide a complete enterprise solution. This network should allow a single cardholder to be programmed at any facility within that network. This link should distribute cardholder information including images.

The system should be capable of reconciling all cardholder information, so that each facility is updated with the most current data. The system should provide a mechanism by which the reconciliation process can be performed using either a manual or automatic routine, but should also be able to perform this task in real-time.

- The communications between facilities should be compliant with a wide variety of networking protocols, and as a minimum include:
  - Dial-up Networking (DUN)
  - Remote Access Server (RAS)
  - Local Area Network (LAN)
  - Wide Area Network (WAN)
- As a minimum, the ACS shall be capable of linking independent sites across:
  - a campus
  - large single facility
  - cities
  - states
  - nationally
  - internationally

## **Third party integration**

### ***Application Programming Interface***

- The system shall support information sharing both to and from third party applications via the use of an Application Programming Interface (API). This API must be DCOM compatible and execute the same logon routine as if logging on from a standard ACS workstation.

This sharing of information shall still be governed by the standard authentication used by the ACS, and prevent those System Operators logging into the third party package from accessing information to which they have not been assigned appropriate privileges.

- As a minimum, the system shall allow the transfer of the following cardholder data to and from the third party application:
  - Card number
  - Name (first and last)
  - Employee ID
  - Start and End Dates
  - Vehicle Details (registration, colour, model)
- All activity carried out via the API shall be logged to the ACS audit trail in real-time. Reports may also be generated at a later stage detailing all the events that occurred from the third party application.
- In addition, the API shall not simply be a disguised SQL interface that may allow invalid changes to database information. Rather, it must be a full application programming interface that enforces all the standard business rules of the ACS.

### ***Building Management System***

The system shall support the integration of the ACS with a Building Management System (BMS), using the same workstation to control both systems from the MMI. The two systems should provide hardware connectivity so that points programmed in one system, can be used to trigger actions and change the state of points contained in the other system.

### ***Alarm Monitoring Systems***

The system shall be capable of sending alarm messages to an alarm monitoring company, via the use of a Securitel connection. The alarms shall be configurable and the scheduling of these alarm messages should also abide by the standard system scheduling rules.

## Server Redundancy

- The system shall be capable of duplicating all database information on a backup Server. When the primary server fails, the system shall be capable of continuing operation using the backup server without loss of data. In instances when the backup server is required, the system should fail-over automatically.

During fail-over, workstations shall automatically be locked out from the database preventing further database changes from taking place. Once the secondary server is on-line workstations should only allow manual logon to gain entry back into the system to ensure correct authentication has taken place.

Data mirroring shall be provided across a dedicated link between the primary and secondary servers. This will prevent an increased traffic load on the WAN/LAN due to data mirroring.

- The system shall be configured so that it is possible to remove the primary or backup server for maintenance or repair without interrupting the operation of the access control and security network. As a minimum, the system will fail-over in the event of:
  - Hard disk drive failure
  - Power supply failure
  - Mother board failure
- 1 As a minimum, the Server Redundancy solution shall incorporate the following functionality:
  - Bi-directional failover
  - Hardware independence
  - Operates at the device driver level
  - Use of TCP / IP protocols and industry standard network cards for mirroring traffic
  - RAID compatible

## **Documentation**

A comprehensive documentation portfolio shall support the system.

### ***Software Documentation***

- The ACS manufacturer shall be able to supply a full range of software documentation, including:
  - An Installation Guide
  - User's Guides for the core software module and any additional optional modules
  - Product Sheets that outline the system requirements and specifications
- The software shall include a comprehensive help system that provides information regarding all aspects of the ACS. This help system shall include written procedures that guide the System Operator through the use of the ACS.

### ***Hardware Documentation***

The ACS manufacturer shall be able to supply a full range of ISC documentation, including:

- User's Guides
- Installation Sheets
- Product Sheets that outline the system requirements and specifications.

### ***Other Documentation***

The ACS manufacturer shall also be able to supply a guide that outlines the Third Party Application Protocol Interface (API) and instructions regarding the programming of third party software to communicate with the ACS system.

Software installed on the system such as operating system, database application and others shall be supported by the documentation provided by the manufacturers of those applications.

## **Upgradability / Expandability**

- The system shall be fully upgradable, with the possibility of upgrading software and hardware components at minimum cost.

The system should also be fully expandable to easily permit the increase in control points, monitor points, access points and cardholders.

- Each ISC shall be designed so that they can be easily added to an expanding facility and communicate with the ACS using the same communications channels as any existing ISC. In addition, the operation of any new ISC shall not affect or cause the re-programming of any already installed ISC.

## **SECTION D: Water Leak Detection System**

### **1.0 General:**

- 1.1** Water leak detection System shall be designed to protect the Air-conditioned premises and to alert the personnel about the leak in the AC systems. The system shall be capable of interfacing to Water leak detection sensors, condensation sensors & I/O modules.
- 1.2** The system shall also be designed to trip the AC when the sensor is activated. Events should be clearly reported on LCD/LED display with full English language description of the nature of the fault in the panel.

### **2.0 COMPONENTS**

- 2.1** The Water leak detection system shall comprise of Cable Sensors, Water Leak detection modules, Condensation detectors, I/O modules and sounders all connected to a Control Panel.

#### **2.2 Control Panel**

- 2.2.1.** The control panel shall be Computerized 16 zone multiplex controller with a facility to add on dialer and speech processor. The system shall be programmed, armed or disarmed through a control key pad. The control key pad shall have a 16 character LCD display for viewing various events. The code to arm or disarm the system shall be changed only by entering a master code.
- 2.2.2.** The system shall have 16 zones and all the detectors shall be connected through a 2-core cable. Each area of the premises shall be divided into specific zones such that the user if required shall isolate any zone. A maintenance free rechargeable battery to take care of system's power requirements whenever power fails shall back up the entire system. The system shall be totally tamper proof and shall activate an alarm if the control panel is opened, the sensors tampered with or if the system cables are cut even in the disarmed state. The system shall log 500 events and optionally printer shall be connected for generating reports.
- 2.2.3.** The Detectors, I/O Modules, Remote Keypads and other Devices shall be connected to a system on a single 2/4/6 Core Cable Bus to avoid individual cabling of zones. The system shall have a Buffer memory of minimum 250 events and log each event with exact date and time. The controller shall have a Serial Port for connecting to a computer.
- 2.2.4.** The controller shall work on 220/240V AC power supply and it shall also have a built in battery backup. A lithium battery shall back up the memory inside the controller. The controller shall work effectively over a temperature range of - 10 Deg. C to + 55 Deg. C. and 0 to 90% of Humidity.
- 2.2.5.** The panel should have the facility to interface with an automatic two-channel programmable speech dialer for verbal reporting of any alarm condition. It shall be able to call four telephone numbers per channel. The programmable speech dialer shall have two alarm inputs and shall provide listen-in capabilities through the built-in microphone. The dialer shall have a built-in keypad for easy operation, programming and voice recording.
- 2.2.6.** The system shall be totally tamperproof and shall activate an alarm if the control panel is opened, the sensors tampered with or if the system cables are cut even in the disarmed state.

#### **2.3 Water Leak Detection Sensors**

**2.3.1.** Water Leak Detection sensors shall be able to mount in DIN rails, inside AHU's, power distribution units or other equipment where localized leak detection is required. The detectors shall be resistant to oxidation and erosion. The detector shall have relay output for connection to the controller. LED alarm indication shall also be provided. The detectors shall operate in AC or DC supply.

#### **2.4 Cable Sensors**

**2.4.1.** Cable sensors for use with water leak detectors shall be covered with plastic netting to prevent short circuits when used in metal trays or conduits, and enables the cable to be folded at right angles to allow easy routing.

#### **2.5 Sounder**

**2.5.1.** The sounder shall give audible alarm when any sensor operates. It shall be complete with electronic oscillations, magnetic coil (sound coil) and accessories ready for mounting (fixing). The sound output from the Hooter should not be less than 85 decibels at the source point.

## SECTION E: CCTV

### 1.0 Functionality

#### General

The work under this system shall consist of design, supply, installation, testing, training & handing over of all materials, equipment's and appliances and labor necessary to commission the said system, complete with Hi-Speed Dome Cameras, Fixed Cmount varifocal camera, Digital Video Recorder and Monitor. It shall also include laying of cabling, necessary for installation of the system as indicated in the specification and Bill of Quantities. Any openings/chasing in the wall/ceiling required for the installation shall be made good in appropriate manner.

### 2.2 Equipment

The CCTV System shall comprise of fixed dome camera, Hi-Speed dome Camera, Digital Video Recorder and 21 Inch TFT Monitor.

#### 2.1.1 Fixed Dome Camera:

The Dome camera unit shall be 1/3" Sony CCD type Color and shall provide a minimum of 480 TV lines resolution. It shall be possible to use lenses of 3.5 mm focal length. The complete unit shall be housed in a dome and base unit, both preferably made from injection moulded plastic. It shall be possible to adjust the camera head inside the dome in both the planes so that it can be wall or ceiling mounted. The camera shall operate on 12 volts D.C.

The Camera shall comply with the enclosed datasheet.

#### Technical Specifications for Fixed Dome Camera

Image Sensor	1/3" Sony CCD
Effective Pixels	PAL: 752 (H) x 582 (W)
Scanning System	2:1 Interface, V 50Hz, H 15.625 KHz
Video Output	1 Vp-p, 75 ohms unbalanced
Resolution	380 TV Lines
Minimum Illumination	0.1 Lux
White Balance	Auto Tracking 2500*K - 9500*K
Back Light Compensation	Auto (center area)
Gain Control	Auto AGC
Shutter Control	AES: 1/50 (60) - 1/100,00 sec.
S/N Ratio	more than 48dB
Gamma Correction	0.45
Lens	Built-in Fixed Lens 3.5 mm. 2.5, 4, 6, 8 & 12mm (optional)
Operating Temperature	+10* C to +45* C
Power Supply	DC 12V
Power consumption	130 mA
Dimension	H: 90 (mm) x 106mm Dia
Model No.	

#### 2.2.2. Dome Camera:

The Dome camera unit shall be 1/3" Sony CCD type Color and shall provide a minimum of 380 TV lines resolution. It shall be possible to use lenses of 3.5 mm focal length. The complete unit shall be housed in a dome and base unit, both preferably made from injection moulded plastic. It shall be possible to adjust the camera head inside the dome in both the planes so that it can be wall or ceiling mounted. The camera shall operate on 12 volts D.C.

The Camera shall comply with the enclosed datasheet.

## Technical Specifications for Fixed Dome Camera

Image Sensor	1/3" Sony CCD
Effective Pixels	PAL: 752 (H) x 582 (W)
Scanning System	2:1 Interface, V 50Hz, H 15.625 KHz
Video Output	1 Vp-p, 75 ohms unbalanced
Resolution	480 TV Lines
Minimum Illumination	0.1 Lux
White Balance	Auto Tracking 2500*K - 9500*K
Back Light Compensation	Auto (center area)
Gain Control	Auto AGC
Shutter Control	AES: 1/50 (60) - 1/100,00 sec.
S/N Ratio	more than 48dB
Gamma Correction	0.45
Lens	Built-in Fixed Lens 3.5 mm. 2.5, 4, 6, 8 & 12mm (optional)
Operating Temperature	+10* C to +45* C
Power Supply	DC 12V
Power consumption	130 mA
Dimension	H: 90 (mm) x 106mm Dia
Model No.	

### 2.2.6 Hi-Speed indoor Pan/Tilt/Zoom Color Dome camera

The Dome camera system would be consisting of a 1/4" Sony super HAD CCD camera with a 18X Optical zoom and 12X digital zoom auto-iris lens delivering the power of 216X zoom to ensure that the finest details are captured. The Unit shall have a camera with 480 TV lines and auto focus lens, a high-speed pan/tilt in a dome enclosure. The enclosure for indoor pan tilt dome camera shall suit to our environmental conditions. The High speed dome shall have an integral RS-485 communication channel for direct control via the Digital Video Recorder.

The auto dome shall contain an integral 360-degree pan/tilt device. This variable speed pan/tilt shall be capable of operating in the manual mode to speeds up to 140 degree per second (variable speed). The camera shall operate on 24 volts A.C. The auto dome system shall be compatible with the Digital Video Recorder.

The Camera shall comply with the enclosed datasheet.

### Technical Specifications for 1/4" Hi-Speed Dome Camera

Image Sensor	1/4" Sony Super HAD CCD
TV System	2:1 Interface, PAL V:50Hz, H:15.625KHz
Horizontal Resolution	480 TV Lines
Synchronization	Internal / V-Lock
Optical Lens	18X Zoom, f=4.1 – 73.8mm (F1.4-3.0)
Digital Zoom	12X (Upto 216X with Optical Zoom)
AGC	Auto
Minimum Illumination	1 Lux (1/50s PAL F1.4)
S/N Ratio	=>50dB
BLC	On/Off
Shutter Speed	Auto: 1/50 - 1/10000, Manual: 22 steps
White Balance	ATW (2000°K - 10000°K ), One Push WB
BL Compensation	Auto, Manual , Backlight Compensation
Focusing system	Auto (Sensitivity: Normal , Low)
Focus	Auto / Manual
Preset	80 points with editable time
On- Screen Display	Yes
Interace	RS-485
Protocol	Europlex, Pelco - D/P, VCL, Kalatel, Emitec, Lilin, Vicon,



	Panasonic
Alarm Function	4 Inputs / 1 Output
Emission & Safety Standard	CE Approval
Ambient Temperature	AC 24V +/- 10% / 50Hz +/- 1 Hz
Power Supply	10°C - + 50°C
Power Consumption	10W (max)
Built in	Lightning proof and surge proof
Dimension	
Model No.	

### 2.2.7 16 Channel Digital Video Recorder

The Digital Video Recorder (DVR) shall have on board Ethernet and shall be able to integrate with the Integrated Security Management Software (ISMS).

The DVR shall include, but not limited to the following

- The DVR shall use H.264 compression technology and shall have on board Ethernet port
- The DVR shall have embedded Linux operating system and shall function as a standalone unit. For either programming or normal operation, it shall not require the use of a computer, special monitors or any other special peripheral devices.
- The DVR shall have internal hard disk drives with SATA interfaces. Internal HDD shall be able to support up to a maximum of 2 TB storage
- The DVR shall have Triplex capability that allows to record, playback and view live images simultaneously
- The DVR shall have a built-in web server and it shall be possible to do the configuration through a web browser over the IP network
- The DVR shall have the capability to record and playback real time video at 4 CIF resolution.
- The DVR shall support Dual streaming to allow using different setting for recorded video and network streamed video
- The DVR shall use a battery internally to back up memory that stores the time, date and all internal programming functions
- The DVR shall have an easy to ready on screen text and menus. It shall also allow the user to change the position of On screen display
- The DVR shall have buttons, jog / shuttle integrated into the front panel to allow menu navigation, set up and control of unit, without the need of any external device
- The front panel buttons shall be capable of controlling / navigating Pan / Tilt / Zoom functions of PTZ cameras connected to the unit
- The DVR shall the following the following option
  - a. The unit shall allow the user to select different resolution for each channel
  - b. The unit shall have the option to select either different frame rate for each channel.
  - c. The unit shall allow the option to select either Fixed or Variable bit rate for each channel. The bit rate shall range from 32 Kbps up to 2 Mbps
- The DVR shall have the following record mode
  - a. Continuous
  - b. Manual
  - c. Motion Detection
  - d. External alarm
  - e. Motion & Alarm
  - f. Motion or Alarm
- The DVR shall allow setting up of privacy mask for each camera using an on screen menu. Each camera shall have the possibility to set at least 4 privacy mask area
- The DVR shall have a minimum of one audio input channel for every video channel and additional audio input to provide bi-directional audio. The compressed audio bit rate shall not exceed 16Kbps
- The video and audio signals shall be synchronized and the DVR shall have the option of having a mixed stream (Video & Audio) or a Video only stream

- The DVR shall the following video output
  - a. Multi-screen / Sequential – BNC Type
  - b. Auxiliary Video output – BNC Type
  - c. VGA
- The DVR shall have one digital alarm input for each video channel and a minimum of 4 relay outputs
- The DVR shall provide automated alarm handling. Upon receipt of an alarm, shall have the capability to change the resolution and frame as defined in the alarm recording settings
- In addition to changing of record settings upon receipt of an alarm, the DVR shall also be capable to provide relay output operation
- The DVR shall also have the capability to integrated with access control system controllers, intruder alarm panels and other security control equipments to receive alarm signals from those devices and perform alarm handling over IP network
- The DVR shall support pre-alarm recording maintained in a buffer and shall append this buffer to the beginning of all recorded alarms. The DVR shall continue to record with the alarm record settings until the alarm is reset or acknowledged.
- The DVR shall provide the option of single channel as well as multi-channel playback
- The DVR shall provide extensive search capabilities for archiving, restoring and playback operation.
- The DVR shall have the capability of archiving the recorded images from internal hard disk to an external medium
- The DVR shall support USB HDD, USB CD R/W, USB DVD R/w
- The DVR shall allow the option to set ‘STOP RECORDING’ or OVERWRITE’ when the hard disk is full
- The DVR shall support recording of all images with a digital watermark
- The DVR shall support Infra-red Remote control to operate, configure and navigate the menus. The remote control shall also support PTZ controls
- The DVR shall support configuration / operation through any of the following
  - DVR Front panel buttons
  - Remote client viewer software over the network
  - Integrated Security Management software (ISMS)

**Technical Specifications for DVR:**

Operating system	Embedded Linux
Network Ready	Yes
Built-in web server	Yes
System Control	Front button, Remote Control, Client Viewer, ISMS
Video Compression	H.264
Video Channel Input	16
Video Output	a) Multi screen / Seq output: BNC b) Aux Output (BNC) c) VGA
Composite Monitor output	
Dual Streaming	Yes
<b>Stream 1</b>	
Playback video	2CIF @ 6fps/ ch; CIF @25FPS /ch
Audio Input	a) 4X BNC Input
Audio Output	a) 1 x BNC
Audio Bit rate	16Kbps

HDD Interface	SATA
HDD Capacity	2 Interfaces – 1000 GB (Max)
Multi-zone motion detection	Yes
Camera Block (Tamper) alarm	Yes (Using VGA or Main Monitor)
Video Signal Loss alarm	Yes (Using VGA or Main Monitor)
Alarm Inputs	16 X Digital Inputs
Relay Outputs	4
Area Masking	Yes, Multizone
Water Mark	Yes
Communication Interface	1 X RJ45 10M/100M Self-adaptive Ethernet Interface, 1X RJ45 RS232 Port and 1 RS485 PTZ port
Keyboard	1 Port (D+, D-)
DVD /RW	Yes, External
USB	Yes
Protocols Supported	Shall support multiple protocols including Pelco D
Power Supply	230V AC
Working Temperature	- 10 to +55 Deg C
Working Humidity	10 to 90%
Model No.	

## 2.2.8 VIDEO MANAGEMENT MODULE:

### General Requirements:

1. The Integrated Video Management software shall leverage a powerful Client Server architecture with interactive Graphical User Interface to provide exceptional Operator management and Alarm handling capabilities.
2. The system shall be able to support redundancy server module and redundancy communication gateways to ensure that the devices are online in case of failure of the primary server or gateway modules.
3. The software components (Application server, Database and Gateways) shall be capable of running together on a single PC for small systems or on separate PCs and servers for large systems. Multiple DVRs and client workstations shall be used as needed to suit application of any size
4. Live video from a camera shall be viewed in an independent floating window. It shall support multi-viewer feature to allow monitoring multiple cameras simultaneously. Selecting the cameras for multi-view shall be made easy using the Drag and Drop from the Device browser or Site Explorer. PTZ operation shall also be performed from the multi viewer.
5. It shall have the capability to directly transmit the video to the desktop / browser based client upon authentication of the Client from the server for various streaming parameters and upon fetching the Username/password if enabled.
6. The software shall allow the floating windows to be dragged to another monitor in the case of a PC supporting multiple monitors to facilitate graphics views on one monitor and list views or video on another. The software shall also support tabs to view multiple camera videos page by page.
7. The software shall be able to support configuration of parameters such as Preset Name, Target Data Rate, I-frame and P-frame quality, I-frame distance, Video Resolution, Password, Relay Switch, Alarm Inputs, Audio and status of the device, subject to the acceptance of the same by IP Camera devices.
8. The software shall allow the Camera to be selected in the site explorer or the camera list view or from the Graphics page which allows a video window to pop up with video stream. Any number of such video windows shall be opened subject to resource availability / limitations on individual devices and PC.
9. The software shall be user friendly. Video capture, video record, maximize/minimize, video stop are all shall be activated by a click of a button.
10. The application shall have a PAN speed track bar to allow PTZ function, Preset functions and video sequencing. Presets on PTZ devices shall be definable. Operator shall be able to select a pre-defined preset and move the PTZ to that preset. Video clip search and playback shall also be available in the tool bar.

11. Video Management system shall allow the following

- Record Video streams, and audio continuously
- Trigger recording based on alarm input, motion detection
- Set Record time interval for each day of a week
- Recorded information on the entire network
- Password protected access to recorded video based on the authorization level
- Simple integration of cameras and storage media
- Simple integration to various systems in the application platform
- Pre and post event recording based on events
- Support playing back video directly from event list
- User friendly graphics
- Supports multiple DVRs
- Quick search functions with time filters to access desired video sequence
- Status of the DVR hard disk size, HDD space available, data transfer rate, retention time, type of video stream etc
- Creation of snapshots in JPEG format and video segments in MPEG format to be stored in a separate location for third party application

12. The Video management system shall be able to support cross module functionality. The application software shall provide easily definable cause and effects across disciplines by simply referencing the respective object, its state and its attribute directly from the integrated database.

- Video recording shall be enabled based on access events (valid or invalid). These recording shall be played back directly from the access event listing.
- Client stations shall be defined to automatically pop up live video stream on receipt of alarms and events from other systems.

***SYSTEM FUNCTIONS:***

***DEPLOYMENT – SHALL BE CAPABLE OF THE FOLLOWING***

- Updates of operator client and configuration client shall be automatically deployed from the central server.

***CONFIGURATION – FOLLOWING SHALL BE SUPPORTED***

- Configurable Logical Tree
- Predefined camera sequences
- “Automatic Sequences” created by multiple selection and drag and drop to Image panes

***USER INTERFACE – SHALL BE CAPABLE TO DO THE FOLLOWING***

- Sitemaps with Links, Devices, Sequences, and Command Scripts
- Up to 4 monitors supported per workstation
- Flexible Image panes allow any combination of video window sizes and layouts
- Device states shall be shown by icons, including network connection loss, video loss
- Camera selection by double-click or drag and drop from site maps, logical tree, or favorites tree
- Control of analog monitors connected to decoders via drag and drop
- Shall have Sophisticated multi-camera timeline to allow easy, graphical searching of stored video
- Flexible search shall work across all NVRs and DVRs connected to the system
- Analog monitor wall support

### ***EVENT HANDLING***

- Event list with device events (e.g. video loss), system events (e.g. disk full), network events (e.g., heavy network traffic), subsystem events (e.g. allegiant alarm), user events (e.g. logon failure), schedule events (e.g. every Tuesday at 10:15), etc.
- Event allocation to user groups
- Schedule dependent alarm generation
- Schedule dependent event logging

### ***ALARM HANDLING – SHALL HAVE THE FOLLOWING CAPABILITIES***

- Alarms can trigger alarm-mode recording for any cameras
- 100 alarm priorities
- Selective auto-popup on alarm
- Alarms displayed in separate alarm window
- Wave file per alarm priority
- Workflow with user instructions and user comments, optionally forced before clearing
- Email or SMS notification on alarm
- Alarm display on analog monitor walls

### ***USER MANAGEMENT – SHALL HAVE THE FOLLOWING CAPABILITIES***

- Logical tree customized per user group – users shall only see devices for which they have access
- User group rights for protecting, deleting, exporting, and printing video
- User group rights for Logbook access
- User group priority assignment for PTZ control

### ***SYSTEM MONITORING – SHALL SUPPORT THE FOLLOWING***

- System-wide health monitoring, including cameras, computers, software, and network equipment

## **2.2.9 32” LCD Monitor**

The Color monitor shall be suitable with the standards of the selected cameras. It shall be 32 inch LCD monitor. It shall provide a bright, clear and well-defined picture display on the screen. All controls for brightness, contrast etc. shall be provided on the front panel for readily adjusting the levels of the video signal. The rear panel shall be provided with input and output BNC connectors for coupling the video output to other Monitors.

## **SECTION F : FM 200/HFC 227 gas Suppression System**

### **1.0 Scope of Tender**

- 1.1** The contractor shall supply, install, test and put in operation HFC 227ea based fire suppression system. The fire suppression system shall include and not be limited to gas release control panel, CCOE approved seamless cylinders, discharge valve (with solenoid or pneumatic actuator) as the case may be, discharge pipe, non-return valve and all other accessories required to provide a complete operation system meeting applicable requirements of NFPA 2001 or ISO standards and installed in compliance with all applicable requirements of the local codes and standards.
- 1.2** The system design should be based on the specifications contained herein, NFPA 2001 & in accordance with the requirements specified in the design manual of the agent. The bidder shall confirm compliance to the above along with their bid.
- 1.3** The system shall be properly filled and supplied by an approved OEM (Original Equipment Manufacturer)

1.4 Wherever FM 200 is mentioned It shall also mean the generic agent HFC 227

## 2.0 Design and Engineering:

- 2.1 FM 200 systems shall be designed taking the minimum design concentration of 7.0% (0.548 gm/m<sup>3</sup>) as applicable to class 'A' risks.
- 2.2 The system design must consider the limitations caused by the void height. The bidder should clearly indicate the qty. of the gas in Kgs. to be used for the system. All voids within each hazard shall be discharged simultaneously. Each hazard shall have an independent system, unless otherwise specifically stated, when a centralized system with directional valves can be used.
- 2.3 FM 200 systems shall have a working pressure of 25 /42 bar.
- 2.4 A fill density between 0.85 Kg /Lit. to 1.1 Kg/Lit. should be considered for the agent to be discharged within the specified time of 10 seconds.
- 2.5 The system engineering company should carry out the piping Isometric design and validate the same with a hydraulic flow calculation generated by using the agent's design software. The appropriate fill density to be arrived at based on the same.

## 3.0 FM 200 Authentication

A certification (from the manufacturer of the agent or their direct distributor) on the genuinity and quality of the agent filled in the system procured should be submitted.

## 4.0 Refilling and Maintenance

In case of any leakage or accidental discharge of the agent, it should be possible to refill the cylinders in India itself. The contractor should indicate the source of refilling and time that will be taken for refilling and replacement.

## 5.0 Discharge Time

After ascertaining the discharge status on manual intervention the gas has to be fully discharged within 10 seconds for effective quenching of fire as per the relevant standards, the contractor has to ensure that the design meets this requirement. Once the discharge takes place there should be warning signs restricting personal from entering the protected area until the gas has been cleared from the area.

## 6.0 Materials and Equipments

- 6.1 All materials and equipments shall be from approved manufacturers and shall be suitable for the performance of their respective functions.
- 6.2 The cylinders should be complete with all accessories. The contractor shall indicate the dimensions of the cylinders required for each area while quoting.
- 6.3 The number of nozzles and their positions must be chosen so that the design concentration is established everywhere in the enclosure.
- 6.4 The gas release panel should have manual override and manual release lever.

## 7.0 Cylinder

- 7.1 The cylinder shall be high pressure, seamless steel gas cylinder, flat type, concave bottom as per IS 7285 complete with neck ring. Welded and non-CCE approved cylinders will not be accepted.
- 7.2 As per the regulations of the Chief Controller of Explosives (CCE) Nagpur, any system which has a working pressure above 19 bar (280 psi) will require the use of seamless cylinders that have been duly approved by the CCE, Nagpur.

- 7.3 The maximum fill density of FM 200 in a cylinder shall not be less than 0.85 kg/lit. and not exceed 1.1 Kg/Lit. of internal volume. Appropriate fill density shall be chosen based on the cylinder location and piping retrofit. The hydraulic calculations should prove that the fill density is appropriate and total discharge will take place within 10 seconds.
- 7.4 The cylinders shall be super-pressurized with dry nitrogen to 42/25 bar at 20°C. The cylinder shall be capable of withstanding any temperature between -30° C and 70°C.
- 7.5 Cylinder shall be mounted according to manufacturer recommendations.
- 7.6 The cylinder shall withstand Hydrostatic test pressure upto 250 bar and maximum working pressure at 15°C shall be 150 bar.

## **8.0 Valves**

The discharge valve shall be approved or listed for use with FM 200. All the gaskets, O-ring, sealant and other valve component shall be constructed of materials compatible with the clean agent. The system should be engineered using hardware approved for use with FM systems. This would include main discharge valve, solenoid, check valve / non-return valve and pneumatic actuators.

## **9.0 Pipes & Fittings**

All Pipes shall be of ASTM - A-106, Gr: B, schedule - 40 seamless Mild Steel Pipes and fittings shall be as per ASTM-A-105 standard.

## **10.0 Discharge Nozzle**

Nozzle shall control the flow of FM 200 to ensure high velocity, proper mixing in the surrounding air and uniform distribution of the agent throughout the enclosure. The number of nozzles and their positions must be chosen so that the design concentration is maintained everywhere in the enclosure. Nozzle shall be located where they can be adequately supported on walls, ceiling or structural members. Software generated calculation supporting the nozzle design shall be submitted by the successful bidder before signing of contract.

## **11.0 Documentation**

- 11.1 The Contractor should prepare & submit the piping Isometric drawing and support the same with a hydraulic flow calculation generated by using the agent's design software. The calculations shall validate the fill density assumed by the contractor.
- 11.2 The bidder shall also submit calculations to evidence the qty of agent considered for the system.
- 11.3 The contractor must submit, along with the supply invoice, quality certificate of authenticity/quality of the gas from the gas manufacturer supported by a gas chromatography test report from the manufacturer of the agent with respect to sample drawn from the corresponding production batch.
- 11.4 The contractor should provide, as part of handing over, the as-built drawing, operation manual and maintenance manual. The as-built drawing shall exactly match the Isometric drawing submitted with the flow calculation prior to commencement of work.

## **SECTION G: Ultrasonic Pest Repellent System**

### **1.0 Console:**

The console (controller) shall have power card with 3-pin power supply of 2.5 Mtr long. All the subsystem shall be connected through this system. The pest repellors shall be electronic transmitters of high frequency sound waves of above 20 Hz frequency. Each controller shall support the minimum of 12 Satellites.

### **2.0 Specification for Satellites:**

Each Satellite shall cover the area of minimum 300 Sqft and height of ceiling of Maximum 10 feet. The system shall be mounted in a suitable size angle wherever necessary. The system shall be capable of withstanding the high temperature in false ceiling and low temperature in cooled area. The system shall have self-testing facility at own with an audible range.





**SECTION H**  
**SITE ACCEPTANCE TESTS**

The following shall be verified/conducted during SAT

- 1) Checking of all system for completeness of supplies for both software & hardware.
- 2) Checking whether guaranteed performance of individual equipment/item is achieved as per specification.
- 3) Checking if installation of the complete system is as per approved drawing.
- 4) Checking out of the equipment installations per the owner approved installation drawings for each equipment/item and system as a whole.
- 5) Checking of interconnection, hardware and software configuration, system interfaces and overall system function. Checking self diagnostic feature on individual equipment.
- 6) Loop checking: Field cable termination and inter cabinet cabling and termination.
- 7) Field tests.
- 8) Commissioning and on-line debugging of the system
- 9) Performance of integrated system including communication to remote location.
- 10) Test Run
- 11) Test Report

**B) TRIAL RUN**

Vendor shall conduct trial run of his system for a minimum period of 5 days after the mechanical completion of job. The interface among the various equipments supplied by the BMS vendor and other vendors shall be established during these trial runs. These trial runs are conducted to verify the satisfactory performance of the system in its entirety. In case of major failure in the system, the trial run shall be repeated for a period of another 15 continuous days.

After trial run site acceptance test (SAT) will be conducted and system shall be handed over. The project is deemed to be complete after the compliance of pending points of SAT.

**Acceptance Testing:**

A. A written acceptance test procedure (ATP) for testing the system components and installation will be prepared by the contractor. The contractor shall be responsible for the performance of the ATP, demonstrating the function of the system and verifying the correct operation of all system components, circuits, and programming.

**Documentation:**

System documentation shall be supplied to the owner and shall include but not be limited to the following:

1. System record drawings and wiring details including one set of reproducible drawings, and a CD ROM with copies of the record drawings in DXF format for use in a CAD drafting program.
2. System Operating, Installation and Maintenance Manuals.
3. System matrix showing input signals to output commands.
4. Provide a copy of the system program on a CD.

## **STABILIZATION PERIOD**

After successful commissioning of the entire system, the system shall be observed for faultless working for a period of 15 days. If the following subsystems remain down for more than 2 hours in a day, the same shall be rectified by the vendor at his cost including the replacement of any equipment/components if required and the system shall be observed for a further period of 10 days for stabilization. These subsystems are :

1. BMS System
2. Access Control System
3. CCTV
4. Fire Alarm System & Aspiration Smoke Detection System
5. Gas Supression System
6. PA & EVC system
7. Water Managemnt System
8. Water Leak Detection System
9. Ultrasonic Pest Repeller System

However, during the stabilization period, incase of fault in any individual equipment which does not result in complete break down of any of the above subsystems or any other subsystems, the same shall be rectified within 24 hours of breakdown and restored back to operation and such fault will not be considered as major fault. At the end of stabilization period, vendor shall handover the entire system in fully working condition.

## **SECTION-I**

### **WARRANTY:**

The entire Integrated Building Management System (IBMS) included in this tender shall have warranty for two years from the date of handing over ( after SAT). During warranty period the vendor has to provide a trained resident engineer for 12 hours (8 AM to 8 PM) trouble free operation of IBMS free of cost and any spares/consumables required during warranty period shall be supplied by vendor free of cost. The above charges shall be deemed to have been included in the quoted rates .

### **OPERATION SUPPORT SERVICE (POST WARRANTY)**

Operation service support to be provided for Integrated Building Management System including providing a trained resident engineer capable of handling all software modules of IBMS included in this job schedule and maintaining all soft ware of IBMS. Any problem in Hardware is not included in scope of this item.

### **PURCHASE ORDER:**

A separate purchase order shall be released for operation support service after expiry of warranty period.

## SECTION- J

### TECHNICAL SPECIFICATION FOR CONTROL / SIGNAL CABLES

#### **1.0 SCOPE**

This specification covers the design, manufacture, testing at works, inspection and delivery at site of LT- Copper conductor, XLPE insulated, extruded PVC inner sheathed, armoured, extruded FRLS outer sheathed Control and Signal cables.

#### **2.0 CONTROL CABLES**

1100 V grade multicore, 1.5sq.mm stranded Multistrand conductor, PVC insulated and extruded PVC inner sheathed and extruded FRLS PVC outer sheathed.

#### **3.0 CONDUCTOR**

The conductor shall be stranded Annealed Tinned stranded Copper as specified in the Schedule of Quantities. It shall be smooth, uniform in quality and free from scale and other defects. The stranded conductor shall be clean and reasonably uniform in size and shape. The conductor shall be either circular or shaped.

#### **4.0 CONDUCTOR SHIELD**

Conductor shield shall be extruded in the same operation as the insulation. The semi-conductor polymer shall be cross linked.

#### **5.0 INSULATION**

Insulation shall be Cross linked polyethylene (XLPE) / PVC for Control cable as specified in the Schedule of quantities.

#### **6.0 OUTER SHEATH:**

All cables specified in the Schedule of Quantities shall have Outer sheath with Fire retardant low smoke (FRLS) PVC compound to reduce the Fire hazard. The FRLS outer sheath material shall meet the following requirements:

- |    |                     |   |   |
|----|---------------------|---|---|
| a. | Oxygen Index        | - | 29 when tested at 27 + 2°C as per ASTM – D – 2863 -77   |
| b. | Temperature Index   | - | Minimum 250°C at Oxygen Index 21 – as Per NES 715.  |
| c. | Flammability        | - | As per IEC – 332 – 1. It shall also Pass Flammability Test as per Class F3 of Swedish Standard SS – 424 - 1475. |
| d. | Smoke Density       | - | -Smoke density rating shall not be More than 60%. When tested as per ASTM – D – 2843 – 77 (1988).               |
| e. | Acid gas generation | - | Less than 20% by weight as per IEC – 754 – 1.   |

The sheath shall be resistant to water, UV radiation, fungus, termite and rodent attacks. The colour of the outer sheath shall be black.

#### **7.0 INSULATION SHIELD**

This shall preferably be of the strippable, triple-extruded thermo set type.

## **8.0 ARMOUR**

The Armour may be of galvanized steel wires or galvanized steel strips as per IS.

## **9.0 SERVING**

The cable serving shall protect the cable sheath and armour from electrolysis caused by stray currents, and from galvanic action. It shall also protect the cable from mechanical

## **10.0 GENERAL**

The cable shall withstand all mechanical and thermal stresses under steady state and transient operating conditions. damage and corrosion

## **11.0 TESTS**

### **11.1 Routine Tests (To be performed on each drum length)**

All tests as per relevant IS shall be conducted and shall be witnessed by PMC/AEC.

### **11.2 Type Tests**

The Bidder shall furnish two (2) copies of type test certificates conducted on similar cables along with the Bid.

- a. Partial discharge test
- b. Bending test followed by partial discharge test
- c. Dielectric power factor as function of voltage
- d. Dielectric power factor as function of temperature
- e. Heating cycle test followed by dielectric power factor as a function of voltage and partial discharge tests.
- f. Impulse withstand test
- g. High voltage test.

## **12.0 Installation**

Cables shall be laid in the routes marked in the drawings. Where the route is not marked, the contractor shall mark it out on the drawings and also on the site and obtain the approval of the Architect / Client before laying the cable. Procurement of cables shall be on the basis of actual site measurements and the quantities shown on the schedule of work shall be regarded as a guide.

All cables shall be new without any kinds or visible damage. The manufacturers name, insulating material, conductor size and voltage class shall be marked on the surface of the cable at every 600mm centres.

Cables rising indoors shall be laid on walls, ceiling, inside shafts, or trenches. Single cables laid shall be fixed directly to walls or ceiling. All supports shall be at not more than 500 mm. Where numbers of cables are run, necessary cable trays shall be provided wherever shown. Cables laid in built-up trenches shall be on steel supports. Aluminium identification tags shall be provided at every 20 m.

Cables shall be bent to a radius not less than 12 times the overall diameter of the cable, or in accordance with the manufacturer's recommendations whichever is higher.

In case of direct buried cables, the cable route shall be parallel or perpendicular to roadways, walls, etc., Cables shall be laid in an excavated, graded trench, over a sand cushion to provide protection against abrasion. Width of excavated

trenches shall be as per drawings. Backfill over the cables shall be sifted earth 90% compacted cables shall be buried with a minimum earth cover of 600 mm. The cables shall be provided with cable markers at every 20 metres.

The general arrangement of cable laying is shown on drawings. All cables shall be full runs from panel to panel without any joints or splices. Cables shall be identified at end terminations indicating the feeder number and the Panel / Distribution Board from where it is being laid. All cable terminations for conductors upto 4 sq.mm may be insertion type .Cables terminations shall have The end-terminations shall be insulated with a minimum of six- half-lapped layers of PVC tape. Cable armouring shall be earthed at both ends.

**SECTION K : LAN Cabling System and Component Specifications:**

UTP Cabling System

Type	Unshielded twisted pair cabling system, TIA / EIA 568-B.1 addendum Category 6 Cabling system
Networks Supported	10 / 100 Ethernet, 155 Mbps ATM, 1000 Mbps IEEE 802.3ab Ethernet, and proposed Cat 6 Gigabit Ethernet
Warranty	15-year systems warranty; Warranty to cover Bandwidth of the specified and installed cabling system, and the installation costs
Performance characteristics to be provided along with bid	Attenuation, Pair-to-pair and PS NEXT, ELFEXT and PSELFEXT, Return Loss, ACR and PS ACR for 4-connector channel

UTP Cable :

Type	Unshielded Twisted Pair, Category 6, TIA / EIA 568-B.2
Material:	
Conductors	23 AWG solid bare copper or better
Insulation	Polyethylene
Jacket	Flame Retardant PVC
Pair Separator	Cross-member, fluted Spline.
Approvals	UL Listed
	Channel test ETL verified to TIA / EIA Cat 6
Operating temperature	-20 Deg. C to +60 Deg. C
Frequency tested up to	Minimum 250 MHz
Packing	Box of 305 meters
Delay Skew	45ns MAX.
Impedance	100 Ohms + / - 15 ohms, 1 to 250 MHz.
Performance characteristics to be provided along with bid	Attenuation, Pair-to-pair and PS NEXT, ELFEXT and PSELFEXT, Return Loss, ACR and PS ACR

UTP Jacks:

Type	PCB based, Unshielded Twisted Pair, Category 6, TIA / EIA 568-B.2
Durability	
Modular Jack	750 mating cycles
Wire terminal	200 termination cycles
Accessoires	Strain relief and bend-limiting boot for cable
	Integrated hinged dust cover
Materials	

Housing	Poly-phenylene oxide, 94V-0 rated
Wiring blocks	Polycarbonate, 94V-0 rated
Jack contacts	Phosphorous bronze, plated with 1.27micro-meter thick gold
Approvals	UL listed
Performance Characteristics to be provided with bid	Attenuation, NEXT, PS NEXT, FEXT and Return Loss

Faceplates :

Type	4-port, White faceplate flush mounted
Material	ABS / UL 94 V-0
No. of ports	Four
Standards	EN 60603-7 (IEC 603-7) and EN 28877, IS 8877, IS 11801

Workstation / Equipment Cords :

Type	Unshielded Twisted Pair, Category 6, TIA / EIA 568-B.2
Conductor	24 AWG 7 / 32, stranded copper
Length	7-feet
Plug Protection	Matching coloured snag-less, elastomer polyolefin boot
Warranty	15-year component warranty
Category	Category 6
Housing	Clear polycarbonate
Terminals	Phosphor Bronze, 50 micron gold plating over selected area and gold flash over remainder, over 100 micron nickel under-plate
Load bar	PBT polyester
Jacket	PVC
Insulation	Flame Retardant Polyethylene

Fiber optic Cable system:

Cable Type	6-core, Multimode, 10G Ethernet OM3, Armored, loose-tube, Gel Filled
Fiber type	50 / 125, Laser Grade, 250 micron primary coated buffers
No. of cores	6
Cable Construction	BELLCORE GR 20 / IEC 794-1
Attenuation	
@850nm	3.5 dB / KM
@1300nm	1.5 dB / KM
Bandwidth	
@850nm	1500 MHz-KM
@1300nm	500 MHz-KM
Network Support	
10 / 100 Ethernet	2000m
155 Mbps ATM	2000m
1000 Base SX	900m
1000 Base Lx	550m without Mode Conditioning launch patch cord.
Tensile rating	1200N
Maximum Crush resistance	3000N
Operating Temperature	-40 Degree C to +60 Degree C
Armor	Corrugated Steel tape Armor
Cable minimum bend radius	20 times cable diameter
Buffered fibre minimum bend radius	19 mm

Fiber Optic Adapter plates :



Fiber Optic adapter plate	6-port, SC-Style, SM & MM
Attenuation	Max of 0.75 dB per mated pair

Fiber Optic Connectors :

Connector Type	SC-Style, Simplex
Operating temperature	-40 Degree C to +85 Degree C
Durability & color	
MM connectors	500 cycles, Beige
SM connectors	220 cycles, Blue
Ferrules	Pre-radiused Ceramic Ferrules
Attenuation	Not more than 0.75 dB per mated pair

Fiber Optic Patch Cords:

Fiber Optic Patch Cords	50/ 125 Ethernet Patch Cord
Bandwidth	
@850nm	500 MHz-KM
@1300nm	500 MHz-KM
Insertion Loss	Less than 0.5 dB/mated connector
Minimum bend radius	1.00
Operating temperature	-20to 70 Deg C

UTP Cable Installation Guidelines:

Outlets & Horizontal cross connect Installation

- All user outlets shall be identically wired with UTP Cabling system conforming to full Category 6 UTP Cabling system TIA / EIA 568-B.1 standards. Cabling systems conforming only to draft versions of Category 6 standards are not acceptable.
- Each user outlet shall be provided with one data circuit via one Category 6 cable to the outlet. The outlets shall be surface mount, with shuttered jacks to prevent ingress of dust and foreign matter.
- The horizontal cable shall be terminated on modular jack panels, placed in wall mounted / floor mounted racks provided with lock-able doors. Factory-crimped workstation and equipment cords shall be provided.
- Cables shall be coiled in the surface-mount boxes / Faceplates if adequate space is present to house the cable coil without exceeding the manufacturer's bend radius. No more than 12" of slack shall be stored.
- Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-B document, manufacturer's recommendations and/or best industry practices.
- Pair untwist at the termination shall not exceed one-half an inch for Enhanced Category 5 connecting hardware.
- Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.
- The cable jacket shall be maintained as close as possible to the termination point.
- Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
- The distance between UTP data cable and any power cable should be more than 4 inches.
- Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

The color codes shall be as shown below.

Conductor Identification	Colour Code	Abbreviation
Pair 1	White –Blue Blue	(W-BL) ( BL)

Pair2	White- Orange Orange	(W-O) ( O)
Pair 3	white – Green Green	(W-G) (G)
Pair 4	White – Brown Brown	(W-BR) (BR)

#### Horizontal Distribution Cable Installation

- Horizontal cable shall be laid to connect each information outlet to the backbone subsystem on the same floor. These cables shall be laid in the already laid cable-trays/ trunking.
- Cable shall be installed in accordance with manufacturer’s recommendations and best industry practices.
- Cable raceways shall not be filled greater than the manufacturer recommended guidelines.
- Each run of cable between the termination block and the information outlet shall be continuous without any joints or splices.
- Horizontal distribution cables shall be bundled into groups of not greater than 40 cables. Cable bundle quantities in excess of 40 cables may cause deformation of the bottom cables within the bundle.
- Cables shall not be attached to ceiling grid or lighting support wires.
- Any cable damaged or exceeding recommended installation parameters during installation should be replaced by the contractor prior to final acceptance at no cost to the HPCL.
- A self-adhesive label or PVC marker ferrules shall identify the Cables. A cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate. Similar label or marker ferrules shall also be placed on a section of the cable near to the patch panel termination.
- Unshielded twisted pair cable shall be installed so that there are no bends less than four times the cables outside diameter (4 X cable Outside diameter) at any point in the run.
- The distance between UTP data cable and any power cable should be more than 4 inches.
- The cable’s minimum bend radius and maximum pulling tension shall not be exceeded during handling and installation.
- Pulling tension on 4-pair UTP cables shall not exceed 25-pounds for a single cable or cable bundle. The pathway shall be adequately sized so as not to exceed the 80% cross-section fill of cables. The pathway shall be securely installed in the facility.
- The 4- pair UTP cable shall be run using a star topology format from the termination block at the administration subsystems on each floor to every individual information outlet. All cable routes to be approved by Engineer prior to installation of the cabling.
- The length of each individual run of horizontal cable from the administration subsystems.
- Distance between switch and information outlet on each floor shall not exceed 90 meters.
- Conduit runs installed should not exceed 30 meters or contain more than two 90-degree bends without utilising appropriately sized pull boxes.

#### Fiber optic Cabling Installation Guideline :

- The inter-building backbones shall be installed with laser grade optical fiber cables as in BOQ.
- Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits or in separate inner ducts within conduits. Where backbone cables and distribution cables are installed in a cable tray or wire way, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.
- Fiber slack shall be neatly coiled within the fiber termination panel. No slack loops shall be allowed external to the fiber panel(s).
- Each cable shall be individually attached to the respective termination panel by mechanical means. The cables strength member(s) shall be securely attached the cable strain relief bracket in the panel.
- Each cable shall be clearly labeled at the entrance to the termination panel. Cables labeled within the bundle shall not be acceptable.
- Each fiber cable shall be stripped upon entering the termination panel and the individual fibers routed in the termination panel.
- Dust caps shall be installed on the connectors and couplings at all times unless physically connected.
- All fiber terminations shall be carried out with SC-Style Connectors, color-coded as per TIA / EIA standards for MM fibers.
- All terminations shall be placed on rack-mount fiber optic enclosures capable of terminating OSP rated cables.

## Documentation Specifications

The successful bidder shall after completion of the installation, submit a detailed documentation. The documentation shall cover, in the minimum, the following

- As-built diagrams of the building Network, with building and floor wise distribution of users and connectivity.
- Test results for UTP and Fiber links.
- Consolidated BOM with manufacturer's part Nos. and quantities used.
- Warranty certificate from OEM supplier.

## **SECTION L : TECHNICAL SPECIFICATION FOR IP EPABX system**

Minimum requirement :

1. IP Digital EPABX system supporting Analog, Digital & IP phones and supporting unified communications
2. Should support PSTN and ISDN PRI/BRI, E1
3. Should be configured for 8 Analog P&T lines expandable to 40 P&T Analog, 4 PRI (120 channels) expandable to 6 PRI, 2 BRI expandable to 4 BRI.
4. Should be Configured for Minimum 24 Analog extensions expandable to 300 , 200 IP extensions expandable to 300.
5. The system should be capable of handling Audio/Video conferencing and Video telephony
6. The system should have duplicated server and power supply unit on hot stand by
7. The system should be of 19 inch form factor
8. The system should be QSIG and TEC complied
9. The system should support DID
10. The System should support DECT and VOWLAN
11. The system should be support BHCC of minimum 1lakhs
12. The system should be SIP enabled.
13. The system should be compatible with call billing software

The system should also be equipped with the following minimum features:

- System architecture should be Server gateway based
- IP switching technology
- 100% Non-Blocking architecture
- 32 bit advanced RISC/ Pentium processor or higher
- System running in 230V AC / 48 DC power supply
- Remote Maintenance facility
- Auto-Diagnostics facility
- Multi-party conferencing facility
- Class of service restriction facility
- Malicious call trace facility on each and every extension
- Call Forwarding facility to external PSTN/GSM/CDMA nos.
- Tone type dialing facility
- Simultaneous transmission of voice+video+data over a single platform
- Direct connectivity to office LAN through 10/100 Base T Ethernet interface
- PC based auto attendant cum voice mail for all extensions
- Should support Power failure back-up with Battery-bank
- Help-Desk software to support Automatic Call Distribution feature for complaint logging / emergency reporting

etc.

- Audio Conferencing Bridge supporting simultaneous conferences, each of multi-parties with facilities such as:
  - Pre-scheduling conferences
  - Joining the conference from anywhere
  - PSTN/ISDN/GSM/CDMA connectivity by just dialing in the passcode
  - Zip tone alert for the members already in the conference
- Wake Up call facility
- MDF with:
  - Krone disconnect modules
  - Integrated Protection Module for all trunks & extensions
    - Separate field side & system side MDF

### **Specification for IP phone (Type I)**

Tiltable colour display  
LAN mini switch  
500 address book entries  
5 one touch programmable keys  
Speaker phone  
Echo suppression  
CLIP  
Flash  
Redial  
Mute  
Power over Ethernet  
IEEE 802.1 X authentication  
G.711,G.729, G.722 protocols  
Call log history  
Supports messaging

### **Specification for IP phone ( Type II)**

Tiltable monochrome display  
LAN mini switch  
500 address book entries  
5 one touch programmable keys  
Speaker phone  
Echo suppression  
CLIP  
Flash  
Redial  
Mute  
Power over Ethernet  
IEEE 802.1 X authentication  
G.711,G.729, G.722 protocols  
Call log history  
Supports messaging

### **Specification for IP phone ( Type III)**

LAN mini switch  
Echo suppression  
Flash  
Redial  
Mute  
Power over Ethernet  
IEEE 802.1 X authentication  
G.711,G.729, G.722 protocols

## **Specification for Analog phone**

Flash  
Redial  
Mute  
Pulse/Tone dialing  
Ring volume adjustable

### **Electronic PBX shall have the following features for interconnection with future systems:**

- Name and Number Display (bi-directional)
- Call Transfer
- Conference Call between the two systems
- Basic call
- Direct Inward Dialing (DID)
- Calling number
- Called number
- Connected name
- Transfer (by join)
- Message Waiting Indication (MWI)
- Divert (by forward-switching)
- Calling name restriction
- Calling number restriction
- Divert (by re-route)
- Divert (responding to "check restriction" request)
- Alerting name (on-ringing)
- Path Replacement
- Callback - Call Completion Busy Subscriber (CCBS) and Call Completion No Reply (CCNR)

Interconnection port on the PBX can be one of the following three:

1. Q.SIG PRI trunk
2. H323 Trunk
3. SIP trunk

## **SECTION M: Technical Specifications for High Definition Endpoint (A V Conferencing)**

<b>Parameters</b>	<b>Essential specifications</b>
<b>ITU-T Standards</b>	<ul style="list-style-type: none"> <li>– The systems should support ... <ul style="list-style-type: none"> <li>▪ H.320, H.323</li> <li>▪ H.281 far-end camera control (in IP/ H.323 and external MCU modes)</li> <li>▪ Connection to MCU: H.231, H.243</li> <li>▪ H.239 Dual Video streams</li> <li>▪ H.233, H.234, H.235 v2 &amp; v3 encryption standards</li> <li>▪ SIP support</li> </ul> </li> </ul>
<b>Video</b>	<ul style="list-style-type: none"> <li>– The systems should support <ul style="list-style-type: none"> <li>▪ H.261, H.263, H.263+, H.263++ (Natural Video), H.264 video standards</li> <li>▪ H.264 even when the call is encrypted using AES encryption</li> <li>▪ H.264 in H.323 and SIP mode</li> <li>▪ 15 frames per second up to 168 Kbps., 30 fps for 168 Kbps. and above</li> </ul> </li> <li>– System must be HD compatible and support HD resolution of 720p</li> <li>– System must support HD transmit and receive</li> <li>– Should have ability to send and receive two simultaneous video sources in single call, so that the images from main camera and PC/Laptop can be seen simultaneously using ITU – H.239 protocol.</li> <li>– Should support VGA-based projector connectivity</li> <li>– Should support side-by-side layout so that two video sources can be displayed on a single or double screen/ display unit.</li> <li>– Should provide for following video outputs: <ul style="list-style-type: none"> <li>▪ 1 x DVI-1/ XGA/RGB/HDMI output for main monitor</li> <li>▪ 1 X XGA/HDMI/DVI/RGB/S-Video/RCA Output for secondary monitor <ul style="list-style-type: none"> <li>▪ Recording output –1X S video. Or should support recording through memory stick media – equivalent.</li> </ul> </li> </ul> </li> <li>– Should provide following video inputs: <ul style="list-style-type: none"> <li>▪ 1 x Main HD camera.</li> <li>▪ 1 x RCA/Phono/composite: VCR input.</li> <li>▪ 1 x DVI-I / VGA / RGB: PC input.</li> </ul> </li> </ul>
<b>Parameters</b>	<b>Essential specifications</b>
<b>Audio</b>	<ul style="list-style-type: none"> <li>– Should support G. 711, G.722, G.722.1, G.728, 64 bit &amp; 128 bit MPEG4 AAC-LD or MPEG4 AAC- LC or G.722.1 Annex C</li> <li>– Should have following audio features: <ul style="list-style-type: none"> <li>▪ Audio mixer</li> <li>▪ Automatic Gain Control (AGC)</li> <li>▪ Automatic Noise Reduction</li> </ul> </li> <li>– <b>Should provide following audio inputs:</b></li> <li>– System must be supplied with minimum one microphone. Microphones should be 360 degrees omni-directional.</li> <li>– 1 X RCA/Phono line input - Auxiliary.</li> <li>– <b>Should provide following audio outputs:</b> <ul style="list-style-type: none"> <li>▪ 1 x RCA/Phono, S/PDIF (mono/stereo) or Analogue</li> <li>▪ 1 x RCA/Phono, VCR or Analogue Stereo R</li> </ul> </li> </ul>
<b>Camera</b>	<ul style="list-style-type: none"> <li>– Must be HD camera</li> <li>– Camera should be ...</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Atleast 7X Optical Zoom</li> <li>▪ Detachable/ separate from the codec</li> <li>▪ 42° vertical field of view; 72° total vertical field of view</li> <li>▪ 70° horizontal field of view; 250° total horizontal field of view</li> <li>▪ Focus distance 0.3m–infinity</li> <li>▪ 1280 x 720 pixels progressive @ 30fps</li> <li>▪ Automatic or manual focus/brightness/whitebalance</li> <li>▪ Far-end camera control</li> <li>▪ 10 near and far-end camera presets</li> </ul>
<b>Network Interfaces</b>	Should support following network interfaces built-in into the codec ... – 1 LAN /Ethernet 10/100 Mbps network interface
<b>Bandwidth</b>	– H.323/ SIP: Up to 2 Mbps
<b>H.323/ IP Features</b>	Should support following H.323/ IP features ... <ul style="list-style-type: none"> <li>▪ IP Precedence( QOS), DiffServe</li> <li>▪ IPv4 and IPv6 dual standards</li> <li>▪ IP Type of Service-TOS</li> <li>▪ Auto Gatekeeper discovery</li> <li>▪ Auto Network Address Translation( NAT) support</li> <li>▪ Secure Firewall protocols: H.460.18 and H.460.19</li> </ul>
<b>Parameters</b>	<b>Essential specifications</b>
<b>Network Capabilities</b>	– Should support down-speeding over IP. – System should be capable to handle network interruptions over IP.
<b>Data Collaboration</b>	– H.239 – 1 x data port-RS 232 for control
<b>Security</b>	Should support following security features ... <ul style="list-style-type: none"> <li>▪ Password protected system menu</li> <li>▪ ITU-T standards based Encryption of the video call</li> <li>▪ End-to-end encryption on IP call</li> <li>▪ ITU-T standards: H.233,H.234, H.235. 'AES' encryption of IP calls. Call should be encrypted end-to-end even in a multi-conference</li> <li>▪ Ability to manually turn encryption On or OFF</li> </ul>
<b>Directory Services</b>	– Should support Local and shared address books – Desirable Should support LDAP/ H.350 protocols for directory transfer
<b>Other essential features</b>	Should support following essential features <ul style="list-style-type: none"> <li>▪ Native resolutions on all inputs</li> <li>▪ Internal web server/ web browser support</li> <li>▪ Allow/ support remote software upload</li> <li>▪ Support HTTP, telnet and XML</li> <li>▪ Direct plug in for a PC/ laptop</li> <li>▪ Remote system management</li> <li>▪ Should have RS232 port for management</li> <li>▪ Power supply: 100-250V AC, 50-60 Hz</li> </ul>
<b>Network Interfaces</b>	Should support following network interfaces built-in into the codec ... – 1 LAN /Ethernet 10/100 Mbps network interface
<b>H.323/ IP Features</b>	Should support following H.323/ IP features ... <ul style="list-style-type: none"> <li>▪ IP Precedence( QOS), DiffServe</li> <li>▪ IP Type of Service-TOS</li> <li>▪ Auto Gatekeeper discovery</li> <li>▪ Auto Network Address Translation( NAT) support</li> <li>▪ Standards based- Packet Loss Recovery feature on H.323 call</li> </ul>

<b>Parameters</b>	<b>Essential specifications</b>
<b>Data Collaboration</b>	– H.239 – 1 x data port-RS 232 for control
<b>Security</b>	Should support following security features ...

	<ul style="list-style-type: none"> <li>▪ Password protected system menu</li> <li>▪ ITU-T standards based Encryption of the video call</li> <li>▪ End-to-end encryption on IP</li> <li>▪ ITU-T standards: H.233, H.234, H.235. 'AES' encryption of IP calls. Call should be encrypted end-to-end even in a multi-conference</li> <li>▪ Ability to manually turn encryption on or OFF.</li> </ul>
<b>Directory Services</b>	– Should support Local and Global directories.
<b>Other essential features</b>	<p>Should support following essential features ...</p> <ul style="list-style-type: none"> <li>▪ Internal web server/ web browser support</li> <li>▪ Allow/ support remote software upload</li> <li>▪ Support HTTP, telnet &amp; XML.</li> <li>▪ Remote system management.</li> <li>▪ Should have RS232 port for management</li> <li>▪ Power supply: 100-250V AC, 50-60 Hz</li> </ul>

NOTE

The bidder will ensure that proper support is extended at this location.

HPCL has a requirement of High definition endpoints at this location. The vendor should provide all the accessories mentioned to fulfill all the functionalities specified in the tender i.e. the equipment provided should at least include the following :

- a. Codec plus camera
- b. One microphone
- c. License for dual video i.e. Video + presentation simultaneously H.239 support
- d. Cables for connecting the entire system that includes camera, codec, microphone, two LCD's at least. The vendor should ensure that the interfaces on cables provided should be of the highest possible configuration supported by the system.