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IP BACnet Guest Room Management System Technical Specifications

HOTEL ROOM MANAGEMENT SYSTEM

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This document defines and specifies a Hotel Room Management System using BACNET protocol for communication on IP network.

PART 1 – GENERAL

1.1 SUMMARY

A. Provide a complete, integrated room automation system using wired technology for the hotel with open standard BACNET on IP network.

1.2 REFERENCES

A. All electrical and Room/Guess Management System installation shall be carried out in accordance with the best International standards and codes of practice specifically with the current issue of the IEC 60669-2-1 and the requirements of the local supply authority.

B. The system shall have been installed and proven in other hotel installations with a sizable hotel site to demonstrate that the system is thoroughly reliable and efficient.

C. All equipments installed shall conform to CE standards with respect to electromagnetic compatibility and Rohs compliant.

D. Manufacturers to provide proof in the way of ISO9002 certifications.

E. Provide integration with PMS operator approved like Fidelio/Opera.

F. Provide integration with access control operator approved like Assa Abloy (Ving Card).

G. Provide integration with smartphone/tablet application via the supervision software to control the room.

1.3 SUBMITTALS

A. Product Data: Submit the Manufacturer's product data and installation instructions for each component and system.

B. Shop Drawings: Submit list of components and equipment to be supplied, including proposed locations, clearances, and power requirements.

C. Operations and Maintenance Manual: Submit the Manufacturer's standard operations and maintenance manual, including emergency maintenance provider.

D. Qualifications: Submit documentation from the Manufacturer and Installer indicating qualifications listed in Section 1.4, Quality Assurance.

E. Warranty: Submit the Manufacturer's standard two years warranty.

1.4 QUALITY ASSURANCE

A. Qualifications of Manufacturer: Legrand is a global specialist in electrical and digital building infrastructures; the Group is present in more than 175 countries all around the world. The Manufacturer shall have a minimum of 20 years documented experience manufacturing integrated wiring devices. The Manufacturer shall submit a list of at least 100 completed projects using wiring devices.

B. Qualifications of Installer: Submit a letter signed by the Manufacturer stating that the Installer is licensed by or acceptable to the Manufacturer of the integrated room automation system.

C. The system shall utilize the latest hardware and software technology and shall meet the specific needs as set out in this document.

D. The system shall be economical and cost effective in terms of its operation, maintenance and personnel required for manning. It must also be energy efficient.

E. The system must be durable and capable of sustained use throughout its life cycle.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened, factory-labeled packages. Store and handle in strict compliance with the Manufacturer's instructions and recommendations. Protect from damage. Sequence deliveries to avoid delays, but minimize on-site storage.

B. Deliver materials on site.

1.6 COORDINATION

A. Conference: Convene a pre-installation conference to establish procedures to coordinate this work with related and adjacent work.

B. Coordination: Furnish inserts and anchors that must be built into other work. Work closely with installers of finish materials so that units are properly aligned with adjacent materials.

PART 2 – PRODUCTS

2.1 MANUFACTURER

Acceptable Manufacturer: Legrand, 128 avenue de Lattre de Tassigny 87045 Limoges Cedex france, Telephone + 33 (0) 5 55 06 87 87, website www.legrand.com.

2.2 GENERAL

A. The Hotel rooms and suites consists of a Guess Room Management System (GRMS) for the following functions:
- Lighting : switching On & Off
- Lighting : dimming
- Motorized curtain control
- A/C control
- Integration with operator approved A/C system
- Do Not Disturb (DND)& Make Up Room (MUR) with status displayed outside the room and in supervision software
- Additional Room Generic Service (RGS), designed by the hotel owner, with status displayed outside the room and in supervision software (for example this RGS may be "Pick Up Laundry")
- Presence determined by mechanical/Rfid key card or virtual keycard function
- Customized touch switches
- Customized touch panels with proximity function (when the hand approach the command, the icons are getting brighter) and with hotel logo
- Master command from scenario switches
- Dedicated scenario from switches, magnetic contacts, sensor
- Dedicated scenario from BACNET command, PMS
- Dedicated scenario from key card switch with discrimination of profile keycard (Guest/Staff)

- Dedicated scenario from virtual keycard with discrimination of profile keycard (Guest/Staff/Maintenance/supervisor)
- Customized Bedside touch panel with scenario (like Sleep/Wake up/TV/curtains/ reading/thermostat/services like DND/MUR/RGS)
- Energy and power consumption measurement
- Energy saving scenario (energy socket/turn off all lights and thermostat in eco mode when no presence/thermostat in OFF mode when window opened…)
- Integration with supervision software (BMS)
- Integration with PMS operator like Fidelio/Opera
- Integration with access control like Assa Abloy (Ving Card)
- Integration with smartphone/tablet application via the supervision software
- Possibility to study an integration with any kind of system on demand

B. Corridor access, DND/MUR/RGS indications, door bell function with possibility to customize the panel with room number and hotel logo to match the in-room switches as per clients' preference. When DND is activated, the bell must be deactivated.

C. Mechanical and/or bus wiring devices compatibles. Each button can be BUS or mechanical.

D. All wiring device have the same aesthetic (for switches, power sockets, data sockets…).

E. Choice between several ranges for bus devices : Arteor/Axolute/Living Light/Celiane/Valena or touch controls - available in all standards.

F. Each button must have the ability to be programmed for multi-functionality and accommodate multiple lighting and automation scenarios.

G. Multi-ergonomy available for each button like short push/long push/toggle

H. Switch icons must be customizable.

I. Safety : Protected shaver socket, step marker lamp for the night, bathroom pull cords, skirting light activated during the night...

J. Entertainment : range of products dedicated multimedia socket with Audio/Video connections and Bluetooth connection, to recharge of technological devices (Smartphone, Tablet, etc…) and to the transmission of WiFi data.

K. Local Bluetooth air play sound system with speakers for smartphone/tablet/etc…

L. The Guess Room Management System must be online solution.

M. The online GRMS must be user friendly for quest's ease of use and management remote access. The BACNET IP GRMS system is able to match with third party Building Management System.

N. The available supervision functions are the following ones :
- Supervision and management of functions installed in the hotel
- Control and management of the functions inside the rooms and the common areas
- Management of the room status (free, occupied, guest presence, etc…)
- Control of DND/MUR/RGS type notifications
- Management of bookings using specific software (PMS)
- Temperature display and modification of the adjustment values
- Programmed scenario activation
- Alarm notifications and management of the contacts (window, door, bathroom pull cord…)
- Different icons and colors helps the operator to immediately identify the status of the room
- Supervision of the energy consumption

N. Integration with solutions of other brands: it can manage systems or products of other brands via the connection with the BMS (A/C system, sound system, CCTV, access control, security system, etc…).

O. Possibility to customize easily the touch panel/corridor display/thermostat/bedside/keycard switch via a dedicated tool with an overview of the result.

2.3 SYSTEM DESCRIPTION

The BACNET IP Hotel Room Control System can be integrated with the global Legrand hospitality building solutions. The Hotel Room Control System offers a fully integrated Guest Room Control using standard protocol such as BACNET.

The functionality includes the following features in each Guest room:
- Room temperature controls
- Lighting controls, dimming groups and on/off groups
- Controlled sockets, enabled/disabled
- Ventilation
- Curtain controls

Each feature shall be controlled by the BACNET IP Room Controller.
To achieve an environmentally friendly solution, the following features are recommended for each Guest Room:
- Electricity consumption measurement
- Cooling/heating energy consumption measurement

The system settings will be adapted according to occupancy and booking status. The occupancy status shall be indicated by the keycard switch or virtual keycard. The system will also be capable of receiving the booking status indication from the reservation software (PMS). The system could support changing the reservation status also manually from reception through the BMS.

A.   Room Controller: the intelligence of the guest room

It will control the temperature, lighting, curtains & the power circuits with energy measurement. The lighting controller shall be capable of ON/OFF and dimming lighting controls, both for incandescent, fluorescent and LED lights where applicable. Dimming control compatible with DALI protocol, 0-10V protocol and leading edge dimming circuit.

The Room Controller shall provide the power supply unit of the room, and control each type of loads.

1.   BACNET IP Room Controller: To be powered, it must be connected to an external power supply, or it can be powered via POE. It is equipped with input terminals for auxiliary connections and can be set up using Hotel Room Controller software.

2.   Functions of each room controller
- Room lighting control :
    - 8 circuits of 5A with zero crossing
    - 1 Dali line able to manage up to 64 ballasts or LED drivers in 8 groups for lighting regulation.
    - Room socket management :

- 4 circuits of 16A using bi-stable relays with zero crossing
- Automation Control : 4 circuits of 2A able to manage ventilation, curtain, MUR,DND,...
- Virtual Key card, based on occupancy control, a dynamic algorithm provides the capability to manage the presence of the guest in the room according to sensors and door contact status.
- Smart scenario to be managed through the control toggle, short press, long press command or scenario.
- Possibility to add accessory (dimmer, ON/OFF actuator, HVAC actuator, dry contact interface, sensor, bus command) to increase the capacity of the RCU.

3. Configuration tool for Room Controller
- The BACNET Room Controller shall be configured with HRC software with easy duplication of the configuration for all rooms with same specifications.
- The configuration can be prepared in office in OFFline mode to optimize the installation time on site.

4. Different scenarios can be set in each guest room as for example:
- *Welcome scenario* : after the check-in, hotel room power is supplied only when guest is detected by the virtual key card or when he puts the key in the wall-mounted key card and trigger on the welcome lighting and open curtains. The thermostat is in comfort mode (scenario designed by the hotel owner). After leaving the room, when the guest come back, he find the room in the same status as when he left.
- *Demand response* : reduce energy consumption in the guest room. It can be set up independently in each room.
- *Green sensitive scenario* : Power-on some outlets and possibility to adapt lighting ambiance by reducing the intensity of lights
- *Sleeping scenario* : turn off lights, close curtains, put the temperature on the eco-mode. This scenario can be activated from the bedside panel.
- *Reading scenario* : turn on lights on each side of bed.
- *TV scenario : t*urn on appropriate lights to watch TV.
- *Staff working scenario* : turn on all lights to check if some are broken and provide enough light to help the staff to see well what he's cleaning, power-on some outlets for cleaning machine, thermostat in eco-mode, deactivation of the commands for cleaning without control the lights.
- *Leaving scenario* : turn off lights after a time delay, thermostat in eco-mode and curtains close for energy saving.

Others scenarios:
- *Open window :* if the window is opened, the Room Controller will switch the temperature control off in order to save energy.
- *Open door :* If the door is opened without keycard in the keycard holder, the Room controller will set alarms.
- *Room status reminder :* when the client comes back to his room, he find the room in the same status as when he left.
- *Wake up during night* : turn on skirting light to guide the guest to bathroom to avoid falls and help him for orientation (a wall mounted motion sensor must be installed below the level of the bed).

5. Management of the room function :

- Make Up Room : if inside the room MUR is activated on the appropriate control, BACNET IP room controller updates the notification to all the display units and notify to the supervision software.
- Do Not Disturb : if inside the room DND is activated on the appropriate control, the BACNET IP room controller updates the notification to all the display units and notify to the supervision software. The bell is deactivated.
- Room Generic Service : if inside the room RGS is activated on the appropriate control, the BACNET IP room controller updates the notification to all the display units and notify to the supervision software. The RGS is designed by the owner as additional service like Pick Up Laundry.
- Management of the room contacts : technical contact for forwarding information and alarm notifications to the supervision software (e.g. windows or refrigerator door open). In case of windows, it can switch off the thermostat for energy saving.
- Presence management : the presence of someone in the room is notified by the key card switch or virtual key card. the BACNET IP room controller updates the notification to the external corridor display and notify to the supervision software.

B.   Thermoregulation

The thermostat acquires the room temperature via built-in sensor and maintains the setpoint by delivering actuator control commands to heating and/or cooling equipment, or by sending the temperature level to third-party HVAC system via BACNET protocol on IP network. The following control outputs are available :

1. Thermostat
   - Flush mounted thermostat with backlit display. It can be used to control the temperature of an individual zone, both if it is an local HVAC system with local actuator or if it is a centralized system.
   - It has 4 keys or touch controls that can be used to select the desired temperature and the various fan speeds.
   - The thermostat can manage different operating modes : both automatic and manual, in addition to the Eco, Comfort, Antifreeze/Thermal protection and OFF.
   - It can also be used in mixed heating/cooling systems if the 2 functions are available at the same time on the same system.
   - It features a temperature probe. It sends the temperature value to the supervisor.
   - An input for the connection of a contact line (e.g. window contact)is available on the RCU, to change the operating mode of the thermostat : when you open the window, the thermostat switch to ECO mode or OFF mode
   - It can be used for the management of different types of systems and the adjustment of the fan speed when fan coils are used.
   - Possibility of automatic operation (summer/winter) with compatible systems.
   - The thermostat can be embedded on the bedside panel. A proximity function can modulate the brightness of the icons : the icons become brighter when the hand is close to the device.
   - The thermostat can be customised with the hotel logo
   - The setpoint of operating modes can be modified from the supervisor
   - In option, when fan coils are used, the thermostat maintain a low speed for fan during the night, to avoid to wake up the guest while he's sleeping.
   - Possibility to manage the fan speed for ventillation function (without sending cold/warm air)
   - Easy customization via dedicated tool : possibility to choose the color and icons, to choose the installation mode, to add the hotel logo.

2. List of available thermo-regulation actuators (to be defined according to the HVAC system)
   - Actuator with 8 independent relays for the control of on-off valves, motorised valves (open-close and 3 points), pumps and fan coils with 2 and 4 tubes
   - Actuator with 3 independent relays and 2x 0-10V outputs for the controlof fan coils with 2 and 4 tubes with proportional 0-10V valves
   - Actuator with 2x 0-10V ouputs for the control of 0-10 proportional valves
   - Actuator with 2 independent relays for single and double loads
   - Actuator with 4 independent relays for single and double and combined loads

3. Energy conservation with the Room Controller system
   - The thermostat shall be Connected to a centralized supervision HVAC System or room management system via the Room Controller Unit.
   - The System shall provide optimized energy conservation measures with minimum inconvenience to the guest. At least five setback strategies shall be employed: two when a room is un-rented (either occupied by staff or unoccupied), and two more when a room is rented (either occupied or unoccupied) and one more when the window is opened.
   - The thermostat shall reset the fan speed to automatic speed when the guest leaves the room.
   - When the room is unoccupied and fan coils are used, the thermostat uses the low speed for fan in priority to adjust the temperature to the ECO setpoint.
   - The System shall obtain rented status automatically from the Property Management System (PMS). No manual data entry shall be required by the hotel to update the room rented status.
   - The comfort value can be set from the supervision software.

C. Guest Room Control System

1. Key Cards holder
   - Key card switch RFID with service icon to activate/deactivate the service (DND/MUR/RGS)
   - Thanks to the LED backlit slot, the device can be found in the dark and an icon animation shows where to put the keycard.
   - It works with RFID key card (13,56 MHz frequency key card detection). It is compatible with keycard of approved access control like Ving card.
   - It can send different scenario according to the type of keycard (guest, staff, maintenance, supervisor).
   - Easy customization via dedicated tool : possibility to choose the color, to choose the service icon according to the additional Room Generic Service, to choose the installation mode, to add the hotel logo.

2. Virtual key card
   - Combination of occupancy motion sensors and door contact allow to determinate the presence in the guest room via an dynamic algorithm.
   - With the integration of access control approved like Ving card, it can send different scenario according to the profile of person who comes (guest, staff, maintenance, supervisor).

3. Functions of Key Cards holder
   a. *Occupancy after check in*

- The keycards trigger the "energizer" control and automatically activate a pre-set lighting configuration, enable all room circuitry and "comfort" mode for climate control.
- Welcome lighting is turned on.
- Air-conditioning setpoint is lowered to predefined comfort level.
- Electricity is enabled in selected power sockets.
- Room status is updated in the supervisor (in reception).

b. Occupancy after absence of occupancy (guest goes to restaurant for example)

- The keycard trigger the "energizer" control and automatically put the room in the same status as when the guest left – even if a person with another profile (like the staff) when into the room during absence of occupancy (to clean the room for example).
- The lights switched on by the guest is turned on.
- Air-conditionning setpoint is defined to the value set by the guest.
- Room status is updated in the supervisor (in reception) .

c. Absence of occupancy

- The keycard is removed from the keycard holder.
- Absence of occupancy in the guest room is notified in the supervisor and the corridor display (the bell icon is turned off).
- The absence of occupancy in the guest room automatically turns off all lights and green outlets in the room after a pre-programmed time delay and switches the room climate control to eco mode.

4. Outside door indicator
   - Outside the door indicator with "Do Not Disturb", "Make Up Room" and "Room Generic Service" notifications.
   - Call bell pushbutton icon is turned ON when occupancy.
   - A contact control the door bell and disable it when "Do Not Disturb" function is activated. The DND icon blink if someone press the bell.
   - When an alarm is activated, ….
   - Easy customization via dedicated tool : possibility to choose the color, to choose the service icon according to the additional Hotel Room Service, to add the room number and the logo of the hotel, to choose the installation mode.

D. Service requests

The guest shall be able to initiate the following requests:

- Do not Disturb - turns on an indicator light outside of guest room.
- Make up Room - turns on an indicator light outside of guest room and activates request in reception
- "Do not Disturb" and "Make up Room" indicators Integrated with door chime and room number in Legrand wiring device.
- Doorbell : The System shall include a doorbell or a chime in each guestroom.
- The doorbell shall be activated through a button on a doorplate mounted outside the room.
- The interior plate can be manufactured to match the exterior door bell plate.
- Door chime shall be deactivated if "Do not Disturb" function is activated by the guest
- Control switch at entry area or alternative location (i.e. bedside) with LED indication

- Override (i.e. disable) connection with door chime
- Interface with room management system and consequently with PMS
- Occupancy sensor operates energizer control
- When the guest finish the check out, the "Make Up Room" is activated and notify to the supervisor. The reception staff will wait that the room is ready to rent it to another guest.

E. Touch Panel scenario

- The touch panel can be with 2, 4 or 6 scenarios buttons
- Easy customization via dedicated tool : possibility to choose the color, to choose the icons according to the scenarios, to add the room number and the logo of the hotel, to choose the installation mode.

F. Touch Panel Bedside

- The touch panel can be with 1,2,3,4,5 or 6 scenarios buttons and thermostat display with touch control
- Easy customization via dedicated tool : possibility to choose the color, to choose the icons according to the scenarios, to add the room number and the logo of the hotel, to choose the installation mode.

G. Cabling

- The cabling scheme of the Guest Room Management System must be in accordance with the manufacturer's instructions of installation.
- The BUS cable used to connect all the BUS products, must be the BUS cable certified by the Manufacturer – cable BUS SCS without halogen.
- The BUS power supply must be adapted to the total consumption of the BUS products.

2.4 GUEST EXPERIENCE

The Hotel Room Control System of Legrand improves comfort of guest by creating various scenarios

1. The system shall create after the check-in a welcome scenario for the guest. The system shall supply the hotel room power when guest is detected by the virtual key card or when he puts the keycard in the wall-mounted keycard holder. It shall trigger on the welcome lighting and open curtains. The system shall turn on the thermostat in comfort mode.

2. The system shall power-on some outlets. The system shall allow the guest to adapt lighting ambiance by reducing the intensity of lights and adapt the temperature of the comfort mode. The system shall reduce energy consumption in the guest room. It shall be set up independently in each room with the demand response.

3. The system shall create a sleeping scenario. It shall turn off lights, turn off the Bluetooth air play music device or the TV after a time delay and close curtains. This scenario shall be activated from the bedside panel.

4. The system shall create various scenarios managed by the guest through the bedside panel. Reading scenario: turn on lights on each side of bed. TV scenario: turn on appropriate lights to watch TV.

5. The system shall turn off lights, shall switch the thermostat in the eco-mode and shall close curtains after 30 seconds (it can be modified) with the exit scenario.

6. When the client comes back to his room, the system shall remind the room in the same status as when the client left for lights, curtains and thermostat.

7. The system shall create a staff working situation by adapting lights ambiance for maintenance, power-on some outlets and switch the thermostat in eco-mode.

2.5 STAFF EXPERIENCE

1. The system shall create a staff working situation by adapting lights ambiance for cleaning, power-on some outlets and switch the thermostat in eco-mode.

2. The staff working situation must help the staff to be more efficient by avoiding waste of time.

3. The tactile commands shall be deactivated to be able to be cleaned without control loads.

4. The system shall switch on all lights, to check if some lamps are broken.

5. The "Make Up Room" is activated by the check out scenario, to be sure that the room will ready before to rent it to another guest.

6. When the room is ready, the system notify the end of work by turning off the "Make Up Room" icon on the corridor display and the supervisor.

2.6 SYSTEM ARCHITECTURE

The System Architecture shall consist of two levels:
- Control Level
- Management Level

The system offered shall be completely modular in structure and freely expandable at any stage. Each level of the system shall operate independently of the next level up as specified in the system architecture. For example, Control Level shall operate independently without support from Management Level.

The system shall be fully consistent with the latest industry standards. To enable efficient functional system integration and to provide maximum flexibility and to respond to changes in the building use, the system offered shall support the use of BACNET, Ethernet TCP/IP and Internet communication technologies.

A. Control Level

The Control Level consists of a distributed network of smart control nodes, which are connected to IP network. Nodes include all the intelligence of the system.

Each node are capable of handling several different systems in parallel through flexible distribution of I/O points.

Nodes shall be capable of operating autonomously independently of Management Level.

For example, all systems must be able to react to alarms on the Control Level without interference from upper levels. All communication shall be event based.

B. Management Level

Management Level shall provide a uniform view to all systems through the supervision software. To ensure fault-tolerant system functionality, the Management Level shall not be responsible for any controls. The Control Level shall function independently also without the Management level.

All the systems - controls of cooling, ventilation and lighting, consumption measurements, access controls, SOS alarm, intruder alarms, fire alarms, curtains, DND and MUR - shall be integrated with the BMS.

2.7 REMOTE CONTROL AND MONITORING

A. Supervision software

the BACNET IP room controller use BACNET protocol on IP network to be compatible with any supervision software using BACNET protocol.

List of variables which can be supervised

- Room presence
- Room rent status (PMS)
- Room power circuit
- Room lighting circuit
- Room curtain circuit
- Energy consumption
- Energy green sensitive
- Energy consumption reset
- Temperature heating mode
- Ambient T°
- Referent T°
- Summer/winter mode
- Service DND/MUR/RGS
- Alarm
- Scenarios

B. PMS

The PMS can also enable integration of the Guest Room Controls & Monitoring System with BMS. The PMS allows updating status of the guest room:

- Rented (check IN scenario)
- Unrented and unoccupied (check OUT scenario - green mode)
- Unrented and occupied by the staff (staff working situation)
- Rented and unoccupied (leaving scenario)

- Rented and occupied by the guest (welcome scenario – remind guest room status)
- Rented and occupied by the staff (staff working situation)

PART 3 – EXECUTION

3.1 INSTALLATION

A. There shall be strict compliance with the Manufacturer's instructions and recommendations. The onset of work shall indicate that the Installer accepts the existing substrates and conditions. System installation shall be coordinated with related and adjacent work.

B. The system shall be tested for proper operation in accordance with the Manufacturer's commissioning guide. Damaged components shall be repaired or replaced until the proper operation is achieved.

C. The Installer shall instruct the Owner's personnel in proper operation and maintenance of the system.