



Green Building Flourishes in the “Garden of the Gulf” Thanks to LONWORKS® Networks

The award winning new building on Corniche Street, Abu Dhabi, is one of the tallest commercial buildings in Abu Dhabi and has become a dramatic addition to the waterfront skyline. The building’s design is open and welcoming, and the fully glazed atrium contains a series of sky gardens echoing the Islamic tradition of planted spaces within buildings.

The building is 185 meters (606 feet) high, is made up of 40 stories and covers an area of 100,000 square meters (328,000 square feet). The north wing follows the city grid while the south wing opens like a book in the direction of the sea and Mecca. Abu Dhabi has earned the title “Garden of the Gulf” thanks to its extensive landscaping along the waterfront and this eco-friendly green building fits perfectly into this environment.



The Challenges

Naturally, one of the biggest challenges facing developers in the United Arab Emirates is that of climatic conditions. Solar radiation can cause a dramatic temperature increase inside buildings. The precise control of lighting and air conditioning, as well as avoidance of excessive solar gain optimizes energy efficiency. The building was the first building in the region to focus on energy efficiency and sustainability. The design brief called for integrated control of lighting and air conditioning for energy -efficiency while enhancing user comfort and control through the use of a single device for all room services. Motorized blinds were also added midway through the contract.

The Solution

The building represents a progressive approach to energy use, with an innovative double-skinned external wall forming a key part of an environmental control while presence-related lighting and air conditioning minimize the building’s energy consumption. Lighting and air conditioning are both linked to occupation (so

energy is only utilized in occupied areas) while DALI digital dimming enables lighting energy consumption to be reduced when daylight levels are high. Automatic and manual control of window blinds maximizes the penetration of daylight while minimizing solar gain.

The system provides integrated control of lighting, air conditioning, and window blinds throughout the building. Users in each of the 1000 perimeter cubicle offices control lighting, blinds, and room temperature from an infrared desktop controller while occupants in open plan areas control services from their desk telephone. Staircase and core lighting, external and landscape lighting, as well as lighting in the separate 30,000 square meter (98,000 square feet) parking building are also controlled by the system.

The design team realized that they could not achieve such an integrated result through one single system or supplier and instead opted to select an open-protocol solution which would enable selection of best-of-breed products. LONWORKS® networks were selected as the open protocol since both the preferred Delmatic lighting management system and Landis & Staefa (Siemens) BMS utilized the LONWORKS protocol (ISO/IEC 14908) for communication. The two bus networks are connected on each half floor by LONWORKS network couplers which enable seamless transfer of data between the devices. The decision was taken mid-contract to integrate automated blinds into the project and as such LONWORKS networks blind controllers were added to the existing Delmatic LONWORKS bus network. This resulted in considerable time savings and reduced installation costs, thus demonstrating the benefit of an open solution. As a result, the lighting, air conditioning, and window blind controls, which are supplied by three separate companies, are fully integrated and share a common network as well as transmit and receive standard-format messages to and from each other.

Ceiling mounted multi-sensors monitor each office area and relate lighting and air conditioning speed to occupation. Delmatic infra-red desktop multi-controllers measure room temperature as well as empower occupants with the ability to adjust lighting, temperature set-point, and window blind angles. The desktop controller beams messages to the multi-sensor which transmits lighting, HVAC, and blind commands to the relevant controllers on the LONWORKS buswire network.

The lighting controller, blind controller, and VAV controller (each from a different supplier) as well as the infrared multi-sensor receiver connect to the network. The multi-sensor incorporates a motion detector which sends occupancy messages onto the shared bus which are received by the lighting controller and the VAV controller. Lighting is dimmed down to a level which takes into account the amount of daylight, while the air conditioning is set to take account of occupation, the current room temperature, and the selected temperature set-point.

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User preferences are transmitted from the desktop controller to the multi-sensor which broadcasts the various requests onto the shared bus. Lighting on, off and dimming commands are received by the lighting controllers, while blind up, down, and tilt commands are received by the blind controllers which are connected to the same bus. Current room temperature and user temperature set-point data are sent via the bus to the BMS which adjusts the air conditioner speed and temperature in the room.

The Benefits

This project demonstrates how the use of open protocols can enhance efficiency and sustainability. The most obvious advantage, therefore, of an international standard protocol is that various systems can communicate without the need for special interfaces, and seamless, integrated building systems can be achieved while still retaining the unique advantages of specialized, expert-developed systems.

Stephen Woodnutt, Managing Director of Delmatic, commented about the project in an interview with the LONMARK[®] International Magazine, "System integration was done by the two main parties – Delmatic lighting management and Siemens BMS. There was no system integrator on the project and the result shows what can be achieved through two parties working on a common protocol. Delmatic was responsible for the configuration and graphical representation of both the lighting and the window blind controllers and for the binding of the occupancy controllers to the couplers. Siemens was responsible for the BMS configuration and the binding of the occupancy controllers from the coupler to their VAV controllers." The Delmatic products integrate directly with the Somfy window blind controllers and the Siemens air conditioning VAV controllers, as they are all LONWORKS network products.

The Delmatic desktop controller provides individuals within each cellular office with control of lighting, room temperature, and blinds. Lighting may be switched on and off or set to any preferred dimming level. Room temperature may be adjusted up and down, while the window blinds may be raised, lowered, and tilted. The desk controller contains an integral temperature sensor which measures room temperature at desk level (avoiding the need for wired, wall-mounted sensors) and passes this information together with the user-selected temperature set-point to the BMS. Delmatic, Somfy, and Siemens are all members of LONMARK International, an industry non-profit trade and standards development association supporting open, interoperable control systems.

The entire system is managed and monitored through Delmatic graphical software at the head-end PC including lamp run-times and lamp failure data. "Our aim was to achieve an energy efficient and user-friendly building where energy use is minimized and in which occupants can fully control their environment. The LONWORKS network has enabled us to achieve that goal through seamless integration of lighting, window blinds, and air conditioning across a shared bus network, creating the most advanced building in the Gulf", Stephen Woodnutt concluded.

Lighting Management System Features

- seamless LONWORKS networks integration with building air conditioning network and window blind network
- shared network buswire with other LONWORKS networks building
- services
- DALI digital dimming
- Delmatic desktop multi-controller provides user control of lighting, blinds and room temperature
- presence-related control of lighting and air-conditioning
- luminaire hours-run logging
- real-time luminaire and lamp failure alarms
- graphical management and monitoring
- scene-setting in meeting and auditorium areas

Number of LONWORKS Networks Nodes

Delmatic lighting management nodes

- 607 DALI DELi Control Modules (LONWORKS to DALI interface)
- 241 Twelve Output Modules
- 1569 Multisensors (with 1100 Desktop Multi-controllers)
- 196 Triac Dimmers for conference rooms
- 36 RS232 AV Interfaces
- 71 LONWORKS technology Couplers
- 3 Dimming Racks for main auditorium
- 2723 Total Lighting Management nodes

Siemens BMS nodes

- 2400 VAV controllers RXC 32.2

Somfy window blind nodes

- 1094 Blind controllers BIU-6AC
- 6217 Total nodes

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