

Networked lighting controls for smart buildings

Latest development in lighting technology and design, their application in green buildings and benefits achieved



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Why lighting controls?

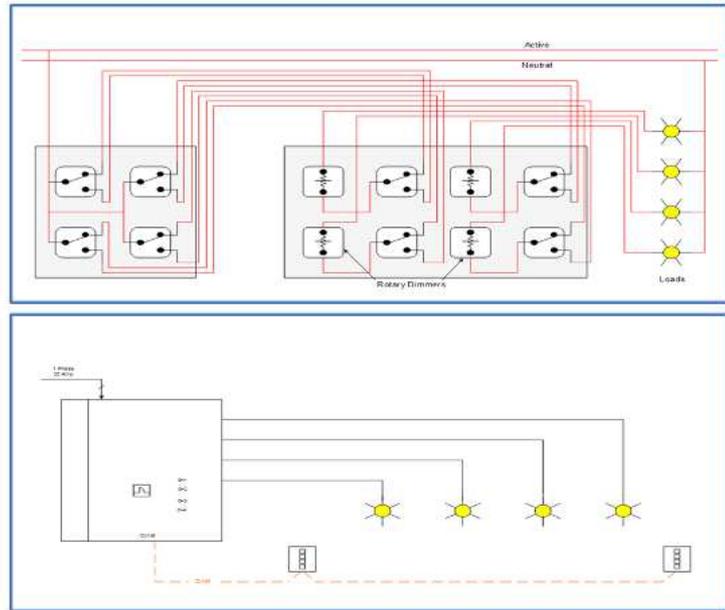
- A room with 4 lighting circuits
- Need to control them independently from 2 locations
- Location 1 needs only switching
- Location 2 needs switching as well as dimming



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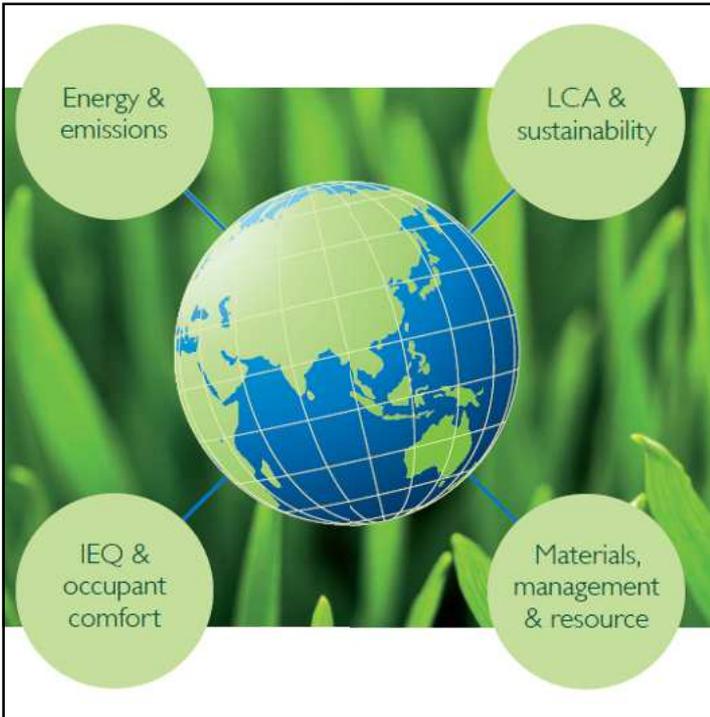
Smart lighting controls can reduce the consumption and cost of copper and plastic used in cabling

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However efficient your lighting system, you can save even more by using smart lighting controls.

- Based on current global energy consumption world energy demand to increase 50% by 2030.
- Buildings consume 30% of world energy.
- Artificial lighting contributes 30% of energy consumed in a typical commercial building.
- It is possible to reduce lighting energy consumption by as much as 55% with the help of lighting controls.

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Energy & emissions:

Superior energy management functions through presence detection, daylight harvesting, superior dimming, switching and enhanced control management.

Indoor environmental quality & occupant comfort:

Control solutions that put control back into the hands of the occupants, enabling desktop management of a worker's direct environment.

Life cycle assessment & sustainability:

Modular product designs provide an upgrade path in the face of changing technologies. Flexible control architecture that facilitates changes in occupant demands and use of a building or space.

Materials, management and resource:

Green based supply and operational practices, lean product design and manufacturing minimize demand on resources and reduce energy consumption.



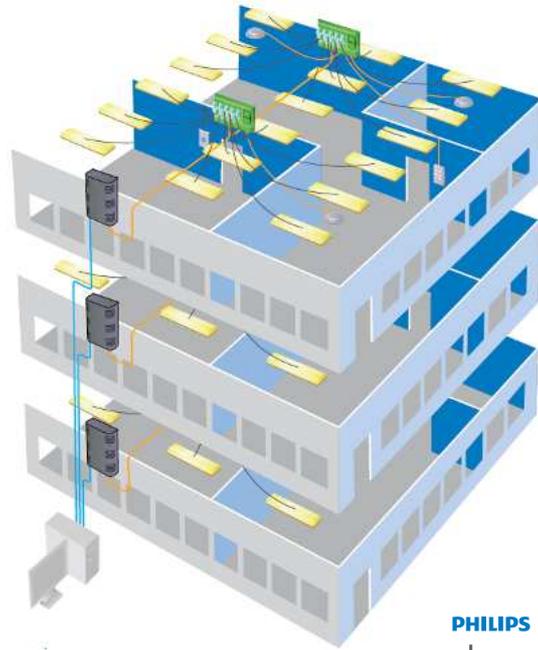
1989
Weight per channel 2.72kg

1996
Weight per channel 2.05kg

2006
Weight per channel 1.5kg

Why lighting controls?

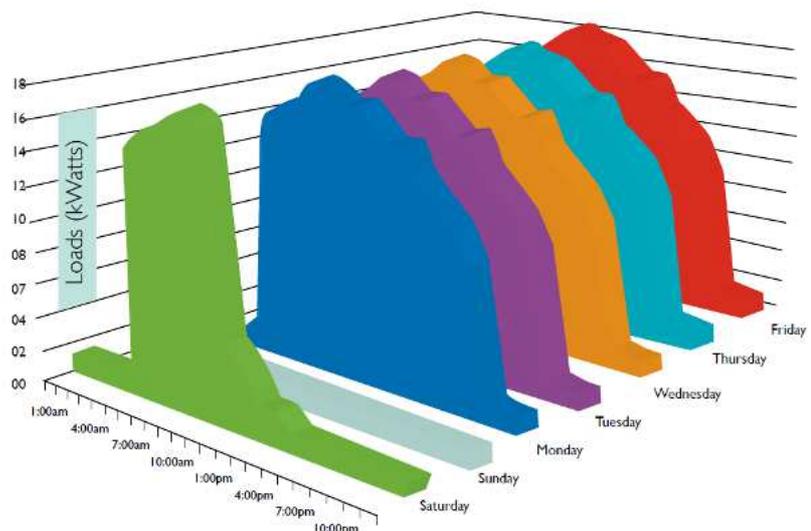
- A networked lighting management system offers a flexible as well as scalable solution for commercial environments ranging from small offices to large campus sized installations.
- The system benefits the environment, the installer, the facilities manager as well as the end user.



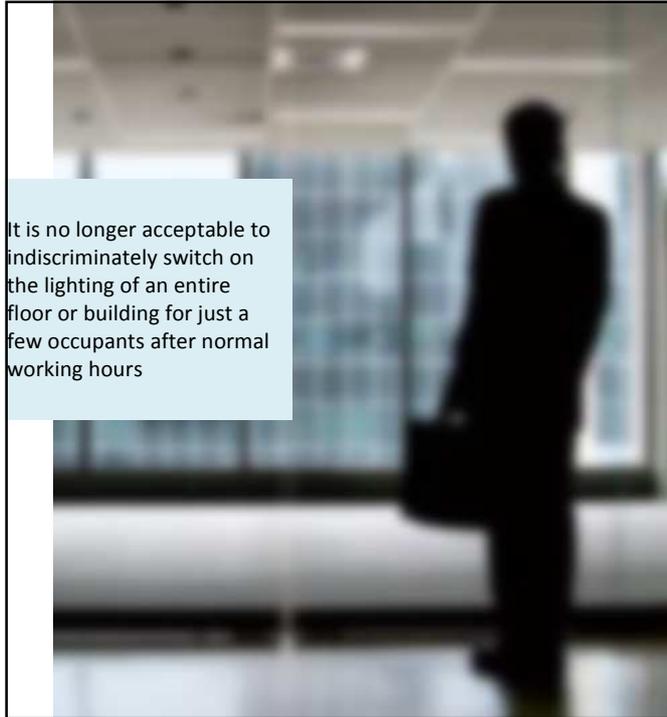
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Symptoms of an under-controlled lighting installation

- A sharp rise in electricity consumption before most workers have arrived
- No observable energy reduction around the middle of the day when many workers go to lunch and daylight penetration is at its peak
- High energy usage continues late into the evening
- Excessive energy usage continues overnight



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It is no longer acceptable to indiscriminately switch on the lighting of an entire floor or building for just a few occupants after normal working hours

Strategies that reduce lighting energy consumption

Limit time of use:

Eliminate unnecessary use outside normal hours. Lighting that is not required can be switched off or dimmed.

- I. Divide the building into zones.
- II. Eliminate lighting use outside normal hours in some zones by using time control to switch off or dim to 20%.
- III. Install occupancy sensors.
- IV. Web browser, touch screen and key pad control.

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A dimming function to compensate for excessive initial lighting level that is delivered in projects to account for light depreciation over time

Strategies that reduce lighting energy consumption

Design illuminance:

The use of any space in a building is dynamic. The lighting can also be dynamically managed depending upon the type of use at a certain point in time.

- I. Illumination management control
- II. Step dimming
- III. Programmed dimming

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Daylight harvesting can maximize energy savings by delivering a combination of natural and artificial light to meet the design intent of a lighting installation

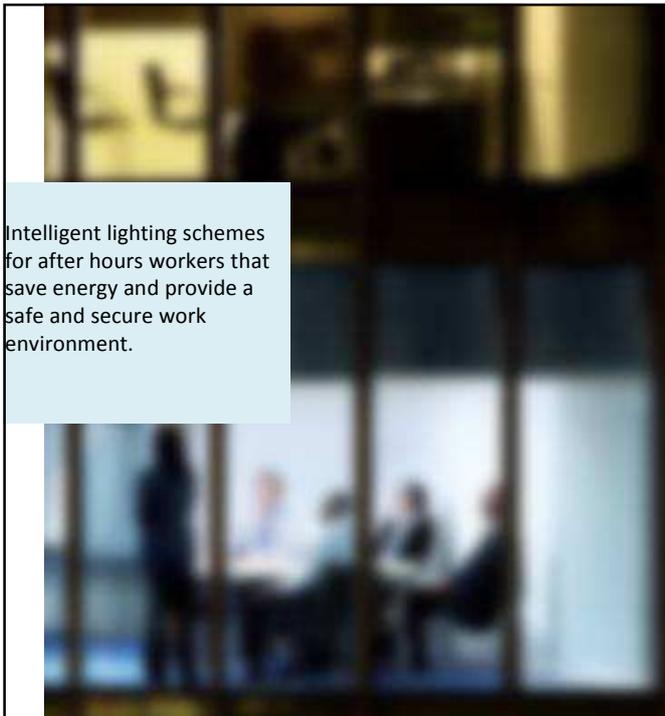
Strategies that reduce lighting energy consumption

Daylight integration:

Enable sunlight to displace artificial lighting with sensitivity to occupants

- I. Daylight harvesting
- II. Multi sensors
- III. Switching
- IV. Dimming

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Intelligent lighting schemes for after hours workers that save energy and provide a safe and secure work environment.

Strategies that reduce lighting energy consumption

'After hours' lighting management:

Evening workers detected and given reassuring illuminance while at the same time eliminating waste of energy in other areas. Gradual closure after all movement has ceased.

- I. Desktop interface
- II. After hours sweep
- III. Egress path and common areas illuminated

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Using technology to ensure lighting consumption is based upon actual usage and intent by switching off lights in areas that are not in use.



Strategies that reduce lighting energy consumption

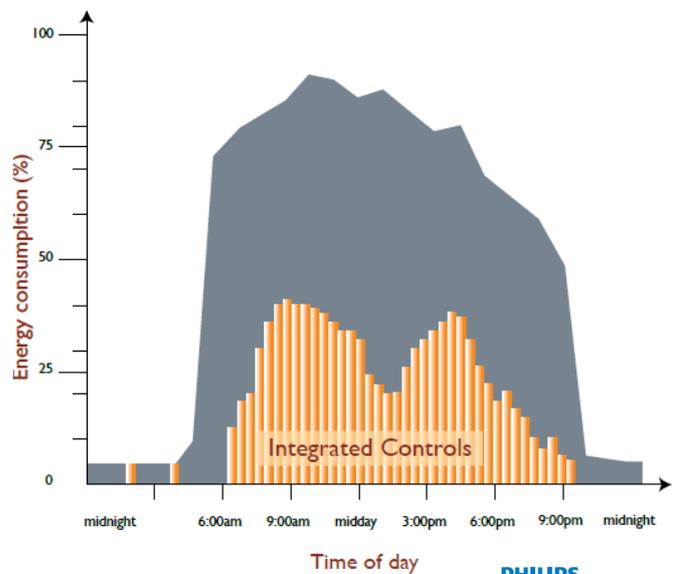
Low utilization areas:

Areas like meeting rooms, store rooms and amenity areas that are not utilized at all times.

- I. Occupancy sensors
- II. Time control

A range of strategies

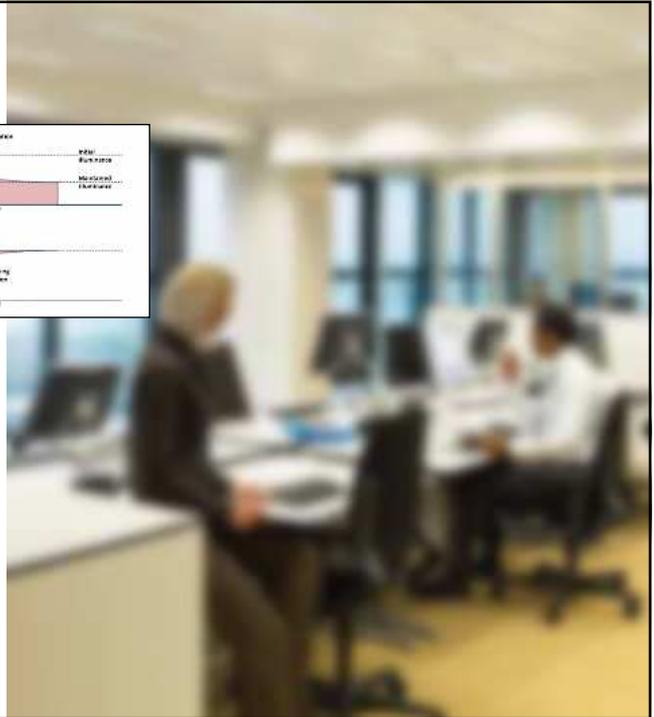
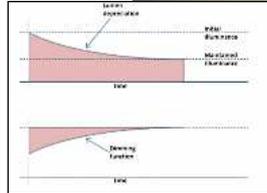
- A well designed energy management system combines a range of strategies, dependent on the layout, design and use of a building to dramatically change its energy use pattern.
- Timed events, substitution of artificial light with daylight and occupancy based detection can substantially reflect on the facility's bottom line.



Control solutions that reduce energy consumption

Dimming

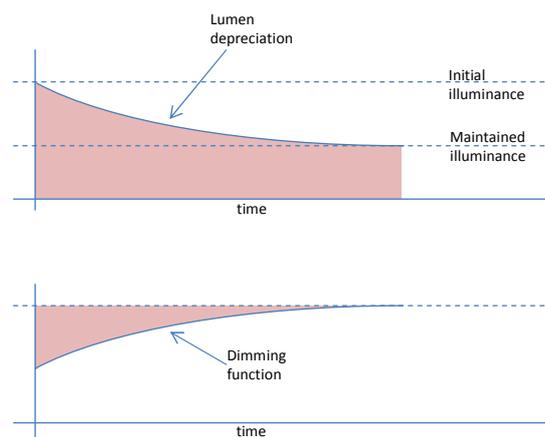
- Digital control enables seamless light level adjustment to occur continuously without being discernible to occupants.
- Designed illuminance management enables optimum light output maintenance as lumen depreciation sets in over time.



Control solutions that reduce energy consumption

Dimming

- Excess illumination is provided in new installations to allow for light output depreciation due to lamp ageing, dirt accumulation and absorption by dark colored interiors.
- A dimming function compensates for excessive initial lighting level and maintains the desired illuminance over time.



Control solutions that reduce energy consumption

Daylight Harvesting:

- Lighting control technology enables us to strategically substitute artificial light with natural light, slowly dimming lights to achieve considerable energy savings.
- Superior dimming and sensing technologies offer enhanced energy management, longer lamp life and hassle free operations.

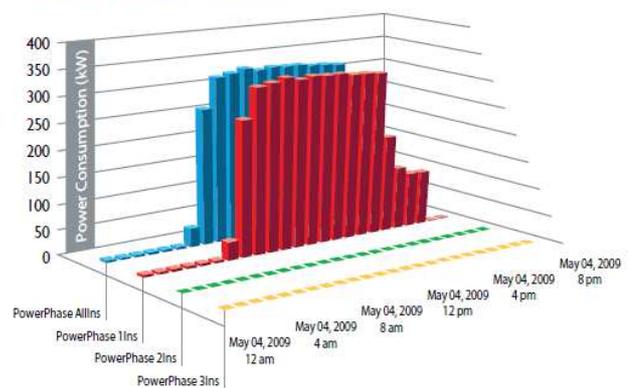


Control solutions that reduce energy consumption

Metering and sub-metering

- Sub-metering is awarded a green building rating credit under schemes such as Green Star, BREEAM and LEED.
- Evaluating differences between notional load and actual load is particularly significant where energy modeling has been used in the design phase.

Metering & Sub-Metering



Control solutions that reduce energy consumption

Networked sensors:

- Modern multifunction sensors offers a great deal more than simple switching.
- The light level and motion detection functions can be configured to work together to provide conditional logic. For instance, the sensors can be set up to change lighting levels when motion is detected, but only if the current lux level for the controlled area is below a specified value.
- The motion detection function can perform different routines according to the time of the day, or day of the week.

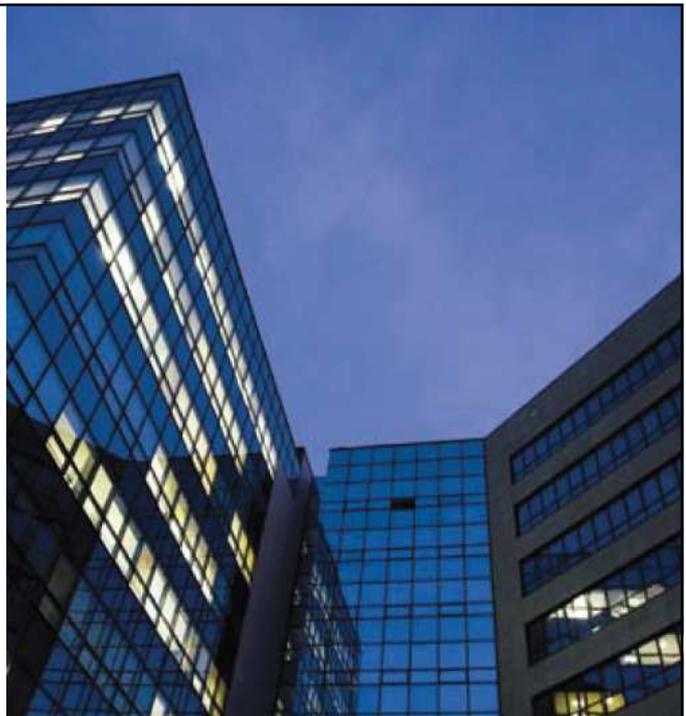


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Control solutions that reduce energy consumption

Time clocks

- Time clock controllers are intelligent devices that store events in their memory that can be triggered to advise downstream devices on the network to actuate or modify their behavior pattern.
- For example a time clock advises these devices to trigger different scenes based on the time of the day



Control solutions that reduce energy consumption

User control panels:

- Highly customizable range of user control panels available in a wide combination of colors, styles and finishes.
- The functionality extends from simple scene selections to advanced sequential and conditional logic.
- Button faders, infrared input to provide IR receive capability and custom engraving to clarify functionality using words or diagrams.



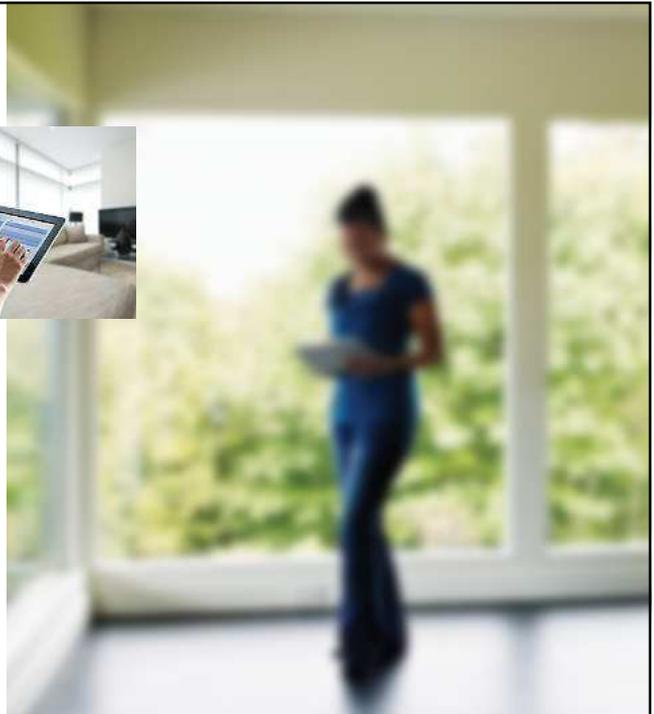
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Control solutions that reduce energy consumption



Smartphone and tablet interfaces:

- EnvisionTouch and DynamicTouch software apps are self configuring or completely customized solutions based upon customer requirements for seamless and effortless control.



Control solutions that reduce energy consumption

Energy Dashboard

- Enables facility users to take active involvement in the energy management of their lighting system.
- Compares current consumption with past performance, displays instant and year to date energy saving performance.



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Burj Khalifa Highrise Complex

– lighting control system, a towering achievement

At over 2720 feet, the Burj Khalifa sets a lot of world records. Opened in January 2010, the 160 floor mixed use tower in Dubai features residences, corporate suites and the world's first Armani hotel and residences.

Philips Dynalite intelligent lighting control system seamlessly delivers interior and exterior lighting for the entire building. The hundreds of guestrooms, residences and offices each contain a lighting control system founded on the same distributed control architecture.

Over 7,000 Philips Dynalite multipurpose controllers and 14,000 Revolution user interface panels have been installed throughout the tower. Their in-built intelligence ensures they retain their programming even when disconnected from the communications network. Philips Dynalite EnvisionManager software acts as the system head-end in the control room, providing control, status and scheduling information for the building.



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PetroChina headquarters

– showcases sophisticated lighting control



Incorporating China's largest DALI lighting installation, Philips Dynalite lighting control system at PetroChina's headquarters sets the standard for flexible control and green building performance.

Over 8,000 individually addressable fluorescent HF DALI ballasts and 2500 switched circuits are coupled with a network of smart motion sensors that feed information back to the control system.

The daylight harvesting functionality automatically modulates artificial light levels according to the level of natural light available. This not only saves energy but keeps lux levels within a predetermined range for occupancy comfort.

The system is configured and managed using EnvisionManager graphical user interface via a user-friendly centralized management system. EnvisionManager provides a visual overview of the entire lighting system. Operators are able to readily identify every light fixture, circuit and channel across the entire complex and control them automatically or manually.

Although the precise timing and functionality is individually configurable for each floor or zone, it essentially corresponds to 'lights on' at the commencement of working mode, followed by a timed sequence of dimming to lunch mode, ending in 'lights off' when the system goes into after hours mode. In 'after hours' mode, motion sensors are activated in amenity areas and lift lobbies to initiate lighting if motion is detected.

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Airtel Network Experience Centre

- state of the art lighting and control



Source: System Integration Magazine

The Bharti Airtel Network Experience Centre in Manesar, India monitors the entire communication network of the fourth largest telecom service provider in the world. Spanning 20 countries and serving more than 267 million customers, this operator connects nearly six million voice and five million data customers during peak hours. As many as 600 switching and routing centers process 80 billion minutes of voice and 24 petabytes of data traffic every month. This huge traffic comes from over 160,000 sites through 150,000 kms of optical backbone via 75,000 kms of undersea cables.

The Lighting system supplied by Philips includes the latest energy efficient LED and conventional luminaires and a state of the art networked control system. More than 40 relay, leading edge and DALI controllers centrally control more than two thousand light points. Custom engraving on keypads display Airtel's corporate logo on the faceplate. The lighting control system is integrated via a BACNET interface for BMS integration to provide seamless centralized monitoring and control via BMS. Ethernet gateways enable integration with iPad and third party AV systems.

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