# LightBox System Overview

Introduction

The MultiControls LightBox system is a sophisticated lighting control and management system. Designed to provide a flexible and powerful lighting control system, the system is primarily focused on commercial applications such as Offices, Schools, Universities, Hospitals and Airports etc. Featuring an intuitive graphic user interface and commissioning tool, coupled with a very powerful database engine, the system provides an intuitive and simple way to initially set-up the system, as well as presentation of live real time status. A wide range of sensors, switch input interfaces and scene button panel options ensure market leading functionality and flexibility.

System Architecture

A LightBox lighting control system comprises of one or more MultiControllers, each supporting up to 10 Dali Hubs. DALI Hubs have two separate DALI field networks supporting up to 64 DALI devices each. Therefore each MultiController has the capacity to manage up to 1280 DALI devices.

The LightBox software can be used to configure any connected DALI device to form local control groups. DALI devices do not need to be physically in the same DALI field network to function as part of a control group. Thus a control group can be as simple as a single switch controlling one local light, right up to say, a switch controlling the whole building.
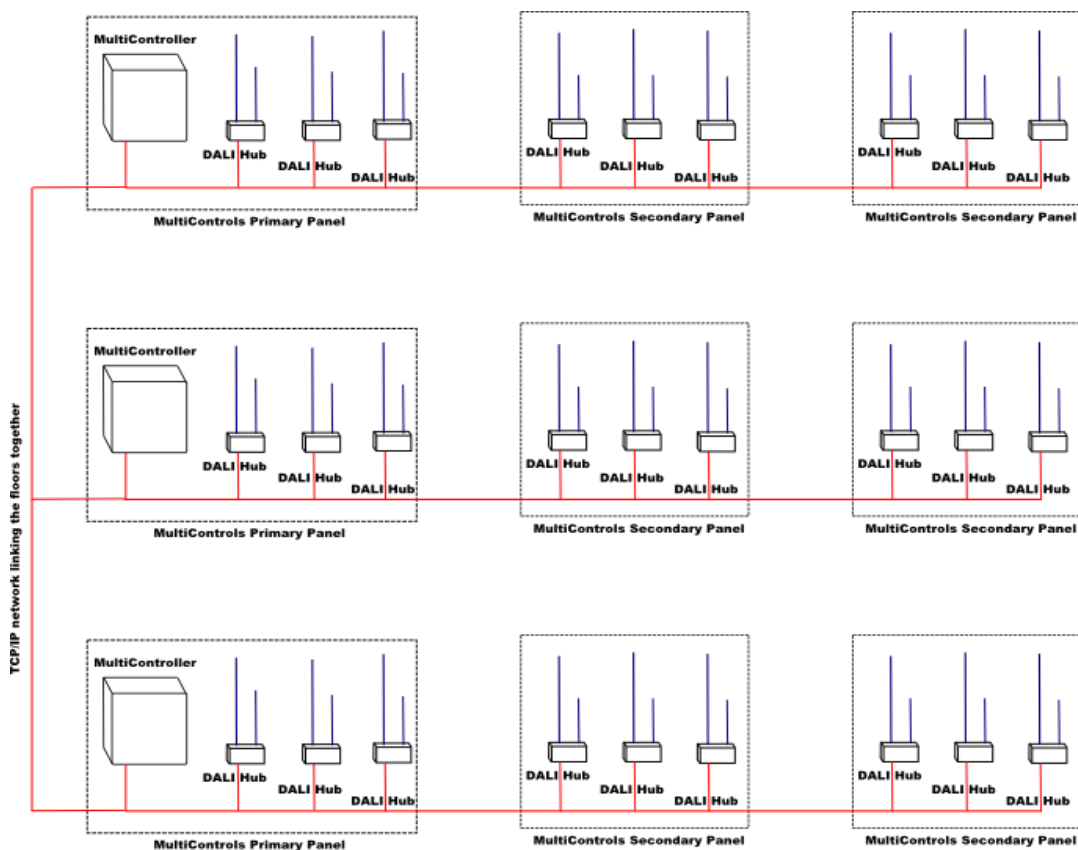
MultiController

The MultiController is in effect an area controller, providing a powerful processing platform to monitor, control and report on the lighting control system. To ensure survivability and performance the MultiController has been developed as an entirely solid state device. In simple term this means there are no moving parts such as fans or Hard Disk Drives that are prone to failure over time.

The core of the MultiController utilises a well proven global standard database engine. This means that MultiControllers provide a very stable operating environment and improved "mission-critical" performance and stability. LightBox has been designed to not only allow you to control your lighting but also to monitor and report on your system to ensure optimum utilisation and energy saving throughout its entire life cycle.

At MultiControls we have seen numerous examples of projects in which the operation of the lighting control system is mission-critical. This is particularly true in areas such as Hospital Operating Theatres, Special/Intensive Care Units, critical Control Centres (air traffic/military operations) and secure environments such as prisons or police cells. Whilst the MultiController is a very resilient device in its standard form, we have developed a unique capability in LightBox that allows one or more additional MultiControllers to be added to the system that function as a "Hot Backup" for the primary MultiController.

This approach allows systems that really must not fail; to continue to function seamlessly in the unlikely event of a MultiController failure. Should the primary MultiController cease to operate for any reason, the "Hot Backup" would immediately take over command and control of the Dali Hubs (whilst alerting the administrator of the failure).

The "Hot Backup" MultiController can reside adjacent to the Primary MultiController, but could also be installed in a separate location. They could even be fed from a different power source such as an Uninterruptible Power Supply (UPS) or an essential supply. In this case data connections would be made using managed network switches to also provide multi path network connections.

Further, MultiControls can supply enhanced MultiControllers in the form of Blade Servers or other rack mounted platforms that can be equipped with more processing cores and memory to create a central building controller. These Blade Servers are capable of running multiple versions of the 10 Dali Hubs of a standard MultiController. This allows the LightBox system to co-exist in a standard I.T. rack alongside other building infrastructure should this be advantageous.

DALI Hub

The DALI Hub is the first of a series of Hub units to be developed by MultiControls. The MultiController/Hub topology has been designed to allow the flexibility to develop new Hubs to cater for the next generation of lighting network protocols as they emerge, without having to redesign the entire system.

The DALI Hub supports two DALI networks, each capable of supporting the full 64 devices as specified by the DALI standard, for a total of 128 devices. The DALI Hub is capable of controlling and monitoring the full range of standard DALI devices which includes fluorescent ballasts, LED drivers, relays and emergency devices.

The system will work correctly with any lighting load controller (Ballast, Driver, Relay Module or Emergency Pack) that fully complies with the DALI standard. By localising the system processing in the MultiController, we have been able to make the DALI Hub very cost effective units, and therefore minimise the cost impact should additional DALI networks be required on a project when compared to traditional DALI solutions. The DALI Hub also features an Auto-Heal facility enabling the replacement of a single failed DALI device automatically, without the need for any reprogramming.

System Input Devices

MultiSensors

The LightBox system supports a wide range of extended DALI input devices for user control. MultiControls have developed a range of Passive Infra-Red (PIR) sensors for detecting occupation. Based on a common compact and bespoke plastic housing, MultiSensors are available in standard, slight motion, spot motion and 12m High Bay formats, each of which also includes a light level sensor and an infra-red receiver for use with an optional user remote control unit.

Due to their compact size (only a 40mm diameter mounting hole required) the MultiSensor range is easy to install into most standard ceilings and tiles, using a standard sized hole saw. They can also be incorporated into light fittings and thin metal ceilings using the standard spring arrangement, but an optional backing ring or "Herbie" clamps are available to facilitate fitting if the material thickness is not sufficient for the standard spring arrangement to work properly.

The design of the plastic sensor housing has also been made such that it can be mounted in a standard GU10 type downlight enclosure. This provides a further range of mounting options and bezel finishes.

MultiControls also offer a range of surface mount options to suit applications where there is no ceiling void such as stairwells, or industrial type applications.

Switch Input Interfaces

In addition to the sensor range, the LightBox system also offers universal input units in both ribbon cable and Din Rail mount formats. Each of the input units supports up to 8 separate inputs, enough to cater for a full four gang switch plate of two way centre off retractive switches. Unlike many of our competitors, each input on the MultiControls ribbon cable input unit can be extended by up to 10m. This is achieved by a combination of comprehensive hardware and software noise filtering and switch de-bounce circuitry. This approach allows for multiple switch drops to be linked back to a single module, and allows for the input unit to be mounted in the most advantageous location. The Din Rail module switch input cables may be up to 50m long.
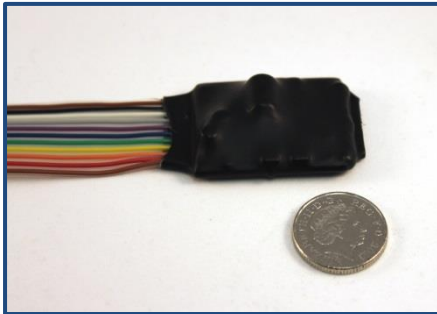
The input units are referred to as "universal" because they are more than simple switch interfaces. Each of the 8 inputs on a device may be assigned to be either a latching switch, a momentary contact, a 3rd Party Sensor with integral timeout, or a 3rd party sensor using system timeout. This enables the LightBox system to use a wide range of switches and 3rd party sensors to ensure the widest possible flexibility when designing a system for your application.

Scene Button Panels

Multi Button Scene selection panels are also available, that allow the pre-configuration of different scene levels. These scene levels can then be recalled by a simple single button press. Typically, a standard scene plate would have 4 Pre-set Scenes, Master Raise and Lower buttons and Off. Other button combinations and custom graphics are also available.

The MultiControls button modules are designed to use Euro Module wall panels. This means that a wide range of panel bezel finishes are available to complement other switches and power outlet hardware in the space.

System Topology

The MultiControls LightBox system is connected together using global standard Ethernet TCP/IP network connections. This can either be a fully private network or the system can be incorporated in to an existing building I.T. infrastructure with an appropriate range of I.P. addresses being provided by the I.T. department.

In the development of LightBox we have focussed our protocols on the use of TCP/IP messaging as this is considerably more robust than its counterpart UDP/IP. TCP/IP ensures that LightBox is able to take full advantage of industry standard network technologies such as WIFI wireless networking etc. We have also ensured that all of our devices use fully compliant network addressing, and do not cause restrictions on the network (this is a significant limiting factor with some other systems).

The flexibility and worldwide standard of Ethernet means that the full range of networking tools and equipment may be used to create a network that is as simple or complex as required for the particular specifications of a project. A simple installation might consist of a private network using unmanaged network switches allowing all of the devices to communicate. A more demanding project might utilise fully managed network switches, enabling the creation of Virtual Local Area Networks (VLANs) which manages the traffic around the network and allows the creation of redundant links which are only bought in to life if the primary connection fails for any reason. This enables the creation of a bespoke solution that balances the demands of cost versus functionality.

Lighting Control Panels

At MultiControls we are well aware that providing an installer with a carton full of DALI Hubs and other electronic devices, can sometimes be a daunting and problematic prospect. This is also exacerbated by the fast track nature of modern construction programmes. We have found that offering a panel manufacturing service takes the worry of finding suitable enclosures to house the sensitive electronic components, connection of power supplies, and terminating DALI field networks. This is particularly true when it comes to the Ethernet connections for devices such as MultiControllers, Hubs, Wireless Access Points and Network Switches.

To overcome these real life problems, MultiControls can manufacture lighting control panels which are designed specifically for the project. All internal assembly and wiring is completed and tested at our works. This approach means that for each control panel location, the correct equipment is pre-installed within the panel and internal wiring for power supplies etc. are all completed prior to shipping to site.

Once on site, all that is required is to mount the panel on the wall of the electrical riser / cupboard, connect the control panel mains power, outgoing DALI networks and Ethernet data cables.

All panel connections are brought to terminal rails at the top of the panel (bottom entry is available on request). This means that the installer does not need to worry about the interconnection of the individual components, or risk damaging them making up their own panels. The external wiring is simply connected at the panel terminal rail.

Unless specifically requested otherwise, MultiControls panels use high quality IP65 enclosures with hinged locking doors and removable gland plates as standard.

All internal wiring is over rated for the loads involved, and the ends of the cables are terminated with Bootlace ferrules.

Cable management is by loomed cable runs, or contained in finger trunking as appropriate.

Where multiple devices such as the MultiController and a number of Hubs are to be fitted in a panel, a network switch will be provided for the Ethernet Data connections. Alternatively, if the building IT infrastructure will be used to connect the lighting control system together, we offer an option of a patch panel.
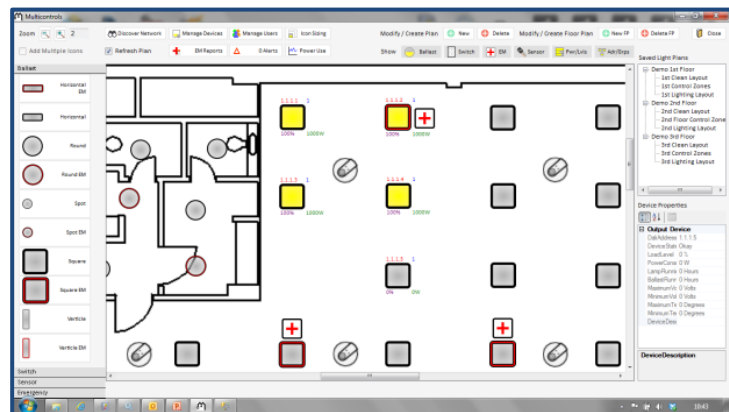
LightBox Graphic User Interface (GUI)
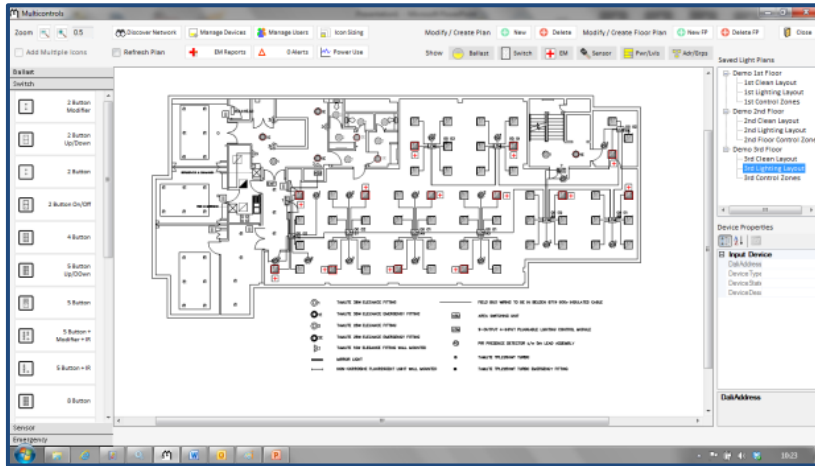
Traditionally, Users of lighting control systems have struggled with a lack of an intuitive graphic user interface resulting in systems being difficult to visualise, harder to access and often requiring additional paper drawings and grouping tables to be maintained to keep the system up to date and allow changes to be made.

MultiControls have developed the LightBox GUI – a graphical user interface designed to provide clear and simple visualisation and management of lighting control systems. Icons representing system elements can be overlaid on building schematics and incorporated into a site plan. These icons are dynamic and allow the state of the system and current output levels to be viewed at a glance giving a real-time system wide view.

Thanks to the power of the MultiController the full set of site graphics is stored locally on the lighting control system so any authorised user or commissioning engineer, can connect to the system and utilize the full range of graphic functionality. This means there is no need to supply copies of paper drawings or site files to a user before they can access the system. Also, this

approach ensures accuracy as it derived directly from the system, unlike separate drawings or "Bolt on" graphics packages which require updating separately with any changes made to the control system.

The graphic capability is a standard and integral part of the LightBox software. Unlike most other lighting control systems systems, no external graphics packages are required in addition to provide the graphic User Interface (GUI).

LightBox supports the ability to import various iterations of a floor plan so that the user can seamlessly toggle between an electrical layout, ceiling plan or furniture arrangement for example, to provide the best information for the task at hand. Again, unlike most other lighting control systems, each layout supports seamless pan and zoom functionality for navigation around the floor areas.

LightBox also provides the following functionality giving greater management of a system:

- System diagnostic information
- Alert messages
- Power consumption data
- Emergency test reporting

Our aim is to give our customers a better solution for their lighting control and management by providing:

- Intuitive user interfaces
- User friendly tools for energy management helping to reduce the energy consumed by a building's lighting
- Out of the box tools and reporting for functions such as routine emergency lighting tests
- Live remote reporting of faults and failures using email and automated work sheets
- High levels of customer focused technical support and site commissioning
- Ongoing routine maintenance and support packages for the life of the system