

## Quantum® and Quantum Vue™ Ethernet Network Configuration

### Installation Overview

The network architecture that forms the Local Area Network (LAN) for the Quantum® processor and server communications of the Quantum® lighting control system through the Quantum Vue™ browser can be adapted to an existing institutional network infrastructure. While this can be of substantial savings in time and material when adapted to an institution's network infrastructure, the responsibility, setup, and authority for that network falls directly under that institution's IT administration.

When using an institution's network infrastructure, the Quantum® LAN must have unrestricted communication within that institution's IT parameters. This document lists the IT requirements for the Quantum® LAN and needs to be given to the institution's IT administration far in advance of system installation.

Timeliness of a project where a Quantum® system is residing on the institution's network is dependent on that institution's IT planning and cooperation. The earlier the institution IT administration is brought into the project, the easier and more efficient the installation will be.

### Ethernet Overview

The Quantum® light management system requires an IEEE 802.3 Ethernet link to enable communications between Quantum® processors as well as between Quantum® processors and the Quantum® server. When this Ethernet link is supplied by a customer's IT department, it must be designed and configured to meet the institution's IT requirements and the Quantum® LAN requirements.

### System Overview

Each facility will have its own characteristics. This document outlines the guidelines and requirements for the infrastructure to support the Lutron® Quantum® system.

The Quantum® Ethernet communications link follows the IEEE 802.3 Ethernet standard using a minimum cabling of Category 5 (CAT5) at the Quantum® processor, and IEEE 802.3 Ethernet standard cabling between Quantum® processors and the Quantum® server. This copper or fiber wiring must follow the standard IEEE 802.3 Ethernet wiring rules for distance and separation.

- CAT5 maximum distance requirement: 328 ft (100 m)
  - If a cable run of longer than 328 ft (100 m) is required, a switch or repeater will need to be used to extend the length.
- There should not be more than 6 "hops" from the processor to the server.
  - A "hop" is defined as the Ethernet link passing through a device such as a router or switch. Keep in mind that there is a "hop" from the Quantum® processor to the first Ethernet switch.

It is possible to use an existing Ethernet infrastructure installed in the building as the Quantum® processor communications link. When this is done, the customer, network installer, and network administrator must be aware of the Quantum® system requirements.

The Quantum® system uses UDP multicast between Quantum® processors. The customer-provided network must be configured to allow multicast traffic between the Quantum® processors on the network.

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### System Start-Up

When the network is supplied by others, the network must be operational before the Lutron® field service engineer arrives on site for system start-up. The system start-up cannot be completed without reliable connectivity between the Quantum® processors and the Quantum® server.

The customer may be required to schedule an additional field service visit at an additional charge if start-up cannot be completed. This may occur if the network is not installed or if any networking equipment required to ensure connectivity between Quantum® components is not operational and properly configured.

### Site and Network Access

Lutron® field service engineers and supporting personnel must have access to network equipment required to ensure communication between Lutron® components on the network.

If access to network equipment and/or use of network analysis tools is not permitted, the customer must ensure that qualified network support personnel are on site and available to support the Lutron® field service engineer during the commissioning process. Lack of support may require scheduling additional field service visits at an additional charge.

### Network Documentation

The network configuration settings of the Lutron® equipment connected to the network; such as, IP addresses, subnet masks, and gateway addresses, must be supplied to Lutron prior to the Lutron® field service engineer's arrival on site to commission the system.

### Network Support Disclaimer

When the network is supplied by the customer's IT department, Lutron cannot be held responsible for Quantum® system downtime that results from network downtime.

The network that is used to communicate between Lutron® Quantum® equipment is utilized as a control and a data network. Control networks require more predictable and consistent response times. Increased traffic from corporate intranet data can greatly affect these response times.

Network reliability impacts the collection of data from the Quantum® system. This data is used to generate reports and to assess the system health. Network reliability also impacts control functions.

Lutron recommends that the customer employ qualified network support personnel that will maintain the reliability and health of the network post-occupancy.

### Network Equipment Requirements

All network equipment ports connected to the Lutron® Quantum® processor are configured to 10/100 MB/sec data speeds.

Network communications between the Quantum® processor and the Lutron® server must not rely on wireless technology. A wired IEEE 802.3 Ethernet network is required for the Quantum® system to function. Quantum Vue™ browser-based user interface can be used with wireless technology, IEEE 802.11 in communications to the Quantum® server.

Physical and administrative access to network equipment should be limited to authorized personnel only.

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### Network Port Configuration

All network equipment that is required to enable connectivity between Lutron® equipment must have the following ports open.

*For communication between processors:*

- UDP Port Range 2055 thru 2184
  - Used for Lutron® subsystem processor communication (required)

*For communication between processors and server:*

- UDP Port Range 2055 thru 2184 or TCP Port 51023 (an option for Quantum Vue™ only)

*For communication between processors and other equipment:*

- UDP Port 2647
  - Used for Lutron® Processor Configuration and detection software (only required while performing initial commissioning/maintenance)
- UDP Port 47808 (BAC0)
  - Used for BACnet IP communication from a third-party Building Management System (only required if the Quantum® system is integrating with a BMS through BACnet)
- TCP Port 5327
  - Used for Q Control+ App communication (only required if using the Quantum® Control+ App for the iPad and not connecting app to server)

*For communication from admin client to the server (only required if admin client is in a separate PC)*

- TCP Port 8888
  - Used for the Quantum® Runtime Service (required)
- TCP Port 9999
  - Used for the Quantum® Reporting Service (required)
- TCP Port 4444
  - Used for the Lutron® Service Manager (required)
- TCP Port Range 49152 thru 65535
  - Ephemeral ports used for communication between server and client
- TCP Port 1433 and UDP Port 1434
  - Used for Microsoft® SQL Database Connection (required)

*For communication from browser hosting Quantum Vue™ to the server:*

- TCP Port 80 or 443

*For communication from Q Control + IPAD app to the server:*

- TCP Port 5327
  - Used for Q Control+ App communication (only required if using the Q Control+ App for the iPad)

All network equipment required to enable connectivity to the Lutron® system must have all ports and protocols mentioned enabled/opened by default after a power-up to prevent system downtime after a power-cycle.

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## Quantum® and Quantum Vue™ Ethernet Network Configuration

### IP Multicast Configuration

Lutron® uses IP any-source multicast for system communication between Quantum® processors. Each sub-system of the Quantum® system must have its own unique multicast address. These multicast addresses are assigned to Lutron® for use with the Quantum® system only. Multicast addresses must be determined and configured prior to the Lutron® field service engineer's arrival on site to commission the system. Class D addresses may be assigned by end user or will be supplied by default by field service engineer

### IGMP (Internet Group Management Protocol)

In order to properly route multicast traffic between Layer 2 and Layer 3 devices, "IGMP snooping" needs to be enabled on all switches in both directions from the Quantum® server to the Quantum® processor and from the Quantum® processor to the Quantum® server.

The Quantum® system multicast supports the IGMP standard Versions 1, 2, and 3.

### PIM (Protocol Independent Multicast)

If routing multicast traffic between Layer 3 devices over a LAN or WAN, Protocol Independent Multicast will need to be enabled to properly route the multicast traffic. Both sparse mode and dense mode are supported.

### Quantum® Processor Configuration Software

During system commissioning the multicast address of 224.0.37.42 must be configured. This multicast address will be used by the Quantum® processor Configuration Software to set up Lutron® processors in the system. All Lutron® devices will respond to the multicast address of 224.0.37.42, and Lutron® processors will join the multicast group 224.0.37.42 using IGMP.

**Note:** The multicast address of 224.0.37.42 is only used during the initial startup and commissioning of the system. It is also used for diagnostics if a Lutron® field service engineer is on site. It is not a constant requirement to have this multicast address active.

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## Quantum® Server and Windows® SQL Server® Requirements

The Quantum® server hosts a Quantum® specific instance of Microsoft® SQL Server®. The Quantum® instance of Microsoft® SQL Server® has two functions; historical data collection for reporting and acts as the host for server/client software. The Quantum® instance of the Microsoft® SQL Server® does not affect the normal functionality of the Quantum® lighting system. If communications to the Quantum® processors from the server were suspended, the lighting system and its components would function as normal. However, any historical energy data and management software access would be lost during the downtime.

Refer to the Q-Manager™ Specification Submittals, Lutron® P/N 369593 and 369589 at [www.lutron.com](http://www.lutron.com) for a description of Quantum® server-approved Windows operating systems and compatible Microsoft® SQL Server versions. Quantum® system can use an end-user supplied version of Microsoft® SQL server full edition.

### Configurable Processors Perimeters

- Static IPv4 Address (Default - 192.168.X.X)
- Subnet Mask (Default - 255.255.255.0)
- Gateway (Default - 0.0.0.0)
- Multicast Address (Default - 239.X.X.X)
- BACnet port (Default - 47808)

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