# Igor® PoE Lighting Control System

## Quick Start Installation Guide

## Introduction

The Igor PoE lighting control solution leverages Power over Ethernet technology to provide intelligent lighting using a single Ethernet cable connection. The intended audiences for this Guide are IT and building facilities stakeholders. The combined efforts of facility managers and IT are essential to the success of a PoE lighting network installation.

This Guide provides a summary of recommendations and requirements necessary for a successful Igor PoE installation, including setup and commissioning and is applicable for Gateway Software version 3.0 and above. For emergency lighting applications, the Igor PoE system works with existing PoE emergency driver equipment. For more information, please contact your nearest Igor representative.

## References

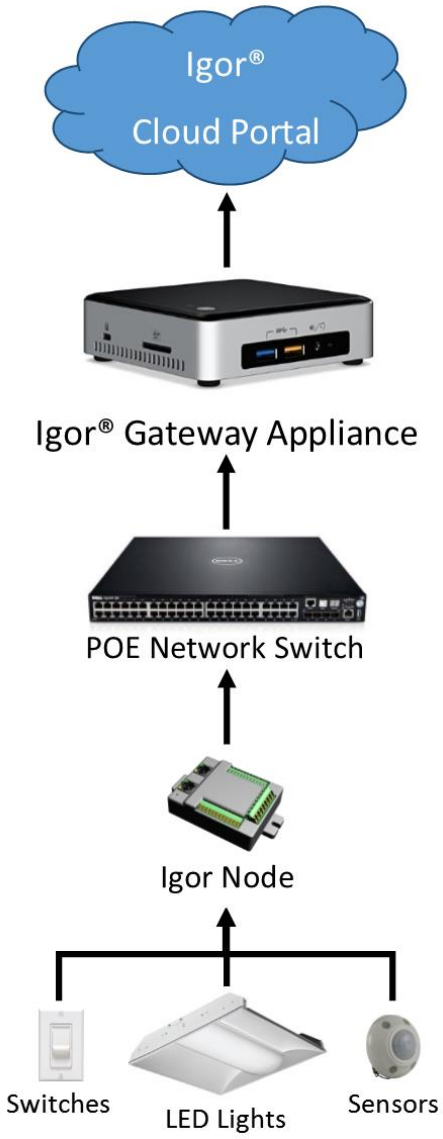
The following documents provide further details about the design, installation and operation of the system:

- ID-0220 Igor Gateway Software Quick Start User Guide
- ID-312 Gateway Product Data Sheet
- ID-2150D-1-3 (Max, Mid, Min) Igor Device Node datasheets
- ID-2150P1-3 (Max, Mid, Min) Igor Network Node datasheets
- ID-4101 Igor-Approved PoE Power Sourcing Equipment List
- ID-41xx Igor Network Switch and Midspan Configuration Guides

# System Overview

The Igor PoE intelligent lighting solution offers an open architecture and fixture agnostic capability essential for a successful connected lighting solution. The system includes data collection with advanced cloud analytics and powerful automated software tools for ease of installation and configuration.

**Before Installation:** All Igor components shown below are required to complete the system installation.




## Igor Cloud Portal Services

The Igor Cloud Portal provides data analytics, reporting and notification capabilities all under a unified platform. Sensor data, energy data, system data and even daily Gateway backups are just a click away for Igor users.

## Igor Gateway Appliance

The Igor® Gateway Appliance is a web-enabled, Ethernet-based supervisory controller that enables users to monitor and control building lighting systems from a desktop or mobile platform using the web-based Admin application software.

## Third-Party PoE Network Switch

The Igor lighting solution is compatible with PoE network switches and midspans from a variety of manufacturers. For tested and approved models, please refer to the following Igor document: ID-4101 Igor Approved PoE Power Sourcing Equipment List.

## Igor Node

Igor's groundbreaking node design offers multiple I/O configurations and is compatible with a wide array of LED light fixtures, low voltage sensors and wall controls.

**Note**: Igor PoE lighting nodes can come pre-installed in LED fixtures from our manufacturing partners, or they can be used to retrofit existing line voltage LED fixtures. Please review the Igor node data sheets for full details on LED driver capabilities or consult with Igor for a list of verified fixtures.

# Workflow

A successful Igor PoE installation typically follows the workflow shown in Fig. 1 below. This Installation Guide provides details for each step of the workflow process.

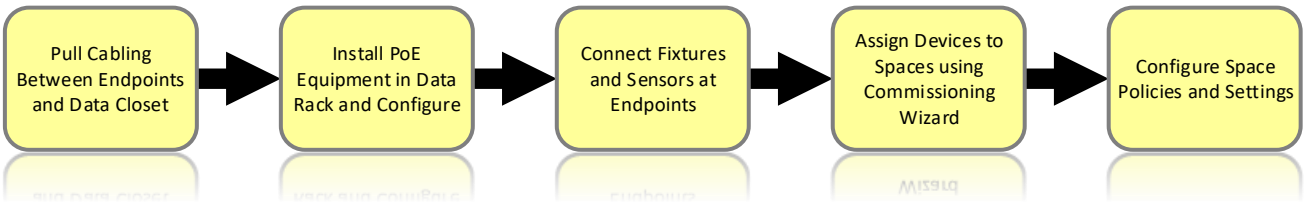



Fig. 1: Igor PoE installation workflow

# Igor® Gateway Software System Requirements

The Igor Gateway Software is the heart of Igor's on-premises control system. The software communicates bi-directionally with Igor Nodes to control lighting levels for each space, as well as receives incoming signals from sensors and other devices to improve occupant comfort and optimize energy savings. In addition, the software sends all recorded data and system configuration to the Igor Cloud Portal for backup and analysis. For the Igor Gateway to operate effectively, please follow these system requirements:

| Item | Requirement |
|---|---|
| **Operating System** | Windows 8.1 Pro 64-bit; Windows 10 Pro 64-bit; Windows Server 2012 R2 x64or Windows Server 2016 |
| **Processor** | Intel i3-5-7/Xeon Families:<br>*Small to medium installations:* Single or dual core processor<br>*Larger installations:* Quad core or higher processor |
| **Memory** | 8 GB RAM |
| **Hard Disk** | 60 GB HDD or SSD with 5 GB free disk space |
| **Network Interface Card** | Any standard 10/100/1000 Mbps Ethernet compatible card |
| **Software** | Microsoft SQL Server Express 2012 or SQL Server Express 2016<br>Microsoft .NET Framework 4.6.1 or higher |

**Important**: Google Chrome is the recommended browser.

To ensure proper Igor Gateway operation, add the following Antivirus Software Path and Process exclusions on the Igor Gateway Appliance:

| **Antivirus Software Exclusion Requirements<br>Version 1.12.1 and Later** | |
|---|---|
| **Path exclusions:** | • C:\Igor\Data<br>• C:\Igor\Sampling |
| **Process exclusions:** | • C:\Igor\BACnet\Igor.Bacnet.Service.exe*<br>• C:\Igor\Cloud\Igor.Cloud.Service.exe<br>• C:\Igor\EmergencyLighting\Igor.EmergencyLighting.Service.exe<br>• C:\Igor\Management\Igor.Management.Service.exe<br>• C:\Igor\Sampling\Igor.Sampling.Service.exe<br>• C:\Igor\Runtime\Igor.Runtime.Service.exe<br>• C:\Igor\UPnP\Igor.Upnp.Service.exe |

*BACnet can have a custom install path. It may not be in this folder.

# PoE Network Cabling

The Igor PoE lighting system architecture allows for each cable run from the data closet to maximize the available PoE power to drive one or more LED fixtures, as well as connect multiple devices such as motion, daylight and temperature sensors and wall switches. This additional capability is accomplished via Igor Device Nodes and the Igor Bus daisy-chain technology, which allows the cable run to be extended beyond the first endpoint to pick-up additional Igor-enabled fixtures and devices.

Each cable run may consist of the following:

- A patch cable between the network switch and the patch panel
- A home run between the patch panel and a terminal box in the plenum near the fixture
- A patch cable between the terminal box and the fixture
- Additional patch cables connecting the first fixture to other fixtures and Igor Device nodes in a daisy-chain

**Igor Recommendations:**

- Use CAT5e or higher cable with a minimum wire gauge of 24 AWG for the home runs from the data closet to the first fixture.
- Use CAT5e or higher Ethernet patch cables (with a minimum wire gauge of 24 AWG) for the Igor Bus daisy-chain connections between fixtures and nodes.

**Igor Requirements:**

- The maximum cable length for each home run must not exceed 100 meters (328 ft.).
- The maximum Igor Bus cable length between fixtures or nodes must not exceed 30 meters (~100 ft.).
- A single daisy-chain must not contain more than five (5) total fixtures and/or Igor nodes.
- Total daisy-chain PoE power load must not exceed the power available at the PoE switch/midspan port.
- The bend radius of a CAT5e, CAT6 and CAT6a cable must not be smaller than four times the cable diameter.

- All cable lines must be certified end-to-end for continuity and data prior to connecting to the Igor nodes.

## PoE Power Sourcing Equipment (PSE) Setup

Two primary PSE hardware installation solutions are supported: 1.) a centralized solution with the PSEs installed in a rack within a wiring closet; and 2.) a distributed solution with the PSEs housed in wall-mounted racks or in plenum-rated ceiling racks collocated with the light fixtures they support. Patch panels are recommended in both scenarios to provide the most flexible cable routing options.

> **ATTENTION:** To prevent unauthorized access to either network, the lighting network switches should be isolated from the enterprise production network, either physically or through security measures.

Redundant lighting is a critical life safety feature. To prevent all lights in a space from shutting down in the event of a power loss or network service interruption, lights should be distributed across multiple PSEs. If each PSE has multiple power supplies (PSU), then the power supplies of each PSE should also be split between two independent AC circuits to allow for power redundancy.

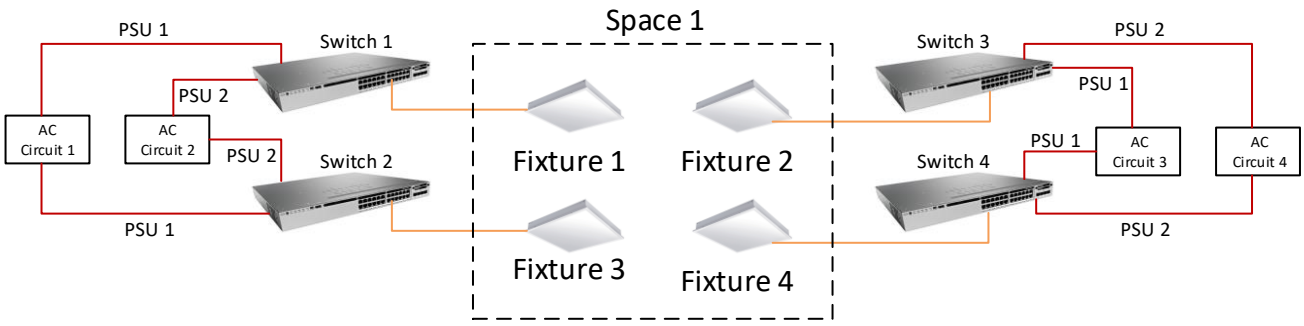



Fig. 2 - PSE setup diagram

## Igor Approved PoE Power Sourcing Equipment (PSE)

Several PSE's from Cisco Systems, Inc. and Microsemi Corp. have been tested and are Igor approved to use with the Igor PoE solution:

| Manufacturer | PSE Equipment |
|---|---|
| **Cisco Systems, Inc.** | UPoE Network Switches, 60W per Port;<br>PoE+ Network Switches, 30W per Port;<br>Non-PoE Network Switches for use with PoE midspans and power injectors |
| **Microsemi Corp.** | PoE++ Midspans and Injectors, up to 72W per Port and up to 95W per Port |

For specific model numbers, port counts and available PoE power details, please refer to the following Igor document: ID-4101 Igor Approved PoE Power Sourcing Equipment List.

# Network Switch Configuration Settings

Standard network configuration practices should be followed when setting up the lighting control network. The Igor PoE lighting network should be isolated from the enterprise network either physically and/or via VLANs.

Please refer to the appropriate Igor network switch or midspan configuration document for the appropriate equipment settings for your project:

- ID-4122 – Cisco 3850 Switch Configuration
- ID-4123 – Cisco SF300-24P Switch Configuration
- ID-4124 – Cisco CDB-8U Switch Configuration
- ID-4141 – Microsemi PD-95xx Series Configuration
- ID-4142 – Microsemi PD-96xx Series Configuration

## Igor Nodes

- The Igor Network and Device nodes provide the PoE endpoints necessary for an intelligent lighting control network.
- These nodes can be factory installed in the LED fixtures, used to retrofit existing line voltage drivers onsite or used to extend an Igor Bus daisy-chain to pick-up additional motion sensors and wall switches.
- Network nodes must always be the first node in any chain, as they have the detection circuitry and LLDP programming to negotiate with the PoE switch or midspan for appropriate power levels.
- Up to four additional Devices nodes can be daisy-chained from each Network node if total chain power limits are followed.
- As soon as PoE power is available on a cable run, the Network node and any connected Device nodes automatically turn on associated fixtures to provide light in the spaces, even when the lighting network hasn't been fully configured.
  **Note:** This provides a life safety feature as well as immediate feedback to the cabling contractor as to any potential cable run issues, but no control of the lighting network will be available until the network is commissioned.

## Automatic Configured Devices Discovery

Once the network is fully configured, the Network nodes will receive an IP address from the DHCP server and start communicating with the Igor Gateway Appliance. Discovery of all configured devices will occur automatically and appear in the Gateway UI ready to be assigned to lighting control spaces.

**Note:**

- Device nodes don't require an IP address but instead utilize the Network node's ID so connected devices can still be uniquely identified and assigned within the Gateway UI.
- A lighting plan will be developed during the design process to indicate the quantity of light fixtures, sensors and wall controls that are required and their installation points.
- Each cable home run in the lighting plan requires an Ethernet port. The sum of these ports will determine the number of Ethernet ports that will be required.

> ***ATTENTION:** If Igor PoE lighting is the principal lighting within the space, auxiliary lighting should be used during the setup process to ensure minimum safe lighting is present. The auxiliary lighting should be turned on prior to the start of setup and remain on until setup is complete.

# Igor Network Communication Port Requirements

This section defines the incoming and outgoing operation and maintenance port requirements for Igor Nodes to communicate with the Igor Gateway. For more details included requirements on older software and firmware versions, please refer to the following Igor document: ID-3121 Network Communications Port Requirements.

## Software and Firmware Network Port Legend

| Port | Description |
|---|---|
| **69** | TFTP |
| **80** | HTTP |
| **88** | Configuration |
| **443** | HTTPS |
| **1050** | Firmware Updating |
| **1900** | UPnP |
| **1901** | UPnP |
| **5683** | CoAP |
| **50195** | Firmware Updating |
| **50196** | Firmware Updating |
| **50197** | Firmware Updating |
| **50198** | Firmware Updating |
| **50199** | Firmware Updating |
| **50200** | CoAP - UPnP Service |
| **50201** | CoAP – Emergency Service |

## Igor Gateway Software

(Version 4.0.0 and Later)

| INCOMING | | OUTGOING | |
|---|---|---|---|
| **TCP** | **UDP** | **TCP** | **UDP** |
| 80 | 69 | 80 | 69 |
| 88 | 1050 | 88 | 1050 |
| 1900 | 1900 | 443 | 1900 |
| 1901 | 1901 | 1900 | 1901 |
| -- | 5683 | 1901 | 5683 |
| -- | 50195 | -- | 50195 |
| -- | 50196 | -- | 50196 |
| -- | 50197 | -- | 50197 |
| -- | 50198 | -- | 50198 |
| -- | 50199 | -- | 50199 |
| -- | 50200 | -- | -- |
| -- | 50201 | -- | -- |

## Igor Firmware

(Version 3.1.0 and Later)

| INCOMING | | OUTGOING | |
|---|---|---|---|
| **TCP** | **UDP** | **TCP** | **UDP** |
| 80 | 69 | 80 | 69 |
| 88 | 1050 | 88 | 1050 |
| 1900 | 1900 | 1900 | 1900 |
| 1901 | 1901 | 1901 | 1901 |
| -- | 5683 | -- | 5683 |
| -- | 50195 | -- | 50195 |
| -- | 50196 | -- | 50196 |
| -- | 50197 | -- | 50197 |
| -- | 50198 | -- | 50198 |
| -- | 50199 | -- | 50199 |

## Igor BACnet/IP Systems Service

Ports required for third-party BACnet/IP Systems to communicate with the Igor Gateway:

### Legend

| PORT | DESCRIPTION |
|---|---|
| **80** | HTTP |
| **5000** | HTTP |
| **47808** | BACnet/IP |

### Version 1.0.1 and Later

| INCOMING | | OUTGOING | |
|---|---|---|---|
| **TCP** | **UDP** | **TCP** | **UDP** |
| 5000 | 47808 | 80 | 47808 |

# Device Configuration

In many cases, the Igor nodes that ship with LED fixtures or other lighting control equipment will come pre-configured for that equipment with the associated devices and will be automatically discovered by the Igor Gateway software when the network is fully configured. In cases where additional low voltages sensors are added to an Igor Bus daisy-chain or fixtures are field retrofitted, the Igor Field Configuration Utility (FCU) application can be used to update the appropriate nodes and bring those sensors and fixtures onto the lighting network. The FCU is a Windows desktop application that is designed to be used by a field technician to perform node discovery, configuration and testing activities.

For FCU application instructions, please refer to the following Igor document: ID-3231 Igor Field Configuration Utility User Guide.

## Igor Compatible Sensors, Relays and Wall Controls

The Igor PoE lighting solution is designed to be compatible with a wide array of low voltage sensors, relays and wall controls. Igor nodes can provide 24VDC power to these devices and receive a variety of signal types back to bring data from non-IP devices onto the lighting network.

- Daylight Sensors
- Occupancy Sensors: Ceiling, Fixture, Wall, Wall Switch
- Relays
- Wall Controls

For a complete list of tested and approved devices, with manufacturer model number and descriptions, please refer to the following Igor document: ID-4201 Igor Compatible Sensor List.

# Final System Commissioning

After all the PoE lighting equipment has been installed and configured, it's time to perform final system commissioning activities that will assign all the fixtures, sensors and wall switches into appropriate lighting control spaces. All these activities can be performed via the Igor Gateway Software Admin application. Since the Admin application is web-based, these activities can be performed using a mobile device, such as a laptop, tablet or smartphone. This will allow the technician, or multiple technicians simultaneously, to walk the building, identify devices and assign them to the correct Spaces within the Admin application.

For instructions on system commissioning via the Igor Gateway Software Admin application, please refer to the following Igor document: ID-0220 Igor Gateway Software Quick Start User Guide.

# Installation FAQs

## How many fixtures will a site require?

A lighting plan will be developed by the design team of the space to indicate the quantity of light fixtures, sensors and wall controls that are required and their installation points.

## How many network switches or midspans will be required for an installation?

Each cable home run back to the data closet in the lighting plan requires an Ethernet port. The sum of these ports will determine the number of Ethernet ports that will be required. Remember to consider both individual port power maximums, as well as total PSE power available when planning for network switch/midspan quantity.

## Where can network switches and midspans typically be installed?

When applying a centralized solution, the equipment can be installed in a switch rack within a wiring closet. When applying a distributed solution, the equipment may be housed in wall-mounted racks or in plenum-rated ceiling racks. Patch panels are recommended in both scenarios to provide the most flexible cable routing options.

## How much AC power must be available to support PoE installation?

A typical PoE network switch or midspan will have one or two power supplies that convert AC power to DC power for the Igor nodes. AC source power must be available that meets the maximum load for the switch/midspan; see the manufacturer's documentation for maximum AC load values. In cases where the equipment has two power supplies, such as with Cisco® 3850 UPoE switches, the power supplies should be split between two AC circuits to provide redundant protection.

Refer to the following Igor document for network switches and midspans that have been tested and approved for use with the Igor PoE lighting solution:  ID-4101 Igor Approved PoE Power Sourcing Equipment List.

END.