LightRules® Network Infrastructure
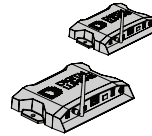
System and Hardware Specifications

The LightRules® network infrastructure enables communication and data transfer between Intelligent Light Engines, the LightRules Appliance, and the facility network. For performance and security purposes, LightRules requires installation of an Ethernet network dedicated solely to the lighting system. Power over Ethernet (PoE) networks, which deliver electrical power to the LightRules Network Gateways, are preferred for most deployments. PoE eliminates the need for an electrical service at each Gateway location, simplifies setup, and reduces system cost. Optionally, a non-PoE network can be deployed, requiring an AC-DC power supply (ordered separately) for each LightRules Network Gateway.

Web Application

The LightRules web application is accessible via any supported web browser connected to the facility network.

LightRules Appliance

The LightRules Appliance is the heart of the LightRules network infrastructure. The Appliance hosts the software engine, serves the web application, and manages the dedicated LightRules network. The Appliance connects to the facility network from a secure, central location.

LightRules Network Gateways

LightRules Network Gateways create a network bridge between the Ethernet components in the LightRules network infrastructure and the fixtures. Each Gateway manages communications for up to 50 fixtures within RF range.
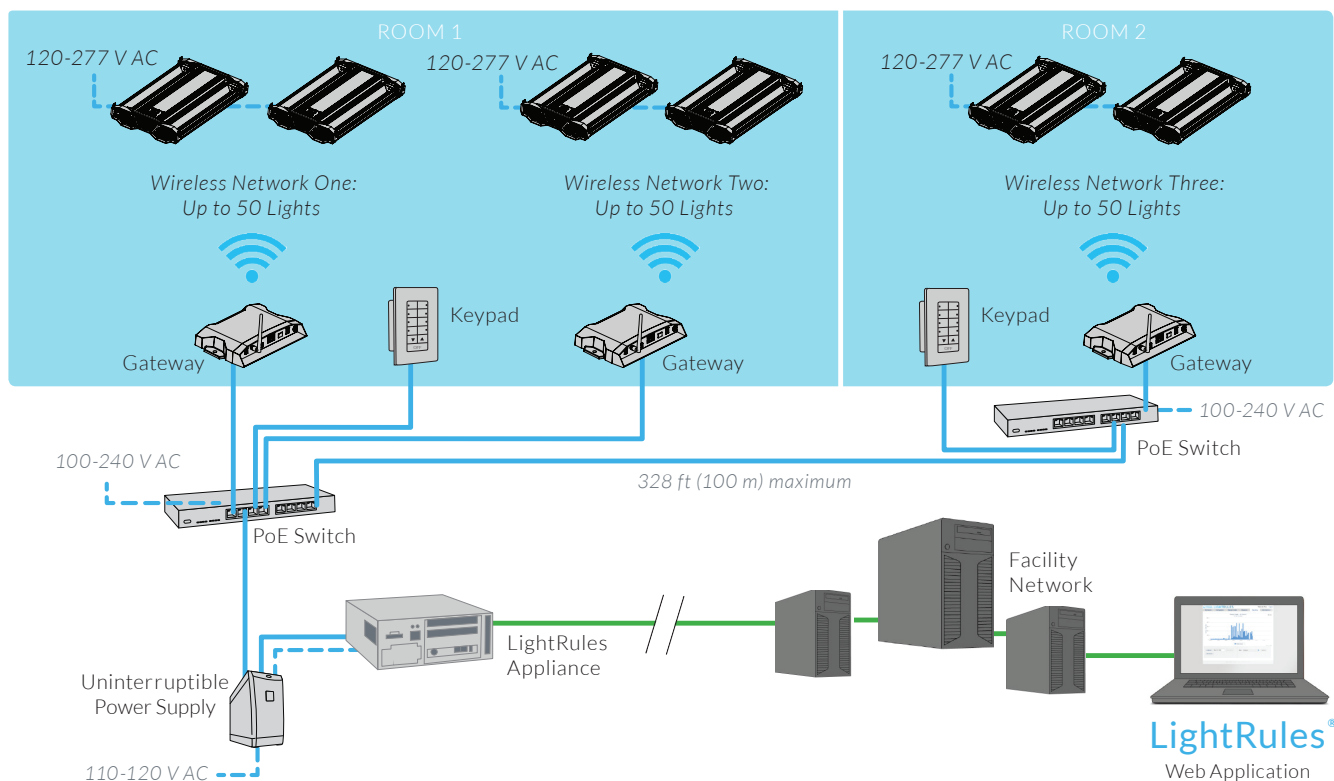
TCP/IP Ethernet Components

PoE (Power over Ethernet) switches and Ethernet cables connect the Appliance to the Gateways. PoE switches also supply electrical power to the Gateways. Note that LightRules is compatible with non-PoE Ethernet switches, if PoE functionality is not desired.

NETWORK EXAMPLE

— Dedicated LightRules® Network (Ethernet CAT-5/5e/6 cable and IEEE 802.15.4 wireless)

— Facility Network (Ethernet)

- - - Electrical Power

ROOM 1

120-277 V AC

120-277 V AC

Wireless Network One:
Up to 50 Lights

Wireless Network Two:
Up to 50 Lights

Keypad

Gateway

Gateway

ROOM 2

120-277 V AC

Wireless Network Three:
Up to 50 Lights

Keypad

Gateway

100-240 V AC

PoE Switch

100-240 V AC

PoE Switch

328 ft (100 m) maximum

LightRules Appliance

Facility Network

Uninterruptible Power Supply

110-120 V AC

LightRules®
Web Application

LightRules Appliance Specifications

The LightRules Appliance (LRA) hosts the software engine, serves the LightRules web application, and manages the LightRules network infrastructure. Digital Lumens offers two LRA server hardware options: the Enterprise Edition is suitable for larger industrial and commercial facilities, and the Compact Edition is designed for smaller environments.

Enterprise Edition

24.7 in
(62.7 cm)

1.7 in
(4.3 cm)

17.0 in
(43.2 cm)
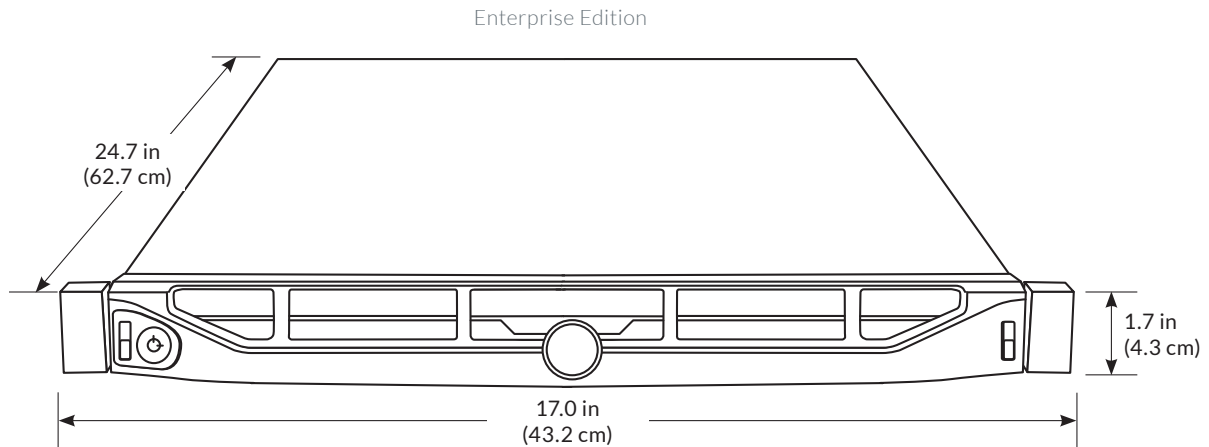
Enterprise Edition:

ENVIRONMENTAL	
Operating Temperature	50° to 95°F (10° to 35°C)
Operating Humidity	20% to 80% non-condensing

ELECTRICAL	
Power Supply Rating	480 W
AC Input Voltage Range	100–240 V AC, 50–60 Hz

CERTIFICATION & WARRANTY	
Certification	ENERGY STAR Version 1.0-compliant
Warranty	3-year Limited Warranty
Safety	NRTL, CE, TÜV, NOM, and others
EMC	FCC Class B, CE Class B, C-Tick Class B, and others

| PHYSICAL	
Rack Mount Form Factor	1U
Dimensions (H x W x D)	1.7 x 17.0 x 24.7 in (4.3 x 43.2 x 62.7 cm) without ears & bezel
Maximum Weight	35.0 lbs (15.9 kg)

NETWORKING & STORAGE	
(2x) Ethernet Ports	RJ45: Connects to LightRules network
	RJ45: Connects to facility network[1]
Data Rates Supported	10 / 100 / 1000 Mbps
Hard Drive Storage	(2x) 600 GB internal (mirrored RAID); external USB drive for backups supported
Optical Drive	CD/DVD-ROM drive for software updates

[1] The LightRules Appliance requires a static IP address.

Compact Edition

9.1 in (23.1 cm)

9.1 in
(23.1 cm)

3.5 in
(9.0 cm)
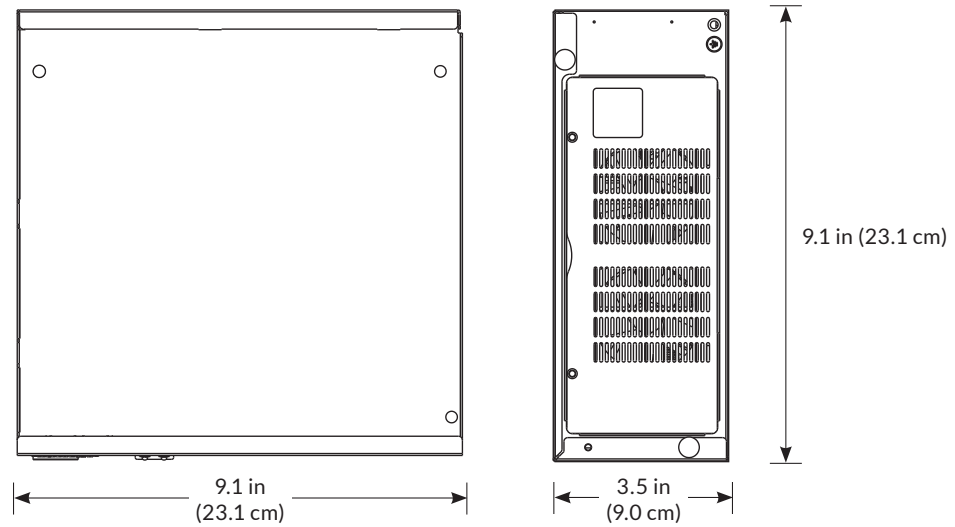
Compact Edition:

ENVIRONMENTAL	
Operating Temperature	32° to 104°F (0° to 40°C)
Operating Humidity	10% to 85% @ 40°C non-condensing

ELECTRICAL	
Power Supply Rating	250 W
AC Input Voltage Range	100–240 V AC, 50–60 Hz

CERTIFICATION & WARRANTY	
Certification	80 PLUS
Warranty	2-year Limited Warranty
Safety	UL/CB, CCC, BSMI, and others
EMC	CE/FCC, CCC, BSMI, and others

PHYSICAL	
Dimensions (H x W x D)	9.1 x 3.5 x 9.1 in (23.1 x 9.0 x 23.1 cm)
Weight	8.1 lbs (4.0 kg)

NETWORKING & STORAGE	
(2x) Ethernet Ports	RJ45: Connects to LightRules network
	RJ45: Connects to facility network[1]
Data Rates Supported	10 / 100 / 1000 Mbps
Hard Drive Storage	500 GB internal; external USB drive for backups supported

LightRules Network Gateway Specifications

The LightRules Network Gateway is the device through which the LightRules Appliance communicates with intelligent light fixtures. A single Gateway manages communications for up to 50 fixtures within RF range.

Designed for Demanding Environments

Rated for temperatures of -40° to 122°F (-40° to 50°C), the Gateway operates in the most demanding commercial and industrial environments, including cold storage and high ambient temperature locations. Using widely available hardware[1], the Gateway housing mounts rapidly to ceiling structures, walls, and suitable vertical surfaces.

Flexible Power Options

The LightRules Network Gateway is a PoE (Power over Ethernet) device[2], eliminating the need for power service installation. Optionally, a low-temperature AC-DC power supply is available when PoE functionality is not desired.

Network Protocol Translation

The Gateway's onboard translation engine processes data and commands for two-way communication:

- Outbound commands from the LightRules Appliance are formatted and transmitted to the fixtures via IEEE 802.15.4 wireless mesh networking.
- Inbound data from the intelligent fixtures is packaged and delivered via the Ethernet TCP/IP network to the LRA
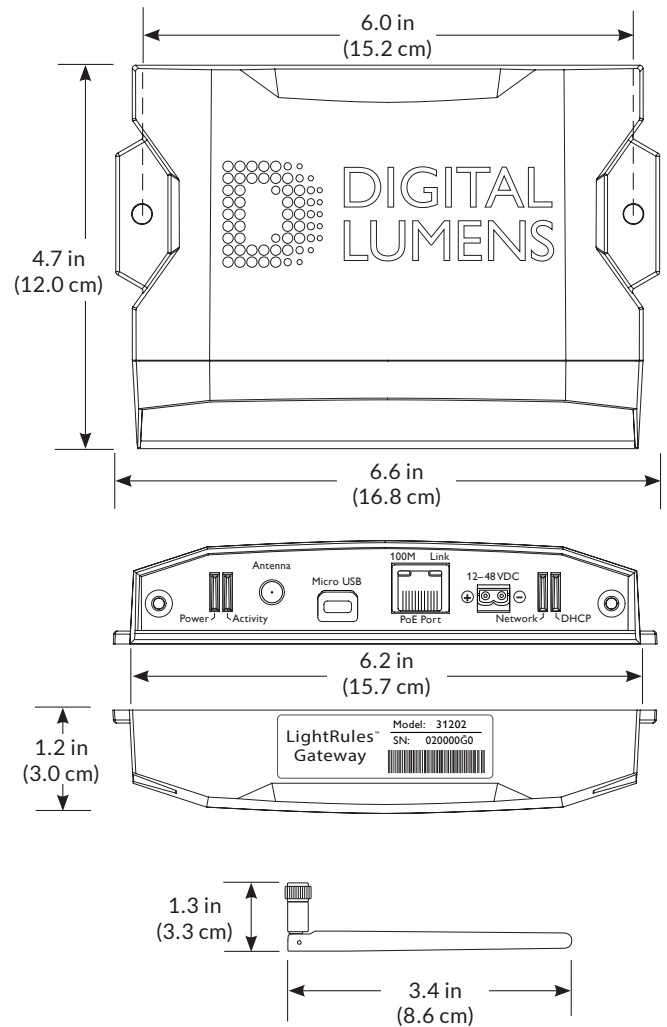
ENVIRONMENTAL	
IP Rating	IP51
Storage Temperature Range	-40° to 122°F (-40° to 50°C)
Operating Temperature Range	-40° to 122°F (-40° to 50°C)

PHYSICAL	
Enclosure	PC/ABS
Radio Antenna	External swivel, ROP-SMA
Connectors	• SMA antenna • RJ45 Ethernet (PoE/non-PoE) • Screw terminal DC power input • Micro-USB type B
Status LEDs	• Network activity (red) • Power (blue) • Network connection (green) • DCHP (yellow)
Dimensions (H x W x D)	1.2 x 6.6 x 4.7 in (3.0 x 16.8 x 12.0 cm)
Mounting Hole Spacing	(2x) centerline; 6 in (15 cm) apart
Mounting Hole Diameter	.25 in (6 mm)
Weight	7.9 oz (222 g)

| ELECTRICAL	
Standard Power Source	PoE (Power over Ethernet)
Overvoltage Protection	Integrated surge protector
Component Power Source	Electrical isolation
Optional Power Source	Low-temperature AC-DC power supply (ordered separately, see page 6 for details)
DC Power Input *for Optional Power Source*	12-48 V DC, 3 W terminal block

NETWORKING & CONTROL	
Wireless Networking	IEEE 802.15.4
Network Integration	IPv4 Ethernet
Programming	via Ethernet

CERTIFICATION & WARRANTY	
Certification	FCC Part 15 Class B
Warranty	5-year Limited Warranty

ORDERING INFORMATION	
Item Number	31202

Approved Ethernet Components

PoE (Power over Ethernet) switches are preferred for most LightRules deployments, as they supply electrical power to the Gateways.

CISCO SF302-08P

N-TRON 105TX-POE

DNR60US48-JDI001
(see next page for specifications)
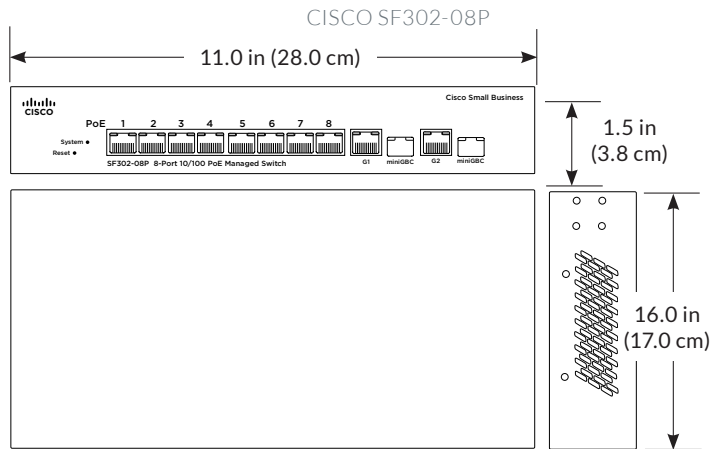
Standard PoE Network Switch

The Cisco SF302-08P[2] Ethernet switch is approved for use in standard temperature environments. An external power supply is included with this item.

Low-temperature PoE Network Switch Kit

The N-TRON 105TX-POE[1] Ethernet switch is approved for use in low-temperature environments. An XP Power DNR60US48-JDI001 low-temperature AC-DC power supply is included when ordering this kit *(see next page)*.

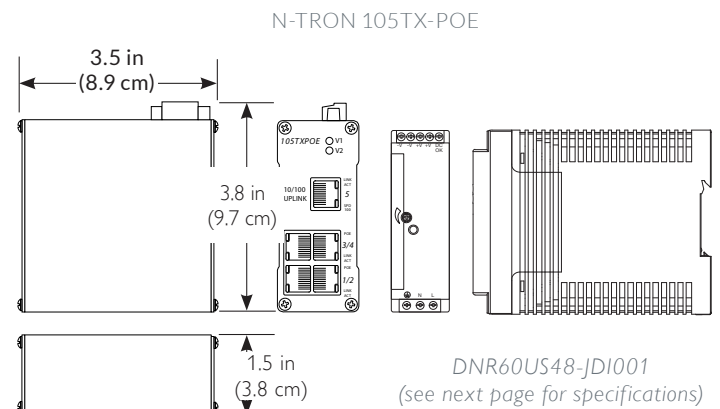| ENVIRONMENTAL	
Operating Temp. Range	32° to 113°F (0° to 45°C)
Operating Humidity Range	10% to 90% relative, non-condensing

NETWORKING & CONTROL	
Networking Connectors	• (8x) 10/100 PoE ports with 62 W power budget • (2x) combo mini-GBIC ports
Capacity *(millions of packets per second; 64-byte packets)*	4.2
Switching Capacity *(Gigabits per second, Gbps)*	5.6

PHYSICAL	
Dimensions (H x W x D)	11.0 x 1.5 x 6.7 in (28.0 x 3.8 x 17.0 cm)
Weight	2.7 lbs (1.2 kg)

ELECTRICAL	
Input Voltage *(Power Supply)*	100-240 V AC, 50-60 Hz, 0.5 A
Switch Input Voltage	48 V DC
Power	150 W maximum (with PoE)

WARRANTY	
Warranty	Limited Lifetime Warranty

ORDERING INFORMATION	
Item Number	DLSW1
Manuf. Part Number	CISCO SF302-08P[2]

ENVIRONMENTAL	
Operating Temp. Range	-40° to 185°F (-40° to 85°C)
Operating Humidity Range	95% maximum RH; non-condensing

NETWORKING & CONTROL	
Networking Connectors	• (4x) RJ-45 TX/PoE Ports; auto speed-sensing • (1x) RJ-45 TX Uplink Port

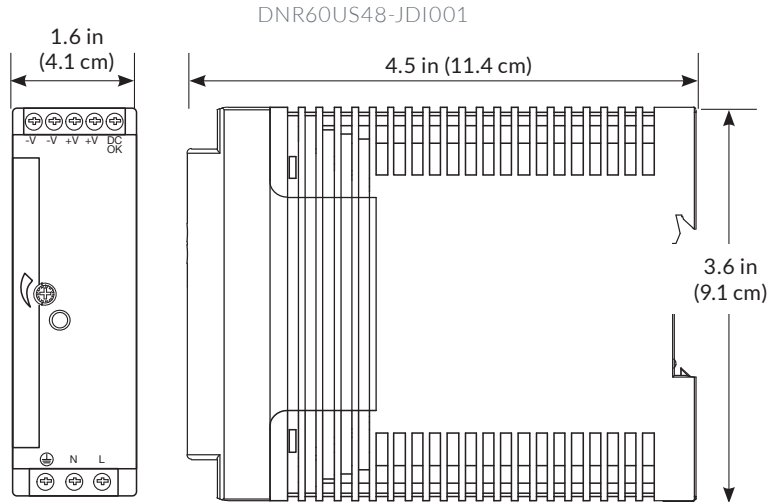| ELECTRICAL	
Input Voltage[3] (External Power Supply)	85-264 V AC, 47-63 Hz
Switch Input Voltage[3]	46-49 V DC
Power	77 W maximum
PoE 802.3af Power Consumption	32 W maximum (Ports 1-4), 48 V DC; 0.8 A power output

PHYSICAL	
Dimensions (H x W x D)	3.8 x 1.5 x 3.5 in (9.7 x 3.8 x 8.9 cm)
Weight	0.7 lbs (0.32 kg)
DIN-Rail Mount	Compatible with TS35/7.5 or TS35/15
Enclosure	IP30

WARRANTY	
Warranty	3-year Limited Warranty

ORDERING INFORMATION	
Item Number	31401
Manuf. Part Number	N-TRON 105TX-POE

Low-Temperature AC-DC Power Supply

The low-temperature AC-DC power supply is included with Item Number 31401, the N-TRON 105TX-POE Ethernet switch. Additionally, the AC-DC power supply is an optional accessory used to power a single LightRules Network Gateway, when PoE functionality is not desired for example, if non-PoE switches and electrical service are being used).

DNR60US48-JDI001

ENVIRONMENTAL

Operating Temp. Range	40° to 158°F (-40° to 70°C) startup at -31°F (-35°C)
Operating Humidity Range	95% maximum RH; non-condensing

ELECTRICAL

Input Voltage	85-264 V AC or 90-375 V DC
Input Frequency	47–63 Hz
Power Factor	meets EN61000-3-2 for Class A equipment
Earth Leakage Protection	0.8 mA maximum
Input Protection	Internal fuse T2A, 250 V AC
Output Voltage	48 V DC
Output Current	1.25 A

PHYSICAL

Dimensions (H x W x D)	3.6 x 1.6 x 4.5 in (9.1 x 4.1 x 11.4 cm)
Weight	8 lbs (0.35 kg)
DIN-Rail Mount	Compatible with TS35/7.5 or TS35/15
Recommended Wiring Clearance	• Front: 2 in (5 cm) • Top: 1 in (3 cm)

CERTIFICATION & WARRANTY

Safety	• EN60950-1 UL508 Pollution Degree 2 • UL1310 Class 2 • UL60950-1 Overvoltage Category II • UL508 Overvoltage Category III • DNR30 & DNR60: SEMI F47, ANSI/ISA 12.12.01. Class 1 • Division 2 Groups A, B, C and D
Warranty	3-Year Limited Warranty

ORDERING INFORMATION

Item Number	31500
Manuf. Part Number	XP Power DNR60US48-JDI001[2]

[2] Refer to the manufacturer website for the latest product updates, product certifications, and complete warranty information.

[3] Wiring diagram provided; power cabling not included.