

## WaveLinx Best Practice Design Guide

TRELLIX CORE HARDWARE			
MAX LIMITATIONS FOR TRELLIX CORE	TRX-TCPRO2	TRX-TCENT2	TRX-TCVRT2
WAC'S	20	500	500
WIRELESS DEVICES	2000	50,000	50,000
BACNET LICENSES	UNLIMITED	UNLIMITED	UNLIMITED
API LICENSES	UNLIMITED	UNLIMITED	UNLIMITED

\*All Trellix Core models come with a base license for Admin/Lighting software, BACnet, and API for 250 devices.

ADDITIONAL TRELLIX SOFTWARE LICENSES	
TRX-LGT250	Base License Addition for 250 devices
TRX-BAC250	BACnet License Addition for 250 devices
TRX-API250	API License Addition for 250 devices
TRX-OPNADR	OpenADR license (unlimited)
TRX-CONFIG	Energy and Graphical Floorplan for 250 devices (none included in base license)

RECOMMENDED PRACTICES	
WIRELESS DEVICES PER WAC	100
WAC'S PER POE SWITCH	4 for the standard unmanaged switch 7 for the 8-port managed switch
WAC INSTALLATION ORIENTATION	Face or back should face first nodes (Vertical)
DISTANCE FROM POE SWITCHES TO INSIGHT MANAGER	Max of 300' (CAT5/CAT6 cable)
DISTANCE FROM POE SWITCHES TO WAC'S	Max of 300' (CAT5/CAT6 cable)
NUMBER OF ROOMS/AREAS PER WAC	12 rooms (Refer to system summary notes below)
NUMBER OF ZONES PER ROOM/AREA	16
NUMBER OF SCENES PER ROOM/AREA	16

RECOMMENDED DISTANCES FOR INDOOR DEVICES (LOS)	
WAC RANGE	150' RADIUS LOS
FROM WAC TO 1 <sup>ST</sup> DEVICE	75'
BETWEEN DEVICES	150'
# OF HOPS	4
SIGNAL TRANSMISSION	2 -3 standard interior walls of sheetrock construction with wood or aluminum framing (no concrete/steel)

RECOMMENDED DISTANCES FOR OUTDOOR DEVICES (LOS)			
DEVICE		SWPD4 and SWPD5	WOLC-7P-10A
FROM WAC	LOS THRU WINDOW*	160'	200'
	THRU 7" CONCRETE	40'	60'
NODE TO NODE		160'	200'
# OF HOPS		10	10

\*Tinting/metallic shades reduce range by 20'

### System Summary:

- A room/area:

- A unique space within the system where the lighting control strategy and lighting settings can be defined (i.e. private office, open office, bathroom, etc.). An open space with two separate control intents would be considered as two rooms.
- A keypad or multiple keypads that control the same zones within a WAC shall automatically be accounted for as 1 area
- A zone:
  - An individual light or group of lights that are controlled together. For example, a private office with two overhead lights, where one will be daylighting-responsive, and a controlled receptacle has three zones.
- A scene:
  - Specific settings for each zone within an area that contribute toward creating a certain scene or ambience.
- At a minimum, the WaveLinx system requires one Wireless Area Controller (WAC) and one node.
- Meets Title 24 and DLC requirements.
- All wireless devices will have MAC addresses.
- Trellix can calculate energy usage by area leveraging both measured and calculated methods from Type I, II, and III devices.
  - Type I – Devices with integrated energy metering
    - Metalux < 50W with integrated sensor
  - Type II – Devices with integrated power metering
    - Integrated sensor fixtures other than Type I, wireless switchpacks, and wireless receptacles
  - Type III – Devices with user input calculated energy
    - WaveLinx wireless radio fixtures, and outdoor and industrial devices
- System maintains its current state if WAC connection is lost.
  - Integrated sensor lights revert to “out of box” functionality after 60 minutes without communications.
- Can define 8 events with the system, actions such as scenes getting activated based on time clock schedules.
- For dimming capabilities all fixtures must be controlled by 0-10V dimming ballasts/drivers or you will only have on/off capabilities.
  - LDCM-PL-120-277-010V-GR can be added to dim/control reverse phase ELV (electronic low voltage) fixtures. The LDCM will receive the 0-10V signal from the wireless switch pack and convert the dimming signal to a reverse phase ELV dimming output (120VAC = 450 watt max, 277VAC = 1000 watt max). A LDCM cannot be used with magnetic low voltage fixtures.
    - Multiple LDCM’s can connect to one relay, if you do not max out the amperage for the relay.
  - PD216 can be added to incandescent and magnetic low voltage fixtures to dim 0-10V (2 inputs and 2 outputs at 1920 watts each).
- Adheres to the IEEE 802.15.4 wireless protocol and data is AES-128 encrypted to provide security.
  - WaveLinx and TrellixCore are UL2900-1 Cybersecurity Certified

**Trellix Core (Pro, Enterprise, Virtual):**

- Allows integration with BMS through BACnet, demand response, API, and A/V integration.
  - BACnet/IP – 3<sup>rd</sup> party can read information and override it
  - Public (REST) API - 3<sup>rd</sup> party can read information and override it
  - Alarms with Smart Tips – Real time notification on the Alarms console
  - Demand Response – broadcast a demand response signal to all connected area controllers
- WAC to WAC communication is not supported in this release of the Trellix Core.
  - The WAC’s expose their data to the Trellix Core and accept read/write commands from Trellix Core.
  - Configure the whole system through the mobile app or through the Lighting Software.
- Network switch required (Call out if it is to be provided by the customer).

**Wireless Area Controller (WAC-POE):**

- A PoE powered wireless area controller
  - A standalone 120V to PoE converter can be ordered (WPOE-120)

- Temperature rating is 32 to 104 degrees Fahrenheit.
  - WAC's will be placed inside a conditioned building for exterior projects. However, they need to be placed on the interior side of an exterior wall, near a window or glass for best performance.
- Over design WAC's by 20% on mid to large projects.
- You can combine exterior and interior devices on the same WAC.
- One WAC cannot talk to another WAC.
- They can be installed in the plenum above the drop ceiling or in the space.
  - Center of the space is preferred.
  - Electrical closets and IT rooms are typically surrounded by concrete walls and should be avoided for WAC placement.
  - Do not mount on or next to a metal or concrete wall.
    - Place typically 15 feet away from these areas, along with stairwells, elevators, and plumbing walls.

**POE Switch:**

- Requires a 120V AC outlet for power.
- Should have at least one per floor for any facility.
- If there are 4 or more daisy-chained, it would be better to use the customer's network.
- 2 PoE switches available:
  - LWP-SW-PoE-8-4 is an unmanaged switch. It has 4 dedicated PoE ports and 4 dedicated Ethernet ports.
  - Use the unmanaged switch as a standard default unless requested otherwise. LWP-SW-PoE-8-8 is a managed switch and all 8 ports can be used as PoE ports or Ethernet ports.
- PoE extenders can be used to extend the distance between PoE's.
  - Veracity Outreach Max has been approved via engineering
    - You must note that this will need to be provided by others.

**Standard Integrated Sensor (WAA):**

- Mounting height of 8' -15'
- PIR sensor
  - Sensor coverage pattern:
    - 12-foot radius for major motion
    - 9-foot radius for minor motion
- Closed loop daylighting (measures the total photometric amount of light, from both daylight and electric sources)
  - Each fixture is a daylight zone and adjusts to target light level
  - Can be programmed as a group
  - WAA sensors cannot send a dimming command to a wireless switch pack. Tile mount sensors (WTA) or ceiling mounted sensors (CWPD-1500) must be used to dim a wireless switch pack in day lighting applications.
- Do not recommend placing any sensor within 4' of an HVAC air diffuser.
- If fixtures are ordered with an integrated sensor, you will need to enter a line item in ControlSpec for "01 INTEGRATED SENSOR FIXTURE COUNT" for commissioning to properly calculate.

**Ceiling Sensor (CWPD-1500):**

- Mounting height of 8' -12'
- PIR sensor
  - Sensor coverage pattern:
    - 20-foot radius for major motion
    - 11-foot radius for minor motion
- Daylight sensor
  - Open loop (only measures daylight)
  - Can program 6 daylight sets
  - Daylight mounting distance is 1-2 times window height

- Must be used in conjunction with integrated sensors, the tile mount daylight sensor, the WNI feature and/or the relay switchpack for functionality with the system
- Sensor location should be based upon occupancy coverage but also careful of proximity to indirect light sources that may interfere with proper daylight control. It is also recommended that the sensors be placed level with the light fixture.
- Battery powered and rated for 7 years of battery life (only 6 if daylighting)
- Cannot act as a hopper/repeater

**Daylight Sensor (WTA):**

- Consists of a tile-mounted sensor, cable, and control unit
- The control unit is rated for 3A of lighting load (360 watts at 120V and 831 watts at 277V)
- Provides 0-10V dimming for up to 10 drivers (20mA)
- Provide occupancy and daylight dimming control of non-integrated luminaires
- Mounting height of 8' -15'
- PIR sensor
  - Sensor coverage pattern:
    - 12-foot radius for major motion
    - 9-foot radius for minor motion
- Has its own relay, does not need a switchpack (WSP-MV-010). Cannot be wired to a switchpack. The dimming wires go directly to the fixtures.
- Closed loop daylighting (measures the total photometric amount of light, from both daylight and electric sources)
- You need one per daylight zone

**WaveLinx Wireless Fixtures (WN):**

- Wireless radio fixture (no sensor)
- Emergency option is emergency battery pack
- Cannot daylight along with an integrated sensor fixture. Must use a ceiling sensor to daylight.

**Outdoor 7-Pin Connector Module (WOLC-7P-10A):**

- Fixtures must have a 7-pin receptacle
- Make sure the node will physically fit on the fixture in that project's application.
- Up to 1000 watt switching control
- Provides ON/OFF and dimming based on an astronomic or time schedule
- Temperature rating is -40 degrees to 158 degrees Fahrenheit

**Indoor/Outdoor 4-Pin Sensor:**

- Closed loop daylighting
- PIR motion sensor
- Fixtures must have a 4-pin receptacle
- Can order a 4-pin ready fixture and add the 4-pin sensor later (ZW) or order installed from the factory (ZW-SWPD\*)
- SWPD2 indoor industrial low bay for 7-15' mounting height
- SWPD3 indoor industrial high bay for 15-40' mounting height
- SWPD4 low mount outdoor sensor for 7-15' mounting height
- SWPD5 high mount outdoor sensor for 15-40' mounting height

**Wall Stations:**

- Cannot communicate across WAC's. The wall station must be programmed to sensors that reside on the same WAC as that wall station.
  - You can have multiple wall stations controlling the same sensors only if they are on the same WAC.
  - Controls one area
- Battery powered wallstations cannot act as hoppers/repeaters

- Default wording shows “Full Lights, Half Lights...”
  - Every quote should include a line item for the Engraving (ENGRV-\*\*)

**Touchscreen (TSE57-WLX-B):**

- Can be associated to only one WAC
- Maximum of 16 per WAC
- Each touchscreen requires a dedicated WAC user account. You can have up to 16 user accounts per WAC.
- POE powered
  - Do not recommend exceeding 900' in one “daisy-chained” direction

**Wireless Receptacles:**

- 15A receptacle (WR-15)
- 20a receptacle (WR-20)
- Top outlet controlled
- Supports overrides for demand response

**Relay Switchpack (WSP-MV-010):**

- Used to control plug loads or luminaires that do not include the wireless integrated sensor.
  - 20A load for general purpose/receptacle control
  - 16A load for electronic ballast (LED load) (1920 watts at 120V and 4432 watts at 277V)
- For indoor use only
- 0-10V output supports up to 60 ballasts/drivers that draw a standard 2mA each (120mA sink)
- Cannot receive a dimming signal from an integrated sensor (WAA)

**Relay Switchpack (WSP-CA-010):**

- Used to control 0-10V and line voltage based lighting fixtures
  - 20A load for general purpose/receptacle control
  - 16A load for electronic ballast (LED load) (1920 watts at 120V and 4432 watts at 277V)
- For indoor use only
- 0-10V output supports up to 15 ballasts/drivers that draw a standard 2mA each (30mA sink).
- Cannot receive a dimming signal from an integrated sensor (WAA)
- GreenGate low voltage occupancy sensor integration or contact closure input is also available for a control area.
  - Dualtech and PIR only as the ultrasonic does not have a LED indicator for commissioning

**Emergency Options:**

- In order to meet UL924, a mechanism is needed to interrupt the dimming leads on all emergency fixtures in the event of a power loss.
  - If using integrated sensors, the fixtures must be ordered with an emergency battery pack or an emergency transfer device(s). If the fixtures are running back to a central inverter or a backup generator, they would have to have the emergency transfer device(s).
    - Options on our Metalux fixture spec sheets (part numbers may differ by brand)
      - GTR2 option includes 2 relays on fixtures with dimming drivers
      - ETRD option only requires one relay when ordered on a dimming fixture
  - If using the tile mount sensor with the wireless relay switchpack or the tile mount daylight sensor, you can order a Remote Relay Unit (RRU-X-UNV) or a CEPC-2-D if the fixtures have 0-10V dimming.
    - If using the CEPC-2-D, you will only need 1 switchpack
    - If using the RRU-X-UNV, you will need 2 switchpacks (1 relay for the normal power and one for the emergency)
      - RRU's must be used to utilize power metering

**White Tuning with VividTune:**

- If the integrated sensor controls the intensity, you must order an additional switchpack for the CCT

- If non-integrated you must order two switchpacks

**Integrations:**

- A/V integration can only be done through API – we provide the strings to the third-party vendor
- Smart building integration through Trellix API
- Nurse call system provider can integrate with our system using Trellix API

**Services:**

- PRE WIRE START UP (required if project has 10+ days of startup)
- CC-DWGSERVICES (Eaton drawing service fees vary depending on project size)
- FACTORY STARTUP-WCL (use Control Spec for pricing)
- SERVICE-CNTRCT WCL (WaveLinx 1 Year Service Contract, Built as an assembly in ControlSpec)
  - Include by default on all WaveLinx projects over \$50K and make a note of it being 'OPTIONAL' with the TYPE feature in ControlSpec
  - For a basic service contract (gold), include 2 days of onsite support (OSD-SVC-C) and a 4 hour remote training (RT-SVC-C).
  - For a platinum service contract, which also includes a modem connection, we would also need to include the Modem Connection (MC-SVC-C) or Modem Connection with Cellular Plan (MCCP-SVC-C).

**Image file setup for Floor Plan in Trellix:**

- Layers to leave on in AutoCad
  - Fixtures, walls, and room names
- If left as DXF file size should be less than 10MB
  - Supported version for device import to Trellix is DXF 2007, 2010, and 2013
- For JPG/PNG:
  - From AutoCAD print to pdf on an E size sheet
  - From BlueBeam save as a JPG/PNG (Must be 1 MB or less)