

# HUBBELL.io

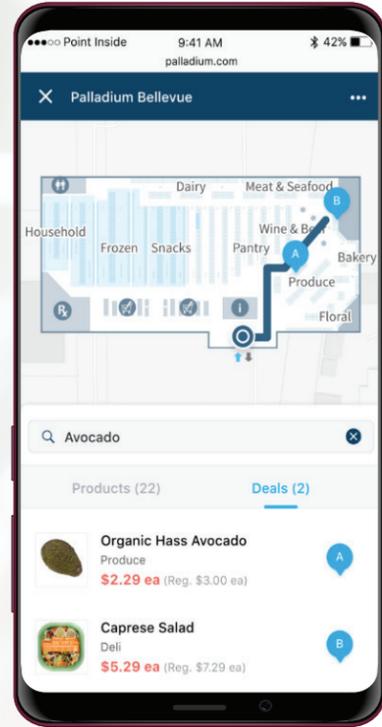
Indoor Positioning System



Hyper-accurate real-time indoor  
location services and spatial analytics



# OPPORTUNITY



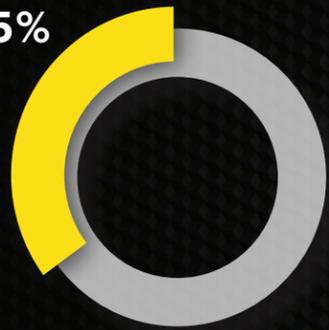
Hubbell's Indoor Positioning System (IPS) utilizes luminaires equipped with Encoded Light technology, also known as Visible Light Communication (VLC), and Bluetooth® technology which enable precise real-time location based services, advanced mapping and wayfinding for building occupants, as well as spatial analytics for venue owners.

# MARKET APPLICATIONS



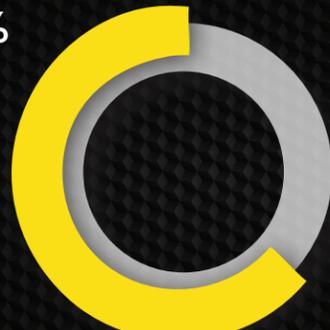
## Digital Transformation in Retail Applications

35%



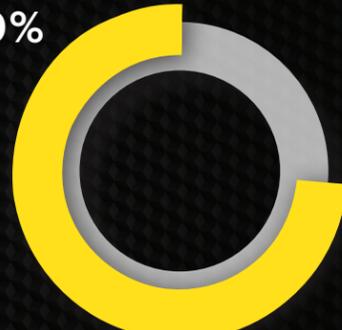
Forecasted reduction in big-box and department store associate employment between 2010 and 2020

69%



Shoppers likely to be influenced by in-store retailer-initiated activities

80%



Shoppers who use their mobile phone to help with shopping for assistance

Source: Chart 1: Mazzone & Associate, 2018. Chart 2: Deloitte Digital. Chart 3: Socratic Technologies, 2017.

# TECHNOLOGY

## Multiple Technologies

Hubbell IPS is powered by YellowDot which utilizes a combination of encoded light (VLC) and Bluetooth® technology embedded in commercial luminaires, as well as core location technology (gyroscopes, accelerometers, GPS, etc.) commonly found in smart phones, to accurately locate occupants within indoor environments.

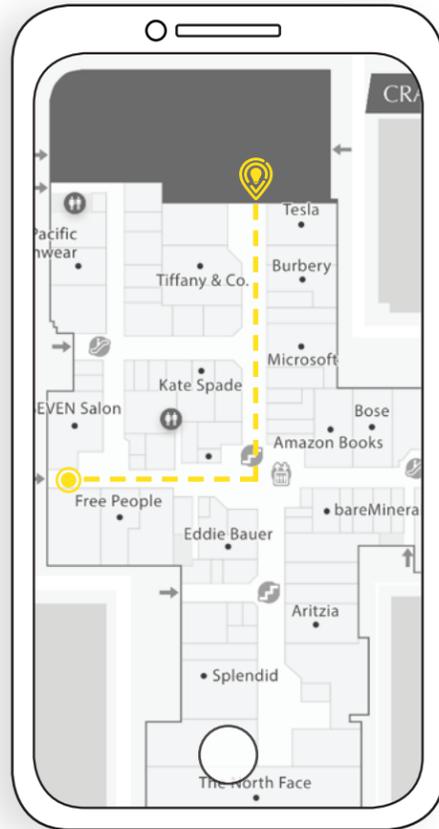


### Encoded Light

A unique fixture ID is encoded in the light emitted from the luminaire. The front facing camera detects high-frequency (invisible) changes in the luminaire light output and transfers this information to the user's venue application.

## The Choice Is Yours

Venue owners can select between Encoded Light, Bluetooth® or a hybrid solution (Encoded Light & Bluetooth) to meet varying requirements across a single or multiple venue applications.



### Technology Comparison

	Encoded Light (VLC) LIVE	Bluetooth®	Wi-Fi™ (by others)
Accuracy	• 4–12" (0.1–0.3m)	• 3–10' (1–3m)	• 16–32' (5–10m)
Position	• 15x / second refresh	• 1–3 seconds refresh	• 5–10 seconds refresh
Orientation	• 30x / second refresh	• Compass limited refresh	• Compass limited refresh
Pros	• Hyper accurate • High speed orientation • No parallel infrastructure req.	• "In-pocket" notifications • Number of supported devices • Luminaire-based or standalone	• Leverage existing infrastructure needed for Wi-Fi connectivity
Cons	• Line-of-sight technology	• Low accuracy, high latency • Lower speed orientation	• Lowest accuracy, highest latency • Lower speed orientation • Unstable performance

## User Interaction

Users interact with IPS technology through an IPS-enabled, venue specific application on an Internet-connected mobile device that depicts a user's indoor position on a map. Applications using IPS use specially designed algorithms and embedded technologies to determine a user's precise location within indoor environments.



### Bluetooth® Radio

The embedded Bluetooth® radio detects wireless transmissions emitted by the luminaire-embedded or standalone device. A smart phone's Bluetooth® radio detects wireless transmissions emitted by the luminaire-embedded device and transfers this information to the user's venue application.

## Encoded Light & Beacons

High Performance Lighting & Controls

## Indoor Positioning

Positioning Algorithms

SDK/API

Indoor Positioning

## Advanced Mapping and Analytics

Wayfinding

Venue Specific Search

Dev. Tools & Support

Platform Capabilities

Mapping as a Service

Spatial Analytics

# SCALABLE SOLUTIONS

## GPS for Indoor Applications:

Large facilities such as retail stores, hospitals, airports, event venues and other complex environments can feel unfamiliar and become disorienting to occupants. This often leads to occupants being unable to easily orient themselves within a facility and navigate to a specific point of interest. Hubbell's Indoor Positioning System (IPS) makes hyper-accurate real-time location possible in indoor commercial and industrial applications by utilizing specialized technology seamlessly embedded into luminaires provided by Hubbell and 3rd party partners.

# FEATURES



## Indoor Positioning

- Luminaires equipped with encoded light or Bluetooth® technology transmit signals over high-frequency modulated visible light (VLC) or radio waves to an occupant's smart phone
- An IPS-enabled app decodes signals and locates the occupant at their precise position on a venue specific map



## Wayfinding

- Routes users from their current position
- Capable of handling the unique needs associated with accessibility requirements
- Accommodates nuances of indoor routes, handling floor changes, stairs, escalators, ramps and elevators



## Venue Specific Search

- Tailored to each venue, and features predictive auto-complete search and optimized search priorities
- Provides results ranked based on proximity to either the users location or based on the portion of the map that is in view



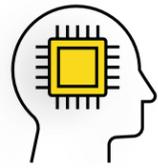
## Mapping as a Service

- Flexible and advanced indoor mapping platform designed to scale from single building to thousands of venues each with customized styles
- Support for locations of products, services, places or any other type of object or data on venue map



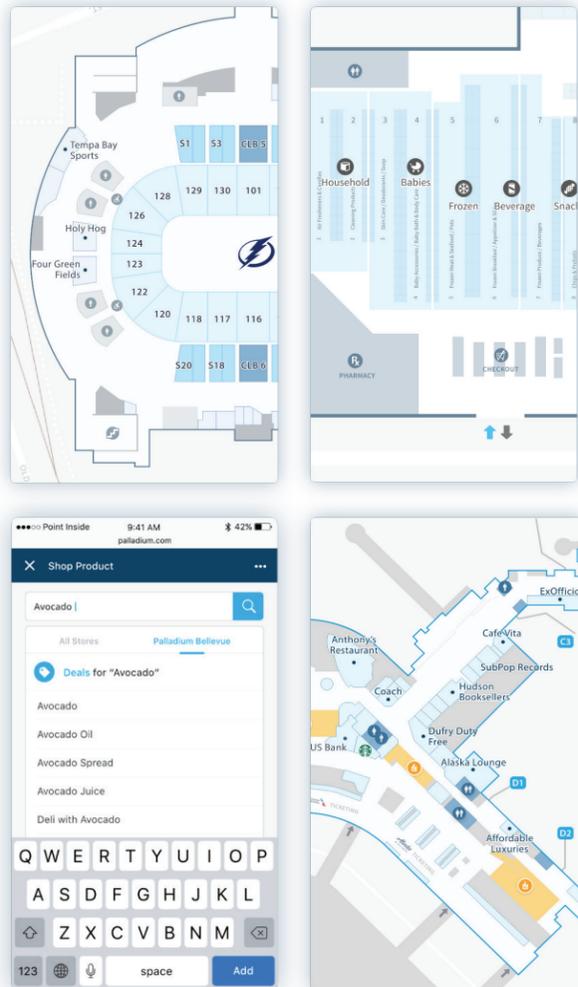
## Spatial Analysis

- A sophisticated Location Analytics platform provides retailers with location-aware insights into departments, service areas, product and brand locations, and more
- Analytics capture time and location parameters for collectible data points
- Location, Region and Enterprise Statistics
- Map anchors every product, deal and shopper location and the location of all in-store activity



## A Smart Wayfinding Solution:

Hubbell IPS benefits both the occupant and the venue owner. Hubbell IPS enables occupants to conveniently and confidently locate points of interest and products with ease, as well navigate their way through multi-floor, complex or dynamic indoor environments using their personal smart phone and a IPS-enabled venue specific app. Spatial analytics provide venue owners with insights into occupant behavior, while simultaneously providing occupants with an immersive and enriched digital experience.



# SYSTEM ELEMENTS



## Physical Infrastructure

Luminaires are equipped with coded light injectors and/or Bluetooth Beacons



## Cloud Infrastructure

The position of luminaires is stored in a cloud-based location database



## Indoor Positioning Service

Nearby luminaire identification is decoded by phone camera or Bluetooth radio and real-time position and orientation is retrieved



## Mapping Service

Customer heading and profile, store merchandise and points-of-interests (POI) are integrated to virtual store/venue environment



## Analytics Services

User, site and enterprise statistics and reporting is provided to venue owner or operator



Powered by **Point Inside**

## YellowDot CERTIFIED LUMINAIRE



Downlights



High Bays



Low Bays



Troffers



LED Strips



**HUBBELL**  
Integrated Solutions



**HUBBELL**  
Lighting

701 Millennium Blvd. Greenville, SC 29607

Tel 864.678.1000

[www.hubbellighting.com](http://www.hubbellighting.com)

The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Hubbell Inc. is under license. Other trademarks and trade names are those of their respective owners

Copyright © 2019 Hubbell Lighting, Inc. All rights reserved. Please refer to online specifications for most up-to-date content as specifications are subject to change without notice.

**HUBBELL.io**