

# “Getting to Smart” Connected Cities Tour

Connectivity and Bandwidth are the oil of the Gig Economy.

Network Technologies such as: 4G/5G, IoT, Fiber, Small Cell and Wi Fi are Transforming How Society Operates.

These sessions bring together thought leaders from Government, Enterprise, Academia and the Tech Community to look at the Business Models, Technology Architectures and action plans that City and Community ecosystems are using to build Dense Broadband Infrastructure.

Be part of the Solution



The Social Think Tank™

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

## 2019 - 2020 Event Schedule

September 10	Seattle
September 18	St. Louis
October 23	Los Angeles
October 29	San Diego
November 14	New York
December 5	Columbus
February 12	Miami
March 12	Jacksonville
March 26	Atlanta
April 30	Chicago

# Connected Cities Tour “GETTING TO SMART” San Diego

October 29 | 9:00 am to 2:00 pm



David Graham  
CIO CARLSBAD

Presenting Sponsor: **GraybaR.**

“Getting to Smart” is a quick dose of knowledge to help you navigate in our increasingly mobile, always-on, information intensive, and SMART Society.

Network Technologies: 4G/5G, IoT, Fiber, Small Cells and WiFi are enabling new smart solutions that are transforming transportation, public safety, real estate and other critical aspects of society.

- 4G is evolving to 5G
- Small Cell deployments are being integrated into Smart Poles
- Cities are creating Smart Spaces with Video and AI
- IoT applications are creating terrabytes of data

Join Industry Thought Leaders and explore Business Models, Technology Architectures and First Hand Use Cases that are driving Innovation and Disruptive Solutions.



**HITACHI**  
Inspire the Next

**JMA**  
WIRELESS



**extenei**  
SYSTEMS



**5th Gen MEDIA**

Build Your Own Coverage

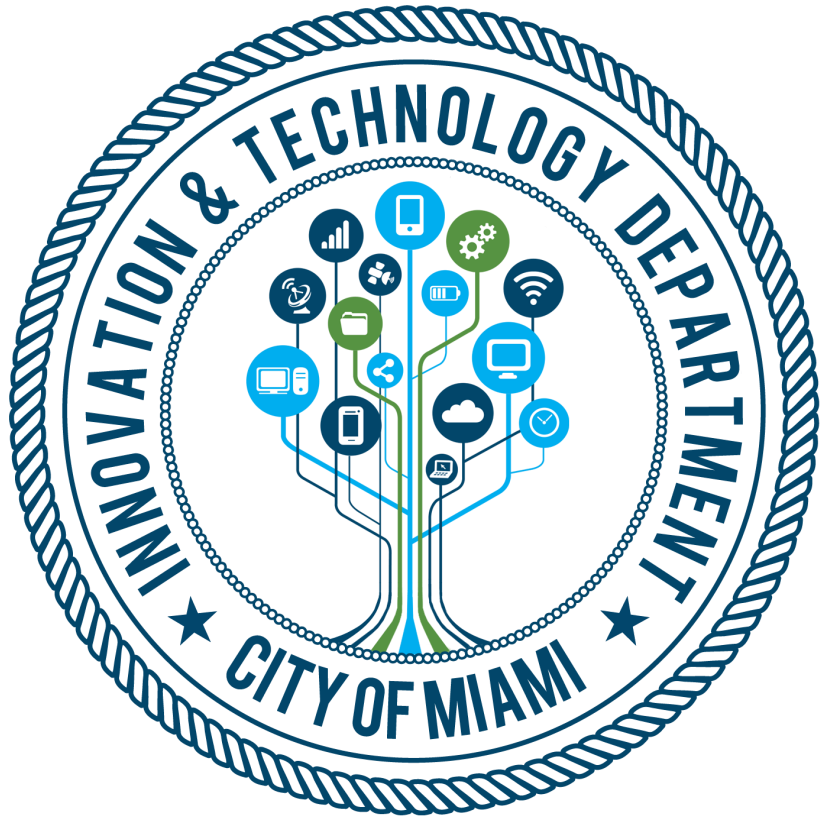
Safer Buildings Coalition

Granite

Gabe's

LANDMARK FLEXGRID

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What does  
“Smart” Mean for  
the City of Miami?

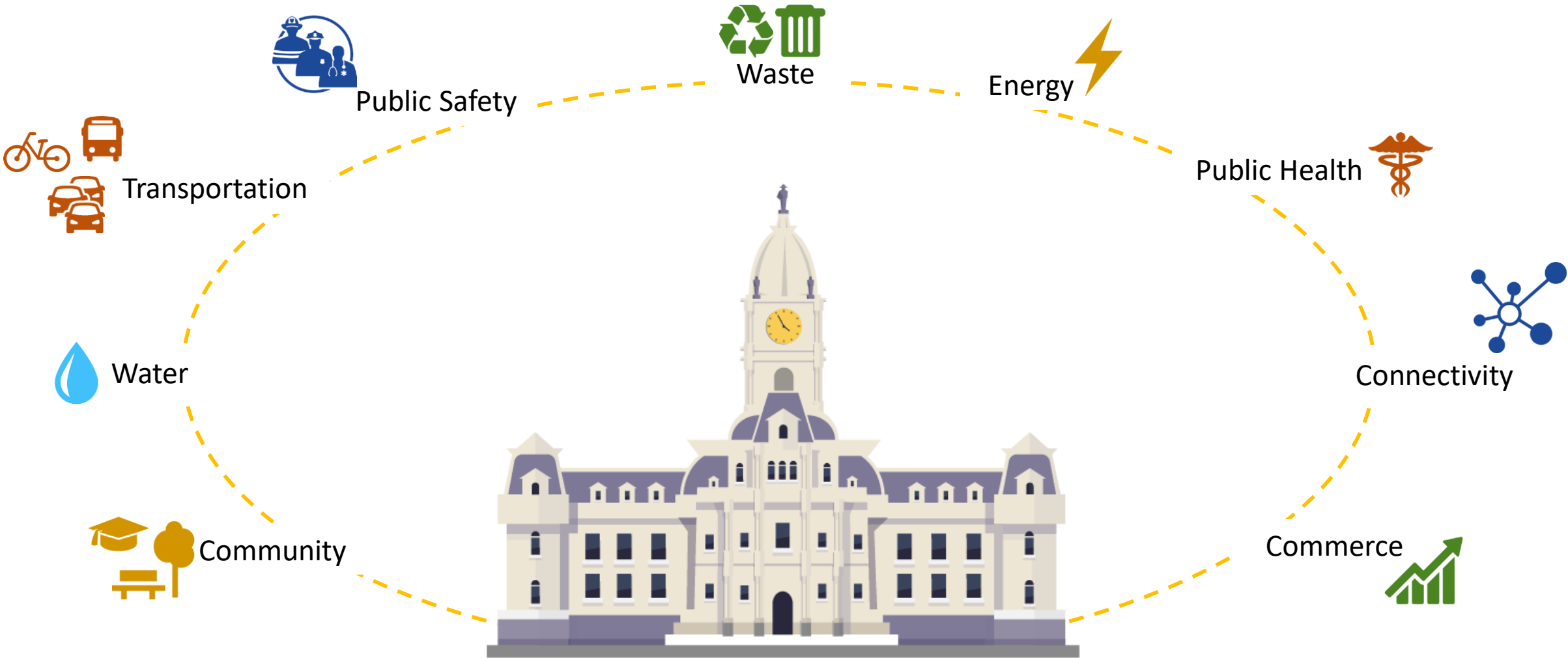
A Smart Miami is:

- *Connected*
- *Equitable*
- *Resilient*
- *Sustainable*
- *Transparent*
- *Self-Aware*



# The Big Picture

Smart Collaboration > Improved Efficiency > Faster Response > Better Service





# The Smart Cities Framework

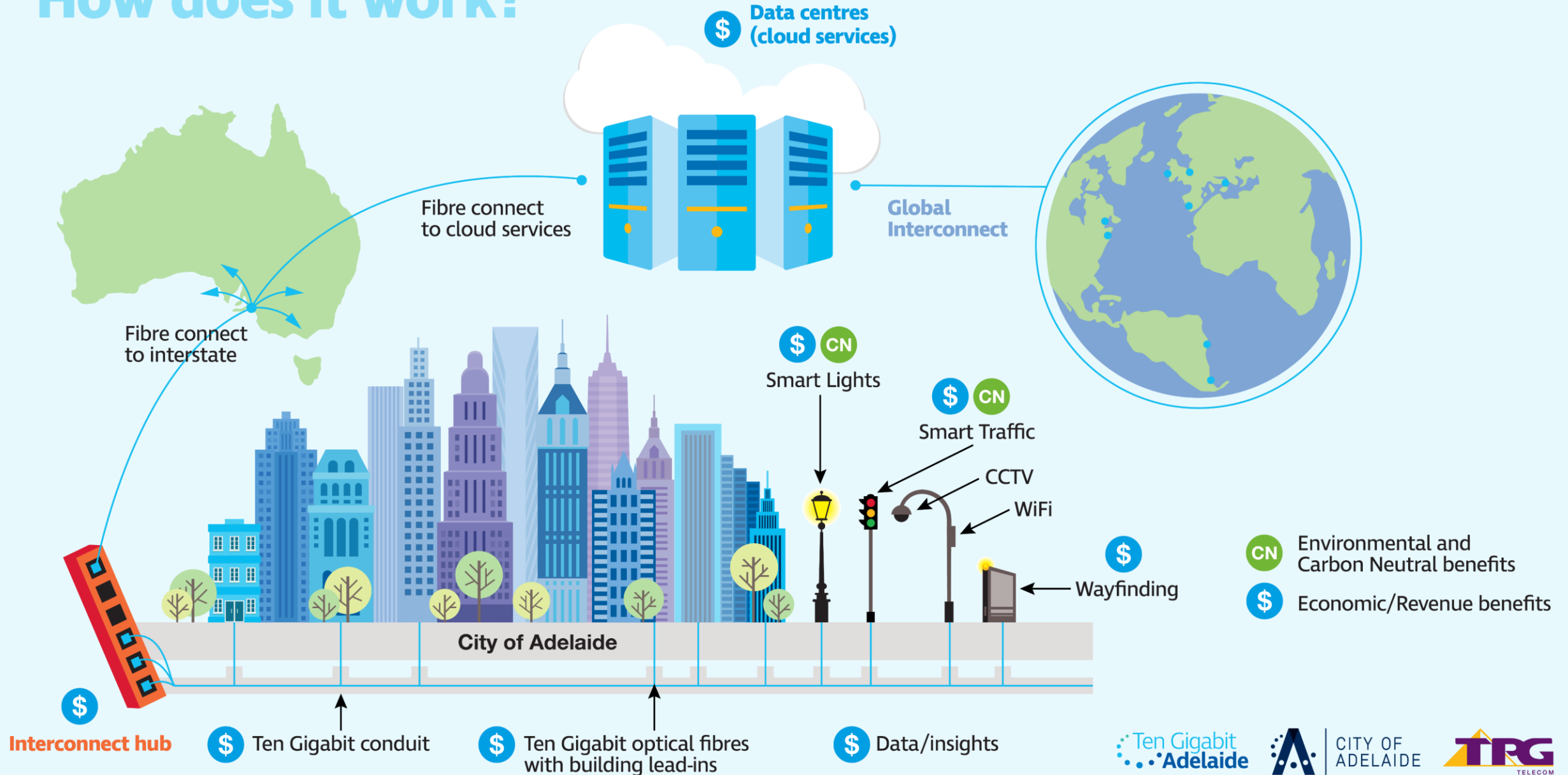
## TECHNOLOGY ENABLERS

Universal Aspects	Built Environment	Energy	Telecommunications	Transportation	Water and Wastewater	Health and Human Service	Public Safety	Payments and Finance	Waste Management
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Instrumentation and Control									
Connectivity									
Interoperability									
Security and Privacy									
Data Management									
Computing Resources									
Analytics									



# How does it work?



# San Jose Broadband Strategy

## Hybrid Approach – 80% results for 20% effort

	Government-led	Hybrid model <u>(Recommended)</u>	Market-led
	<p>Chattanooga</p> <p>San Francisco</p> <p>Seattle</p> <p>New York City</p> <p>Charlotte</p> <p>Kansas City</p> <p>Los Angeles</p> <p>San Diego</p> <p>San Jose</p>		
Summary	<p>Cities building full fiber networks is expensive, complex, and risky</p> <p><b>Too Risky</b></p>	<p>Cities that welcome private investment with appropriate guidance are most successful</p> <p><b>Just Right</b></p>	<p>Cities with laissez faire broadband stagnate as cable-telecom duopolies</p> <p><b>Too Ineffective</b></p>
Key Takeaways	<ul style="list-style-type: none"> <li>• Seattle, Palo Alto and others have determined that city-led full fiber build-outs are not practical, after detailed assessments</li> <li>• Chattanooga’s unique buildout included control by the utility and federal funds</li> </ul>	<ul style="list-style-type: none"> <li>• Seattle leveraged streamlined policies to drive competition and massive fiber buildout</li> <li>• NYC used franchise agreements to drive fiber build-out</li> </ul>	<ul style="list-style-type: none"> <li>• Broadband speed and price cluster to the bottom of the peer set</li> <li>• No substantial competition in any market-led city</li> </ul>
Potential costs	<b>Very high.</b> City-owned fiber-to-the-premise would cost \$800M+.	<b>Moderate.</b> Working with carriers could cost \$50-250M based on build types.	<b>Very low or none.</b> City relies on private sector investment.
Results	Peers show <b>90%+</b> fiber build-out.	Peers show <b>55-70%</b> fiber build-out.	Peers show <b>0-5%</b> fiber build-out.

Easter morning 1900: 5<sup>th</sup> Ave, New York City. Spot the automobile.

Disruption can happen very fast...



Source: US National Archives.



**Easter morning 1913: 5<sup>th</sup> Ave, New York City.  
Spot the horse.**

**Disruption can happen very fast...**



Source: George Grantham Bain Collection.



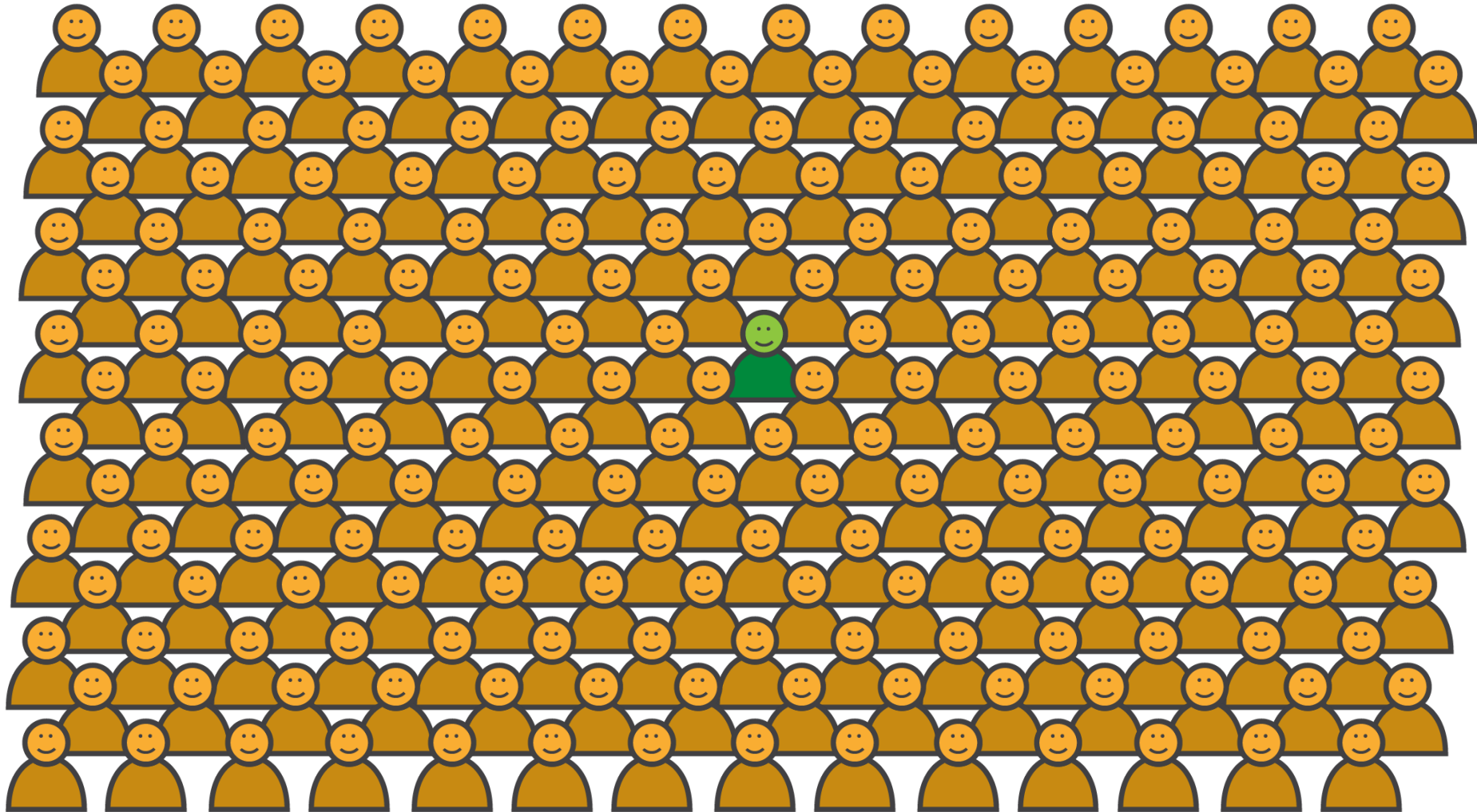
***Connected City***  
***Smart City***



DenseNetworks.com

# Population Vs Visitors

1 Resident to 245 Tourists



# Smart Cities invest in smart infrastructure like fiber



According to 2018 research from RVA, LLC:

## Fiber Cities are more likely to be Smart Cities

- Cities with fiber have, on average, **37% more deployed small cells** and just **over 35% more smart city applications**
- **33% of cities without fiber** report small cell activity, versus **60% of cities with fiber** to the residence.



# About Landmark Dividend

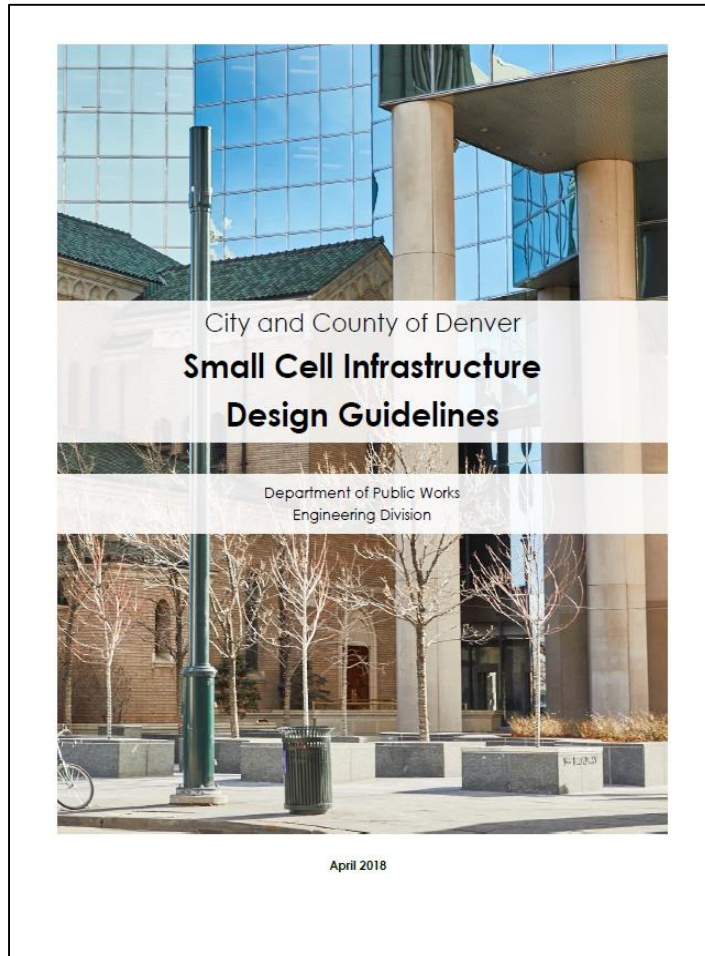


Landmark Dividend LLC is a real estate and infrastructure investment firm specializing in the telecom and renewable energy industries. Our key areas of focus for acquisition and development include:

- **Telecommunications (4G/5G Tower & Concealment Solutions)**
- **Data Centers**
- **Fiber Optic Infrastructure**
- **Smart Cities**
- **Renewable Power Generation and Energy Storage (Microgrids including EV charging)**
- **Outdoor Digital Media & Advertising**



Public Works has created Design Guidelines and a custom Permit process to address:



- ❑ Public-facing review process including Districts, City Departments, Neighborhood Orgs
- ❑ Policy for co-location first
- ❑ Notification of adjacent property owner
- ❑ Restricting new pole density through min **250'** spacing
- ❑ Restricting placement (along parks, historic & residential frontages)
- ❑ Restricting placement in front of residential & valuable sight lines
- ❑ Requiring camouflage and concealment
- ❑ Limiting height and equipment size
- ❑ Opportunity to coordinate fiber conduit

 <b>DENVER</b> THE MILE HIGH CITY The City and County of Denver Public Works Department Jon Reynolds, Engineering Supervisor	 <b>JACOBS</b> Jacobs Engineering Group Mike Butters, Project Manger
 CLANTON & ASSOCIATES LIGHTING DESIGN AND ENGINEERING Clanton & Associates: Nancy Clanton, CEO Dane Sanders, Principal Annie Kuczkowski, Engineer II - Lighting	 Aero Wireless Group Aero Wireless Group: Jim Lockwood, CEO Mike Hoganson, Chief Operating Officer

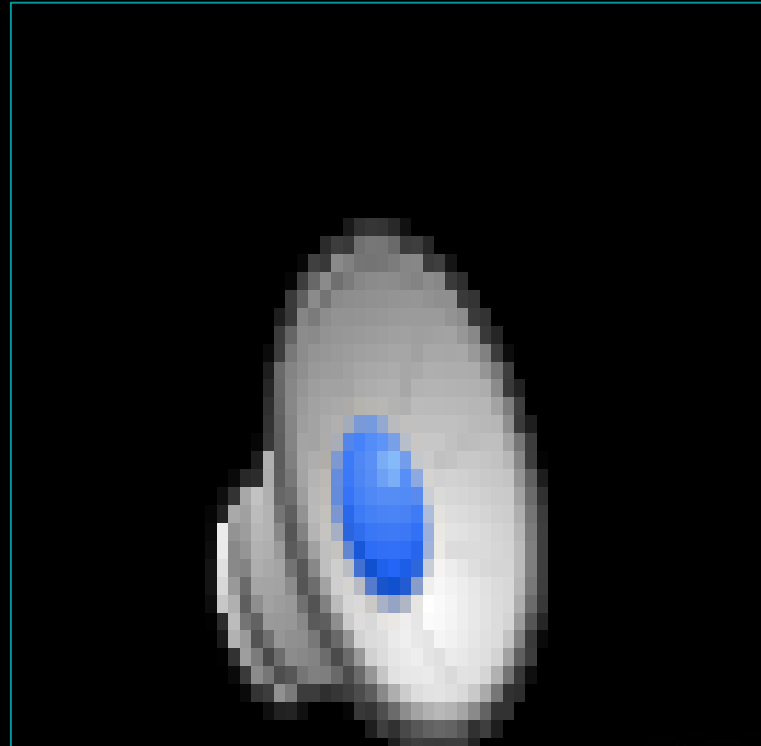
# Video + AI = Rich Insights and Alerts Operations, Business and Safety Intelligence

**NEXT**  
2018

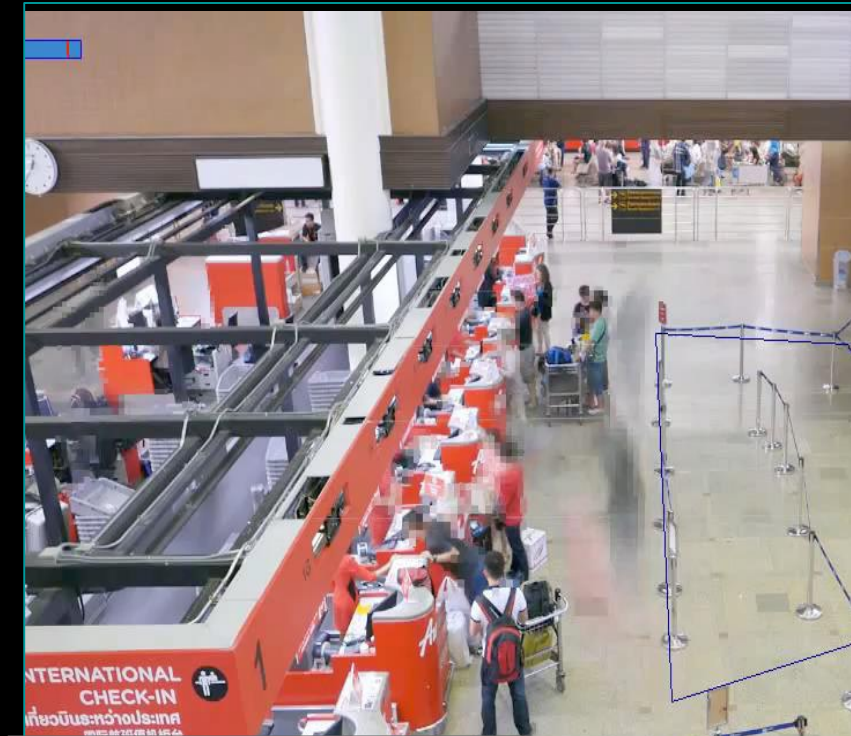
## Traffic Analysis



## People Counting



## Operations and Privacy



\*VMP = Video Management Platform VSP = Virtual Storage Platform HCP = Hitachi Content Platform

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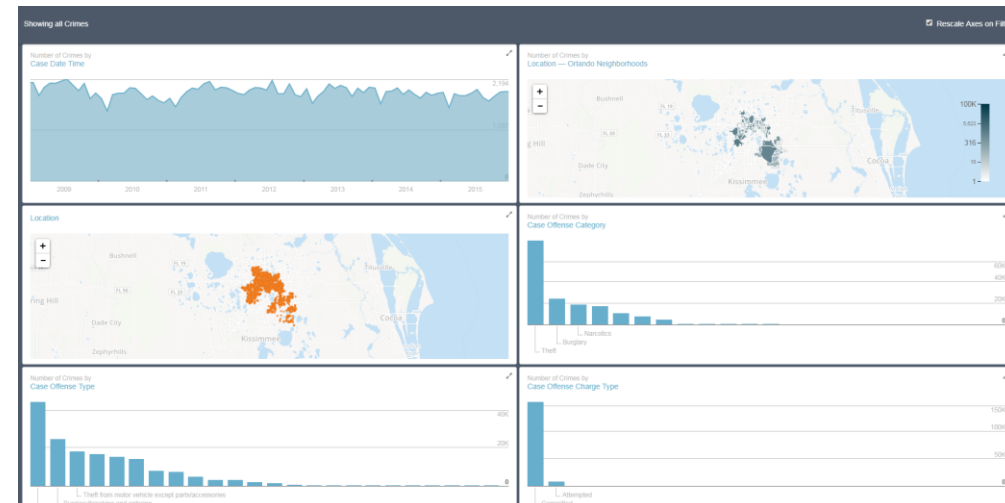


# Orlando

## Open Data Initiative & Digital City Hall



- Launched **Orlando.gov** (alpha) to interface with residents via 'Digital City Hall'
- **Open Date Initiative helps to:**
  - Increase transparency and facilitate economic development
  - Analyze crime data in Orlando Neighborhoods
  - Access GIS Maps and Interactive Visualizations
  - Provide access to energy and water use information in buildings (BEWES)





# Smart Community Ideas: Secure

	Apartments	Master Planned Residential	Office & Retail	Industrial	Hospitality/Community
Smart Streetlights	●	●	●	●	●
Incident Detection	●	○	●	◐	●
Real-time Surveillance	◐	◐	●	●	●
Crowd Monitoring	○	○	◐	◐	●
Wearables	◐	◐	○	○	◐
Real-time Recognition	○	○	◐	◐	●



Less  
  
  
  
  
  
  
  
  
  
More

# Hitachi Video Analytics Delivers Digital Insights

**NEXT**  
2018

## Operational & Business Intelligence



People Counter



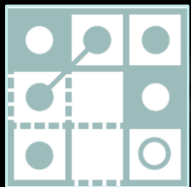
Traffic Analyzer



Queue Detector



License Plate Recognizer



Activity Visualizer



Parking Space Analyzer



Direction Controller



Camera Health Monitor

## Security



Intrusion Detector



Facial Recognition



Object Detector



Video Enhancer

## Privacy



Privacy Protector



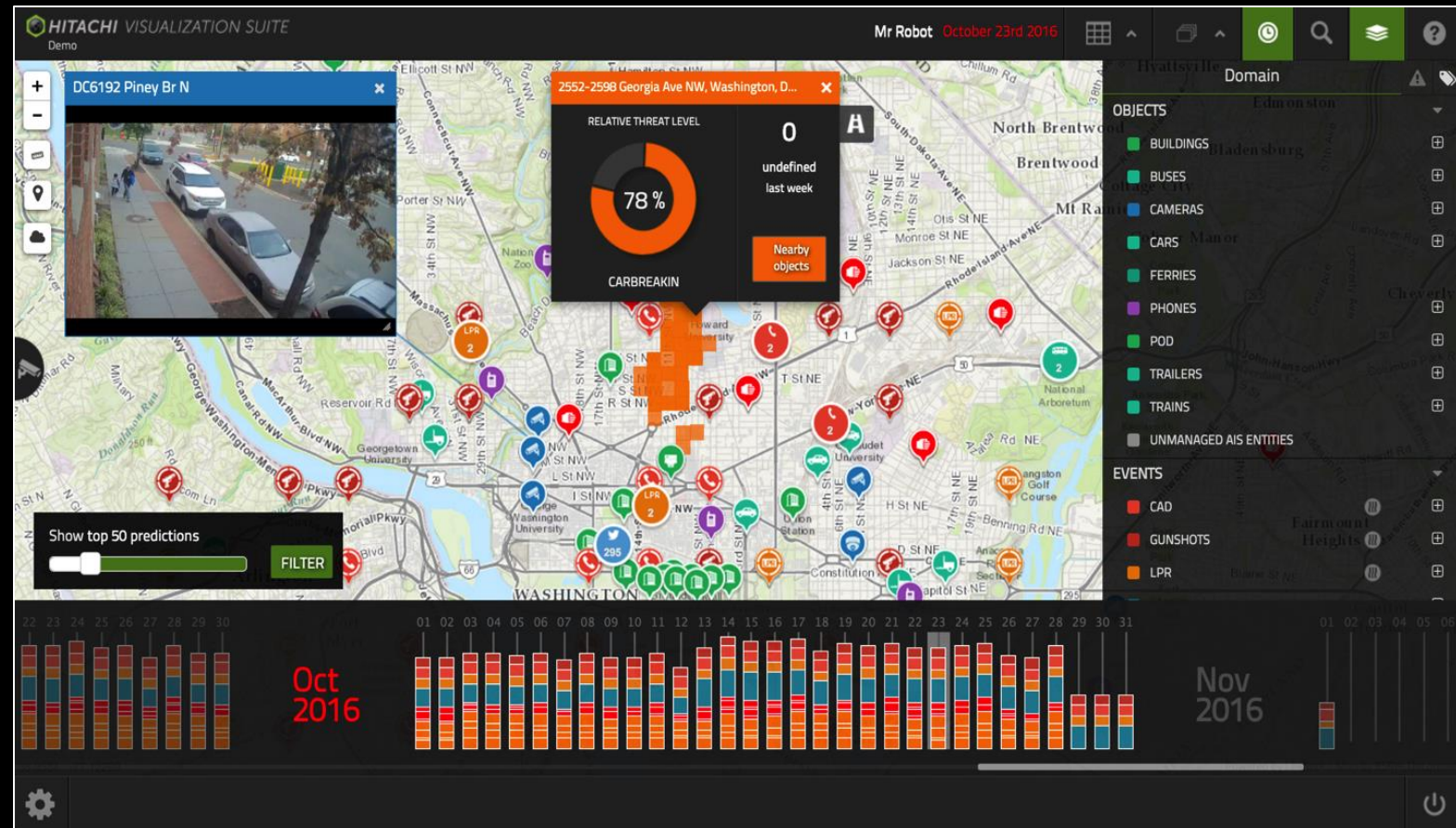
European Privacy Seal  
EP-P-F9LDTM / Valid till 2017-10

Police • Hospitals • Campuses • City Agencies • Retail • Financial Services • Transportation • Utilities

# Situational Awareness Through Hitachi Visualization Suite

NEXT  
2018

- Real-time video and IoT data from facilities, vehicles, infrastructure, security, and shops
- Unlimited data layers on a single pane of glass
- Distributed intelligence for all staff with browser-based desktop or mobile capability
- Workflow automation for setting alerts for customer needs or security incidents



# Smart Cities need smart infrastructure



Smart  
Grid

## Energy Efficiency

EPB in Chattanooga built out a fiber network to reliably manage its energy and electrical systems



Smart  
Health

## Healthier Cities

Hiawatha Broadband in Minnesota piloting project to use its fiber as a platform for home monitoring of patients with dementia



Sensor  
Network

## Civic IoT

US Ignite and cities around the U.S. (and the world) are developing a smart city app store predicated on big bandwidth



Smart  
Mobility

## Safer Streets

Verizon and the City of Boston are using sensors and advanced traffic signal controls to measure traffic, improve safety



City  
Wi-Fi

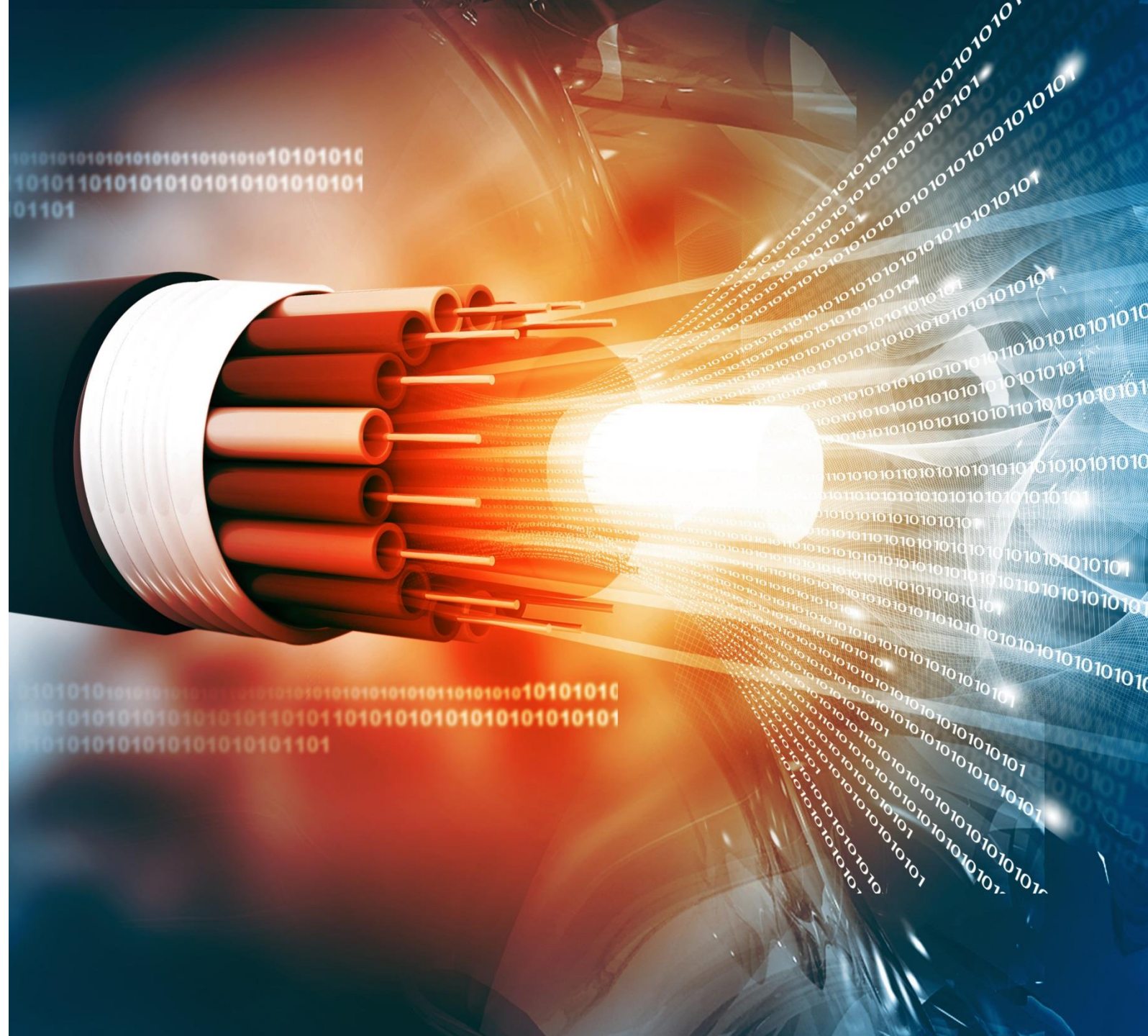
## Connected Community

Santa Monica City Net provides fiber-supported Wi-Fi to its residents in public places



# Fiber Optics

- Fiber Optic Links
  - greater bandwidth,
  - longer distance
  - more signal immunity
- Resistance
  - temperature fluctuations,
  - severe weather conditions
  - moisture
- Lifespan Over 100 Years
- Replace Outdated Solutions
  - Copper and twisted pair transmission
  - Traffic signal loop sensors
- 5G/ Small Cell



# A Tidal Wave of Antennas



Significant opportunity exists to evolve to a *shared* infrastructure model in urban centers





[DenseNetworks.com](https://DenseNetworks.com)

# Smart Street lighting

- **GOAL:** 100% LED streetlight by 2020
- OUC working to retrofit 25,000+ streetlights to LED
  - 18,000 currently retrofitted
- Exploring test of new “Smart Streetlights” in Downtown
  - LED technology
  - Video surveillance
  - Environmental monitoring
  - Traffic analytics
  - Wi-fi / DAS systems
  - Gun shot detection



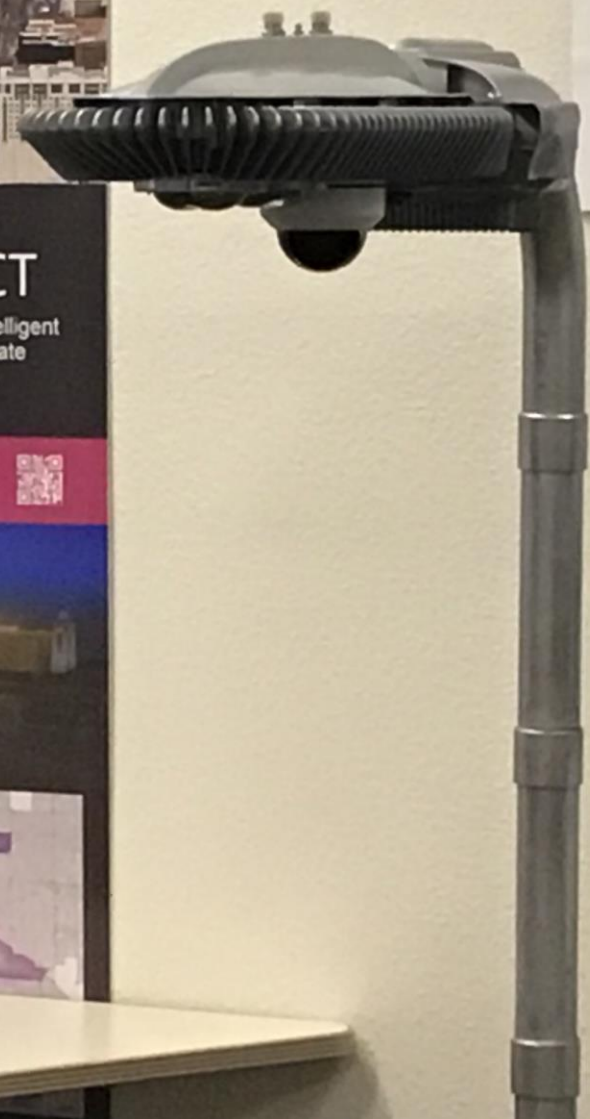
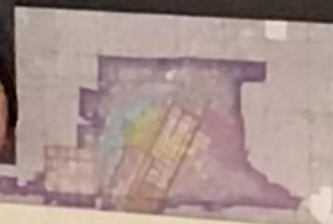


## DOWNTOWN INNOVATION DISTRICT

The city is working quickly to create a place where intelligent transportation systems and smart technology operate seamlessly to provide services efficiently to its 650,000 residents and 42 million visitors.

lasvegasnevada.gov

ASMARTCITY



# San Jose Broadband Strategy

## Emerging landscape for voice and DATA

*Effective in Dense Urban, Urban, and Suburban*

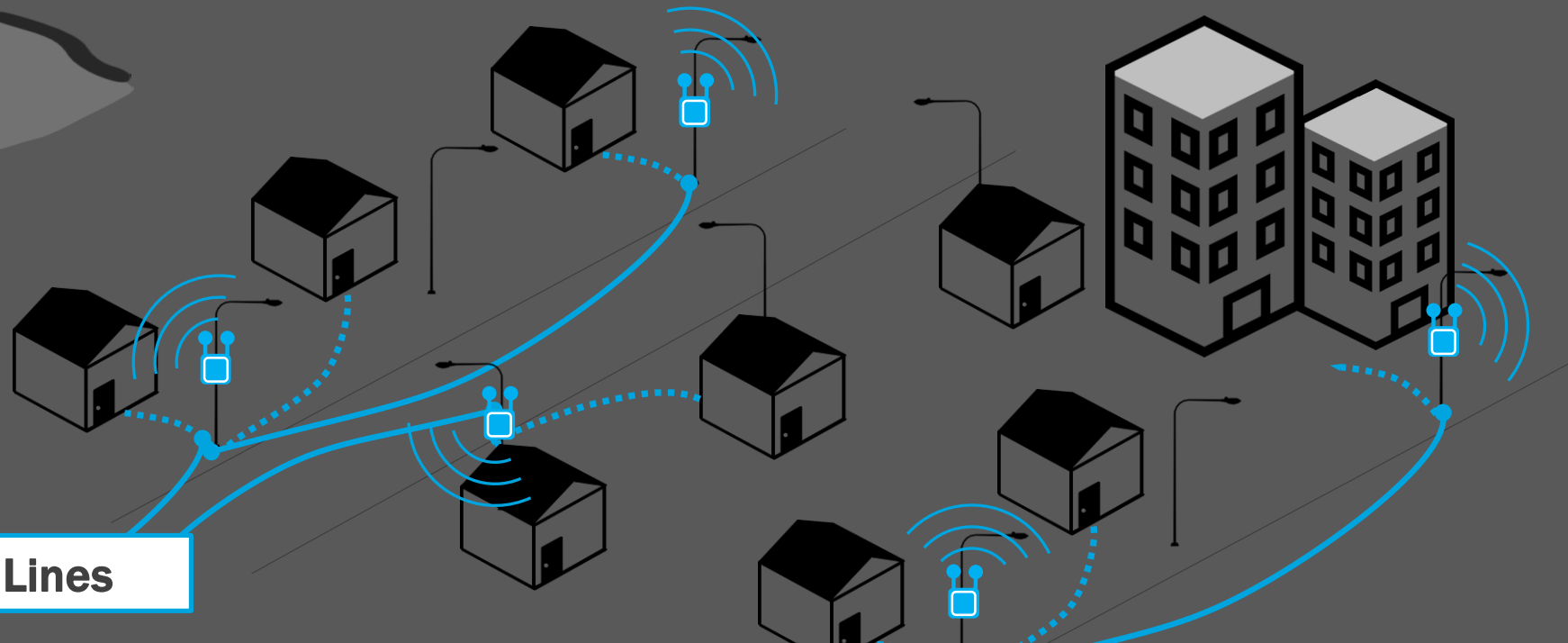
Cell towers: carry all mobile voice & some data

 4G/5G Small-Cells

Gigabit speed  
up to 50x faster

Fiber Lines

*Light pole is most valuable asset for broadband*



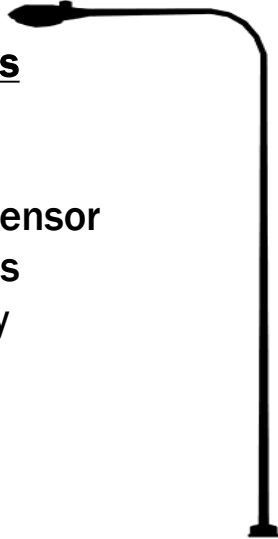
# San Jose Broadband Strategy

## STREETLIGHT

Light/Safety

### Properties

- Height
- Power
- Light Sensor
- Lumens
- Density

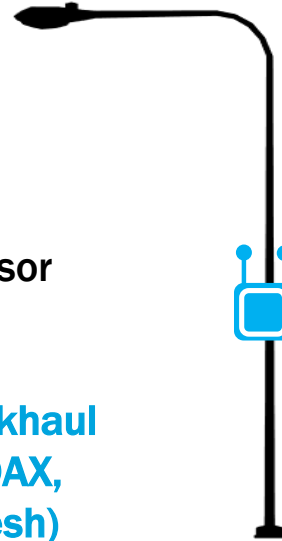


## SMALL CELLS

Broadband Digital Infrastructure

### Properties

- Height
- Power
- Light Sensor
- Lumens
- Density
- **Data Backhaul**  
(Fiber, COAX,  
Radio mesh)

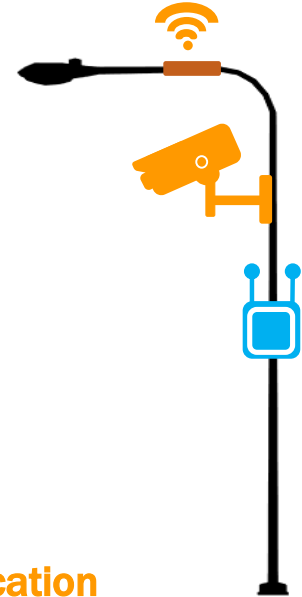


## INTERNET OF THINGS

Smart Cities

### Properties

- Height
- Power
- Light Sensor
- Lumens
- Density
- **Data Backhaul**
- **Sensors**
- **Cameras**
- **2-way Communication**
- **Banner Advertising**



Maturity:

Mature

Emerging

Extremely Immature

Possible Action: Proceed w/ LED Light Replacement Only

Re-examine in Broadband Strategy

Seek to Understand with Knight IoT Grant

## Permitting



**PERMIT  
REQUIRED**

- ❖ Coordinate ahead - Cell AND Fiber AND Power are linked!
- ❖ Require and perform “**Pre-Review**” before any application
- ❖ Bundle to reduce volume - Denver allows 10 poles per application
- ❖ Bundle Fiber optic submissions
- ❖ Work together on GIS data that works for City
- ❖ Leverage Xcel to ensure Co-location is a timely option
- ❖ Strategize with Xcel on grouping installations

## Installation – Designed to Reduce Time in Right of Way

The CityPole® is designed and fabricated to reduce the installation time required on site. Total installation time for a CityPole® (excluding excavation) can be achieved in less than one hour. All remote radio heads, power meter, ventilation system and antennas are pre-installed. The 3-step installation process is straightforward with safety as the priority.

### 3-Step Installation Process



Step 1: Place pre-cast foundation and grounding into excavation in the right-of-way. (Caisson optional.)

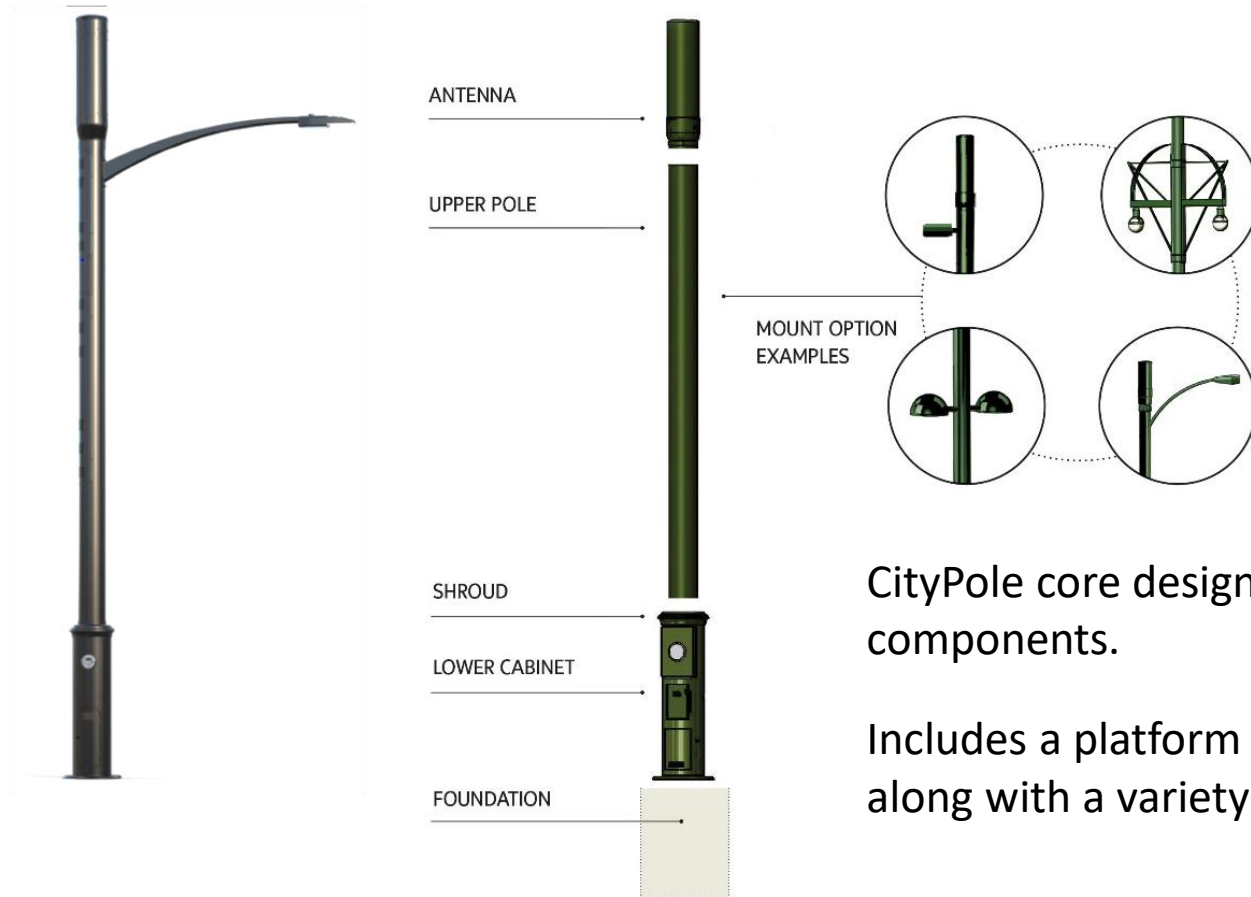


Step 2: Install base cabinet of the CityPole® onto the foundation and secure



Step 3: Install top section with antenna onto base section with architectural shrouds.

The modular CityPole system provides a “starting point” for assuring the local conditions and technology can work together seamlessly



CityPole core design is comprised of modular components.

Includes a platform of standardized components along with a variety of customizable options.

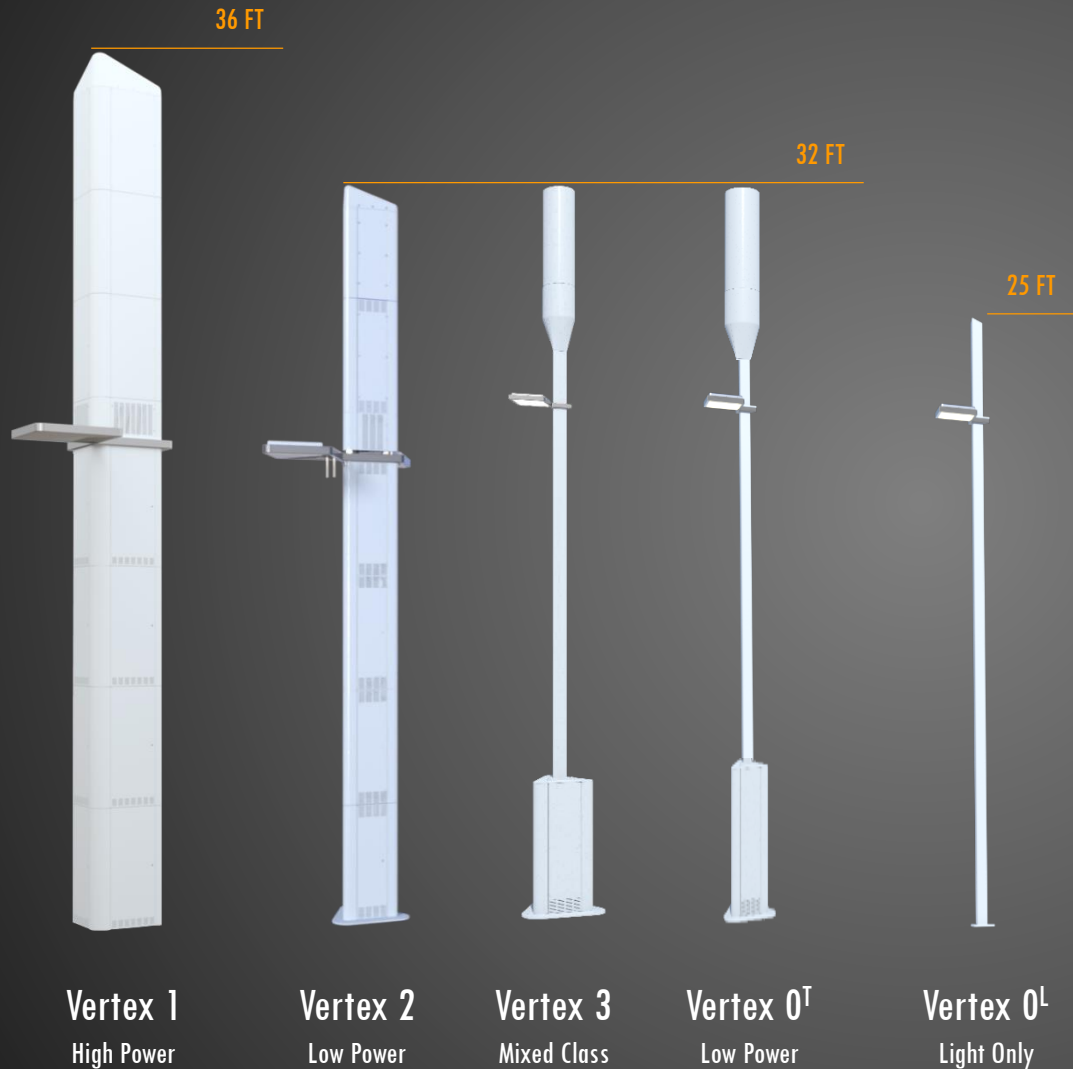




## CityPole is a Technology Center

- Upper 4G Antenna or 5G Radio/Antenna
- Upper Pole Equipment Bays (4G)
- Lighting and IoT Systems
- Lower Pole Assembly
- Base cabinet – Radios and Power metering. Secured separations
- Foundation

# Our Portfolio of Telecommunication Infrastructure



## INTEGRATED POLE SPECIFICATIONS

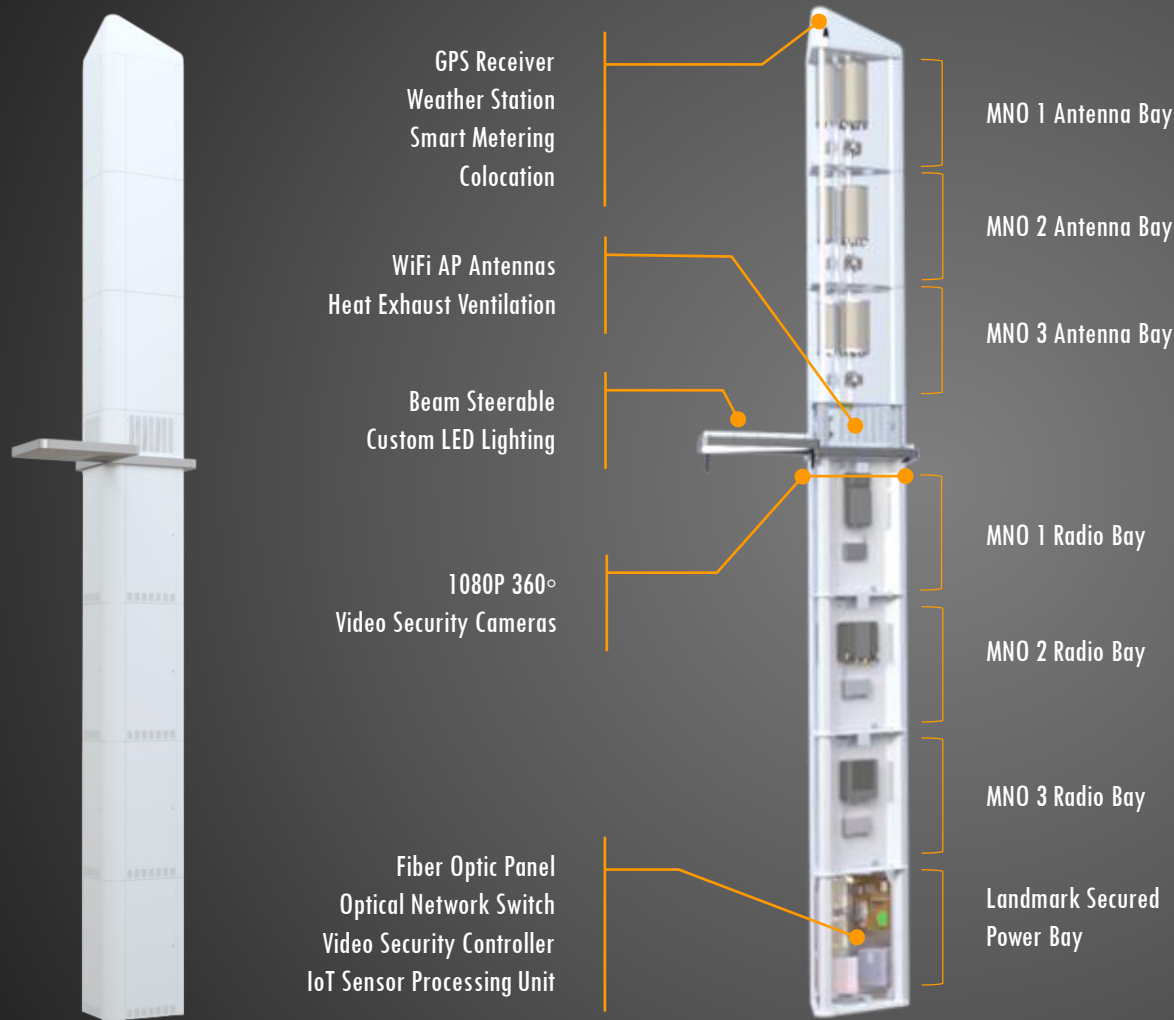
- Radio Vendor Neutral
- ASHTO Light Standard Compliant ASCE 7-93
- GR487, NEMA and TIA-222 Compliant
- UL/ULC Approved Portfolio
- Vendor approved operating environment (preserving radio warranties)
- Universal foundation allowing for rapid site development/changes
- Stainless steel construction offering the longest life expectancy
- Engineered for coastal zone hurricane force winds and seismic zone 4
- Unmatched radio density across all classes of infrastructure



**FDC — Configurable Site Cabinet**

## Vertex Integrated Pole Portfolio for 4G/5G

# Vertex V1 — Maximum Concealment



## VERTEX INFRASTRUCTURE HIGHLIGHTS

- Radio Vendor Neutral
- 4G / 5G — High Band & Low Band
- 80,000 Cubic Inches/Bay
- 12-18 RRUS & 5G AIR Full Concealment
- Baseband & CIPRI CRAN Hub Ready
- Radio / Antenna Vendor Neutral
- UL/ULC Certified
- GR487, NEMA, TIA-222 Compliant
- 240V AC
- AC & DC Power Systems
- Custom Designed LED Luminaires
- Battery Backup Available

## SITE OFFER OPTIONS

- WiFi Services
- Fiber Optic Backhaul/Fronthaul
- Internet Services
- Encryption
- Supports Sensor Nets
- Site Security/Monitoring
- Video Surveillance
- Rackspace / Padmount Colocation
- GPS / SAT Services
- Supports Special Radio Applications — Utility FAN, Meter Collection

**Vertex V1 — Integrated Mini-Macro Multi-Tenant Light Standard**

# Example FlexGrid Deployment



## 1: Radio Colocation & Core Network

Landmark deploys state-of-the-art stealth tower infrastructure that enables the deployment of 4G/5G in marquee locations typically resistant to traditional macro/micro cell towers. Landmark's offerings provide prospective tenants a neutral host solution for small cell connectivity and various smart city and IoT applications.

## 2: Connected Kiosk

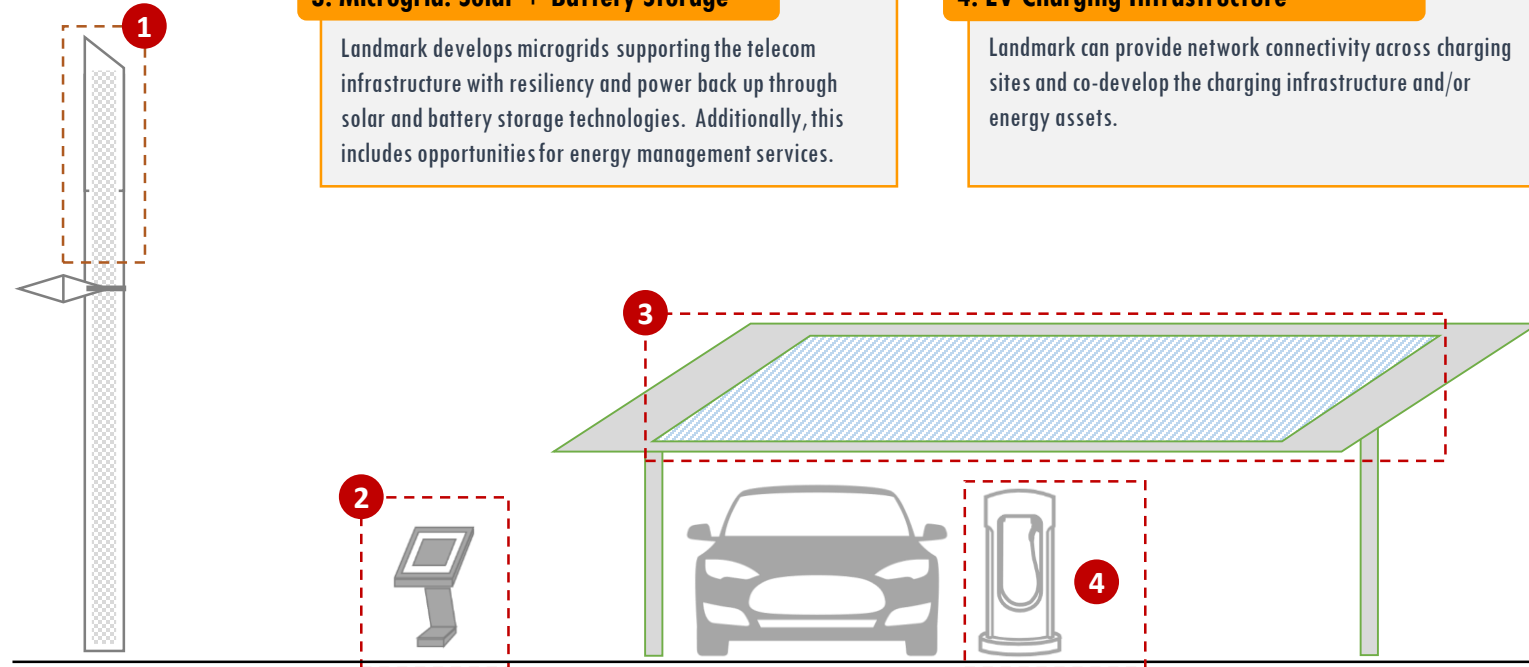
Landmark brings high-speed connectivity fostering a rich environment for out-of-home digital kiosk network operators. Kiosk networks can be leveraged for public safety announcements and advertising revenues.

## 3: Microgrid: Solar + Battery Storage

Landmark develops microgrids supporting the telecom infrastructure with resiliency and power back up through solar and battery storage technologies. Additionally, this includes opportunities for energy management services.

## 4: EV Charging Infrastructure

Landmark can provide network connectivity across charging sites and co-develop the charging infrastructure and/or energy assets.



# Autonomous



# Connected