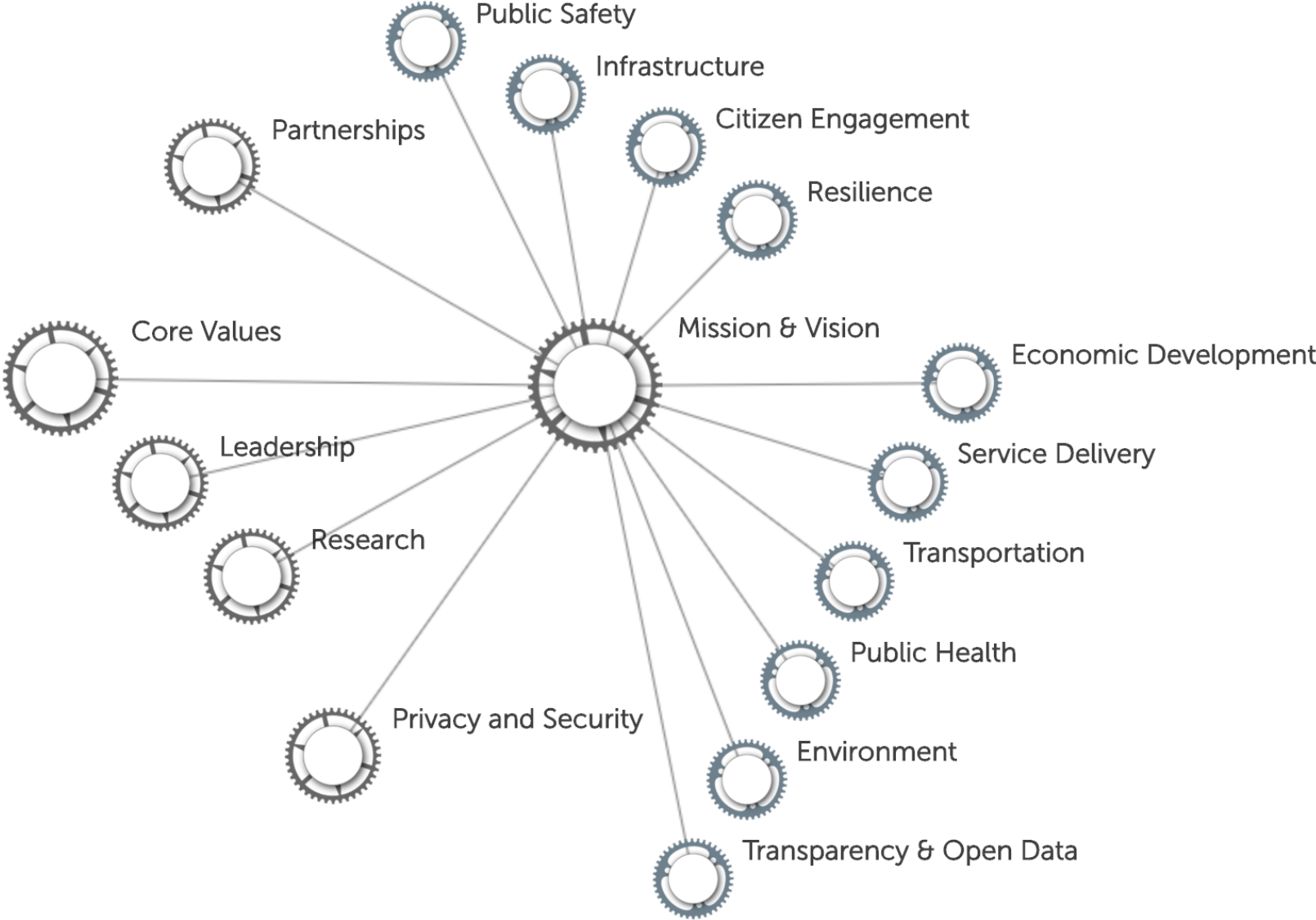
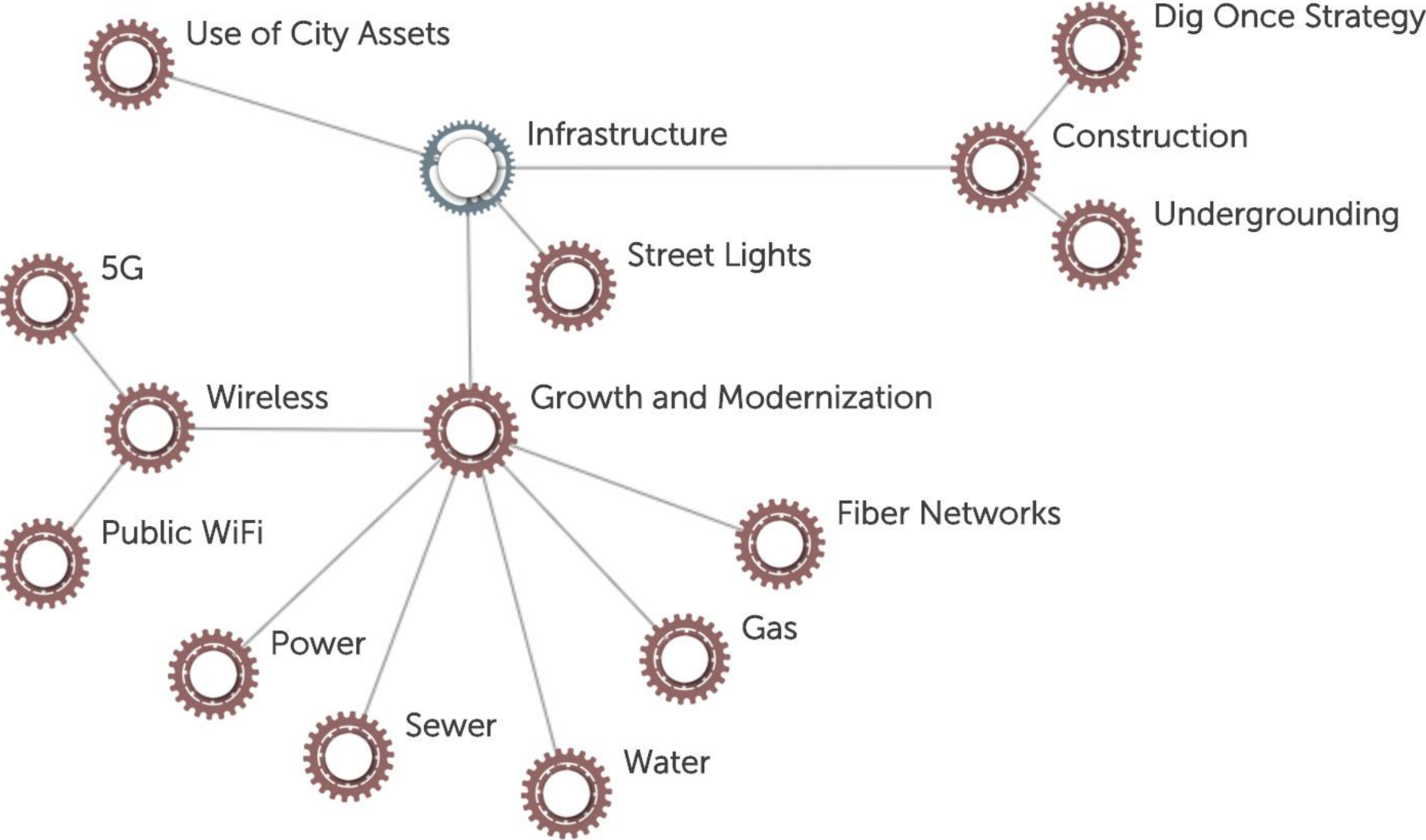


Scope of Smart City Initiative



Scope of Smart City Initiative: Infrastructure



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



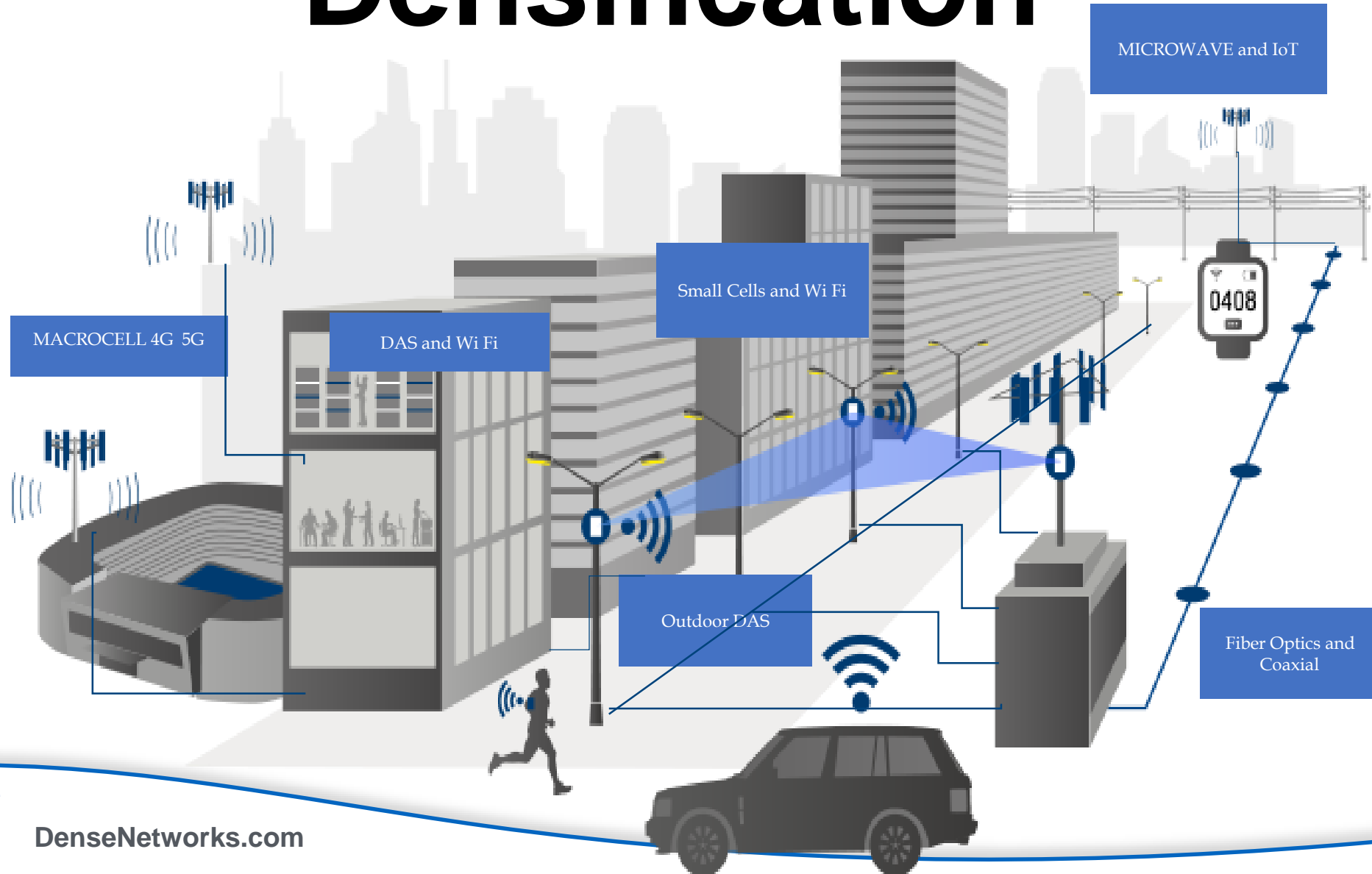
City
Wi-Fi

Connected Community

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



Densification



Capacity

Coverage



Bandwidth

ENTER

[click here for more information](#)



A Tidal Wave of Antennas



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



LA SALLE CAS BUILDING

Apartments

Peabodys
Luxury Living

Today!
6.1711

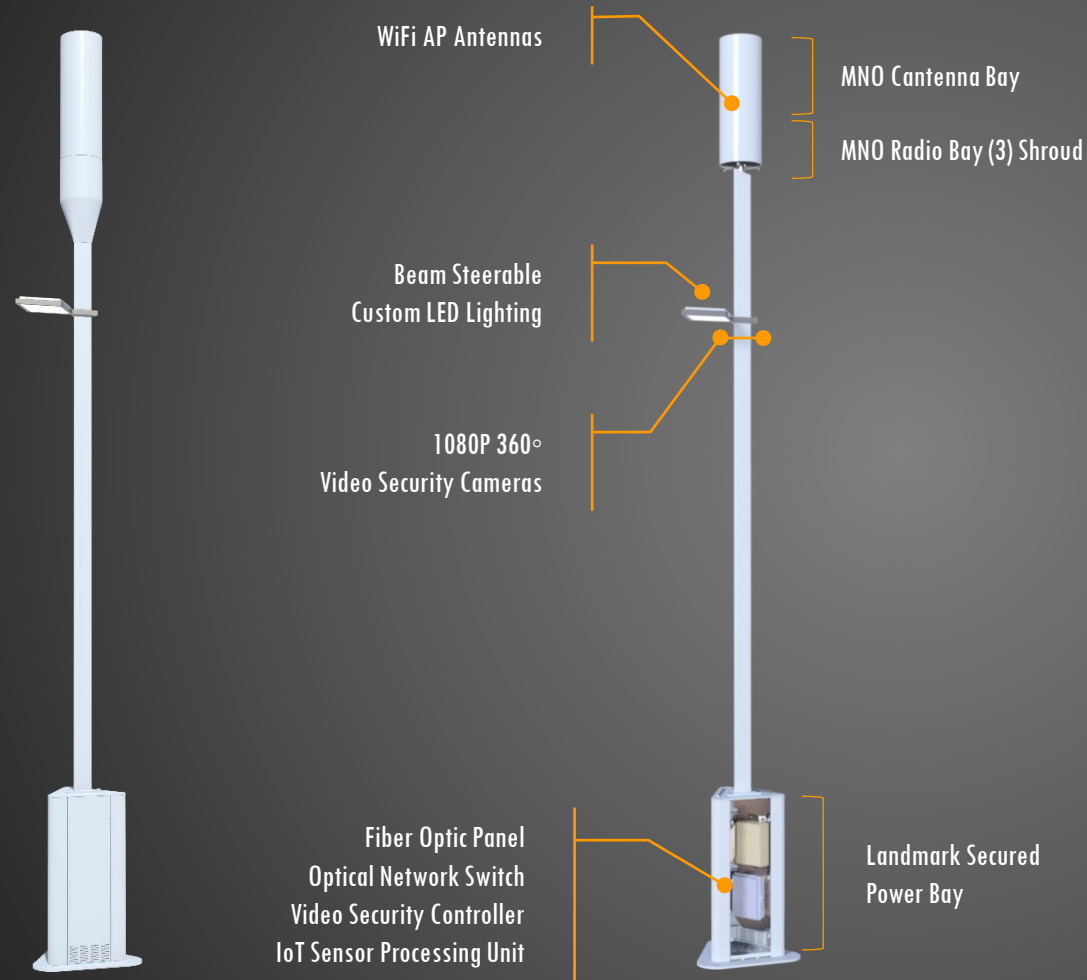
Lashley's Tea Company

THOMPSON
COBBIN

501030

70

Vertex V0^T — Micro Cell Concealment



VERTEX INFRASTRUCTURE HIGHLIGHTS

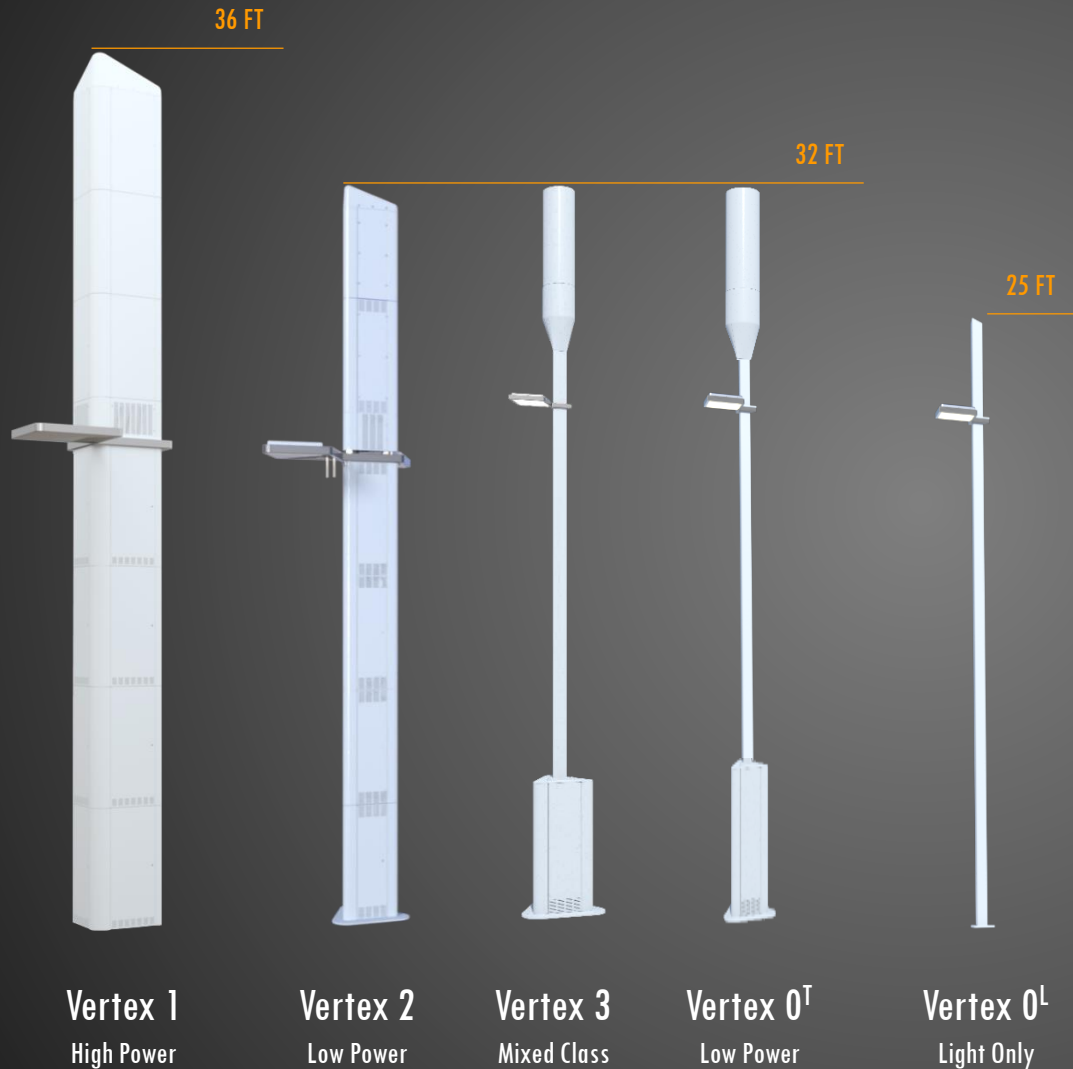
- Multi-Port 4G / 5G Antenna Bay (LB + HB + AIR)
- Vendor Neutral Small Cell Low Power MMRUS Radio Mounting Bay - 3 MRRUS Radios supported
- 15,000 Cubic Inches of Colocation Space
- UL/ULC Certified
- GR487, NEMA, TIA-222 Compliant
- AC & DC Power Systems
- Custom Designed LED Luminaires
- Battery Backup 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 V0^T — Integrated Micro Cell Single Tenant Light Standard

Our Portfolio of Telecommunication Infrastructure



INTEGRATED POLE SPECIFICATIONS

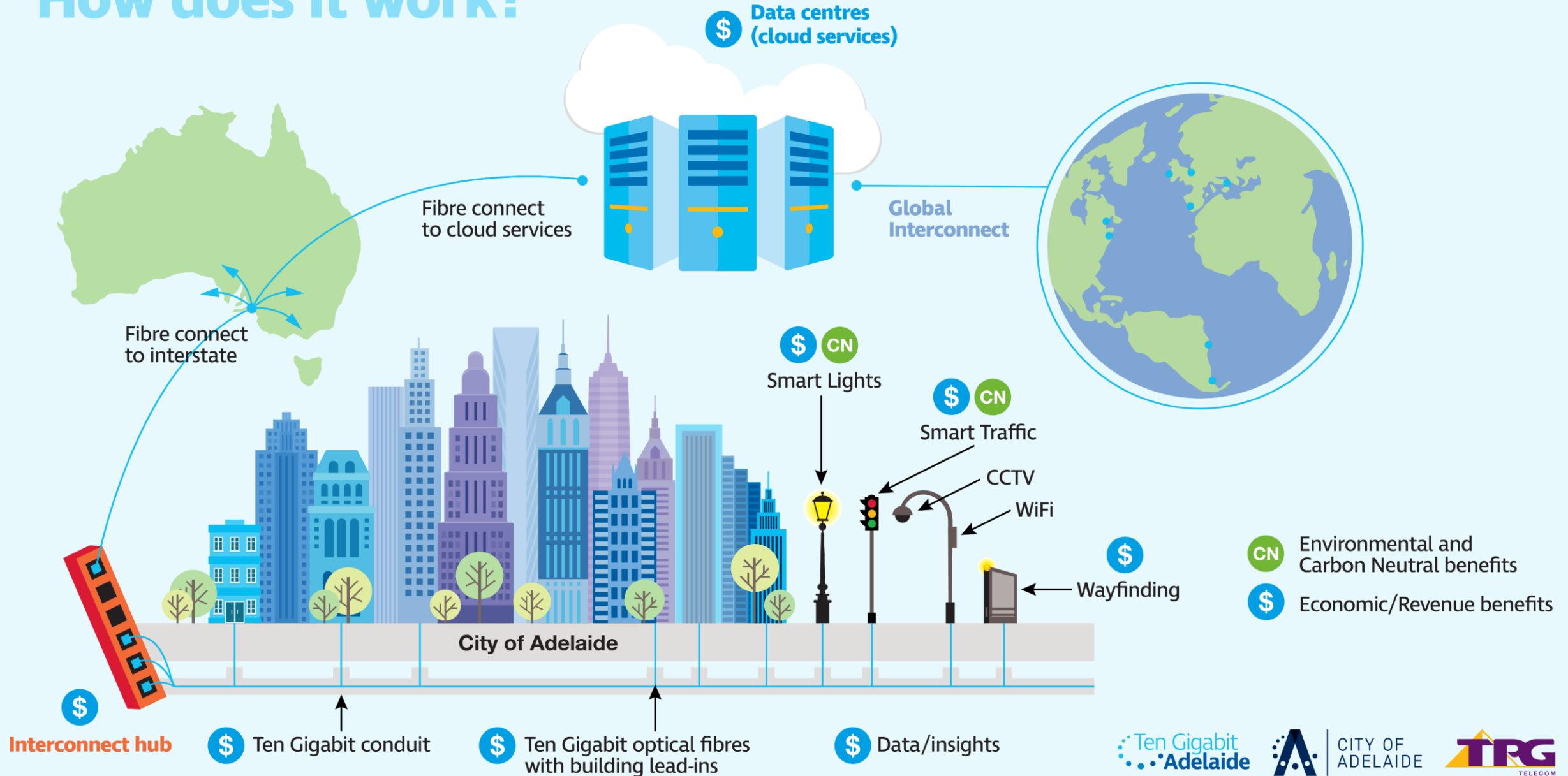
- Radio Vendor Neutral
- ASHTO Light Standard Compliant ASCE 7-93
- GR487, NEMA and TIA-222 Compliant
- UL/ULC Approved Portfolio
- Vendor approved operating environment (preserving radio warranties)
- Universal foundation allowing for rapid site development/changes
- Stainless steel construction offering 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

How does it work?



Smart Cities invest in smart infrastructure like fiber



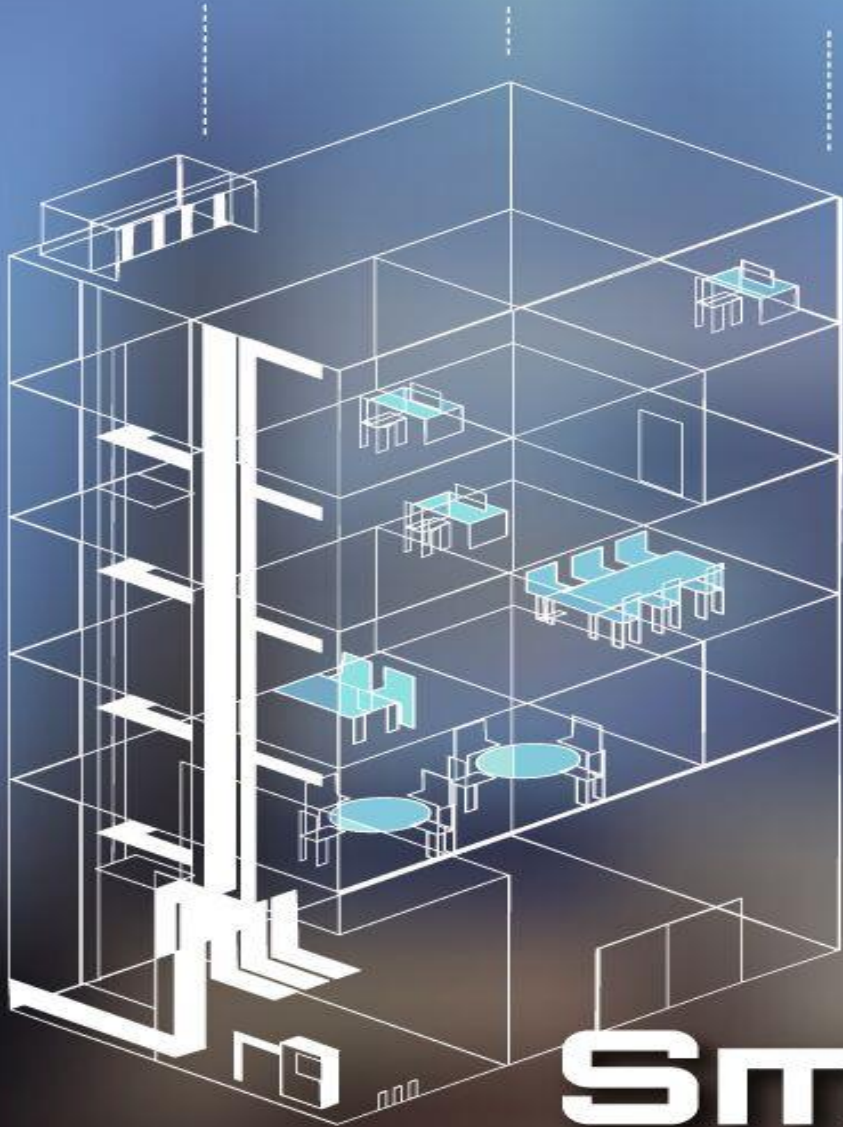
According to 2018 research from RVA, LLC:

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.



BUILDING MANAGEMENT SYSTEM



Smart Buildings

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

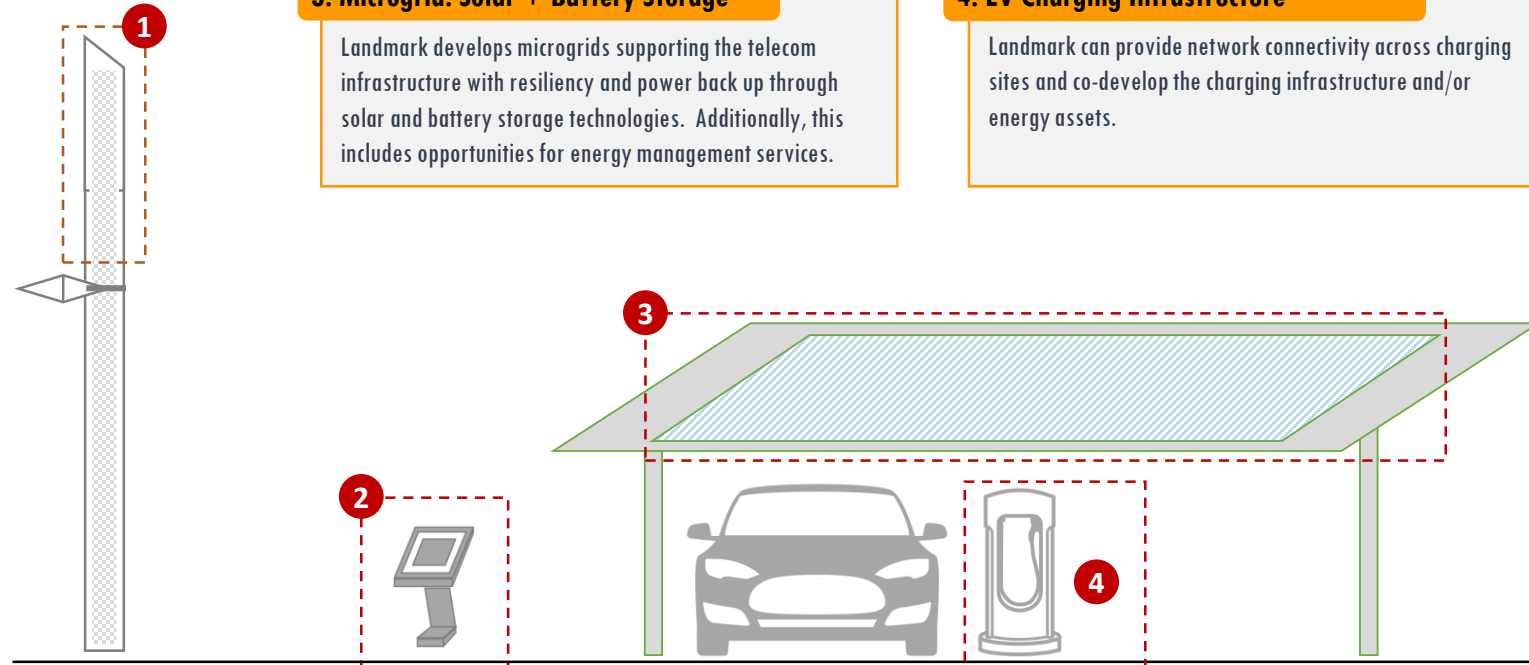
Landmark brings high-speed connectivity fostering a rich environment for out-of-home digital kiosk network operators. Kiosk networks can be leveraged for public safety announcements and advertising revenues.

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.

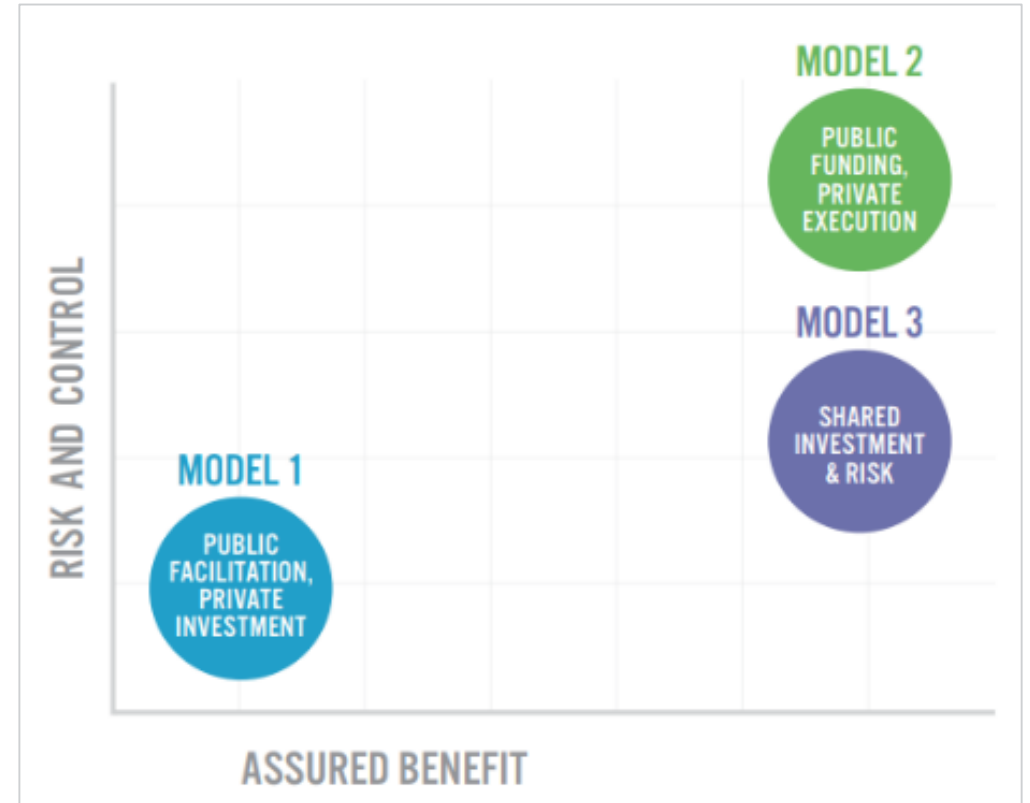
4: EV Charging Infrastructure

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



Broadband Public-Private Partnership (P3) Models – Government Perspective

	MODEL 1 PUBLIC FACILITATION, PRIVATE INVESTMENT	MODEL 2 PUBLIC FUNDING, PRIVATE EXECUTION	MODEL 3 SHARED INVESTMENT & RISK
RISK	LOW	HIGH	MODERATE
BENEFIT	POTENTIAL BUT NOT ASSURED	HIGH	HIGH
CONTROL	NONE	MODERATE	MODERATE



Source: CLIC & Benton Foundation, The Emerging World of Broadband Public-Private Partnerships

Denver Small Cell Dual Use Street Light Pole Deployment

Small Cell Dual Use Sites



Develop **Digital Twin**: Detailed 3D Mapping



- Shared Funding through EIG
- Ground Lidar and imagery
- **Version 1:** Colorized point cloud
- **Version 2:** Shaded 3D (like the current prototype)
- **Version 3:** Fully skinned version using areal and ground-based imagery

Common Operating Picture: Interaction using a Digital Twin

Sensor Control, Configuration, and Access: Common Operating Picture Integration Concept

