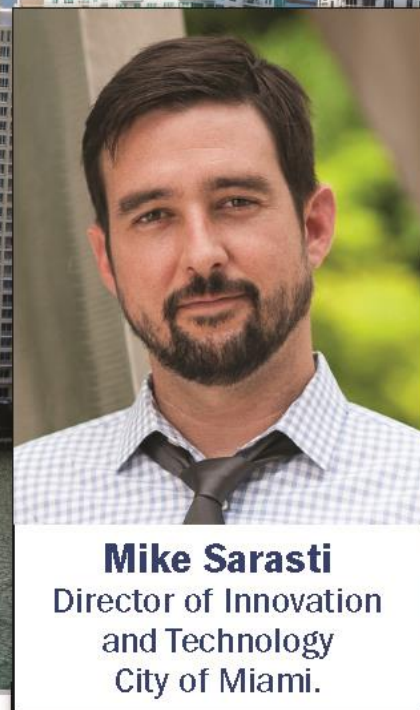# Connected Cities Tour 2020
"Getting to Smart"
University of Miami

1330 Miller Drive Coral Gables
February 11 | 9:00 am to 2:00 pm

Mike Sarasti
Director of Innovation and Technology
City of Miami.

Raimundo Rodulfo
Chief Innovation Officer
City of Coral Gables

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.

"Getting to Smart" Connected Cities Tour

5G

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

CONNECTED CITIES TOUR 2020

2020 Event Schedule

Date	City
February 11	Miami
March 12	Tampa
March 26	Atlanta
April 23	Dallas
April 30	New Orleans
May 14	Phoenix
June 11	Washington DC
June 18	Chicago
September 10	Boston
September 17	Charlotte
September 24	Houston
October 8	Philadelphia
October 29	Orlando
November 11	Nashville
December 3	San Antonio
December 10	New York

Agenda

9:00 Check In

9:15 "Getting to Smart"-Peter Murray, Executive Director, Dense Networks

9:25 Connected Transportation, Cordell Schachter, CTO, NYC DOT

9:50 Smart and Connected Cities, Moderator: Peter Murray

      -Cordell Schachter, CTO, NYC DOT

      -Jawaid Chotani, Director, Hitachi Smart Spaces, Video Intelligence

      -Dan Parsons, COO, Landmark Dividend

      -Jim Lockwood, CEO, Aero Wireless Group/CityPole

      -Lisa Youngers, CEO, Fiber Broadband Association

10:40 Break

10:50 US Communities, David Eckell, Smart City Program Manager, Graybar

11:00 Emerging Network Technologies, Kurt Jacobs, Senior Director, JMA Wireless

Dense NETWORKS

DenseNetworks.com

11:20　　Connected Real Estate

Moderator: Rich Berliner, Publisher, 5th Gen Media

John Foley, Managing Director, Safer Buildings Coalition

Brendan Delaney, Director, ANS

Bill Cune, VP, Corning

Nader Soliman, Senior Director, Engineering, T-Mobile

Dan McDuffie, GM, Granite Telecom

12:10　　Densifying the Empire State Building-Moderator,

Peter Murray, Dense Networks

Tim Ayers, SVP, Extenet

Ken Sandfeld, President, Solid

Nader Soliman, Senior Director, Engineering, T-Mobile

12:40　　Lunch and Networking

-Lunch Speaker

-Ken DiScipio, Managing Director, Tavistock Group

2:00 Adjourn-Followed by Tour of Empire State Building Wireless Infrastructure

CONNECTED CITIES

TOUR 2019

www.ConnectedCitiesTour.com

Dense
NETWORKS

DenseNetworks.com

Easter morning 1900: 5th Ave, New York City. Spot the automobile.

Disruption can happen very fast...

Easter morning 1913: 5th Ave, New York City.
Spot the horse.

Disruption can happen very fast...

5TH.AVE. EASTER '13

Connected City Smart City
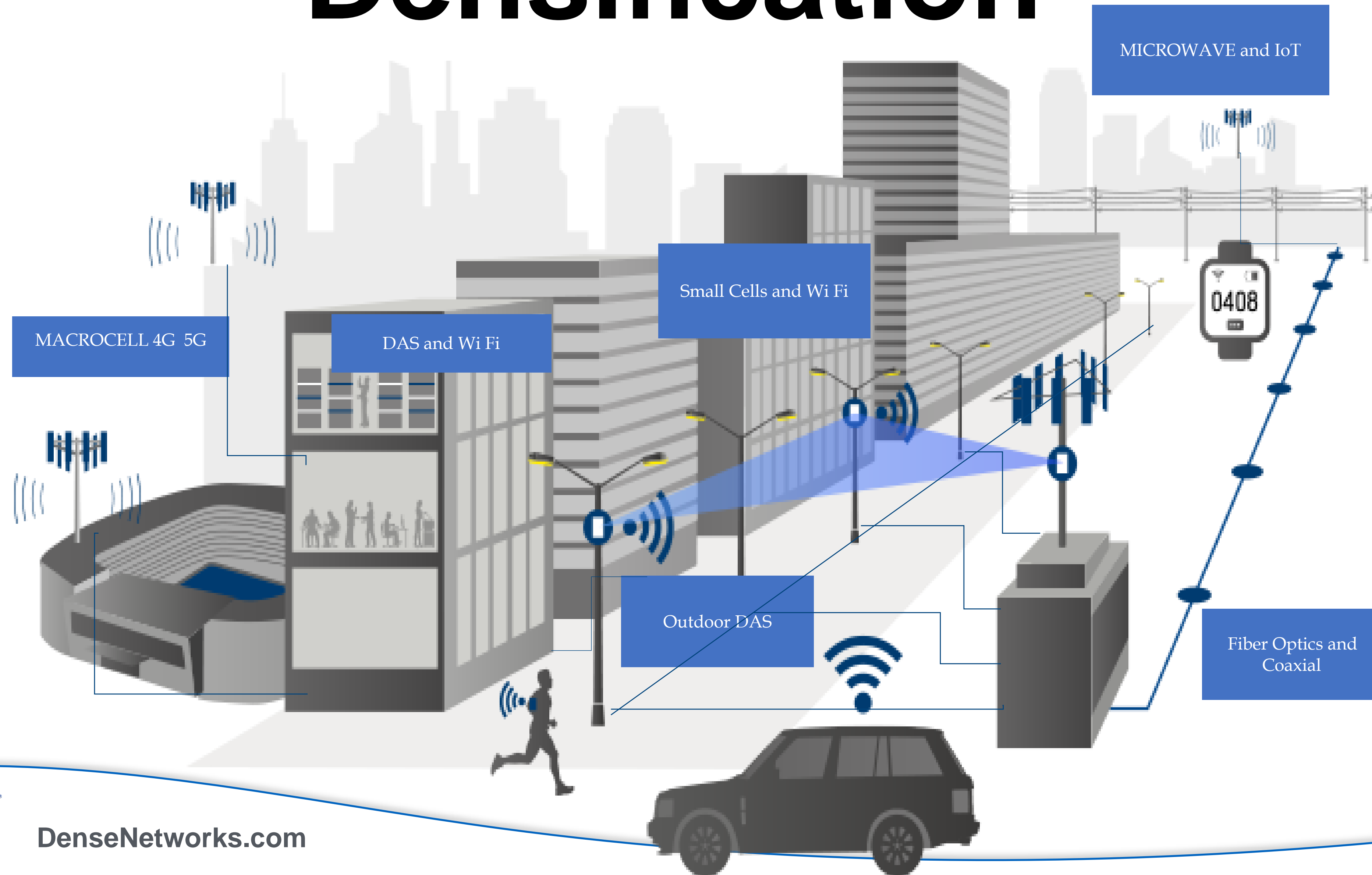
How Many Networks?

Capacity, Coverage, Compliance

WI-FI

4G IoT

3G LTE → 5G

ANT Bluetooth

IEEE 802. 15. 4 Zigbee

Z-Wave

NFC RFID

WIFI

Dense NETWORKS

DenseNetworks.com
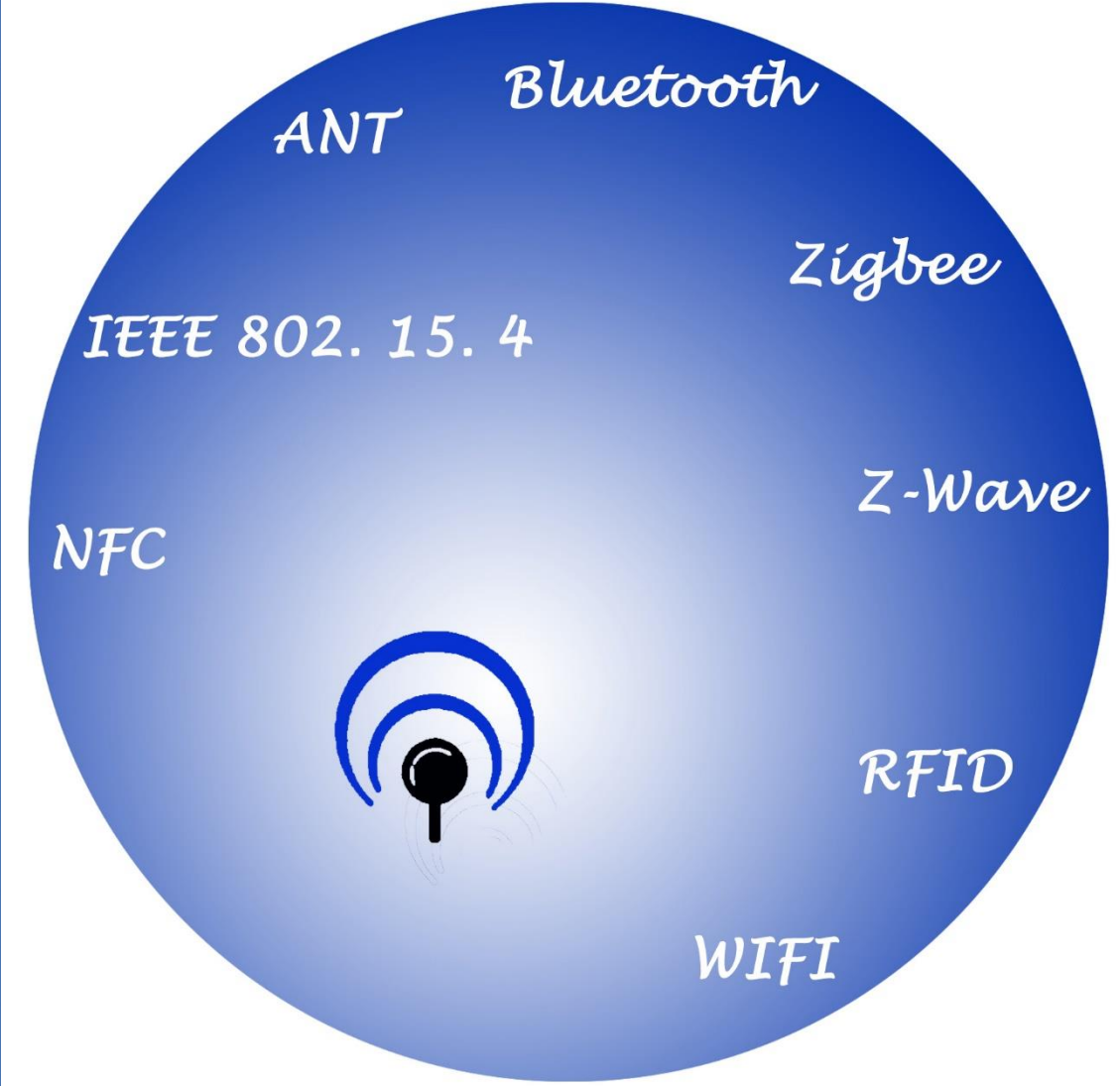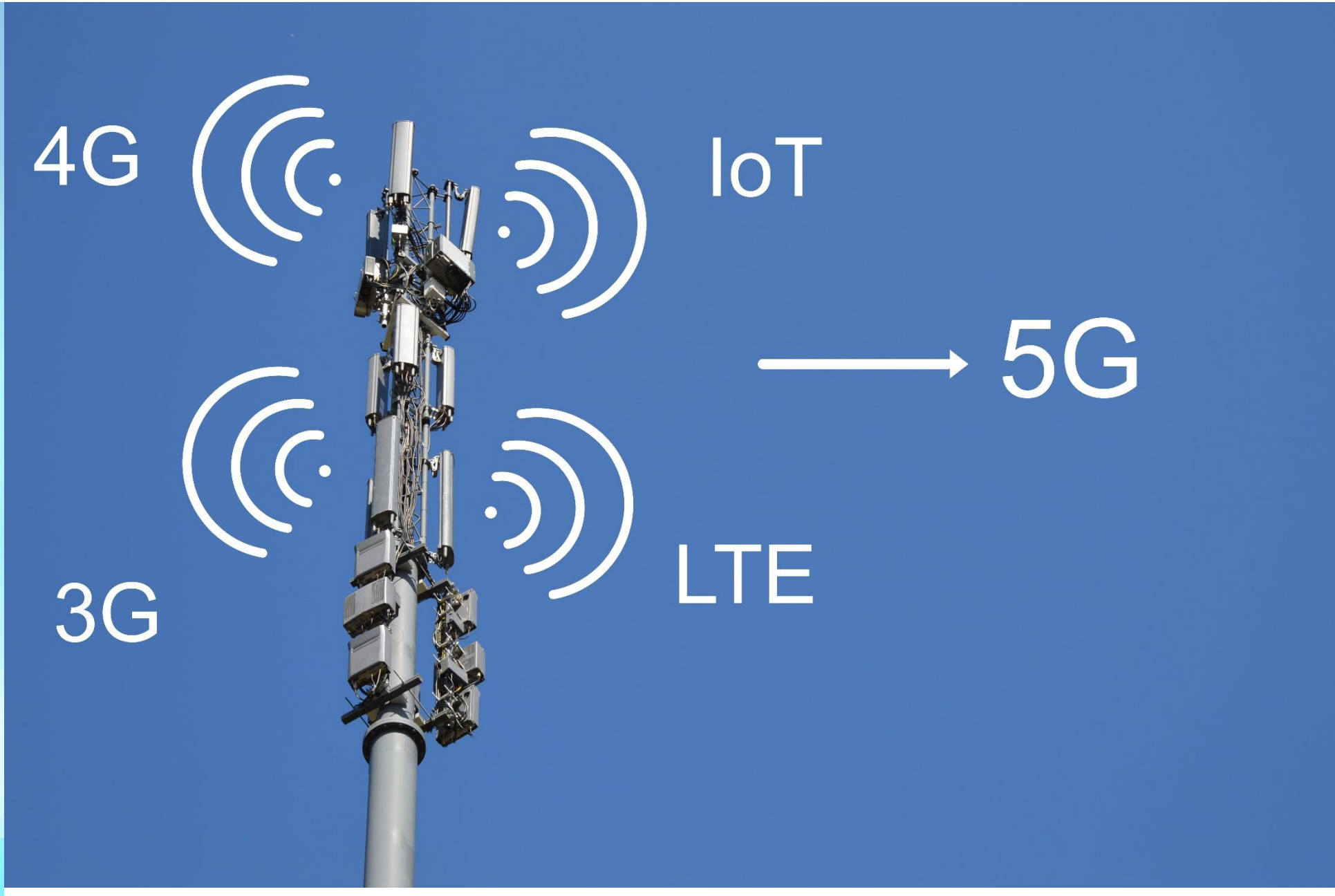
A Tidal Wave of Antennas

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

How does it work?

Data centres
(cloud services)

Fibre connect
to cloud services

Global
Interconnect

Fibre connect
to interstate

Smart Lights

Smart Traffic

CCTV

WiFi

CN Environmental and
Carbon Neutral benefits

$ Economic/Revenue benefits

Wayfinding

City of Adelaide

Interconnect hub

Ten Gigabit conduit

Ten Gigabit optical fibres
with building lead-ins

Data/insights

Ten Gigabit Adelaide

CITY OF ADELAIDE

TPG TELECOM
OFFICIAL NETWORK PROVIDER

Fiber for San Francisco
Internet for All

Date RFQ Issued:	January 31, 2018
Pre-Submittal Conference:	February 12, 2018 (10:00 a.m. PST) View livestream: http://sfgovtv.org/youtube_live
Deadline for Respondent Team Written Questions or Requests for Clarification:	March 2, 2018
Respondent Team Submittals Due:	March 26, 2018
Issue Notice of Shortlist of Respondent Teams Selected for Oral Interviews:	April 9, 2018
Oral Interview with Selected Respondent Teams:	Week of April 16, 2018
Issue Notice of Qualified Bidders:	April 30, 2018

*Dates are subject to change.

SAN FRANCISCO
DEPARTMENT OF TECHNOLOGY

Dense
NETWORKS
DenseNetworks.com
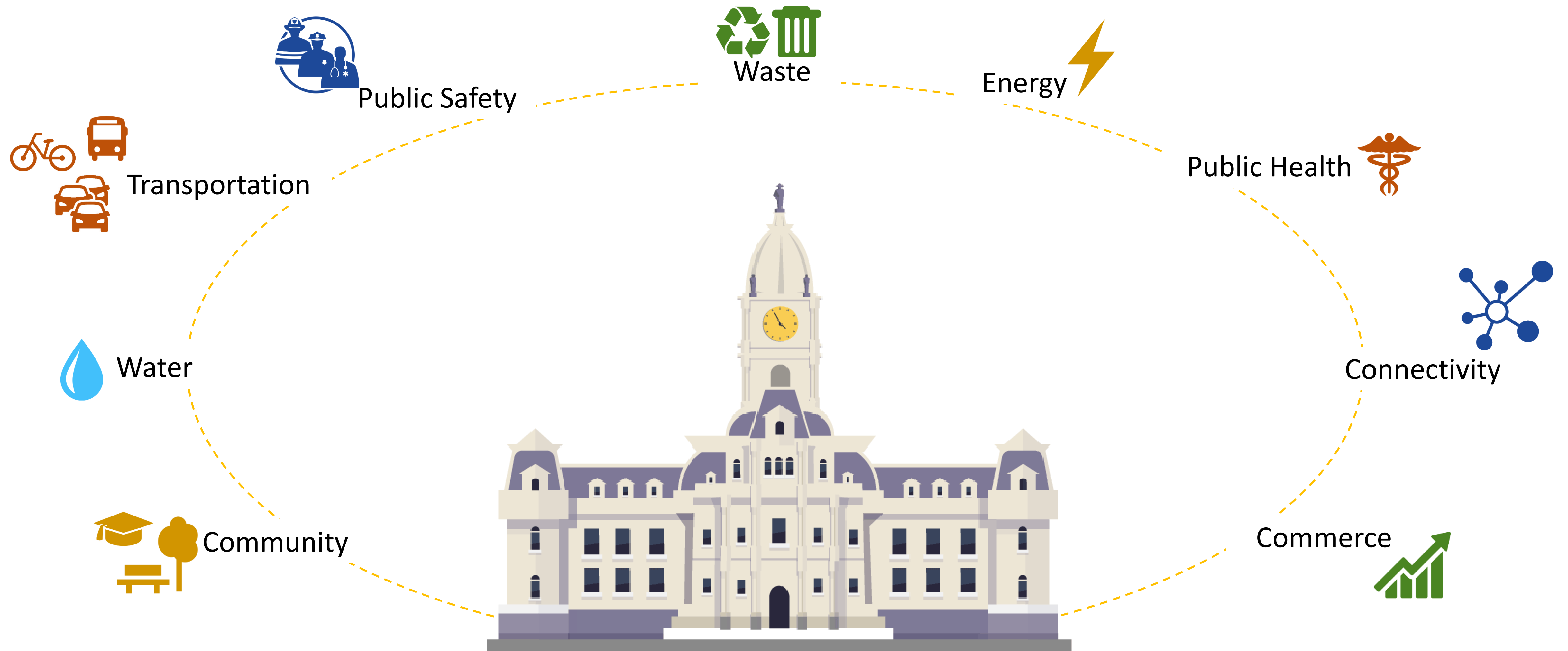
A Smart Miami is:

- *Connected*

- *Equitable*

- *Resilient*

- *Sustainable*

- *Transparent*

- *Self-Aware*

Internet of Things (IoT)

| IoT is sensors...	Sending data to...	For the purpose of...
Audio monitoring	Traffic control	Keeping people with asthma out of dangerously polluted parts of the cities.
Garbage fill level	Mobile apps	
Traffic monitoring	The police	Alerting the police to a shooting. Mapping pedestrian traffic around a city.
Air quality	The fire department	
Gunshot detection	EMS	Relieving traffic congestion.
Foot traffic monitoring	Community organizations	Watering flowers.
Facial recognition	City Governments	Altering the police to crimes in progress.
Soil moisture levels	University researchers	
Flood sensors	Citizen Scientists	Sending the fire department and rescue vehicles to a crash.
Cameras	Digital Kiosks	Predicting flood locations.
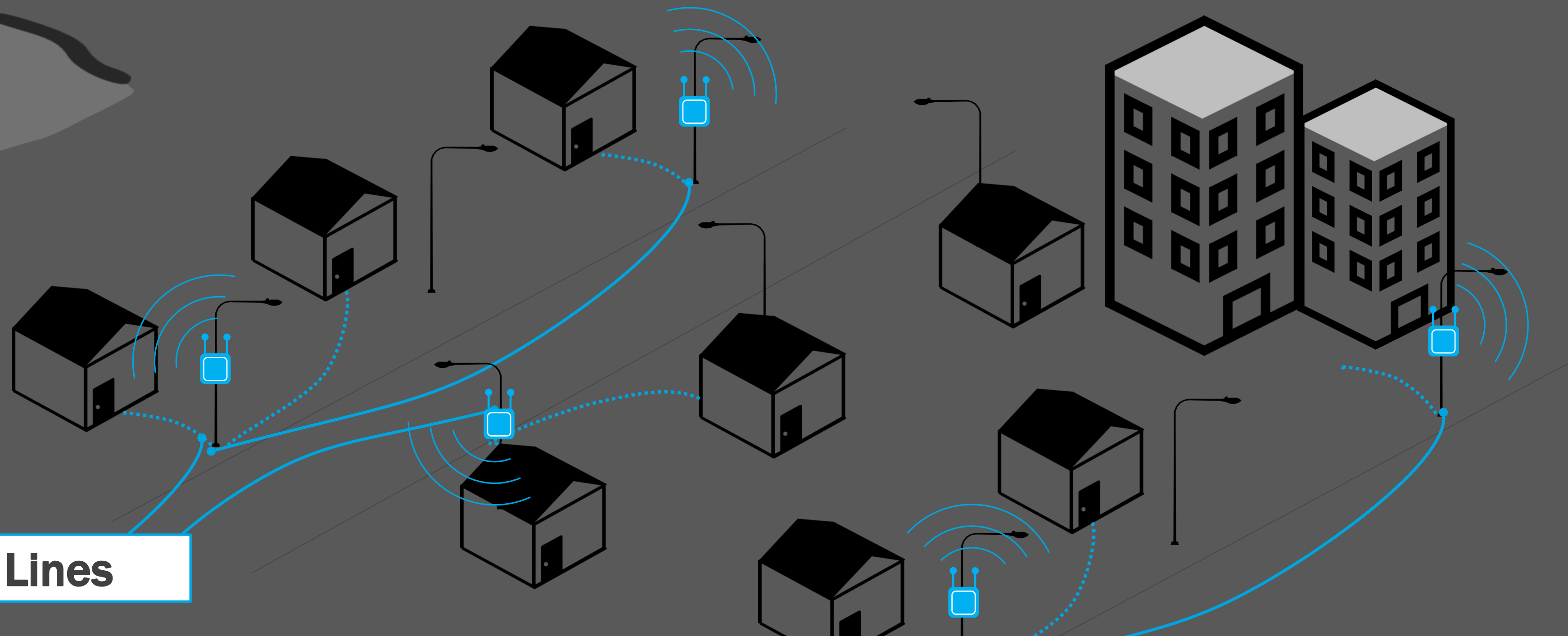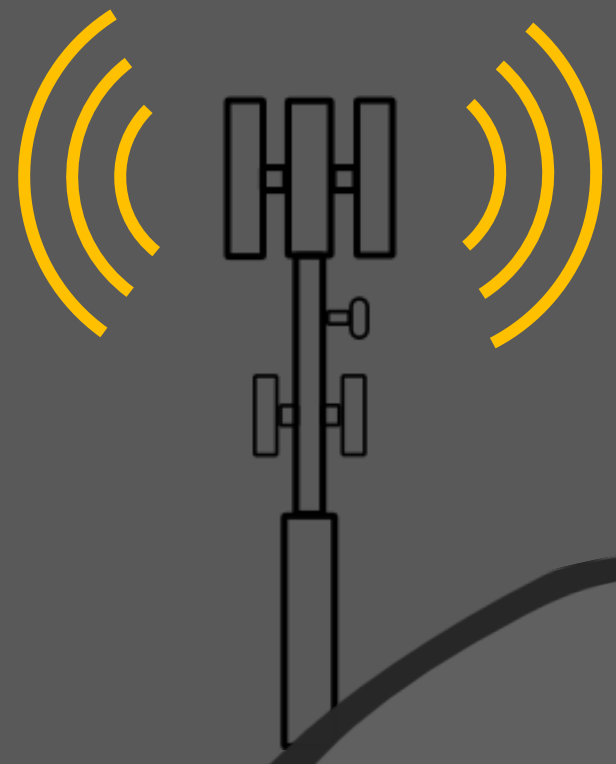
Broadband Strategy

STREETLIGHT
Light/Safety

Properties
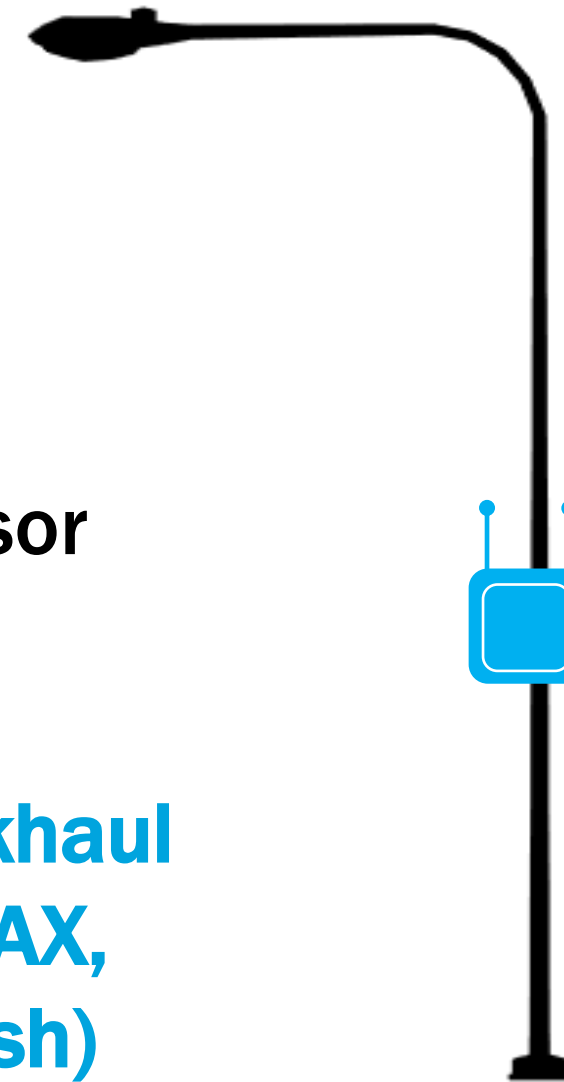- Height
- Power
- Light Sensor
- Lumens
- Density
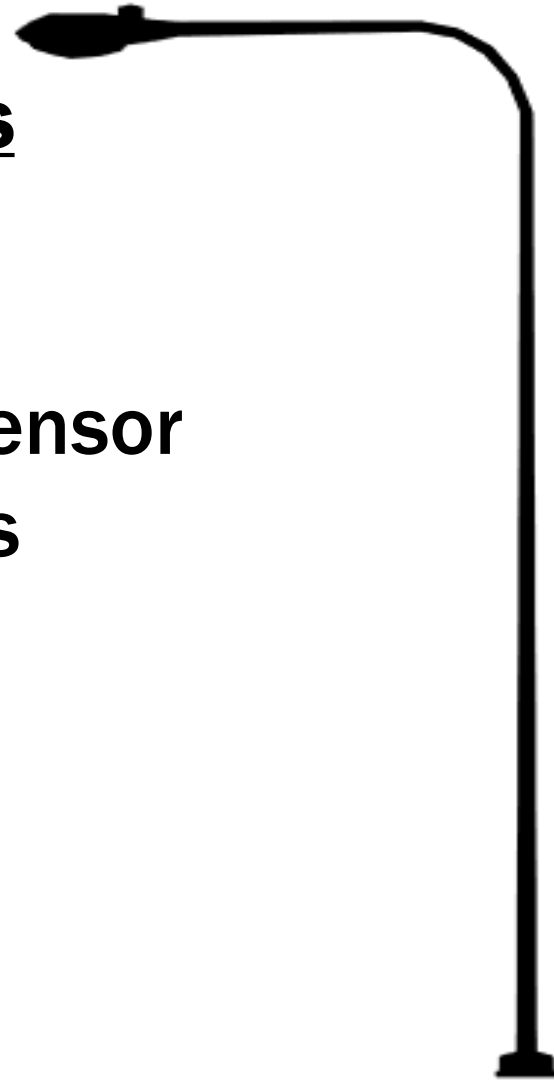
SMALL CELLs
Broadband Digital Infrastructure

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

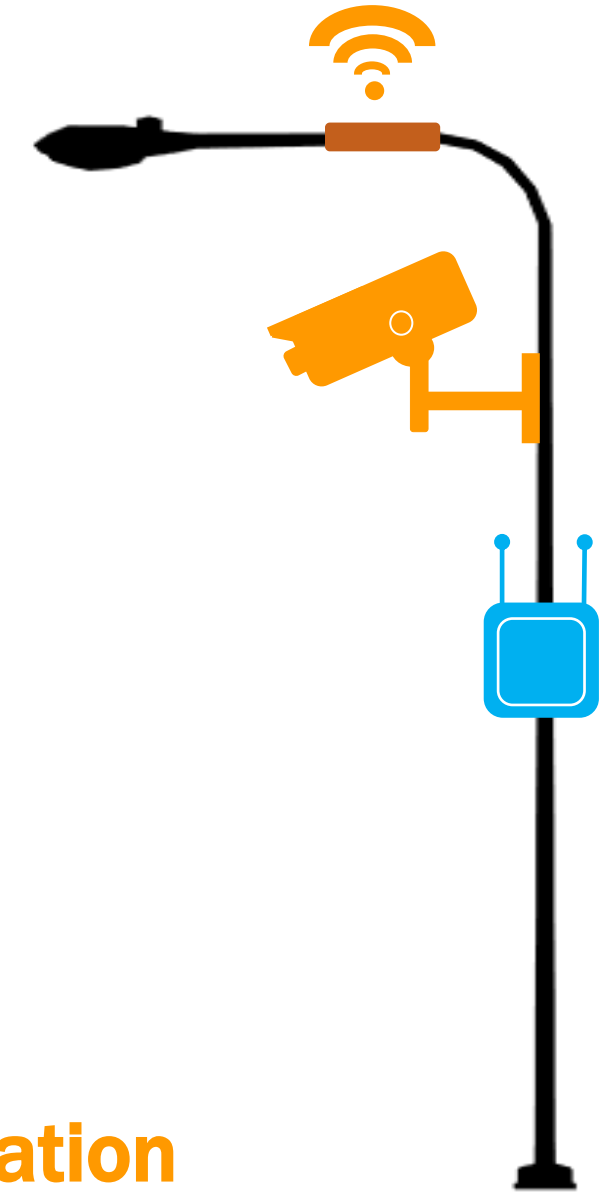## INTERNET OF THINGS
Smart Cities

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

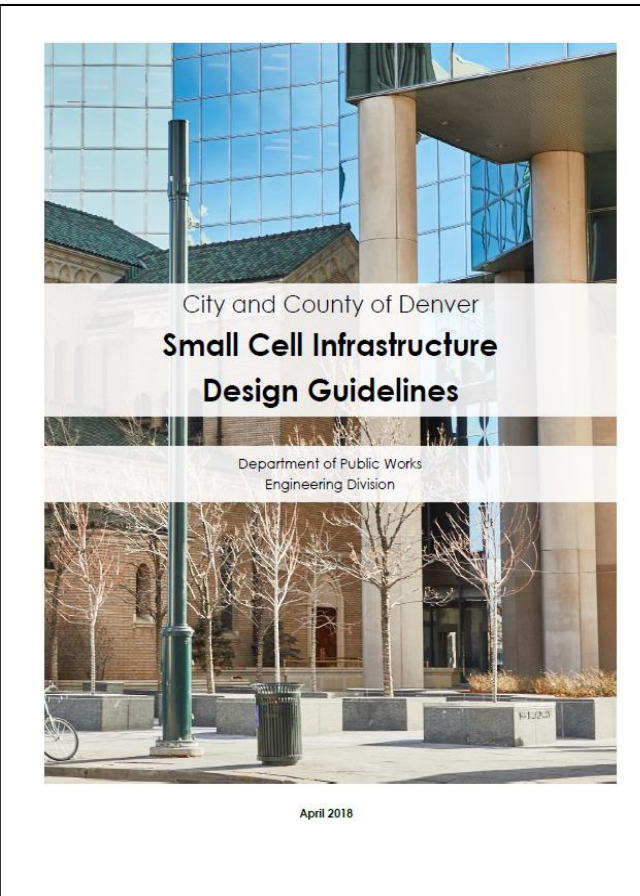**Maturity:**

Mature	Emerging	Extremely Immature

Possible Action:

Proceed w/ LED Light Replacement Only	Re-examine in Broadband Strategy	Seek to Understand with Knight IoT Grant

Establish Design Guidelines – Supports Expediting Small Cell Deployments

City and County of Denver
Small Cell Infrastructure Design Guidelines

Department of Public Works
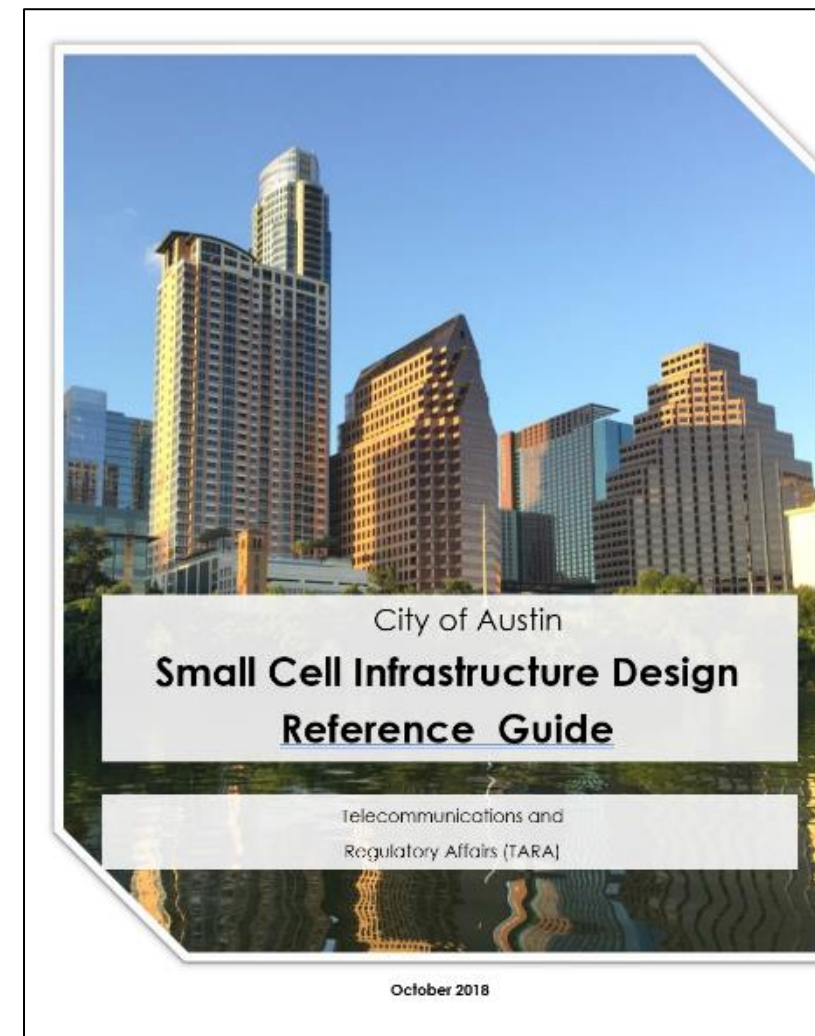Engineering Division

April 2018

- ❑ 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
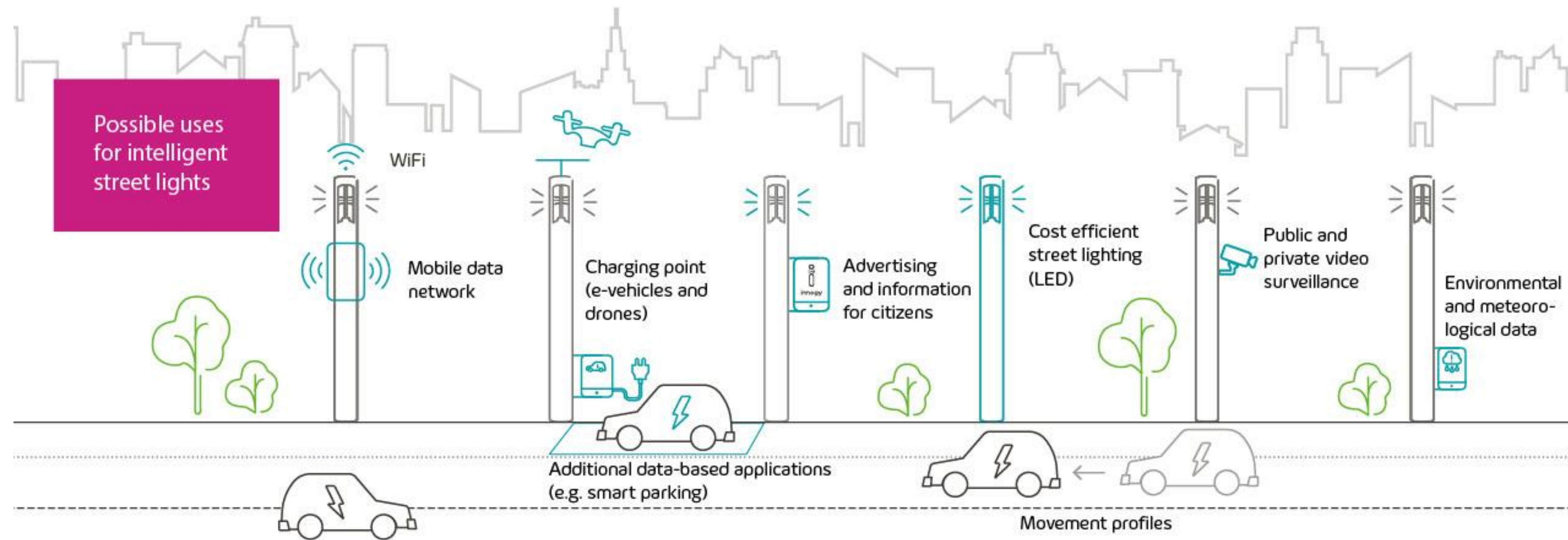- ❑ Opportunity to coordinate fiber conduit

Detailed PROCESS Guidance

City of Austin
Small Cell Infrastructure Design Reference Guide

Telecommunications and
Regulatory Affairs (TARA)

October 2018

Each Municipality is Unique, and Each Should Create its Own Plans Informed by the Local Stakeholders

The Important Part: There's a Plan

Tampa LED Streetlight Program

Possible uses for intelligent street lights

WiFi

Mobile data network

Charging point (e-vehicles and drones)

Advertising and information for citizens

Cost efficient street lighting (LED)

Public and private video surveillance

Environmental and meteorological data

Additional data-based applications (e.g. smart parking)

Movement profiles

- **5-year LED Upgrade Program**
- **Secure Smart Grid**
- **Enables Smart City Initiatives**
- **Low Energy Consumption**

Near-Term
- Gunshot detection
- Parking Space Management
- Traffic Counting

Future
- Flood Detection
- EV Charging
- Pedestrian Counting
- Environmental Sensing
- Motion Detection Services
- Drone Charging
- LED Banners
- Data Mining
- Customer Awareness

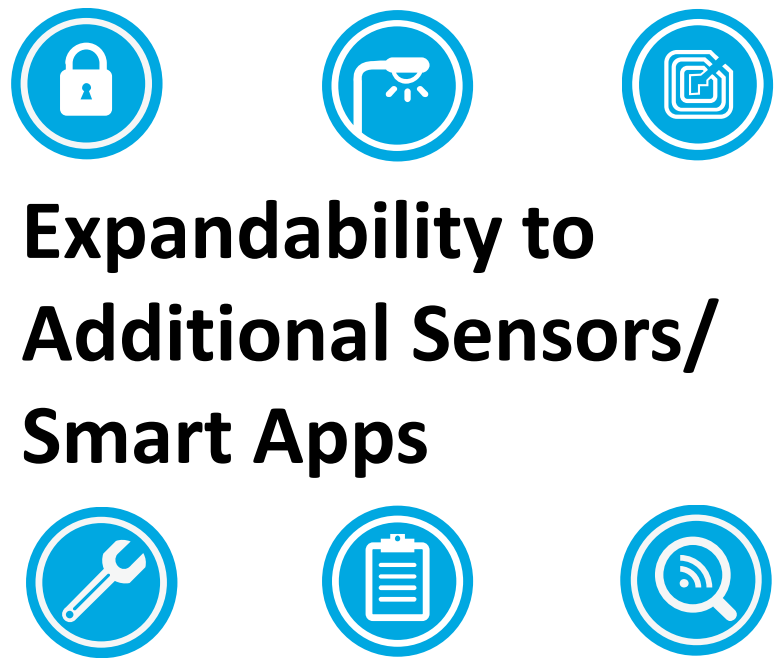PROJECTS

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

Light Pole as Smart Venue Information Hub

Smart Parking

Smart Lighting

Smart Traffic

One Network, No New Poles or Trenching

Expandability to Additional Sensors/ Smart Apps

Video Surveillance

Wi-Fi Connectivity

verizon✓

OUC Approach

Secure

Less   More

Connected

Less   More

Mobile

Less   More

Sustainable

Less   More

Energy

Less   More

Water

Less   More

Resilient

Less   More

RELIABLE • AFFORDABLE • SUSTAINABLE

OUC
The *Reliable* One®

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

OUC
The Reliable One

Connected City
Smart City
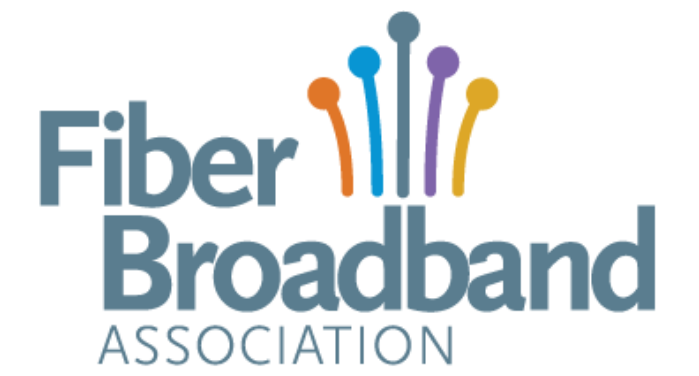
SmartCities Need Fiber

Lisa R. Youngers

President and CEO

Fiber Broadband Association

Dense Networks SmartCities Tour 2019

Expanded REIT Opportunities

LANDMARK DIVIDEND

Infrastructure Partnership Opportunities Generating Positive Returns & New Capabilities Around the Following Areas:

RENEWABLE ENERGY | LIGHTING CONTROL MGMT | LANDSCAPE MGMT | BLDG ENERGY MGMT | IOT SENSOR NETWORK | CONCEALED RADIO COLLOCATION | PRODUCT INVENTORY MGMT | PROPERTY MGMT CENTRALIZATION | REGIONAL / GLOBAL PROPERTY MGMT NETWORK | PRIVATE LTE ON PROPERTY NETWORK | BLDG CONTROL AUTOMATION | FIRE ALARM CONTROL | ENVIRONMENTAL SENSORS | UBIQUITOUS PROPERTY WIFI | BEACON TECHNOLOGY | ENHANCED SECURITY VIDEO SURVEILLANCE
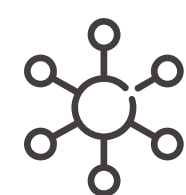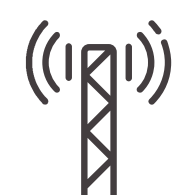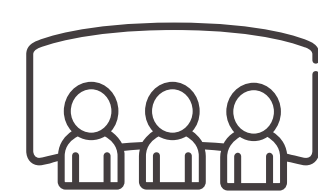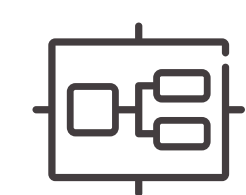
Aero *Wireless Group*

- **20 years – Innovative Wireless Infrastructure**

- **Smart Pole Concealment Solutions**

- **Wireless Infrastructure Planning Product Solutions**

- **Professional Engineering Services**
  - Municipalities
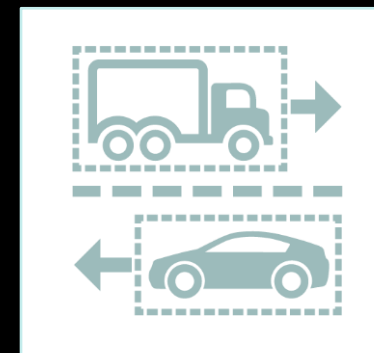 - Wireless Operators
  - Public and Private Utilities

Aero *Smart Communities* • CityPole® • **Comptek**

Hitachi Video Analytics Delivers Digital Insights

NEXT 2018
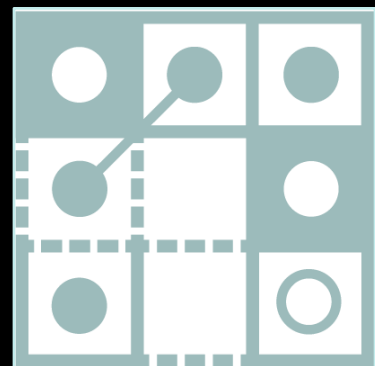
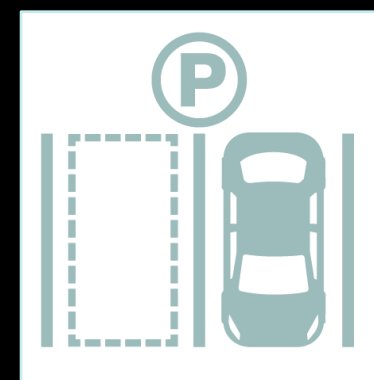## Operational & Business Intelligence

- People Counter
- Traffic Analyzer
- Queue Detector
- License Plate Recognizer
- Activity Visualizer
- Parking Space Analyzer
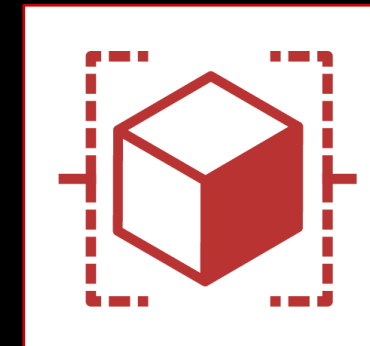- Direction Controller
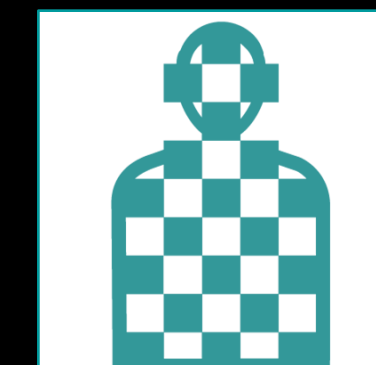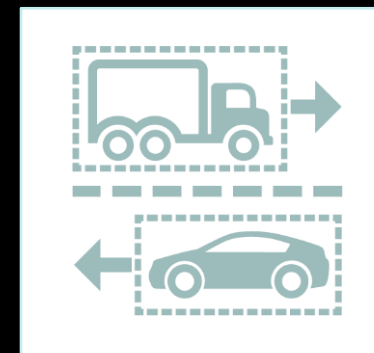- Camera Health Monitor

Security

- Intrusion Detector
- Facial Recognition
- Object Detector
- Video Enhancer

Privacy

- Privacy Protector

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

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

Hitachi Video Analytics Delivers Digital Insights
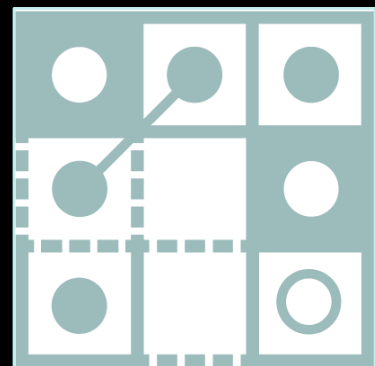
Operational & Business Intelligence

- People Counter
- Traffic Analyzer
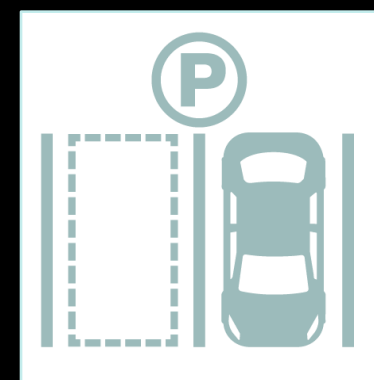- Queue Detector
- License Plate Recognizer
- Activity Visualizer
- Parking Space Analyzer
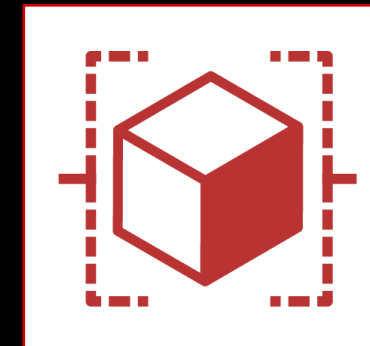- Direction Controller
- Camera Health Monitor

Security

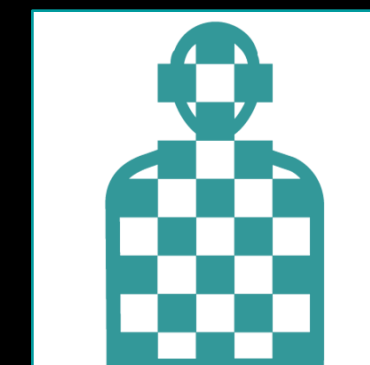- Intrusion Detector
- Facial Recognition
- Object Detector
- Video Enhancer

Privacy

- Privacy Protector

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

Police • Hospitals • Campuses • City Agencies • Retail • Financial Services • Transportation • Utilities
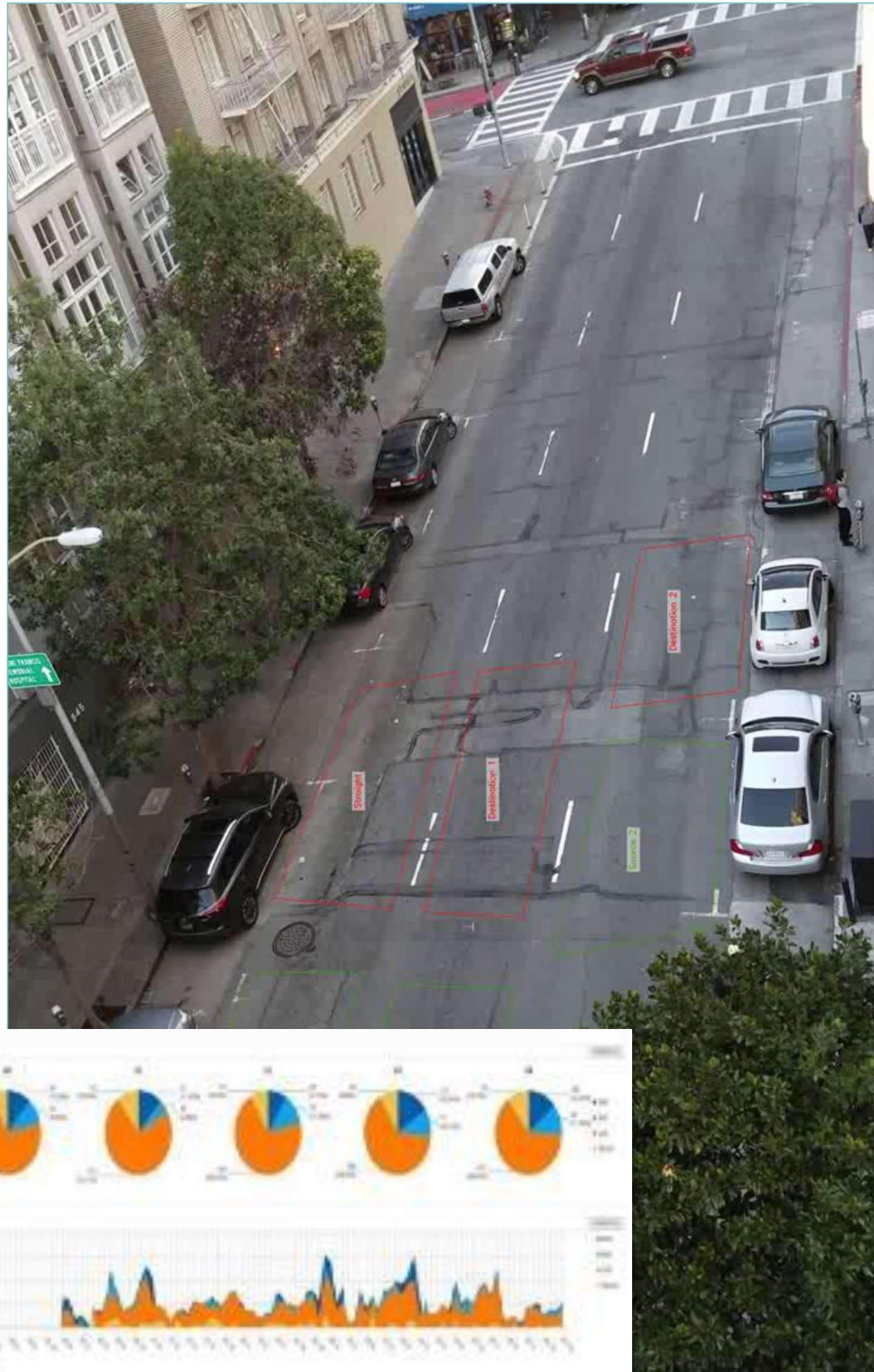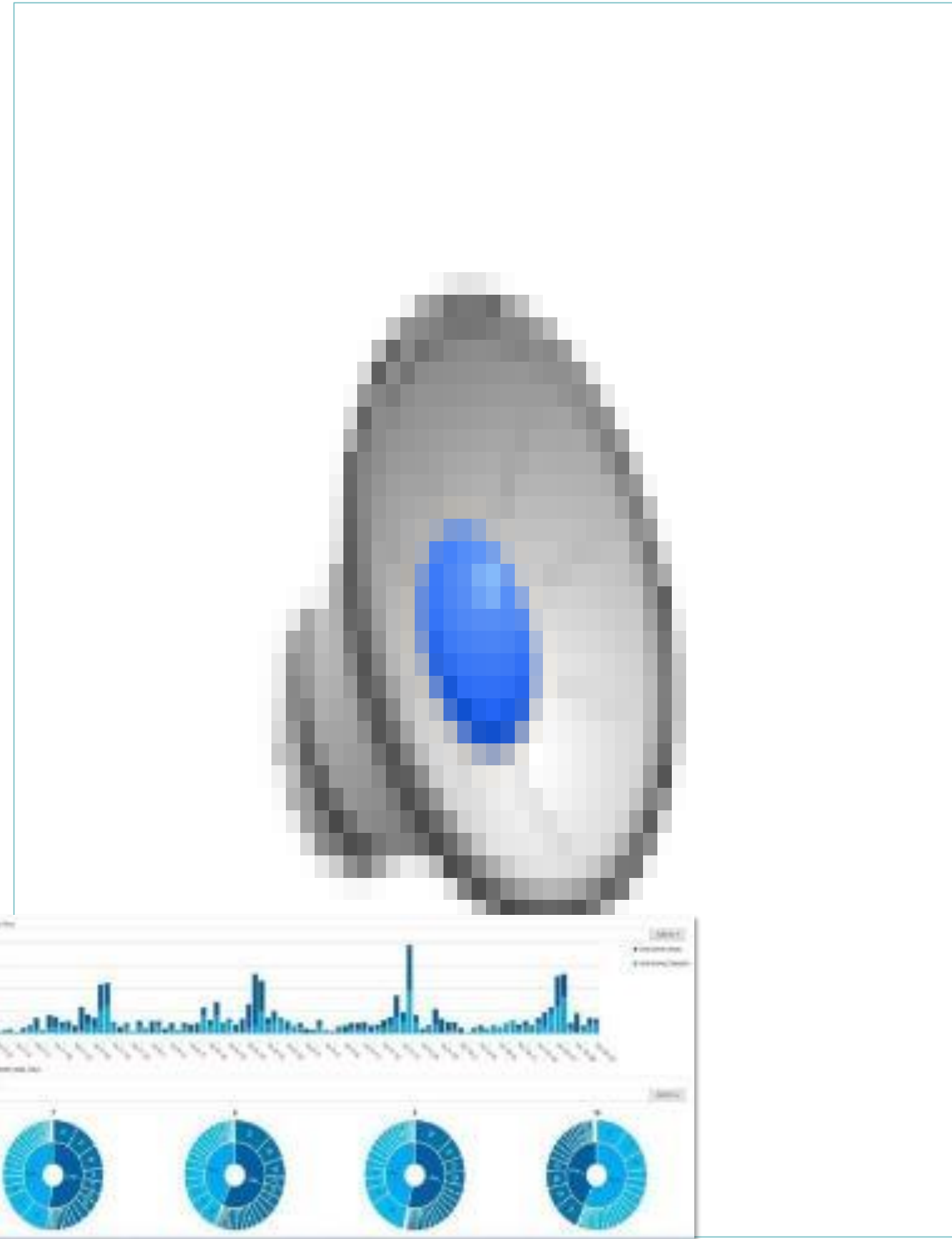
2019

Technology Opportunity: Insights From Video
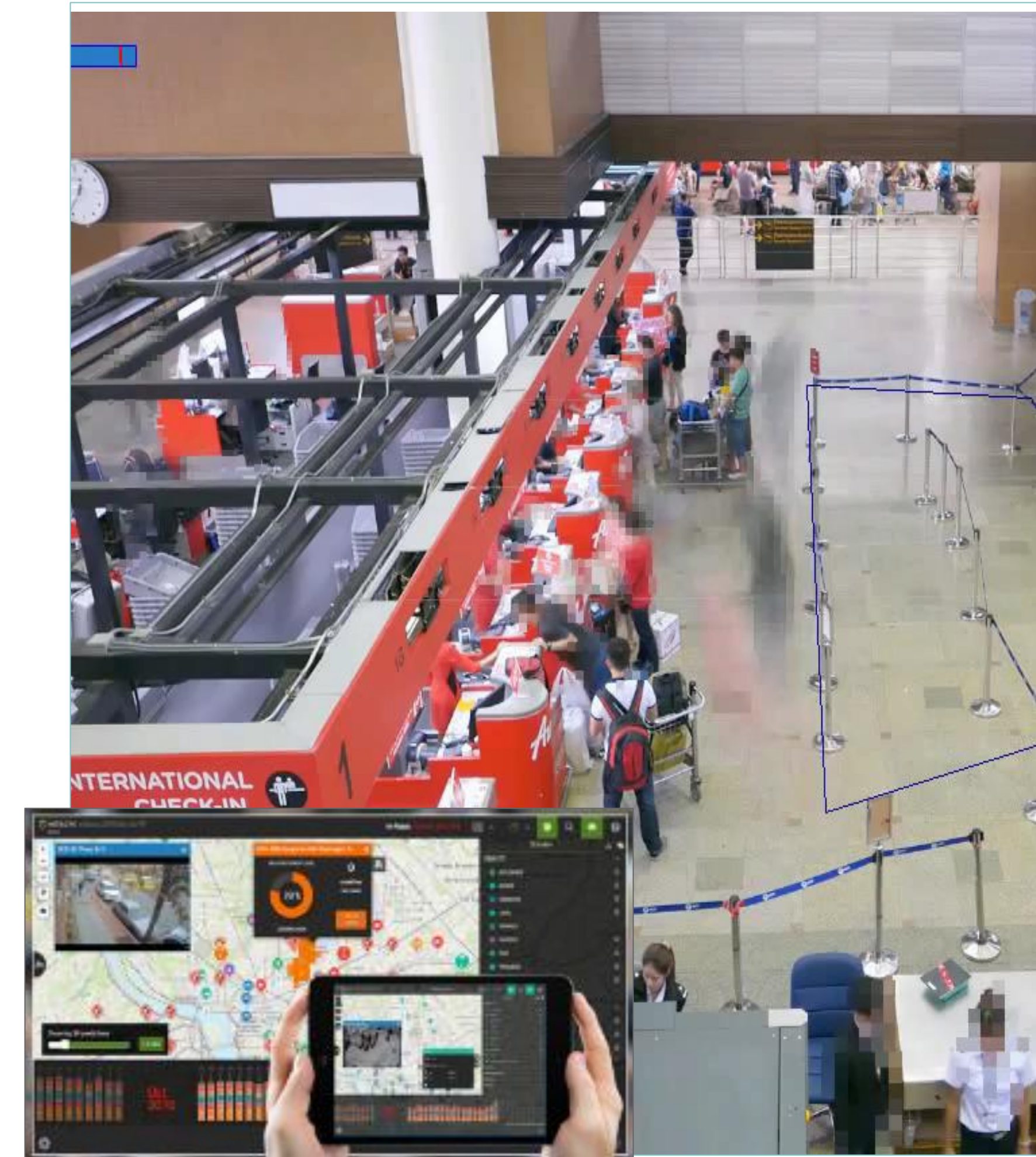## Operational, Safety and Business Intelligence

Transportation	Customer Experience	Operations and Safety
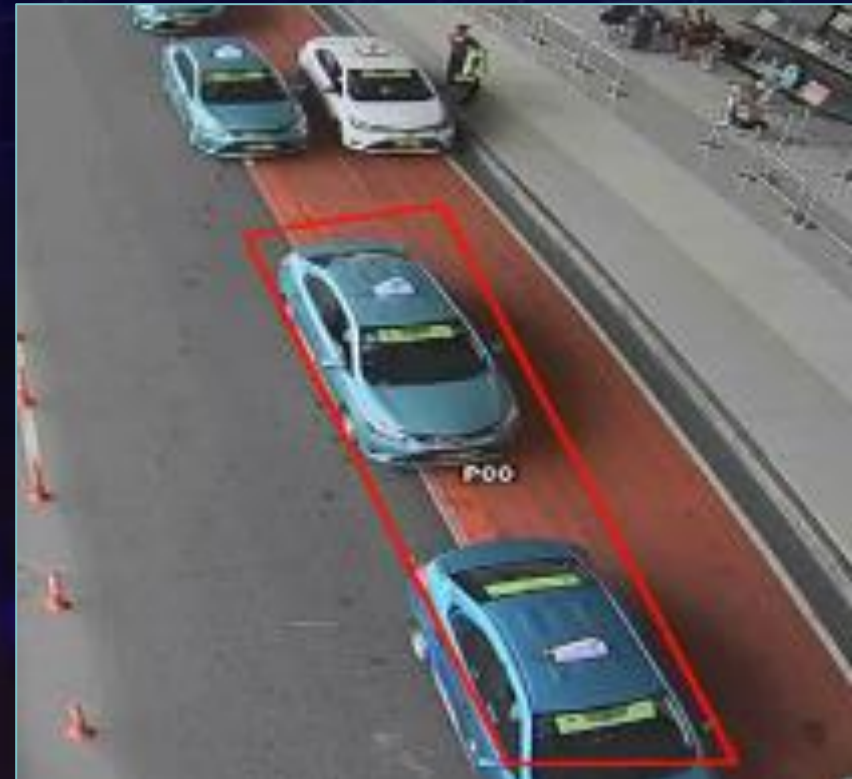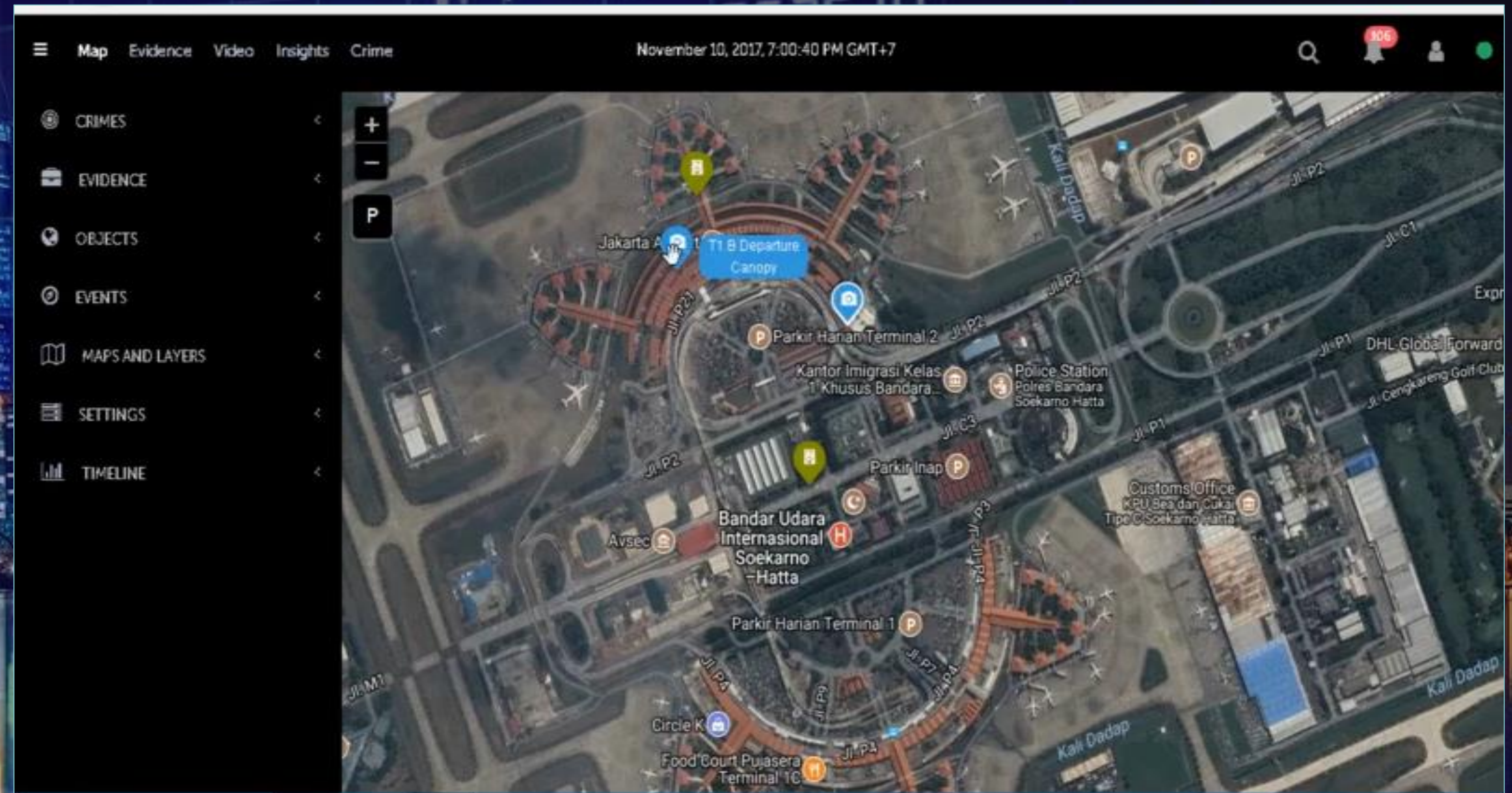
4 Terabytes Per Vehicle
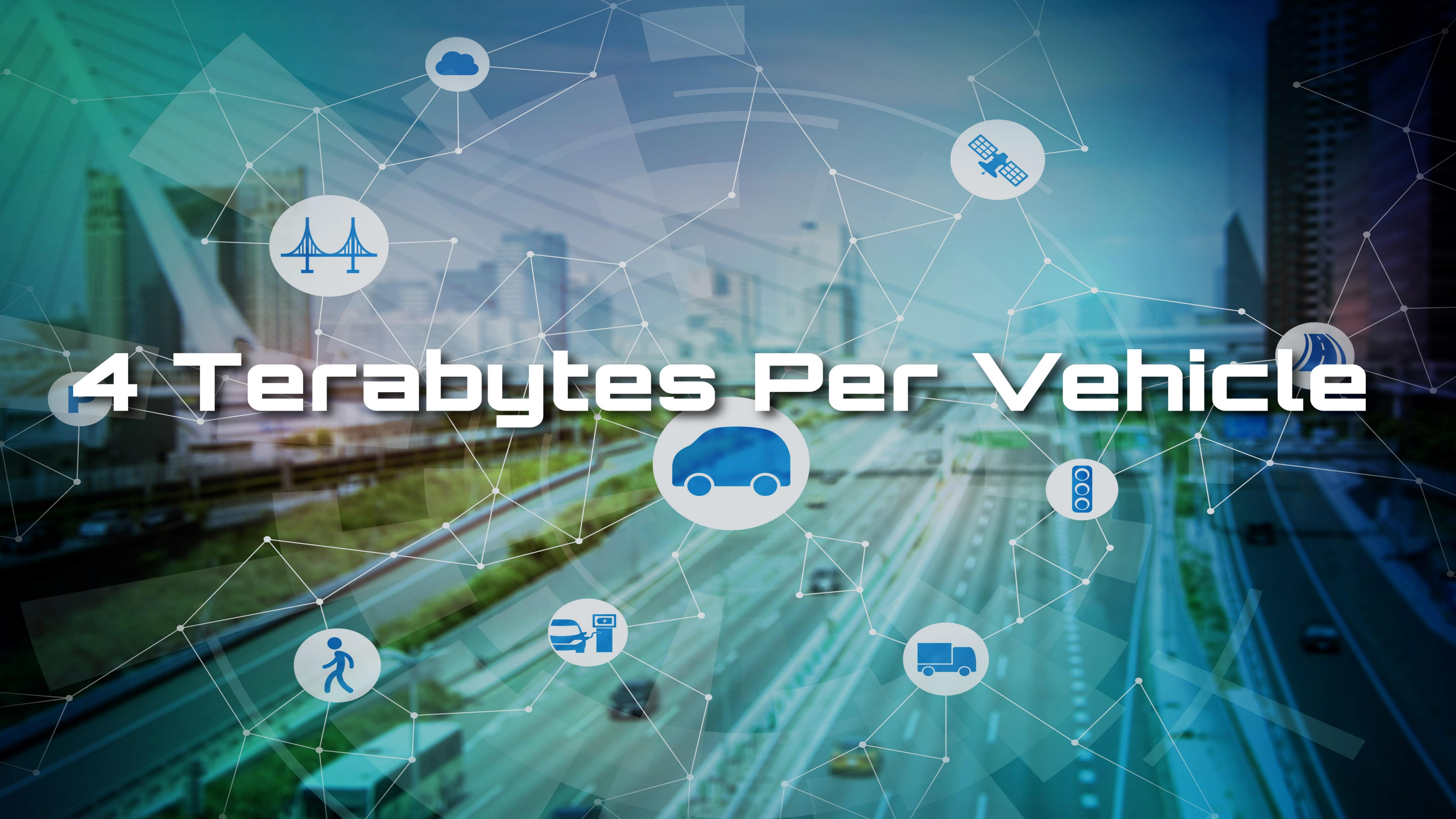
Why Fiber?

Femto cell

Micro cell

Pico cell

Metro cell

Use Cases Demand 5G

Enhanced mobile broadband capacity/speed
Low latency-gaming and AVs
Massive machine-to-machine communication
Many IoT devices

Fronthaul/Backhaul/Midhaul

More fiber needed with 5G architecture
Fronthaul – computing/processing in centralized place. Backhaul – transmit information to final destination.

Wireless Growth Demands Fiber

To meet 5G/wireless demands: estimated 1.4 million miles of fiber needed in top 25 US metros. A $150-180 billion investment in the US in new fiber over 5-7 years.

Why Fiber? Densification
To go to 4G requires 25X more fiber
To go to 5G requires at least 16X more fiber

3G
1 site every 10 km
Cell density=1 cell/100 km2
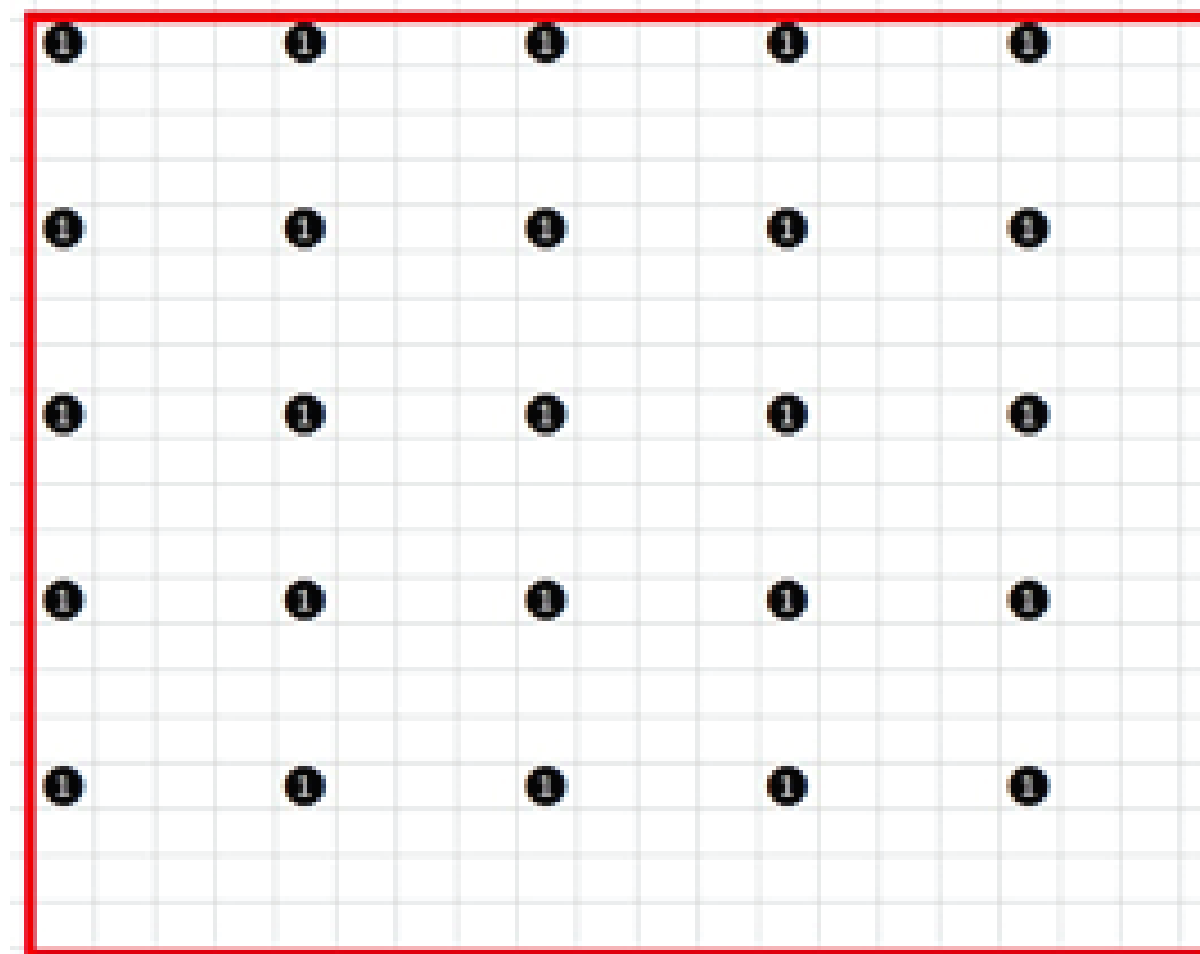
4G
1 site every 2km
Cell density= 5 x 5
= 25 cells/100 km2
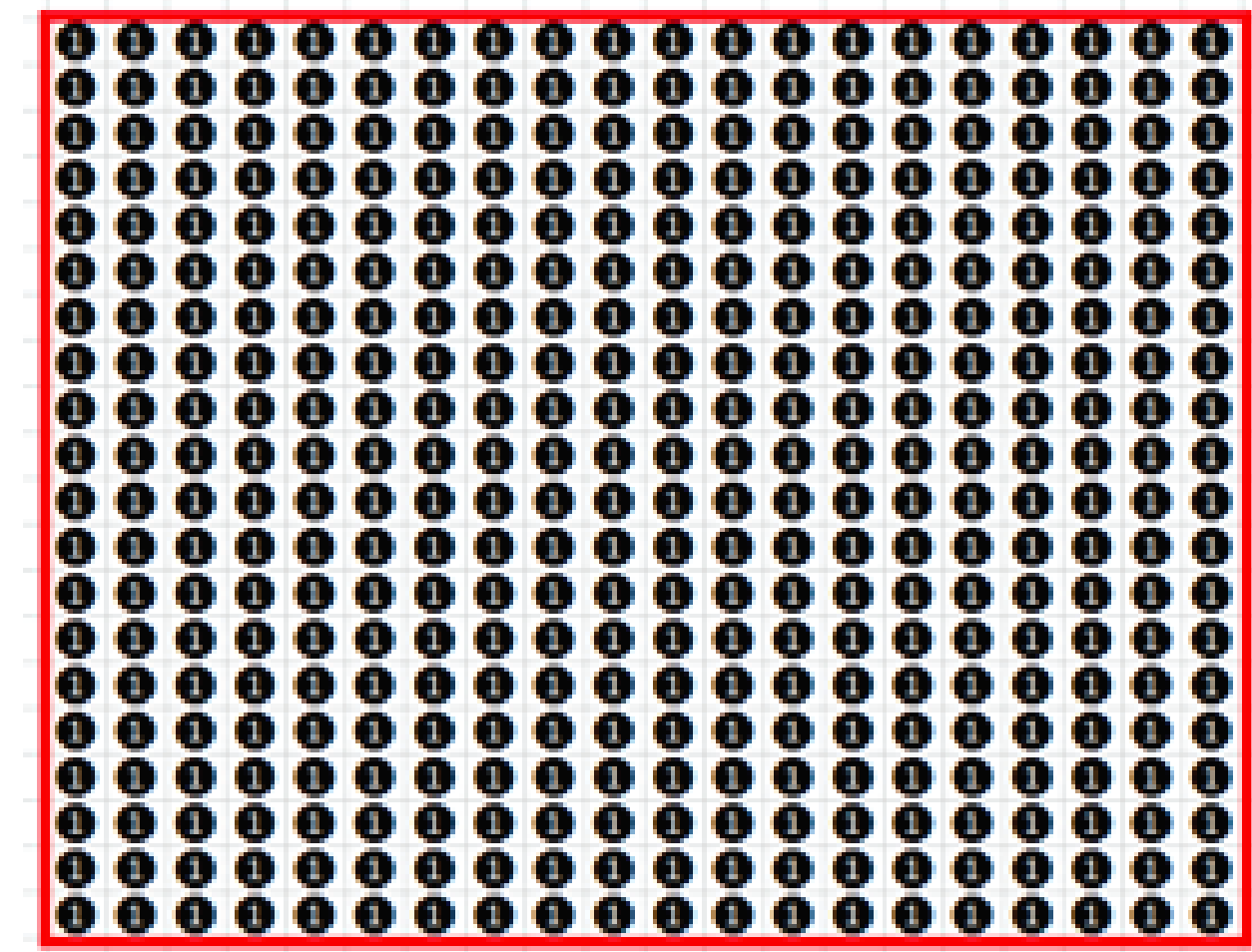
5G
1 site for every 0.5 km
Cell density= 20 x 20
= 400 cells

Total Fiber Deployment at Record Levels
And Small Cell is Just Beginning

Legend:
- Fiber to the home overbuild
- Cable for HFC/ FTTLA
- Fiber to outdoor small cells
- Fiber to new housing
- Fiber for maintainance/ relocations
- Fiber to the node / G-Fast
- Fiber to the macro tower
- Secure private networks
- Fiber long haul
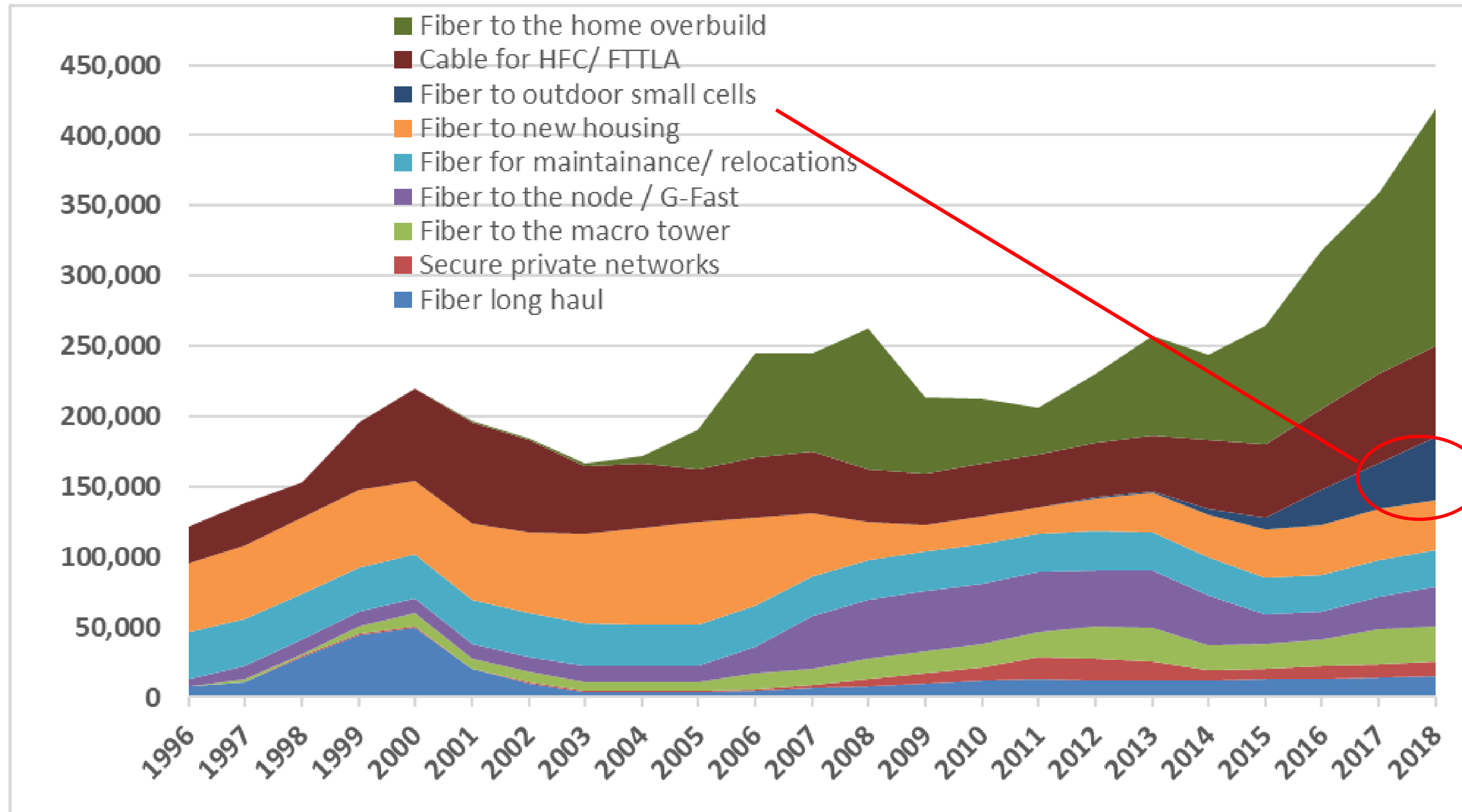
Reviewing fiber route miles, i.e. the number of linear miles fiber is deployed overhead or underground – whether single or multiple fiber strands/ lines.

According to a 2018 study from RVA, LLC

Establish Design Guidelines
– Supports Expediting Small Cell Deployments

City and County of Denver
Small Cell Infrastructure Design Guidelines

Department of Public Works
Engineering Division

April 2018

❑ 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

Detailed PROCESS Guidance

Each Municipality is Unique, and Each Should Create its Own Plans Informed by the Local Stakeholders

The Important Part: There's a Plan

City of Austin
Small Cell Infrastructure Design Reference Guide

Telecommunications and Regulatory Affairs (TARA)

October 2018
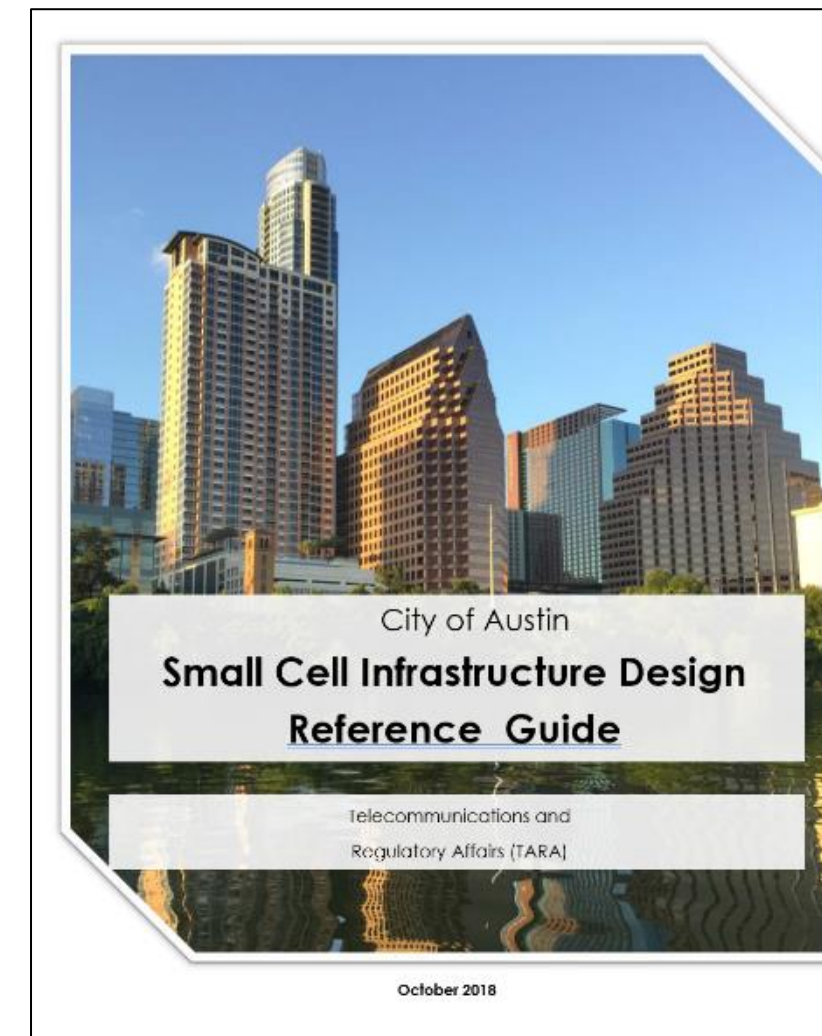
CityPole Power Vault - Network Resiliency

4G & 5G Cellular
Supports up to 4 small cells
Up to one week backup power

IoT Integration
Networked LED Lighting
Environmental Sensors
Video Cameras
 EV Charging

ESS Power Electronics
Converter Access
AC Breaker Panel Access
Critical Loads Panel Access

Resilient Energy Storage
50kWh Microgrids
Easy to Install and Service
Safety First Design

Comptek CityPole

CityNOW POWR Pack

Grade Level

Underground

Pole slides to Provide access to POWR Vault

Dedicated 4G Cellular Broadcast
xxx

Fiber Connectivity
To Utility Field Area Network

Grade

Underground

Data Receipt & Visualization

Utility NOC
Monitoring & Control of DER
...

Critical Agencies NOC
Security Video Surveillance Data

City Services NOC
Environmental Data

CityNOW NOC
Monitoring & Data Visualization
Battery O&M
Database Management
Data Analytics

Comptek NOC
Pole Housed Accessory Monitoring
Pole O&M
Data Analytics

Vertex™ Smart Pole Radio Concealment

	V1	V2	V3	T2	V0ᵀ	V0
HIGH POWER RRUS SUPPORT	18	6	1-2	3	0	0
		OR	AND	OR		
LOW POWER MRRUS SUPPORT	0	18	3	4	2	1

Designed for radio & antenna vendor neutral deployment configurations and freedom for operator configuration

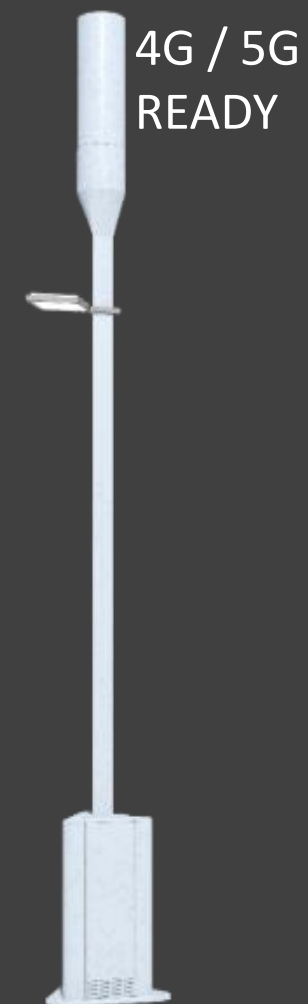- V1 — 4G / 5G READY
- V2 — 4G / 5G READY
- V3 — 4G / 5G READY
- T2 — 4G ONLY
- V0ᵀ — 4G/5G Ready
- V0

INTEGRATED POLE PORTFOLIO RADIO DENSITY

Future Proof Poles - Interchangeable Equipment Modules

Flex Space for Multiple
Equipment Loadouts.

Allows New Pole Configurations
with minimal impact.

Flex-Rail System to simplify
mounting.
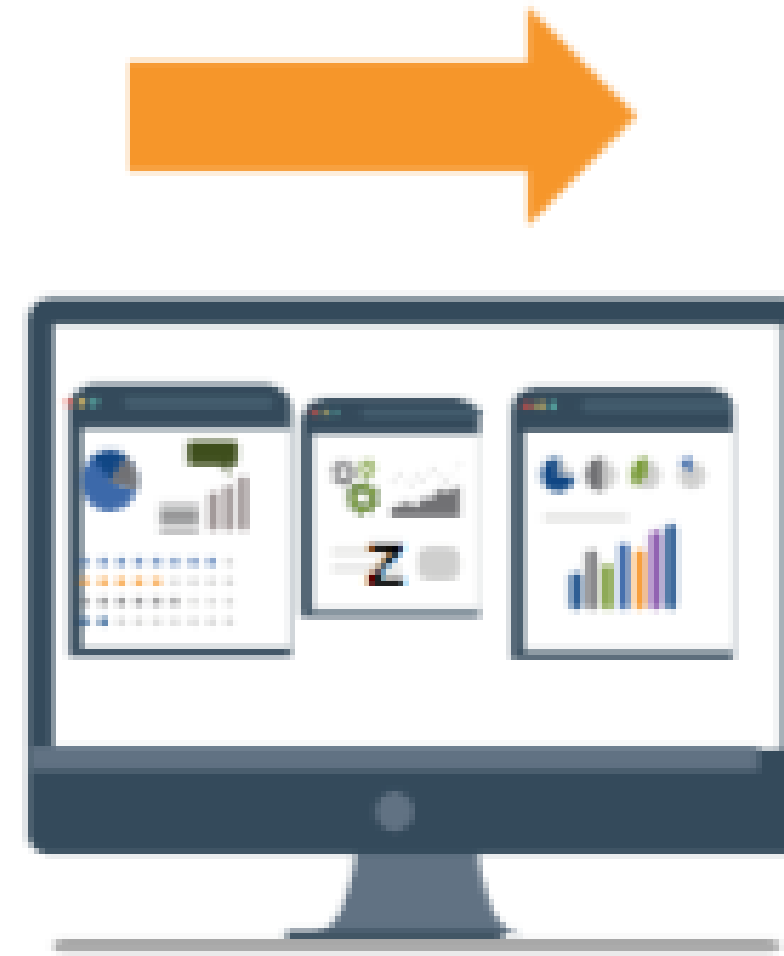
Thermal Management System
and remote monitoring.

4 aspects of a smart city

1 Collect

2 Communicate

3 Compute

4 Control

FlexGrid™ Dallas DART Ecosystem

- Revenue Opportunities
  - Advertising
  - Telecom collocation

- Enhanced Security
  - Up to 2,000 high def video streams

- Private LTE Network
  - IoT Platform

- Improved Rider Metrics
  - Video Analytics

- Enhanced Rider Experience
  - 5G Coverage
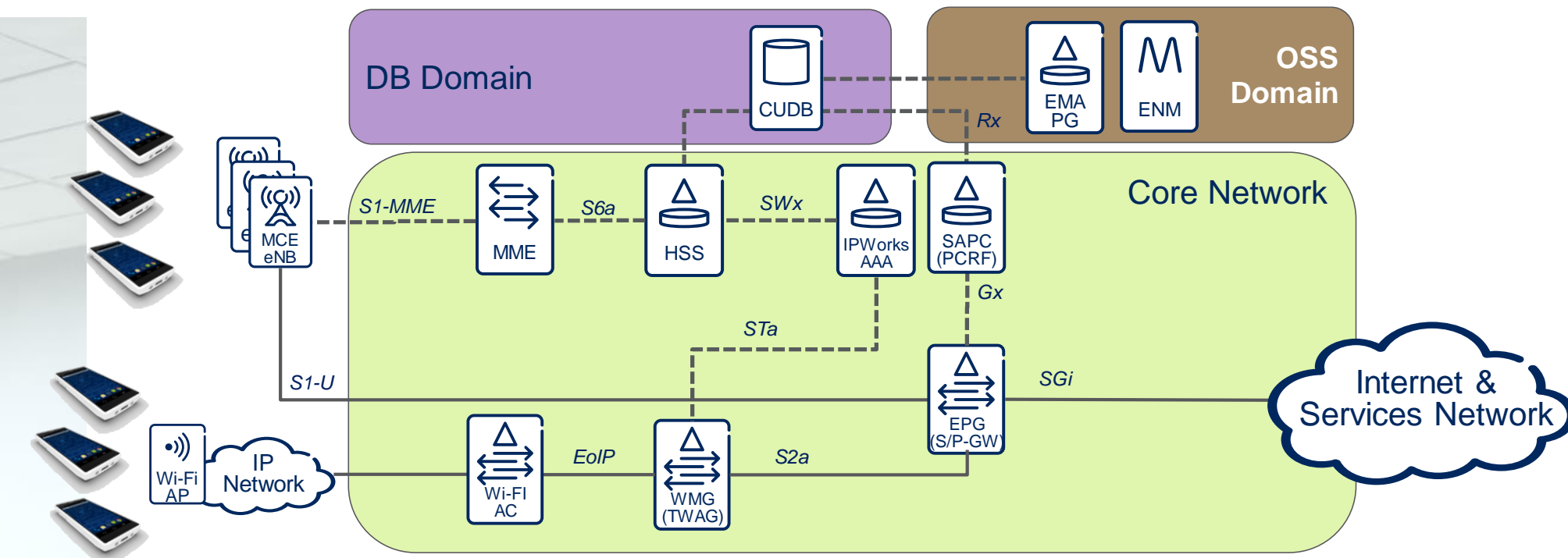 - Free WiFi
  - Wayfinding
  - Community Engagement

Private LTE Evolved Packet Core Network
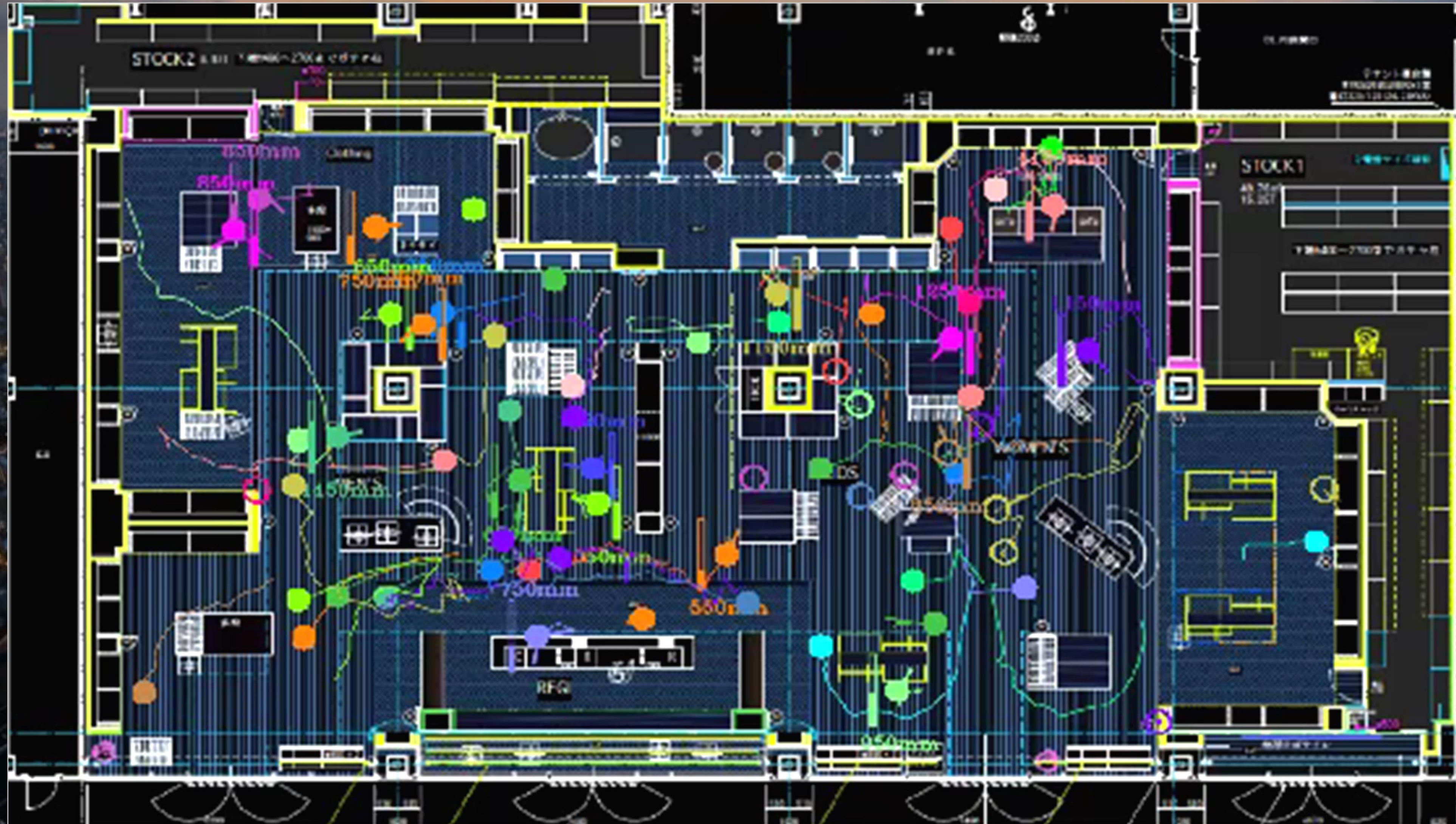
Privacy Protection: Generating Rich Insights
Without Personally Identifiable Information (PII)

Video Privacy Protection:

- Detects people and pixelates or color-masks full body

- Additional analytics can analyze original images

- *Transparency:*

- Original feed can be accessed for investigations, requiring a keycard and passcode; actions are tracked for GDPR readiness

3D Lidar:

- No personally identifiable information (PII) is captured

- Can be used in privacy-sensitive locations

- Privacy protected by design

Private Information-Free Lidar

Visible Light

Hospitals • Schools • Cities • Retail • Financial Services • Transportation

Federal Funding: How to Get Your Fair Share
Hitachi provides free federal funding consultation.

There are currently <u>over 1,000 grant programs </u>administered by 26 Federal agencies providing more than $400 billion to states and local governments through grants, formula allocations and other payments.

Funds are primarily available from:

- Department of Justice
- Department of Homeland Security
- Department of Housing and Urban Development
- Department of Transportation

<u>Billions of $ go unused every year.</u>

Landmark Infrastructure Solutions

The demand for managed connectivity as a service is rapidly expanding.
We provide a multitude of stakeholder benefits surrounding the deployment of 4G & 5G Telecom smart enabled infrastructure including:

- Marquee Commercial and Enterprise Real Estate

- Smart Cities and Planned Communities

- Electric Vehicle and Fleet Charging Stations

  Fixed Wireless (CaaS) Connectivity as a Service

  - Kiosk, Transit Station and Digital Signage Collocation Solutions

    - Energy Storage & MicroGrid Ecosystems

      - Macro and Small Cell neutral-host Tower and Light Standard Collocation Solutions

    - LED Smart Street Lighting Collocation Solutions

    - In-Building – Subterranean Collocation Solutions

RADIO VENDOR NEUTRAL

T2
Tower/Monopole
Vertex
Vendor Neutral Full Lifecycle Services
Transport Kiosks
Neutral-Host Infrastructure Provider
Maintenance Site Monitoring
Media/Interactive Kiosks
Site Video Surveillance
Inbuilding & Garage
Public Safety Grade Backup Power
Fiber Ready Backhaul/Fronthaul
Conditioned Colo Space
Battery as a Service 10 Year Guarantee