Cupertino TICC Briefing

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CUPERTINO EST. 1955

Technology Information & Communications Commission

Dec 2, 2020

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Agenda

Introductions (all)

Verizon Profile in Public Sector

Cupertino Needs Journey

Verizon Smart Technology Framework

- Traffic/Transportation
- Future Proof Architecture/Case Studies
- Climate Monitoring (Bosch)
- Irrigation
- Noise Measurement - Intelligent Video

Conclusions & Next Steps

Be Community Ready.

Public Sector

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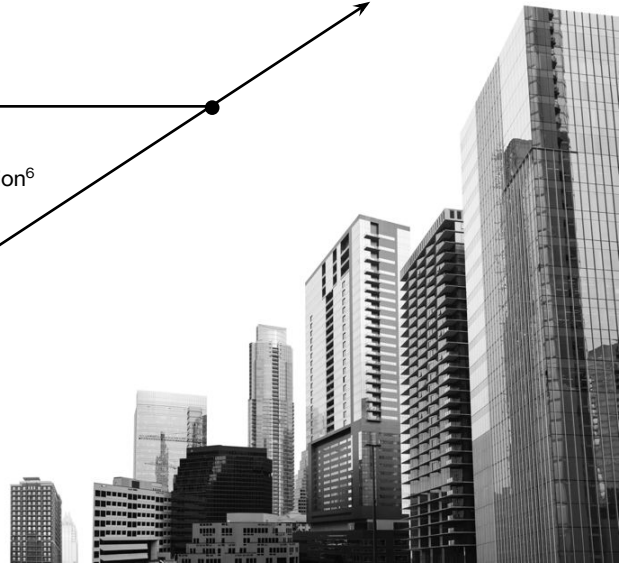
Pressures on government are increasing, placing more demand on fiscal and human services.

2019

U.S. population 329 million[4]
Urban: 89%; rural: 11%[5]
U.S. registered automobiles: 284.5 million[6]

1950

U.S. population was 152 million[1]
Urban: 60%; rural: 40%[2]
U.S. registered automobiles: 25 million[3]



1 https://www.census.gov/population/estimates/nation/popclockest.txt
2 https://www.census.gov/population/censusdata/table-4.pdf
3 https://www.fhwa.dot.gov/ohim/summary95/mv200.pdf
4 https://www.multpl.com/united-states-population/table/by-year
5 https://www.census.gov/content/dam/Census/library/publications/2016/acs/acsgeo-1.pdf
6 https://hedgescompany.com/automotive-market-research-statistics/auto-mailing-lists-and-marketing/

Cloud adoption is making it easier to help securely deliver constituent services.

20-60%

A significant percentage of agency workloads are already in the cloud – between 20-60% for most agencies.[1]

50%

Almost 50% of government organizations are actively using cloud services.[2]

100%

One hundred percent of cloud applications will include artificial intelligence by 2025.[3]

1 https://macquariegovernment.com/blog/new-ovum-study-shows-govt-ict-evolution-underway/
2 https://www.gartner.com/smarterwithgartner/understanding-cloud-adoption-in-government/
3 https://www.oracle.com/corporate/pressrelease/oow18-mark-hurd-keynote-102318.htm

Security incidents are increasing exponentially.

90

In 2008, there were 90 data breaches studied as a part of the Verizon Data Breach Investigations Report.[1]

3,950

Verizon analyzed 32,002 security incidents, of which 3,950 were confirmed data breaches spanning 81 countries worldwide.[2]

61%

Ransomware is 61% of malware incidents for the **public sector** in 2020.[3]

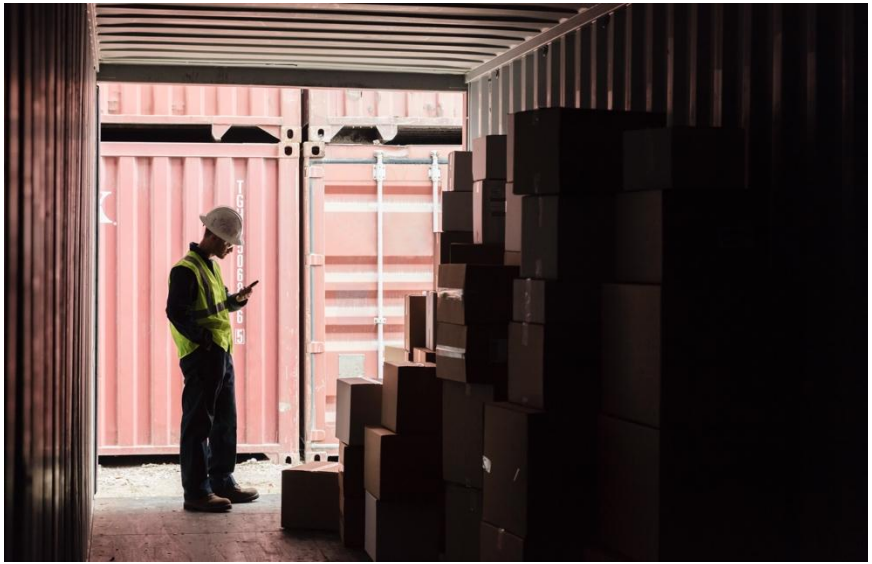
1 2009 Data Breach Investigations Report, Verizon. https://enterprise.verizon.com/resources/reports/2009/2009_databreach_rp.pdf
2 2020 Data Breach Investigations Report, Verizon
3 2020 Data Breach Investigations Report, Verizon, Page 69

2020: The power of one

Ongoing network investments for reliable levels of service

$145B **invested since 2000 in network infrastructure**

We invest billions of dollars every year to expand our network services and capacity, and to build even more powerful networks for tomorrow. All so you can continue to carry out your mission.



The Verizon Intelligent Edge Network

Connectivity

4G LTE

5G Ultra Wideband

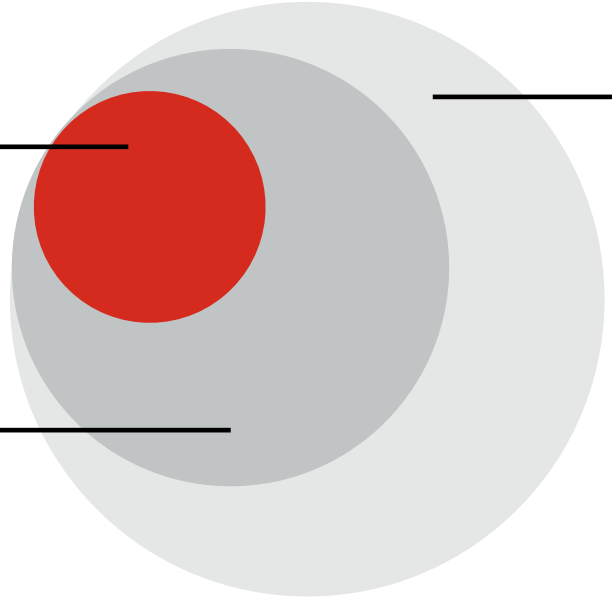
Fiber

Global IP

Platforms

ThingSpace (IoT)

Security



Solutions and services

IoT-enabled solutions

Customer experience

Security solutions

Networking

Application services (IT Services)

Communication

Mobility

Professional Services

Managed Services

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5G Ultra Wideband is available only in parts of select U.S. cities.

Ecosystem for a complete solution

Connectivity

Collaboration and CX

Security

Cloud

IoT

CPE

VADs

System integrators and channel partners

“We don’t wait for the future – we build it for and with our customers.”

Tami Erwin
President, Verizon Business Group

Delivering Public Value

“We are not looking for pitches that oversell products; we are looking for solutions to problems facing the City.

Please respond in this spirit.”

- Smart Cities Pilot Project

CITY OF CUPERTINO

Technology, Information and Communication Commission

FY 2020-21 Work Program

Project/Task	Project Objective	Estimated Completion
Pilot - Adaptive Traffic Signaling	Utilize the City's Traffic Management System to test impact of enhanced adaptive traffic signaling. This will be done through software modifications and/or the addition of IOT devices such as intelligent cameras and sensors.	Summer 2021
Pilot - Multimodal Traffic Count	Utilize the City's Traffic Management System and/or IOT equipment to provide the number of vehicles, pedestrians and bike traffic that moved through a given area, e.g., intersection, roadway or trail.	Summer 2021
Cliimate Monitoring - Pilot	Utilize IOT sensors to measure particulate and pollution levels	Spring 2021
Pilot - Water Scheduling Based on Moisture Content	Utilize IOT sensor to measure ground moisture content. Use this information to better manage water irrigation within medians. Additionally, these IOT sensors may better pinpoint water leaks.	Winter 2020
Pilot - Noise Measurement	Utilize inexpensive IOT sensors to measure/categorize noise	Winter 2020

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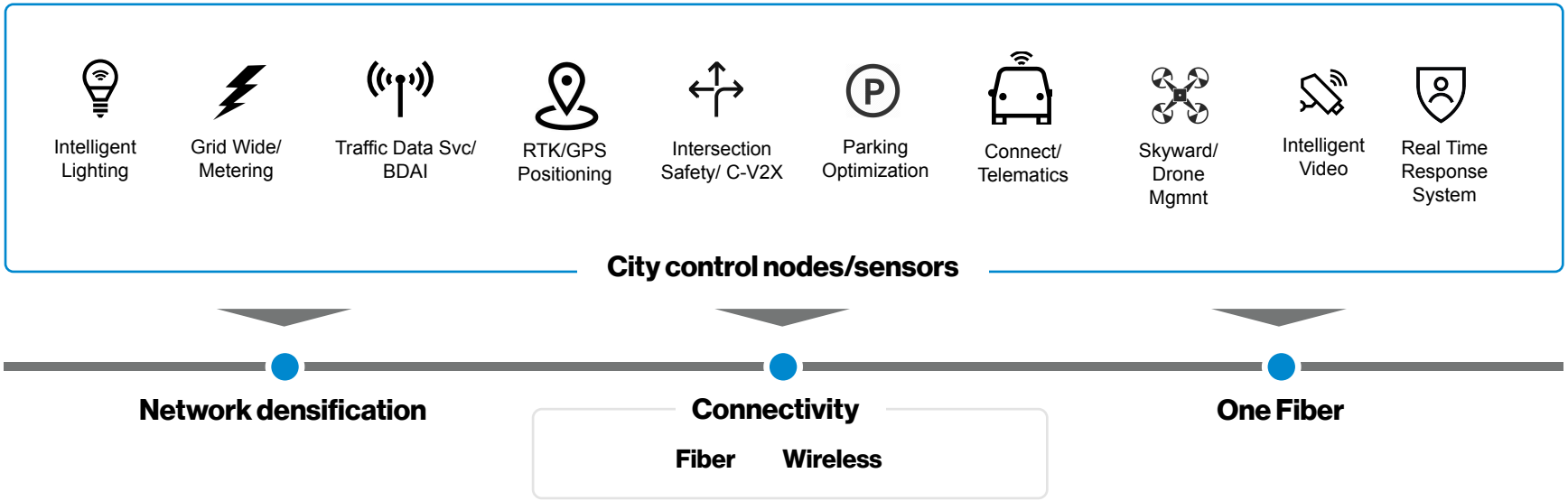
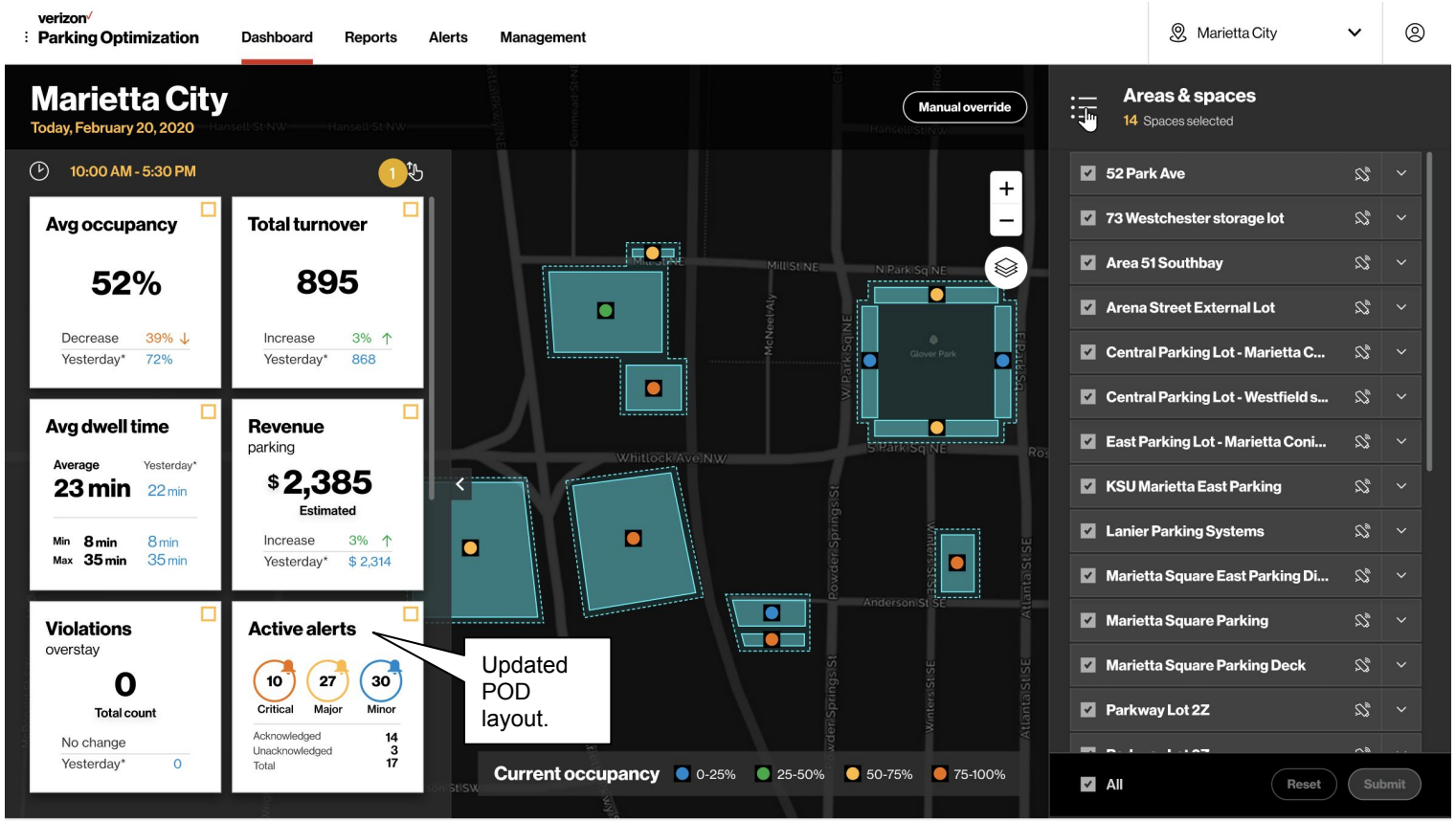
Our Vision

Improve quality of life through a data driven approach to driving the right decisions.

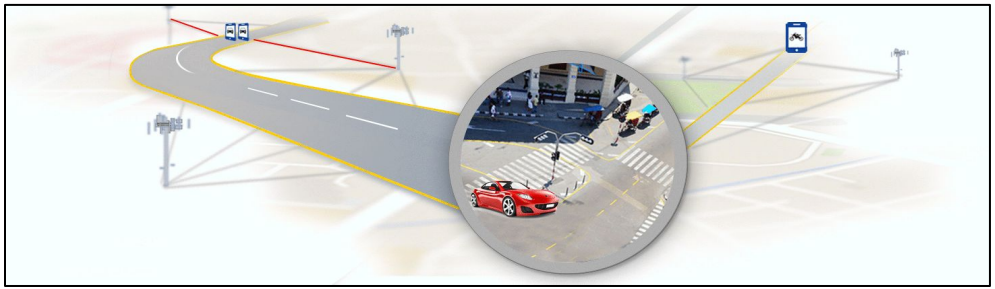


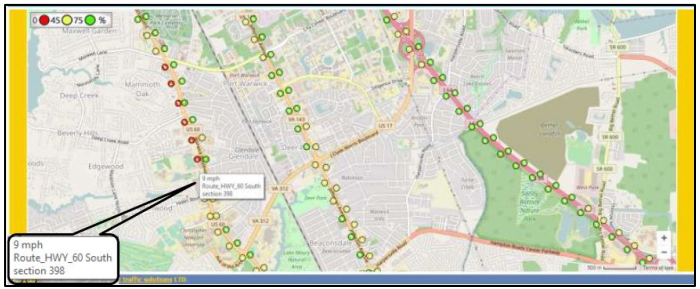
Improving sustainability and efficiency | Reducing crime and increasing security | Enhancing citizen experience

Better Managing Parking and the Curb



Traffic Data Services (TDS)





Traffic Data Services (TDS) anonymously measures the movement of devices in vehicles using the communication messages they exchange with nearby cell towers

- TDS does not rely on triangulation of cellular signals
- TDS detects unique interaction patterns as a device travels down a particular corridor
- TDS "virtual sensors" – spaced at 0.2-mile intervals – measure traffic every 2.5 minutes
  - TDS provides aggregate traffic measures, such as average speed & travel time

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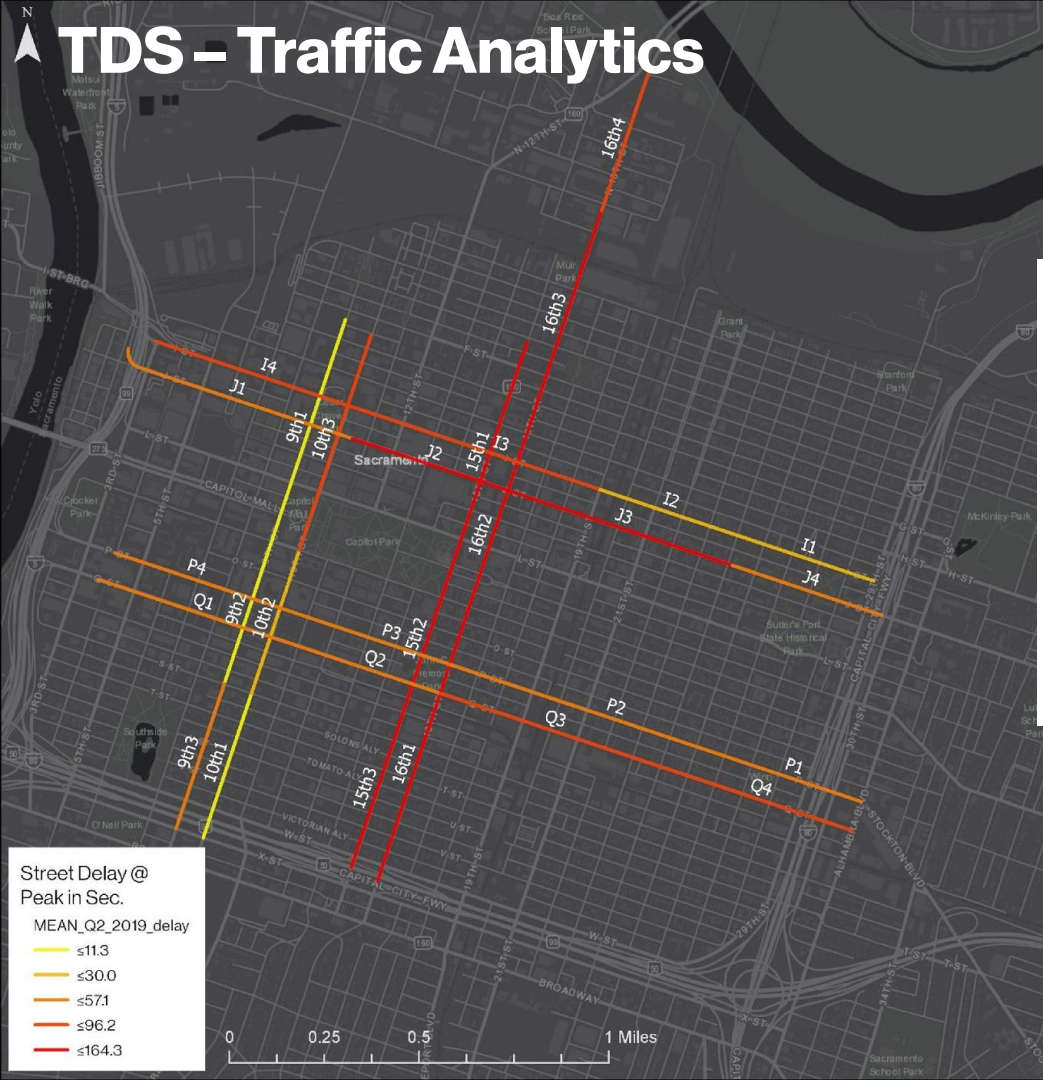
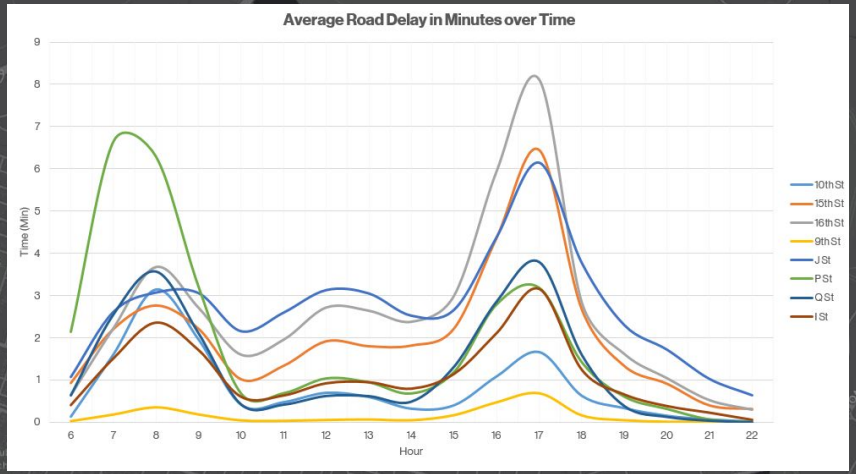
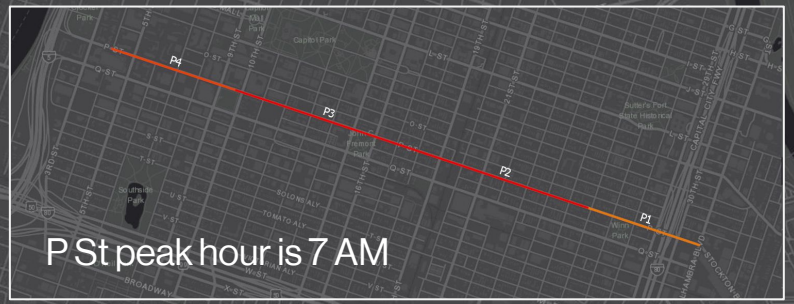
TDS – Traffic Analytics

- 16th St. showed the highest delays @ the peak hour (5 PM)
- P St. peak hour is at 7 AM



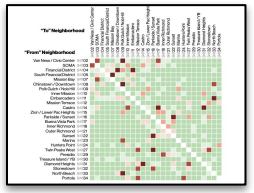




Origin-Destination Reports:
Verizon tells you who's travelling from point A to point B

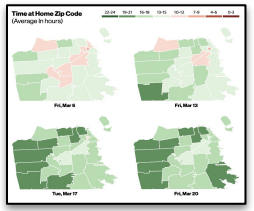
OD data with Demographics answers fundamental questions:

- Who is traveling around my region and how many trips do they make?
- Where do their trips start?
- Where do their trips end?



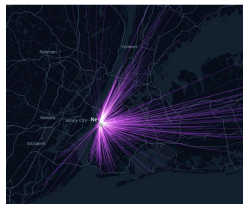
These answers provide understanding...

- What are the dominant commuting/movement patterns that cause congestion?
- How are underserved populations utilizing the transportation network?
- What demand can we predict in the future demand based on historical trends?



...that informs major decisions:

- Where will transit development reduce pollution & increase equity the most?
- How will a proposed "road diet" impact local residents and commuters?
- Will a new exit reduce congestion?
- How much parking is needed?



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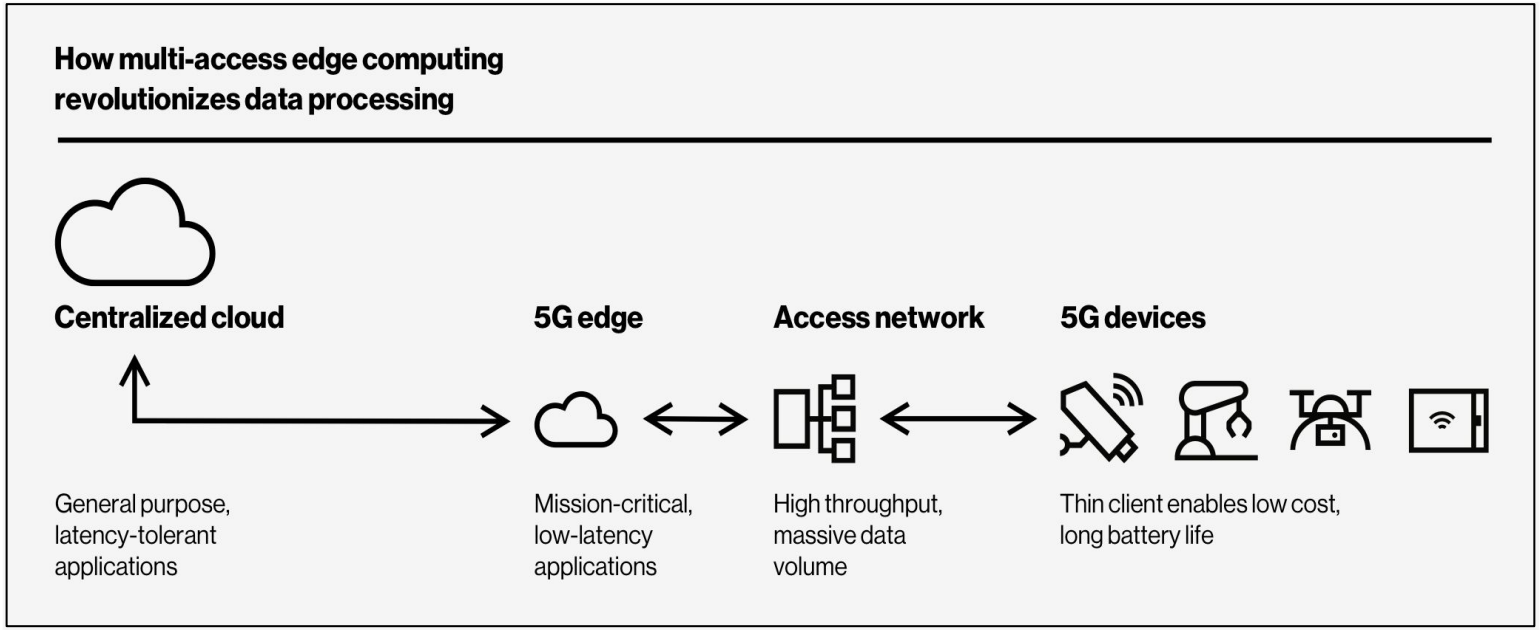
5G/MEC as Catalysts for Disruption



- ❑ **Partner w/AWS**
- ❑ **Off-load low-latency processing**
- ❑ **Run analytics at the edge**
- ❑ **Leverage existing infra**
- ❑ **Mine the data**

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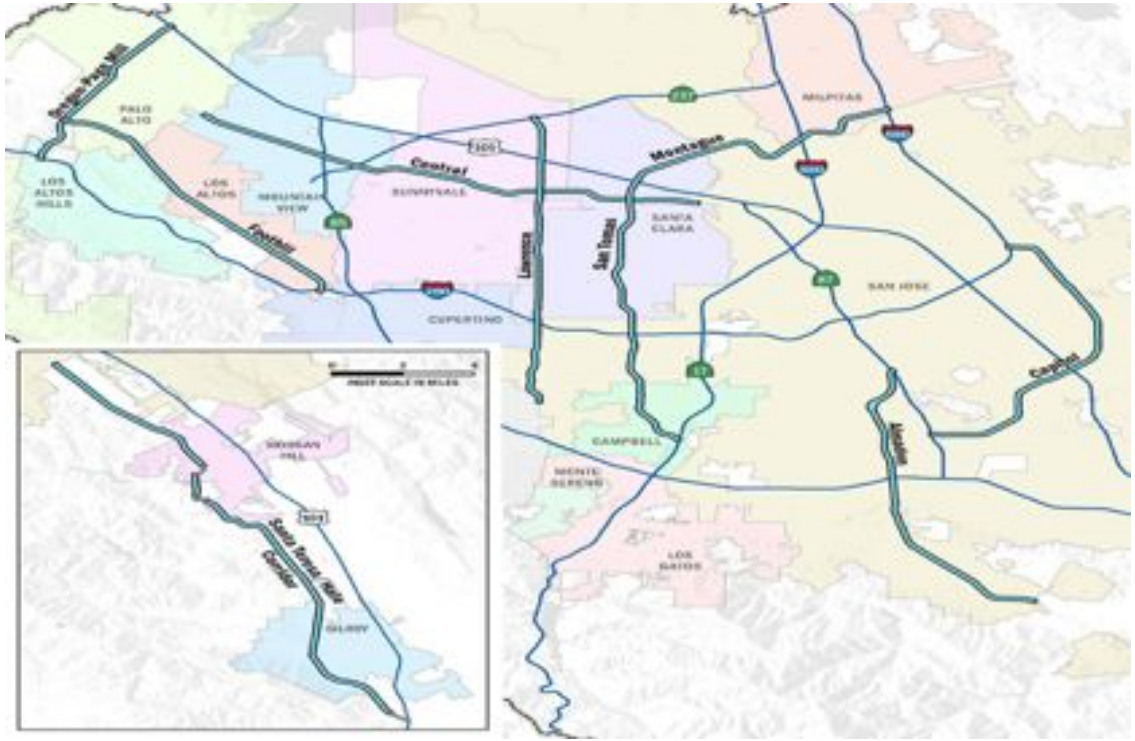
Case Study - Santa Clara County

Integrated TDS into responsive signaling platform for County's 8 expressways

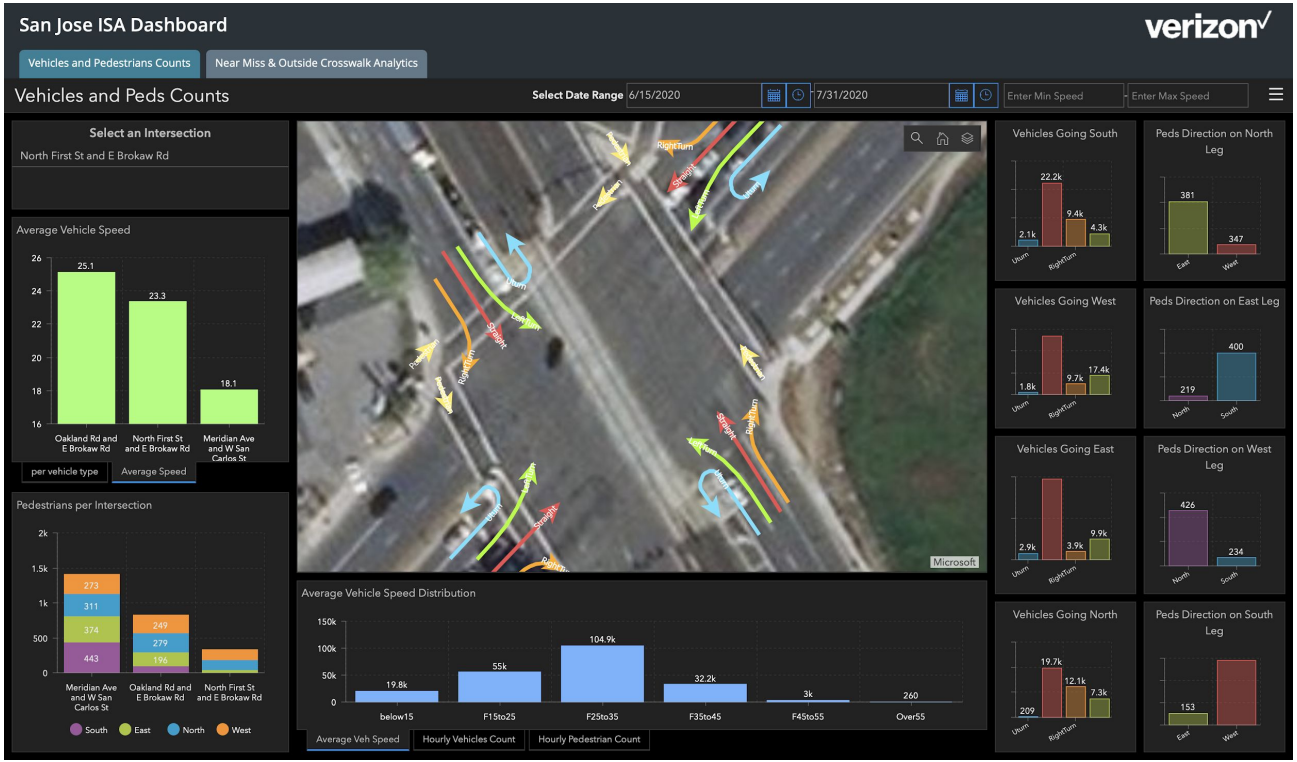
- TDS replacing bluetooth sensors as a source for real time speed data, integrated into TrafficWare responsive signal timing platform
- TDS offering higher resolution, more frequent updates
  - Every .25 miles at 2.5 min interval vs. 2 miles every 15 min for bluetooth
- Significant ROI and savings
  - Minimize capex and cost to maintain equipment



Case Study - San Jose

Delivering traffic counts and analytics to support City's Vision Zero Traffic Safety Program

- Deployed turn-key solution, comprising video sensors, communication backhaul, and ARC-GIS based custom dashboard
- Metrics include vehicles and ped counts, turning movements, speeds, and near miss analytics
- Enabling infrastructure and policy decisions to increase traffic safety and inform longer term Vision Zero strategy



Case Study - Santa Cruz

Partnered with community, leveraging parking and traffic analytics, to enhance safety

- Violations and misuse of parking lots covering stretch of road segment along the ocean, but no mechanism to monitor and enforce
- Deployed turn-key solution, comprising video sensors, communication backhaul, and cloud based dashboard
- Metrics included dwell time, turnover, no. of violations, ped/bike/vehicle counts
- Delivered data and insights to justify enforcement and inform broader strategy covering other priorities (traffic safety, environment impact studies)
- Great example of citizen/community led engagement

CAN LIMITING PARKING TIME CURB CRIMINAL ACTIVITY AT A WEST CLIFF DRIVE PARKING LOT?

BY JOEL HERSCH

Photo courtesy of west cliff/manor neighborhood group

The view over Cowell's Cove from West Cliff Drive is an iconic one. It's a scene that includes the bustling Municipal Wharf, the Santa Cruz Beach Boardwalk, the mountains beyond, and arguably one of the most popular surf breaks in the state—Cowell's itself. All that makes it a very popular place to park, largely for coastal access—waves, ocean views, beaches—but also just for hanging out. This leaves room for all kinds of activity, mostly benign, but also occasionally problematic.

One of those problematic incidences at the Cowell's parking lot, right by the stairs down to the beach, in June of last year, led to a neighborhood group forming to take a closer look at the nature of parking time in the lot. To do that, group member Al Ramadan—a tech executive who lives near the lot in question—developed a plan to collect a year's worth of data using a Verizon parking sensor device called the NetSense Solution.

Bosch
Air Quality Solutions

Monitor. Understand. Improve.

We significantly contribute to life quality and environmental protection by improving air quality.

BOSCH

Air quality solutions - Our mission

Air Quality solutions – products and services for life

Our mission is to understand, react and anticipate the demands of our customers.
To find the best solution we provide accurate and reliable emission and certified air quality data through real time monitoring, predictive functions, data processing and validation.

We empower our customers through concerted approaches due to our high-level expertise in the atmospheric effects chains.
That means we support in a closed loop ecosystem:
the emission, the transmission and the air quality in order to fulfill our goal of products and services for life.

Better air quality

Throughout close cooperation with cities around the globe

Reduced emissions

Optimized combustion engine technologies

Locally emission free

Scalable electrical powertrains for all vehicle classes

Ensure compliance to air quality thresholds

Via environment sensitive traffic management and emission monitoring control

Immission Monitoring Box (IMB)

We monitor with a high precision measurement device to gain an accurate view of the air quality and to identify pollution sources.

Immission Monitoring Box (IMB)

Parameters

Gases: NO_2, O_3, CO, SO_2

Particles: $PM_{2.5}$ and PM_{10}

Air data: relative humidity (RH), temperature, pressure

Certified

according to EU air quality directive 2008/50/EC (39. BImSchV) and BOSCH guarantee for data accuracy over life-time. [1)]

Accurate

air quality monitoring with high time and spatial resolution.

Local measurement data

can be send to the cloud for analysis and further processing; wireless data connectivity offers remote monitoring.

Robustness

towards disturbances[2)] due to intelligent correction functions and HW measures.

Sustainability

draw up precise air quality dispersion maps, make forecasts and enable emission sensitive traffic management to improve. [3)]

[1)] through external test laboratory
[2)] e.g. humidity, temperature
[3)] By installing a network of IMBs, an Immission Monitoring System (IMS)

Immission Monitoring Box (IMB)

World wide data access via BOSCH Cloud solutions allowing multiple processing options with further future potentials

Sending of raw data each minute

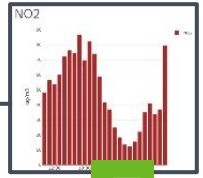
Secured data transmission via GSM

BOSCH cloud

Averaging the raw data to **"x"-min data packages** and storing these in the database

labelled

RB IoT insight



view data (via web page)

from mobile devices

from office or home office

download data (via web page)

e.g. existing frontend

transfer data (via API)

Integrate in smart innovation city ecosystem

The labelled data feature* enables standardized evaluations and algorithm development

Existing Public funded innovation platform

Exchange your AQ data based innovations w/ other platforms

* acc. DIN SPEC 27070 implemented w/ Frauenhofer CCIT as part of the BAUHAUS-MOBILITY-LAB https://bauhausmobilitylab.de/

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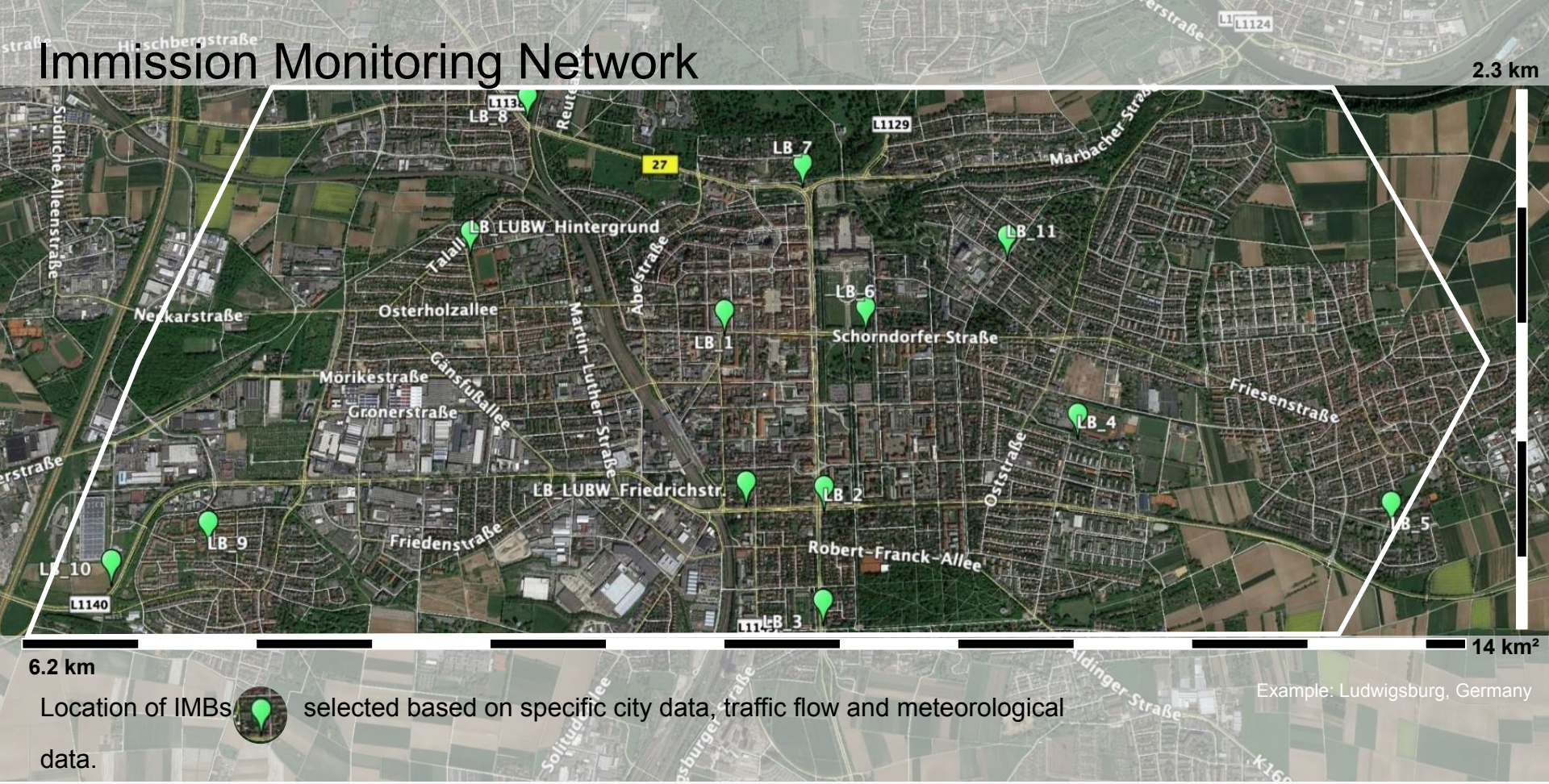
Immission Monitoring Network



Location of IMBs selected based on specific city data, traffic flow and meteorological data.

Example: Ludwigsburg, Germany

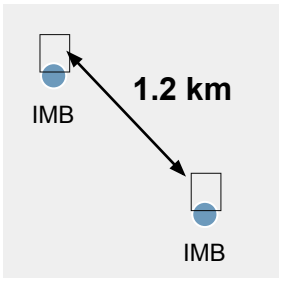
IMB: monitoring grid layout criteria

The monitoring grid is mostly driven by the application driver slogan “If you don’t measure it – you can’t manage it – you will not fix it”

measure

RB case study: City of Russelsheim (DE)

Use case: local **spot check monitoring** for

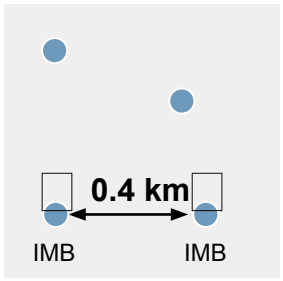


Grid density: high mid low

manage

RB case study: City of Ludwigsburg (DE)

Use case: **continuous AQ monitoring** in

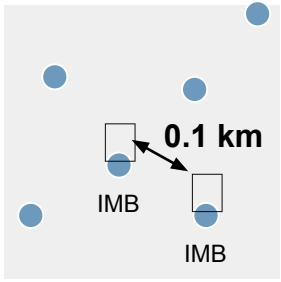


Grid density: high mid low

fix

RB case study: Traffic for London (UK)

Use case: **spot check monitoring** to proof effectiveness of applied measure



Grid density: high mid low

BOSCH

What makes us special

We explore complex relations in the field of air quality management.

Monitoring network,
max. transparency on AQ situation

- Certified, high-quality measurement of air quality
- Identification of pollution sources
- Sensor know-how and robust experience in IoT & cloud

Understanding, analysis and simulation of dispersion from pollution source into wide area

- How emission translates to immission
- Expertise in modelling and simulation
- High resolution dispersion map (5m/1h)

Validating

- Proof of measure effectiveness
- Comparison
  before / after measure introduction

Improving measures, tailored locally

- Microscopic emission models (20m/1h)
- E.g. Environment Sensitive Traffic Management

Company Profile

- **HQ: Salt Lake City, Utah**
- **Offices: France & Korea**
- **43,000+ shipping customers**
- **88 countries in 2019**
- **Tens of billions of data points**

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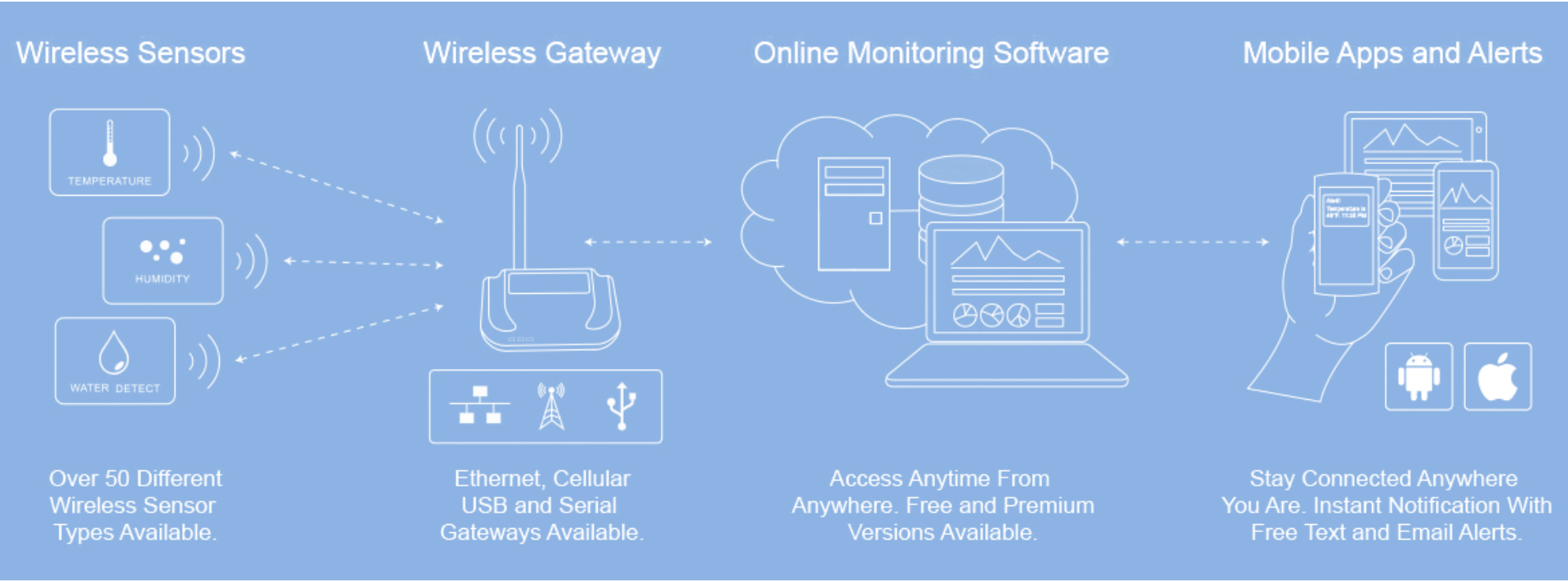
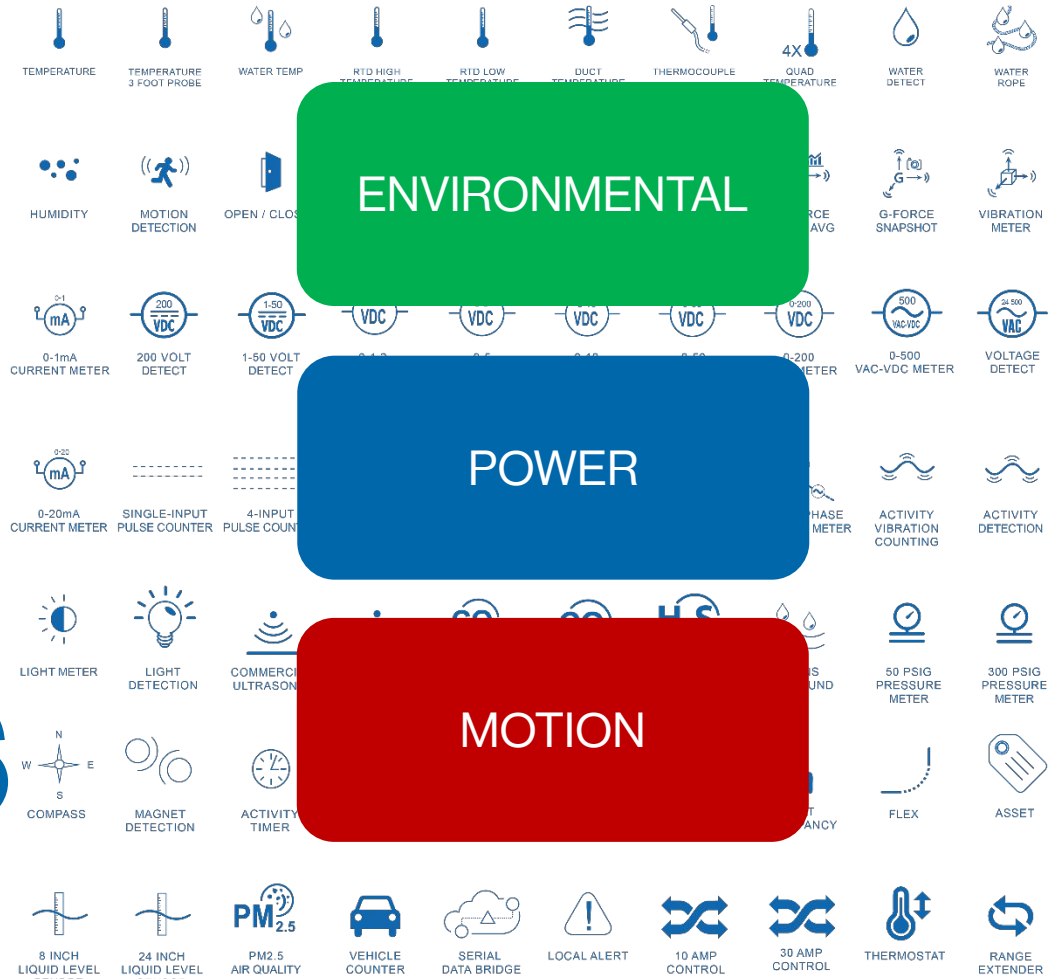
How Monnit Works



80+ WIRELESS SENSORS



Take control of security with smarter monitoring.

Verizon Intelligent Video

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Protect what's important with Intelligent Video.

Our cloud-based Intelligent Video and Remote Monitoring help you:

Record high-quality HD video with cameras at the edge. Wireless and wireline connectivity are supported

Use edge analytics to spot unusual or abnormal behaviors

Trigger alerts to employees and public safety personnel

Get relevant video in front of key personnel in near real time

Flexible storage options— on premises or in the cloud—for short- or long-term needs

Within seconds, relevant footage is sent to security personnel so they can take action. Intelligent Video is a hosted and fully managed service.

Security monitoring challenges

- Difficulty capturing and tracking illegal activity indoors and outdoors
- Barriers to sharing near real-time crime data with other agencies
- Managing and accessing multiple separate systems
- Need to constantly monitor equipment and quickly resolve outages
- Storing video files without bogging down networks

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Intelligent Video – City Use Case

Business challenges

- Medium sized city looks to improve public safety and deter crime
- Requires real time event monitoring
- Needs automatic alerting of license plate “hot” list
- Intersection monitoring
- Limited IT staff

How we helped

- Intelligent Video
- City manages multiple sites from a single interface
- Utilizes both wireless and wireline connectivity depending on location
- Provide a fully featured cloud and managed service to avoid implantation and maintenance burdens

Outcomes

- Improves situational awareness through remote monitoring of multiple areas throughout the city
- Enables quicker response time and apprehension of potential criminals through license plate recognition
- Law enforcement can focus on public safety rather than implementation and IT issues

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Thank You