Best Practices for Enhancing Deployment of a Public Wi-Fi Network

NTIA Webinar Series

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Conference Line: 800-593-7190 Passcode: 984-4951#

February 21, 2018

Participants

Moderator

- Jean Rice, Senior Broadband Program Specialist, BroadbandUSA, NTIA, US Department of Commerce

Presenters

- Mayor Gary R. McCarthy, City of Schenectady, NY
- Tony Batalla, Head of Information Technology, City of San Leandro, CA
- Steve Wimsatt, Senior Director of Business Development and Alliances, Ruckus Networks

Global Cities Team Challenge Resource:

- https://pages.nist.gov/GCTC/uploads/blueprints/20170823-GCTC-PWSC-Public-WIFI-Blueprint-FINAL-v2.pdf

BroadbandUSA is available to help communities with their broadband access and digital inclusion efforts

BBUSA Resources:

- [Implementing a Broadband Network Vision: A Toolkit for Local and Tribal Governments](#)
- [Community Broadband Roadmap Toolkit](#)
- [Guide to Federal Funding of Broadband Projects](#)
- [Using Partnerships to Power Smart Cities](#)

For General Information:

📞 202-482-2048

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🖥️ http://www.ntia.doc.gov/broadbandusa

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Helpful Information

Questions

- Please type questions in the Q&A box on the right hand side of the screen. Questions will be taken after the final presenter.

Presentation

- The presentation along with a transcript and recording will be available on the BroadbandUSA website within 7 days of this webinar under Events/BBUSA Webinar Archives. (https://www2.ntia.doc.gov/webinars)

Audio

- Please dial in to hear the webinar: *800-593-7190 Passcode: 984-4951#*

Presentations

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NTIA Public Wi-Fi Webinar

Gary R. McCarthy
Mayor

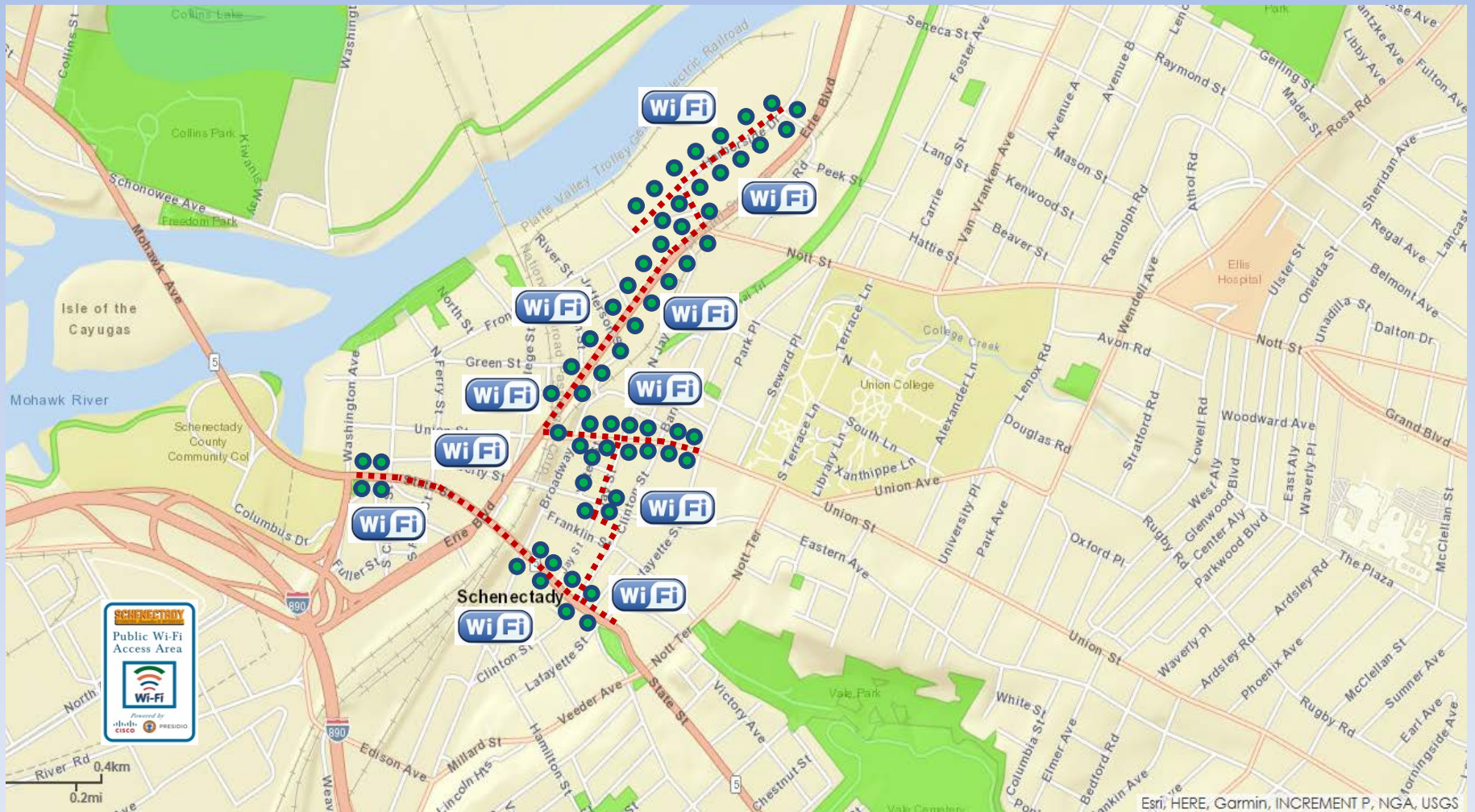# Schenectady, New York
"The City that Lights and Hauls the World"

- Home to 66,000 - Settled in 1661 by the Dutch Colony
- Thomas Edison "Edison Machine Works" – 1887
- General Electric Hea...
- X-ray Machine – 189...
- Large Steam Turbin...
- First Multi-continen... WGY - 1922
- Home to Proctors T...
- First Television Broa...
- First Television Netw... 40
- Home of the 13th Highest Patents, General Electric (2,095) -2015
- Pioneer to Smart Lighting Technology - 2015

SCHENECTADY
INTEGRATING *Innovation* IN GOVERNMENT

Public Wi-Fi
Access Area

Wi-Fi

Powered by
CISCO   PRESIDIO.

Schenectady Smart City Projects

- **280 - Smart LED Lights**
- **23 - Video Analytic Cameras**
- **23 - Wi-Fi Access Points**

- Street Lighting

- Smart Parking

- Video Surveillance\Traffic Analytics

- Wi-Fi - Common platform supports Smart Services

- Connected Learning – improves student access

- Life Safety – Smoke/Heat Detectors: Automated Response

- City App Employees, Tourists & Residents

- Life Safety – Medical Apps - Monitor / Notify

Partnerships with Utility Companies

Many opportunities for improved efficiencies exist
as both of our entities provide services to the entire Community

NEED TO LIMIT RISK OF THREATS CONCERNING DATA

nationalgrid

One of the largest investor-owned energy companies in the world - covering Massachusetts, New York, Rhode Island and the UK.

- Collaboration on projects
- Delivery of new services
- Data sharing
- Reduced maintenance costs
- Energy reductions with new technology
- Less Environmental Impacts

SCHENECTADY
INTEGRATING *Innovation* IN GOVERNMENT

Reforming the Energy Vision

BUILDING A CLEAN, MORE RESILIENT, AND AFFORDABLE ENERGY SYSTEM FOR ALL NEW YORKERS.

Reforming the Energy Vision (REV) is Governor Andrew M. Cuomo's comprehensive energy strategy for New York. REV helps consumers make more informed energy choices, develop new energy products and services, and protect the environment while creating new jobs and economic opportunity throughout the State.

The electric industry is in transition. Climate change mitigation is a global priority. Renewable energy resources cost less than ever before. Energy innovation is growing by leaps and bounds. Yet energy infrastructure is aging, extreme weather is more frequent, and the energy industry is still based on a 20th century model.
This was never clearer than in the aftermath of Superstorm Sandy.

Seeing the effects of the storm firsthand, Governor Cuomo sought to rebuild, strengthen, and modernize New York's energy system while bringing economic growth to New York. His strategy: Reforming the Energy Vision.

The Governor has tasked the New York Public Service Commission (PSC), the New York Energy Research and Development Authority (NYSERDA), the New York Power Authority (NYPA), and the Long Island Power Authority (LIPA) to work together to make the Governor's strategy for a clean, resilient, and more affordable energy system a reality, while actively spurring energy innovation, bringing new investments into the State, and improving consumer choice.

REV DEMO PROJECT PROPOSAL

- Deploy Smart City Technologies and Services using street light infrastructure as a platform to deploy smart city technologies and services using connected devices and a low bandwidth wireless network

- Evaluate & analyze how to provide smart city services, such as internet access to low-to-moderate income residents, facilitate community engagement, more efficiently deploy social services, and enable internet-based medical applications

- Explore opportunities to animate the market through strategic partnerships with third parties that may lead to co-investment and the creation of a smart city marketplace

- Reduce energy consumption of the street lighting systems by replacing existing fixtures with LED

- High attentiveness to <u>Network Threat Protection</u> & secure network deployments

High Security Requirements Utility Companies

- Most customers have no choice but to use the local Utility Companies for service
- Users must provide personal information to have an account
- Large percentage of customers use online or automatic payment options

- Customer Information is stored on company servers
- Usage & meter data information must be imported or coexist in same databases
- Need for improved efficiencies increase the potential for additional mingling of data

- Project selected 6LowPAN network protocol for the primary wide area network due to the built in advanced cybersecurity features
- Data encrypted from the sensor level or device level in AES128 Bit standard – the highest current available standard for IoT communications
- Incorporates efficient certificate management to authenticate each data packet
- Create separate secure channels for different classes of sensors and devices data

Can Utilities scale Smart City offering to meet the needs of municipal customers while maintaining high security control of data?
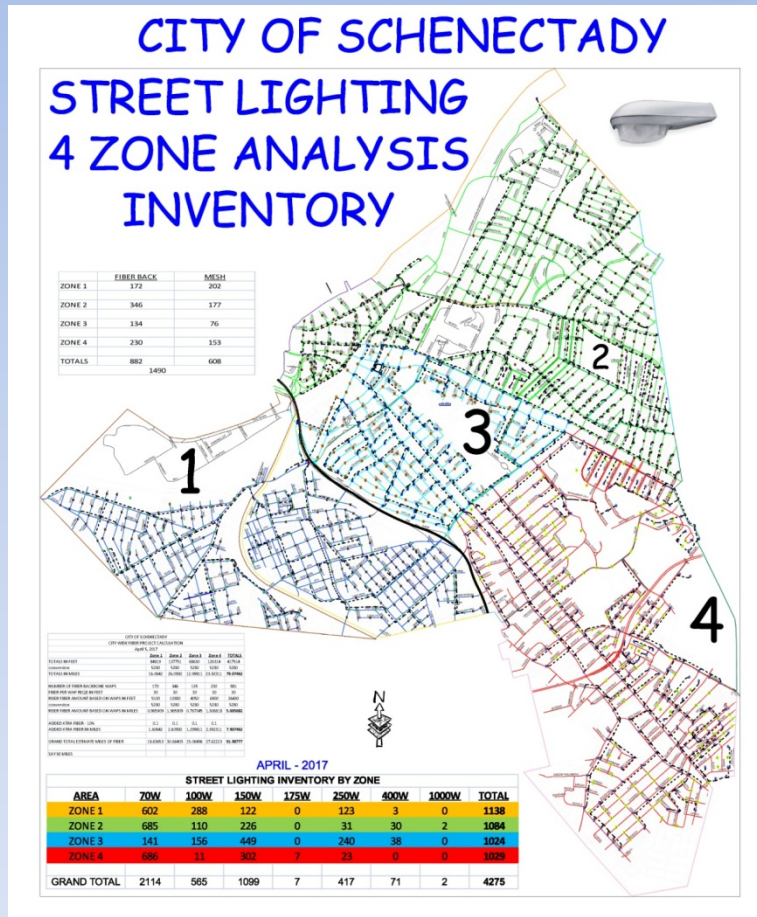
nationalgrid

nationalgrid

CENTER FOR TECHNOLOGY IN GOVERNMENT
UNIVERSITY AT ALBANY
State University of New York

PRESIDIO™

at&t

Bloomberg Philanthropies

Ellis MEDICINE

GE

Schenectady City Schools

CIMCON Lighting, Inc.
Controls Simplified

CISCO

ALLIANCE for Better Health

CITY OF SCHENECTADY STREET LIGHTING 4 ZONE ANALYSIS INVENTORY

	FIBER BACK	MESH
ZONE 1	172	202
ZONE 2	346	177
ZONE 3	134	76
ZONE 4	230	153
TOTALS	882	608
	1490	

APRIL - 2017

STREET LIGHTING INVENTORY BY ZONE

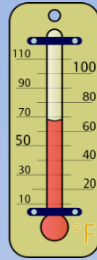| AREA	70W	100W	150W	175W	250W	400W	1000W	TOTAL
ZONE 1	602	288	122	0	123	3	0	1138
ZONE 2	685	110	226	0	31	30	2	1084
ZONE 3	141	156	449	0	240	38	0	1024
ZONE 4	686	11	302	7	23	0	0	1029
GRAND TOTAL	2114	565	1099	7	417	71	2	4275

Reforming the Energy Vision
BUILDING A CLEAN, MORE RESILIENT, AND AFFORDABLE ENERGY SYSTEM FOR ALL NEW YORKERS.
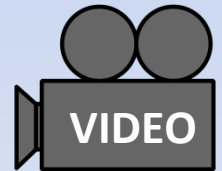
HARDWARE
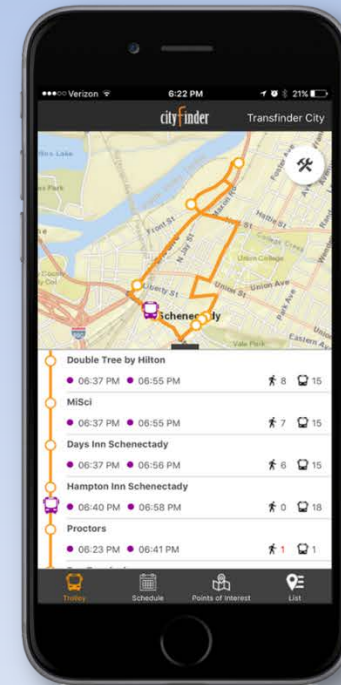
Environmental Sensors

Traffic Analytics

PARKING

service finder

LightGrid™ Node
Outdoor Wireless Control System

iSLC 3300

CIMCON Lighting, Inc.
Controls Simplified

city finder

Wi-Fi

RESULTS

SCHENECTADY
Public Wi-Fi Access Area
Wi-Fi
Powered by
CISCO PRESIDIO

ELECTRICITY

fleet finder

VIDEO

Energy Usage

Cisco Kinetic
Connection Management · Fog Computing · Data Delivery

PLATFORMS

PREDIX

Promote Tourism and Support Local Business

Promote Tourism and Support Local Business

Public Safety Improvements

Public Safety Improvements

Seamlessly uploading Police Dept *IN CAR VIDEO* improving efficiencies and reducing downtime
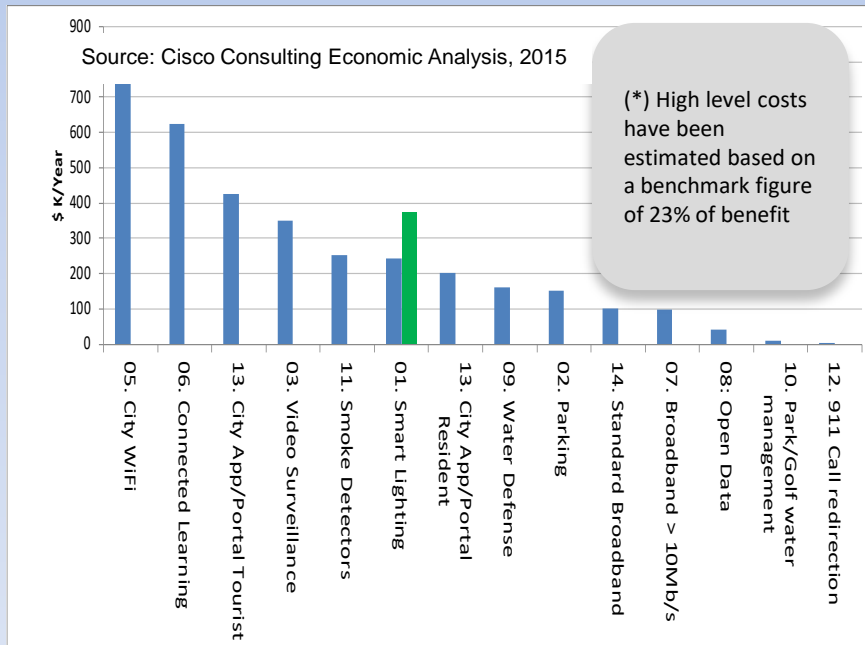
What is the value of Smart Technology?

Long Term Annual Value by Use Case

Source: Cisco Consulting Economic Analysis, 2015

(*) High level costs have been estimated based on a benchmark figure of 23% of benefit

Chart categories:
- 05. City WiFi
- 06. Connected Learning
- 13. City App/Portal Tourist
- 03. Video Surveillance
- 11. Smoke Detectors
- 01. Smart Lighting
- 13. City App/Portal Resident
- 09. Water Defense
- 02. Parking
- 14. Standard Broadband
- 07. Broadband > 10Mb/s
- 08: Open Data
- 10. Park/Golf water management
- 12. 911 Call redirection

Y axis: $ K/Year (0 to 900)

Saving Opportunities

Luminaire Outage Litigation $5
Asset Management and Audits $10
Fault Detection and Documentation $10
Maintenance Reduction Minimizing Trips to the Pole $15
Metered Energy Cost (TOU) VS Flat Rate Tariff $65 ($80)

$105- $120 Annually Per Controller

The numbers above represent only one example case, and may not be representative of all cases.
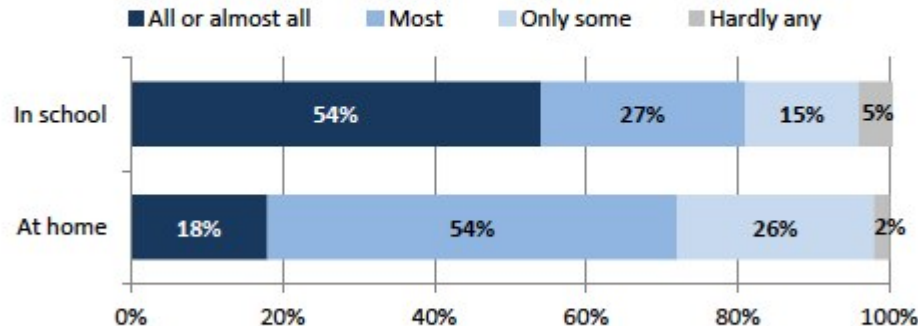
How Teachers Are Using Technology at Home and in Their Classrooms

BY KRISTEN PURCELL, ALAN HEAPS, JUDY BUCHANAN AND LINDA FRIEDRICH

A survey of 2,462 Advanced Placement (AP) and National Writing Project (NWP) teachers finds that digital technologies have helped them in teaching their middle school and high school students in many ways. At the same time, the internet, mobile phones, and social media have brought new challenges to teachers.

54% of AP and NWP teachers say all or almost all of their students have sufficient access to digital tools while IN SCHOOL, but just 18% say the same is true AT HOME

How many of your students have sufficient access [INSERT] to the internet and other digital technologies they need to effectively complete school assignments...

Legend: ■ All or almost all ■ Most ■ Only some ■ Hardly any

	All or almost all	Most	Only some	Hardly any
In school	54%	27%	15%	5%
At home	18%	54%	26%	2%

Source: Teacher data from the Pew Research Center's Internet & American Life Project Online Survey of Teachers, March 7 to April 23, 2012, n=2,462 middle and high school teachers.

http://www.pewinternet.org/2013/02/28/how-teachers-are-using-technology-at-home-and-in-their-classrooms/

Mayor Gary R. McCarthy
City of Schenectady, NY
gmccarthy@schenectadyNY.gov

Presentations

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PUBLIC WI-FI BEST PRACTICES

Tony Batalla

Head of Information Technology

City of San Leandro

February 21, 2018

Why Build Public Wi-Fi?

- Downtown & Open Space Attraction
- Economic Development
- Service for the public

S.L.Wi-Fiber

BUSINESSCLIMATE

WiFi

"The Village" $10M Downtown Project
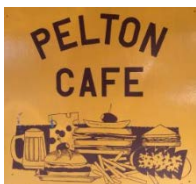
"Pelton Plaza" Old-School Site

Directly across the street…

History Meets Future

- 52' Sign is the Gateway
- Street Lamps w/ mesh nodes
- 802.11AC
- 1Gbps/sec fiber backhaul
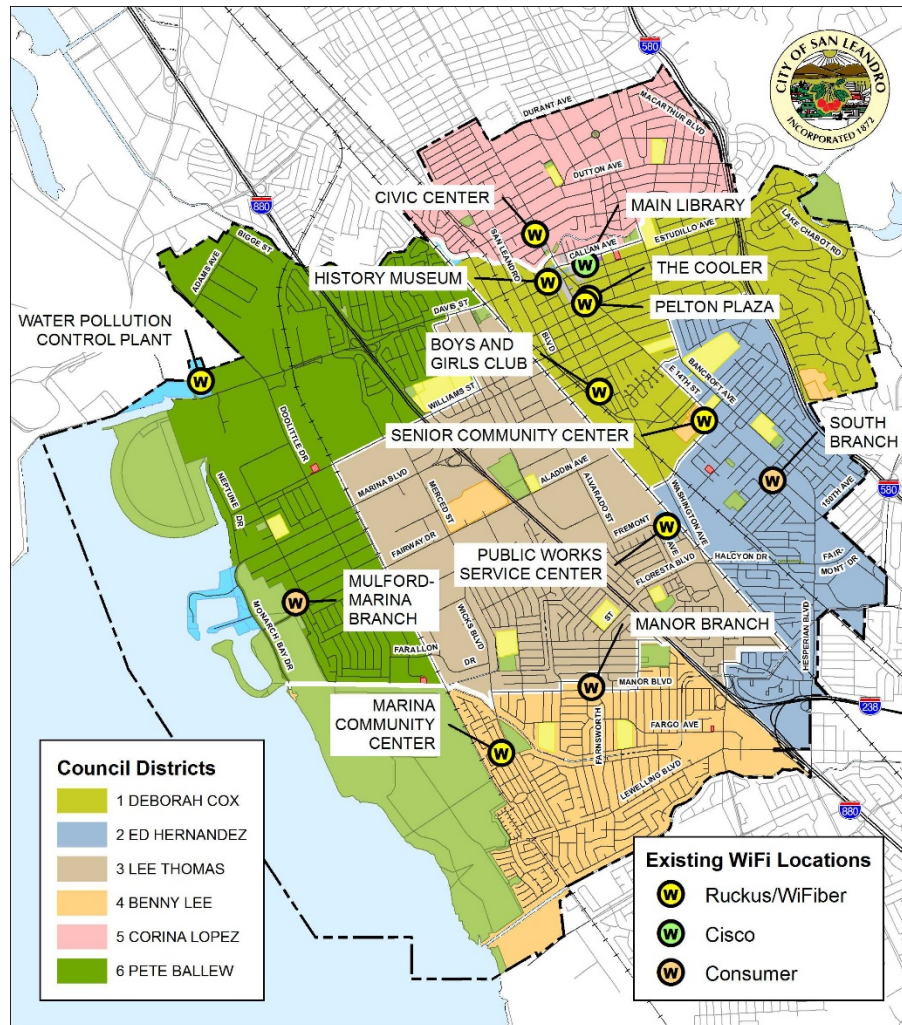- Existing Internet (10/Gbps)
- 5-year hardware warranty

Final design and deployment

- 4-block radius in downtown core
- Owned & Operated by City
- Lit San Leandro Fiber Loop
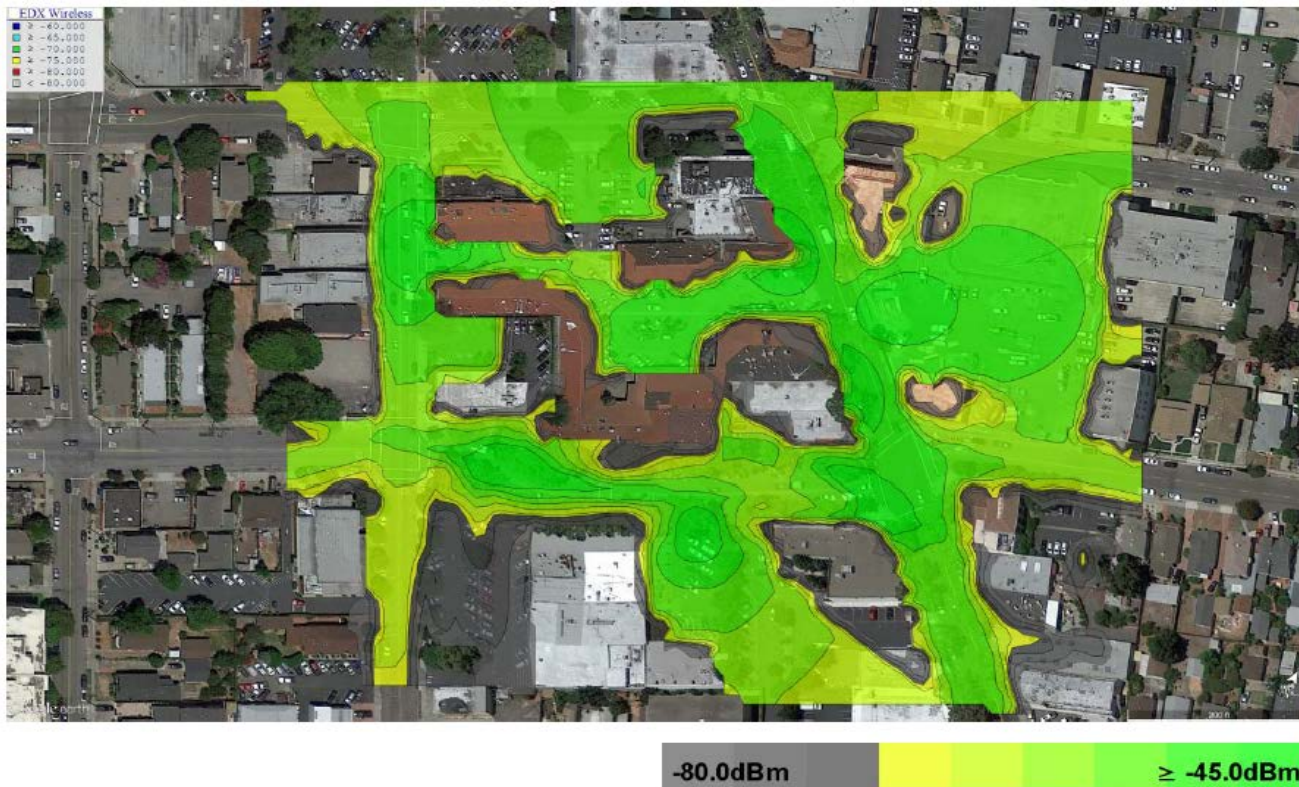
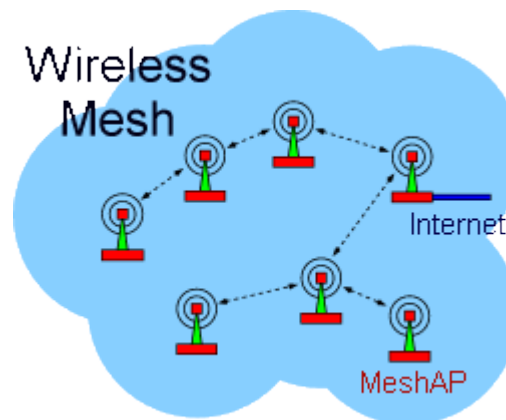# Expansion Since Downtown Project

Best Practices & Key Takeaways

DESIGN
- **Use a mesh design**
- **Mounting Location & Access to network are #1 and #2**

STRATEGY
- **Think Small**
- **Use existing infrastructure**
- **Partner with Public Works**
- **Understand City processes**

MANAGEMENT
- **Use Managed Services**
- **Adopt relevant policy**
- **Don't overlook marketing**

Tony Batalla
Head of Information Technology
City of San Leandro
TBatalla@sanleandro.org
February 21, 2018

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Technical Considerations for Public Wi-Fi

Steve Wimsatt
Ruckus Networks

February 21, 2018

https://pages.nist.gov/GCTC/uploads/blueprints/2017082
3-GCTC-PWSC-Public-WIFI-Blueprint-FINAL-v2.pdf

Strategy and Planning -

- Input
  - Citizens
  - Representatives of multiple city departments
  - Businesses and the local entrepreneurial community
  - Colleges and universities
  - Partner organizations

- Decisions
  - Target performance for Public Wi-Fi
  - Bandwidth shaping or rate limits
  - Service tiers vs. the same standards for all users
  - Filtering
  - Time of day usage
  - Customer support
  - Organizational involvement
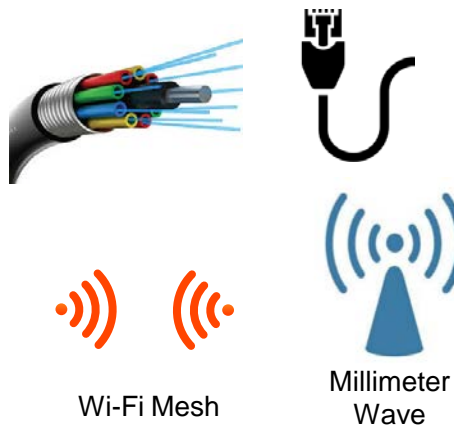 - Privacy / Security
  - General infrastructure policies.
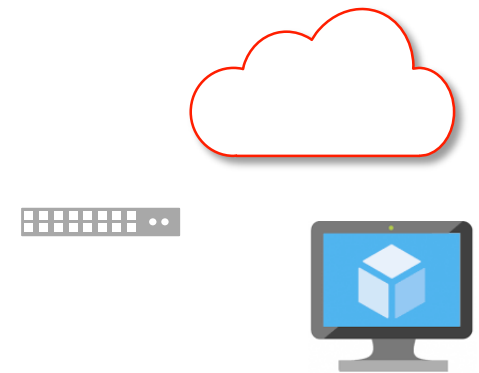
Wi-Fi Network Architecture

Access Points

- Typically placed ~14-20 feet high
- Need power and backhaul
- Look for
  - IP67 rating
  - Meshing
  - Internal antennas

Backhaul

Wi-Fi Mesh

Millimeter Wave

- Fiber best where available
- Cat 5/6 cable
- Millimeter wave
- Wi-Fi mesh

Management

- Software updates
- Reporting and analytics
- Mesh connections

- Cloud, server, vm
- Access Mgmt / captive portal

Authentication, Security and User Experience

- Open Network

- Captive Portal Authentication

- 802.1x:

- PKI Certificates

- Hotspot 2.0

There is no Single Business Model

City Funded

Public Private Partnership

Service Provider

Must Be Sustainable

Additional Wireless Connectivity

- IoT solutions have diverse requirements

- Low energy consumption enables battery power

- Long range, penetrating signals can reach devices and sensors indoors or underground

- Often very low data rates

Protocol/ Technology	Bandwidth	Range	Cost	Device Power Consumption
Wi-Fi	High	50-100 meters	Med	High
3G, 4G LTE	High	2-3 km	High	Medium
Millimeter wave	Very High	300-1,000 meters	Med	NA
Z-Wave, Bluetooth, ZigBee and other 802.15.4 variants	Very Low	50 meters	Very Low	Very Low
LTE-M, LoRa, SigFox	Very Low	3-5 km	Low	Very Low

THANK YOU

Steve Wimsatt
Ruckus Networks
Steve.wimsatt@arris.com

Best Practices for Enhancing Deployment of a Public Wi-Fi Network

Questions and Comments

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http://www2.ntia.doc.gov/

Broadband USA

Thank you for attending.

Tune in for the next Practical Conversations Webinar

Topic: Public-Private Partnerships
March 21, 2018
2:00 pm EST

Registration is required for each webinar:

http://www2.ntia.doc.gov/ under *Events*