City of Santa Clara

Outdoor Distributed Antenna System

A City-Owned Network for Wireless Service Providers

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Silicon Valley Power
CITY OF SANTA CLARA

City of Santa Clara
The Center of What's Possible

Presentation Overview

- Why City of Santa Clara
- Key Drivers for City-Owned oDAS
- oDAS Business Model
- Partnering with DAS Group Professionals Inc.
- Opportunities & Challenges
- Current Status & Future Growth

City of Santa Clara

- Full service, Charter City
  - 118,830 residents
  - $720M Annual Budget;
  - 1,026 Employees
- Business Friendly Climate
  - Corporate Headquarters
  - Data Centers & Technology Firms
- Silicon Valley Power
  - City-owned electric utility
  - Electric, Dark Fiber & Street Lighting
  - Region's lowest utility rates
  - 1% of Electricity use in California


Santa Clara Convention Center

California's Great America


Tech Corporate Headquarters


Data Centers


Santa Clara University

City of Santa Clara
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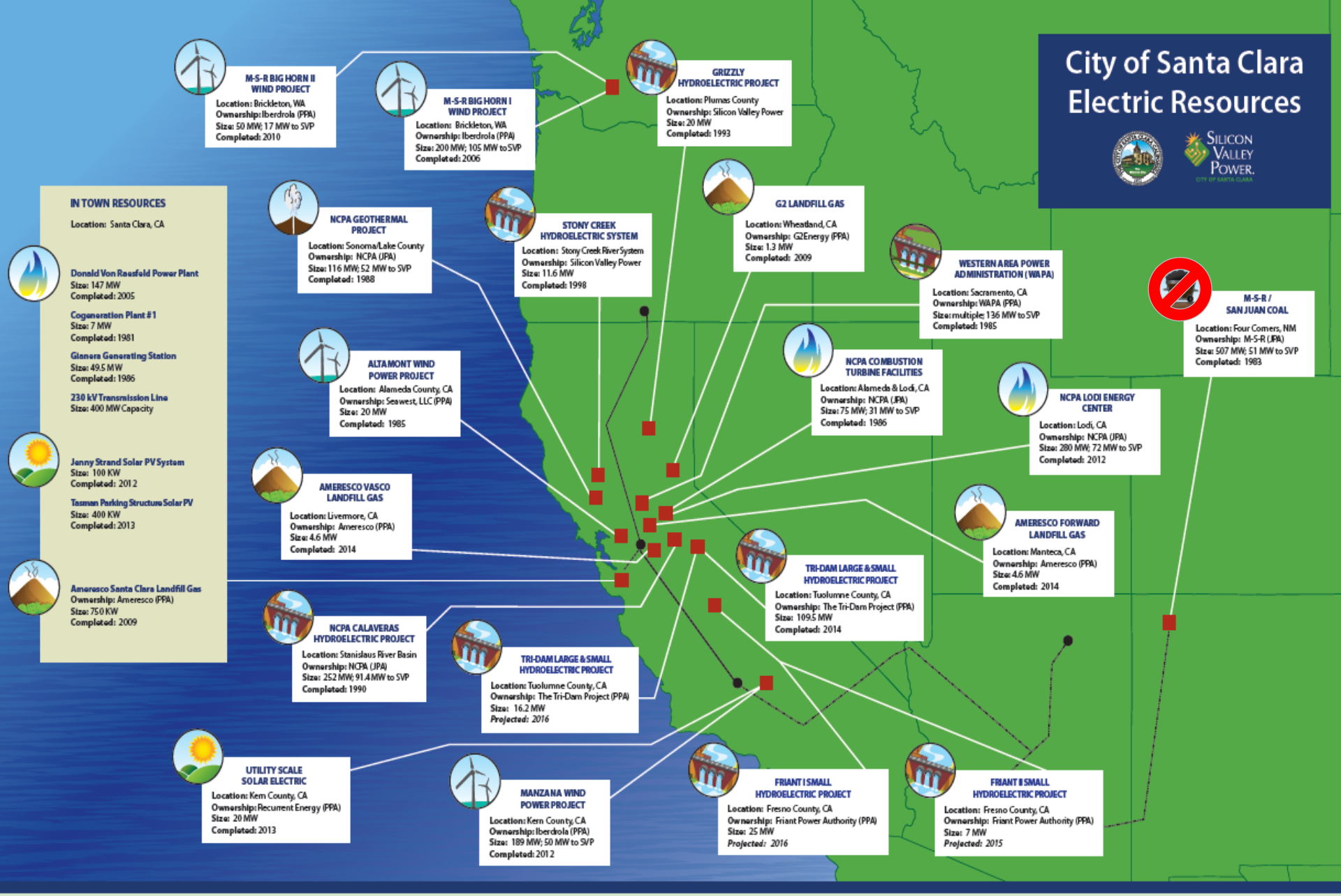

City of Santa Clara Electric Resources
SILICON VALLEY POWER
CITY OF SANTA CLARA
M-S-R BIG HORN II WIND PROJECT
Location: Brickleton, WA
Ownership: Iberdrola (PPA)
Size: 50 MW; 17 MW to SVP
Completed: 2010
M-S-R BIG HORN I WIND PROJECT
Location: Brickleton, WA
Ownership: Iberdrola (PPA)
Size: 200 MW; 105 MW to SVP
Completed: 2006
GRIZZLY HYDROELECTRIC PROJECT
Location: Plumas County
Ownership: Silicon Valley Power
Size: 20 MW
Completed: 1993
G2 LANDFILL GAS
Location: Wheatland, CA
Ownership: G2Energy (PPA)
Size: 1.3 MW
Completed: 2009
NCPA GEOTHERMAL PROJECT
Location: Sonoma/Lake County
Ownership: NCPA (JPA)
Size: 116 MW; 52 MW to SVP
Completed: 1988
STONY CREEK HYDROELECTRIC SYSTEM
Location: Stony Creek River System
Ownership: Silicon Valley Power
Size: 11.6 MW
Completed: 1998
WESTERN AREA POWER ADMINISTRATION (WAPA)
Location: Sacramento, CA
Ownership: WAPA (FPA)
Size: multiple; 136 MW to SVP
Completed: 1985
M-S-R / SAN JUAN COAL
Location: Four Corners, NM
Ownership: M-S-R (JPA)
Size: 507 MW; 51 MW to SVP
Completed: 1983
ALTAMONT WIND POWER PROJECT
Location: Alameda County, CA
Ownership: Seawest, LLC (PPA)
Size: 20 MW
Completed: 1985
NCPA COMBUSTION TURBINE FACILITIES
Location: Alameda & Lodi, CA
Ownership: NCPA (JPA)
Size: 75 MW; 31 MW to SVP
Completed: 1986
NCPA LODI ENERGY CENTER
Location: Lodi, CA
Ownership: NCPA (JPA)
Size: 280 MW; 72 MW to SVP
Completed: 2012
AMERESCO VASCO LANDFILL GAS
Location: Livermore, CA
Ownership: Ameresco (PPA)
Size: 4.6 MW
Completed: 2014
AMERESCO FORWARD LANDFILL GAS
Location: Manteca, CA
Ownership: Ameresco (PPA)
Size: 4.6 MW
Completed: 2014
TRI-DAM LARGE & SMALL HYDROELECTRIC PROJECT
Location: Tuolumne County, CA
Ownership: The Tri-Dam Project (PPA)
Size: 109.5 MW
Completed: 2014
NCPA CALAVERAS HYDROELECTRIC PROJECT
Location: Stanislaus River Basin
Ownership: NCPA (JPA)
Size: 252 MW; 91.4 MW to SVP
Completed: 1990
TRI-DAM LARGE & SMALL HYDROELECTRIC PROJECT
Location: Tuolumne County, CA
Ownership: The Tri-Dam Project (PPA)
Size: 16.2 MW
Projected: 2016
UTILITY SCALE SOLAR ELECTRIC
Location: Kern County, CA
Ownership: Recurrent Energy (PPA)
Size: 20 MW
Completed: 2013
MANZANA WIND POWER PROJECT
Location: Kern County, CA
Ownership: Iberdrola (PPA)
Size: 189 MW; 50 MW to SVP
Completed: 2012
FRIANT I SMALL HYDROELECTRIC PROJECT
Location: Fresno County, CA
Ownership: Friant Power Authority (PPA)
Size: 25 MW
Projected: 2016
FRIANT II SMALL HYDROELECTRIC PROJECT
Location: Fresno County, CA
Ownership: Friant Power Authority (PPA)
Size: 7 MW
Projected: 2015
IN TOWN RESOURCES
Location: Santa Clara, CA
Donald Von Raesfeld Power Plant
Size: 147 MW
Completed: 2005
Cogeneration Plant #1
Size: 7 MW
Completed: 1981
Gianera Generating Station
Size: 49.5 MW
Completed: 1986
230 kV Transmission Line
Size: 400 MW Capacity
Jenny Strand Solar PV System
Size: 100 KW
Completed: 2012
Tasman Parking Structure Solar PV
Size: 400 KW
Completed: 2013
Ameresco Santa Clara Landfill Gas
Ownership: Ameresco (PPA)
Size: 750 KW
Completed: 2009
LEGEND
Wind
Solar
Geothermal
Hydroelectric
Landfill
Natural Gas
Coal
SVP Jointly Owned Transmission Projects
California-Oregon Transmission Project (TANC)
Tesla-Midway Transmission Service (TANC)
Southwest Transmission Project (M-S-R)

Silicon Valley Power

City Infrastructure

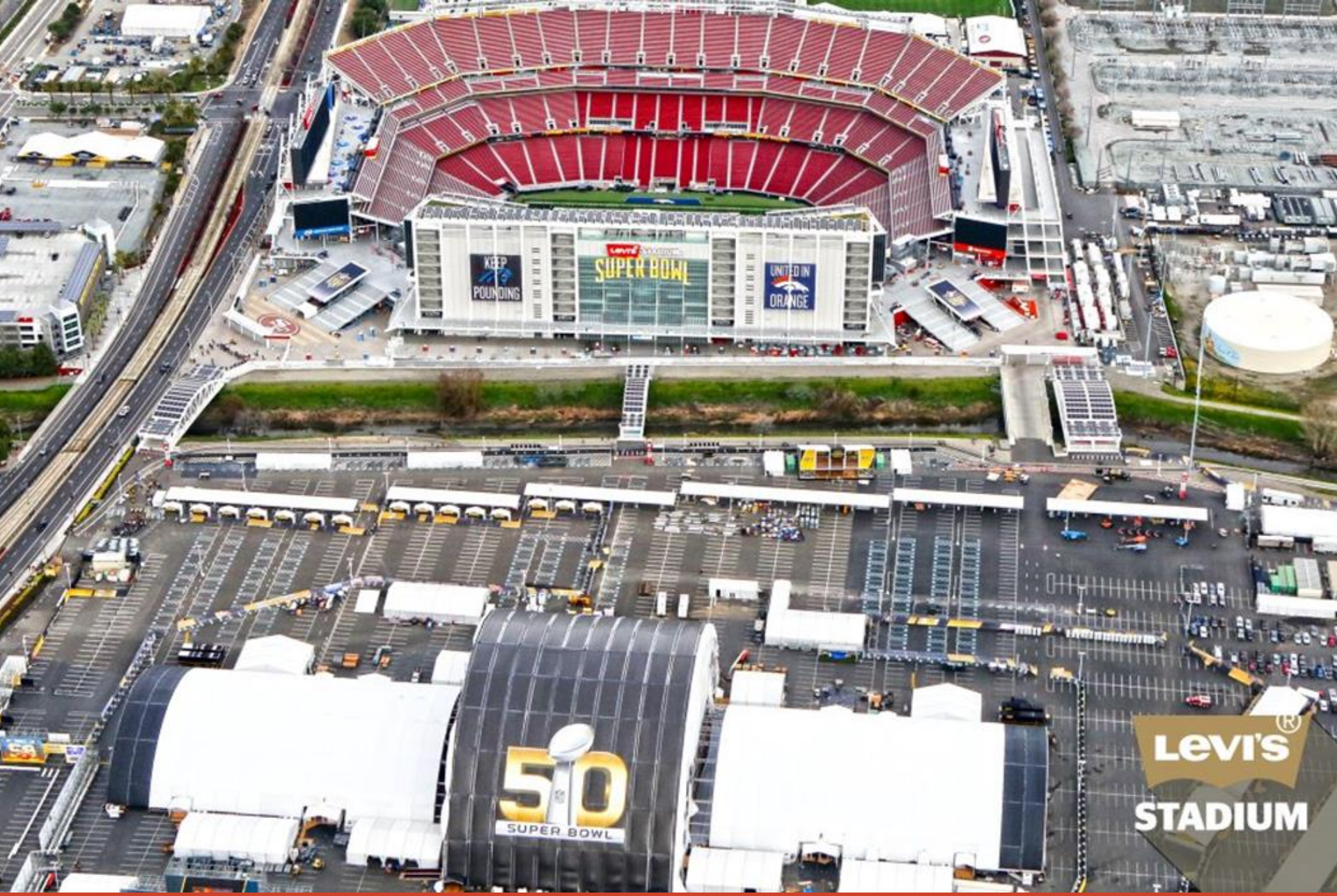
- 10,942 Power Poles
- 106 Fiber Miles
- 8,097 Street Light Poles
- 30 miles of 60kV Power Lines
- 591 miles of 12kV Distribution Lines (64% underground)
- 53,495 Customers meters

SVP MeterConnect© (Mar-2013)

147 MW DVR Power Plant

Street Light Poles

Substations



City of Santa Clara
The Center of What's Possible

Key Drivers for City-Owned oDAS

- Multiple carrier requests to mount large wireless communications equipment on street light poles
- Expanded Growth of City's Entertainment District
- Levi Stadium, Hotels, Restaurants, Convention Center, Stadium Offsite Parking Lots
- A Need to Accommodate Multiple Wireless Carriers to Serve the Community

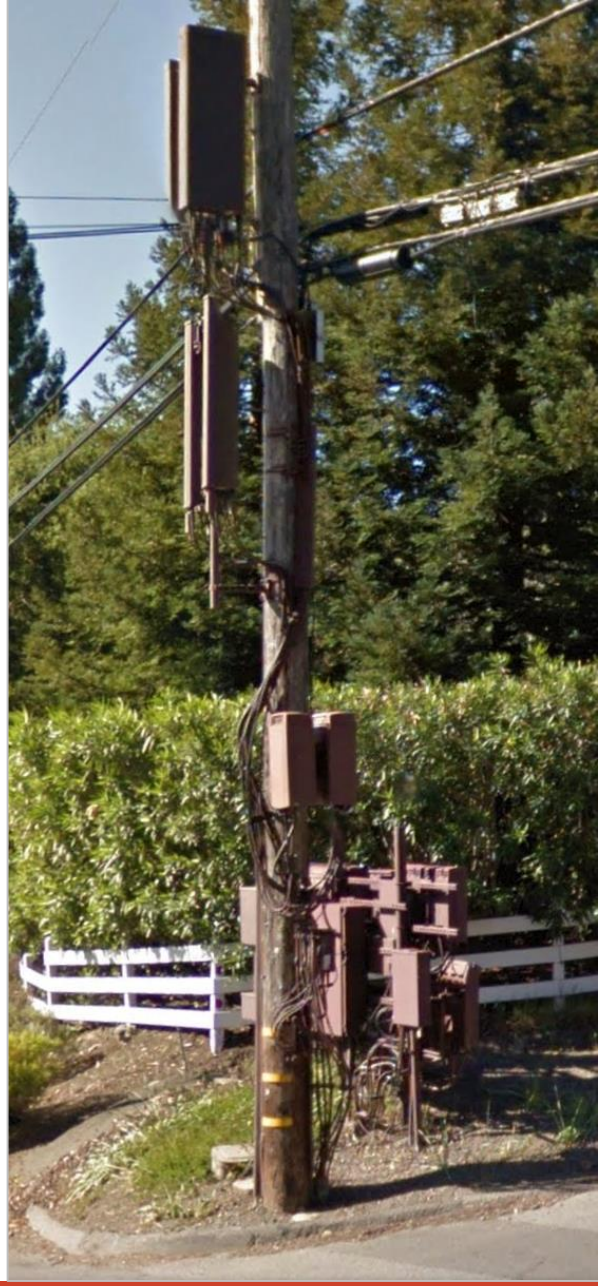
Cellular on Wheels @ Super Bowl XLIX

DAS deployed at Tasman Garage (1,800 spaces)

Levi's Stadium (DAS)... Offsite Parking Lots

What we saw in other cities…

- Clunky boxes on poles
- Many different shapes and sizes of wireless equipment
- Non-compliance with clearance requirements
- Pole over-loading



Access & Aesthetics

- Over-sized boxes
- Pole Inaccessible for Climbing
- Inconsistent “look”

More Examples…



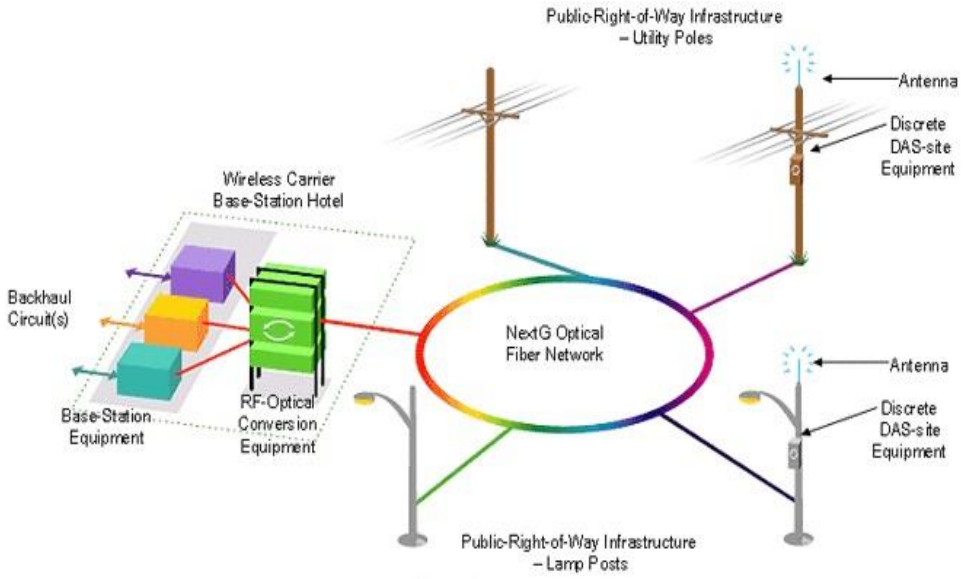

Why Use oDAS?

- DAS Networks allow for smaller coverage footprints to provide more bandwidth per user
- Multiple nodes cover a broad area
- Neutral platform for all Wireless Carriers
- Leverages existing City-owned and managed SL poles, power, and fiber optic network
- Allows for a consistent look throughout Santa Clara

Levi's Stadium oDAS
Great America Main Parking Lot

oDAS Business Model

- Santa Clara owns the system
- oDAS partner maintains head end site, wireless and pedestal equipment, and provides business services
- On-going revenue stream from lease of City assets and node application fees
- Potential to go City-wide.
- Carriers only responsible for maintaining equipment at Hub site.



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oDAS Partner Selection Process

Sept. 2014 - Issued RFI for:

- Turn-key Vendor Experienced in DAS and oDAS
- Carrier negotiation and contracts
- Business Service Provider
- Locally-Based (on-site support)
- Non-Interference with
  - Public Safety
  - Metro WiFi
  - SVP's MeterConnect© (AMI)

DAS Group Professionals

- Provided comprehensive package of services
  - Turn-key Vendor / Full Service Provider
  - Experienced in DAS and ODAS
  - Headquartered Walnut Creek, CA
  - Proposed a shared revenue business model
  - New ODAS equipment on its own frequency (no interference with other networks)
- Dec 12, 2014 – Award approved by City Council

DAS Group Professionals (cont.)

- Experienced in comprehensive DAS and oDAS design, development, deployment, carrier license agreements and long-term O&M
- Notable Projects include Levi's Stadium, Candlestick Park, Bay Area Rapid Transit, universities, and convention centers
- ODAS available to all wireless carriers (AT&T, Sprint, Verizon, T-Mobile and others)

Opportunities & Challenges

- Jan 2015 – Started
  - New Technology and Services for Carriers
  - Tight deadline to SuperBowl 50, Feb 7, 2016
- Head End Site and 15 Nodes designed and active by 12/31/16
- Designed and developed new legal mechanisms and license agreement
- Designed and Developed oDAS-ready poles
- Considered several different designs

oDAS Node Designs Considered

Stealth Street Light Pole Design w/Foundation

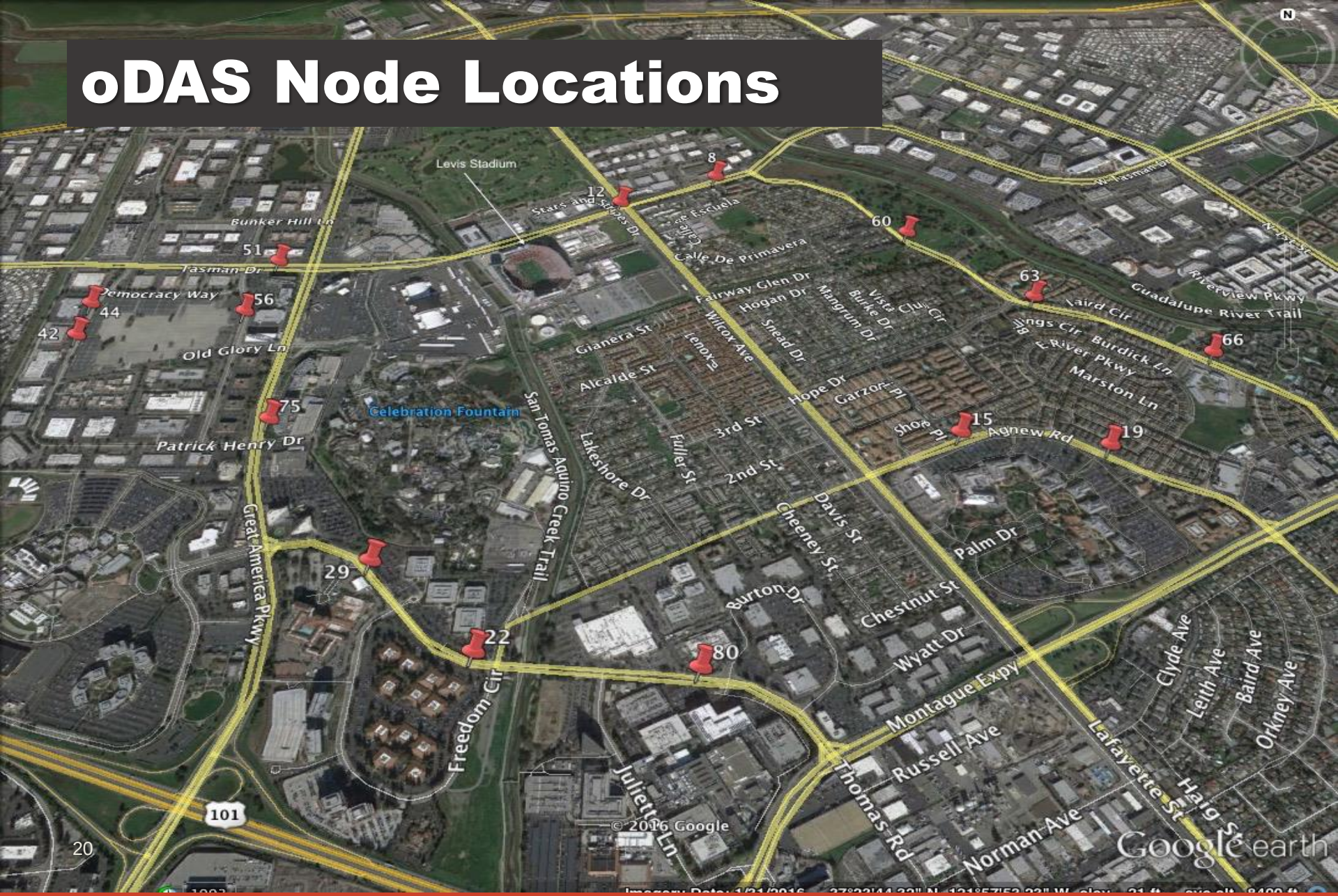
- Advantages:
  - oDAS Equipment concealed inside pole
  - Accommodates banners, lights, etc.
  - Customized
  - Equipment ventilation available
- Disadvantages
  - Higher cost (34% more expensive)
  - Foundation much larger (30”-36” in diameter) than regular SLP’s
  - Long term maintenance cost more specialized and expensive
  - Did not blend with existing SLPs

Design Selected

oDAS Standard SLP w/ Foundation & Pedestal

- Economical
- Accommodates up to four carriers
- SL Pole house antenna cables
- Pedestal secures power, fiber, and remote equipment
- Uniform look; blends
- Accommodates banners
- Lead time: 5 weeks

oDAS Node Locations



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Current Status

- oDAS Head End Site completed with room for expansion
- 15 Nodes completed
  - One wireless carrier
  - Each node has room for 3 more carriers
  - Well-located in congested areas
- Business processes in place
  - Customers being served
  - Emergency response and restoration

Future Growth

- City and DGP partnership
- Negotiating in-process with another carrier
- SVP is standardizing construction process for oDAS Node installation
  - Reviewing economics
  - Streamlining timeframe for completion
- Assessing best locations for future oDAS Nodes
- Large Commercial developments, opportunity to leverage street light replacements

Questions & Answers


CITY OF SANTA CLARA CALIFORNIA
1852
THE MISSION CITY