ROAM Overview

New York Chapter
Association of Energy Engineers

Presented By:

Larry D'Amico. LC

Agenda

- Why ROAM?
- ROAM Technology
- ROAM System Components
- System Capability and Operation
- Services
- Case Study – Camelback Toyota
- Tools
- Summary

Why ROAM?

Remote

Operations

Asset

Management

- Supports green/sustainability initiatives
- Remote monitoring and control for street and area lighting
- Lighting expertise paired with proven wireless technology
- Innovative solutions for common streetlight problems
- Accelerates the benefits of LED lighting

Why ROAM?

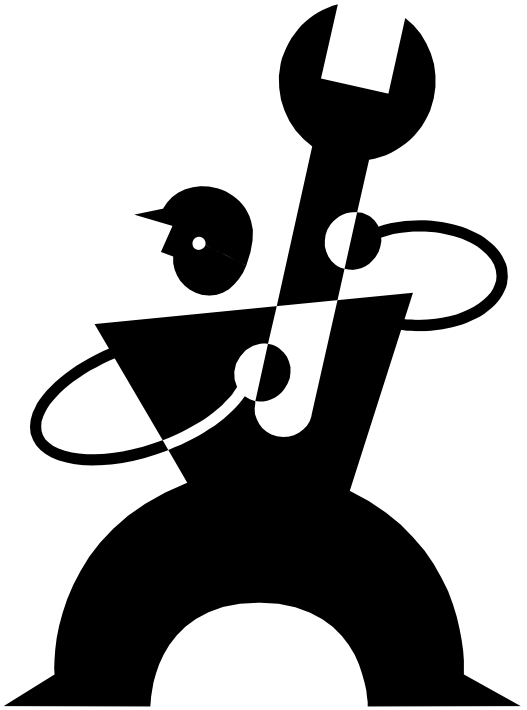
Reduce Energy Consumption

- Eliminate Day Burning Lamps and/or Implement Part-Night
- Scheduling
- Dimming – adjust lighting levels through the night
- Trimming – schedule lighting run time to optimize lamp burn time

Why ROAM?

Reduce Operation & Maintenance Costs

- Improve Service Efficiency
  - Eliminate Unnecessary Visits to Fixture Locations
  - Reduce “Windshield Time” with GPS Located Lights
  - Eliminate “drive-by” patrolling
- Improve Service Performance & Management
  - Improve Supplier Performance
  - Examine lamp and fixture manufacturer performance
  - Collect on manufacturer warranties
  - Field work manager



Why ROAM?

Increase Customer Satisfaction

- Improve Public Safety
- Improve Repair Efficiency and Billing Accuracy
- Demonstrate Ability to Audit Location of Lights on Request
- Quickly view lighting system with audit capability of each location

Capitalize on Proven Technology

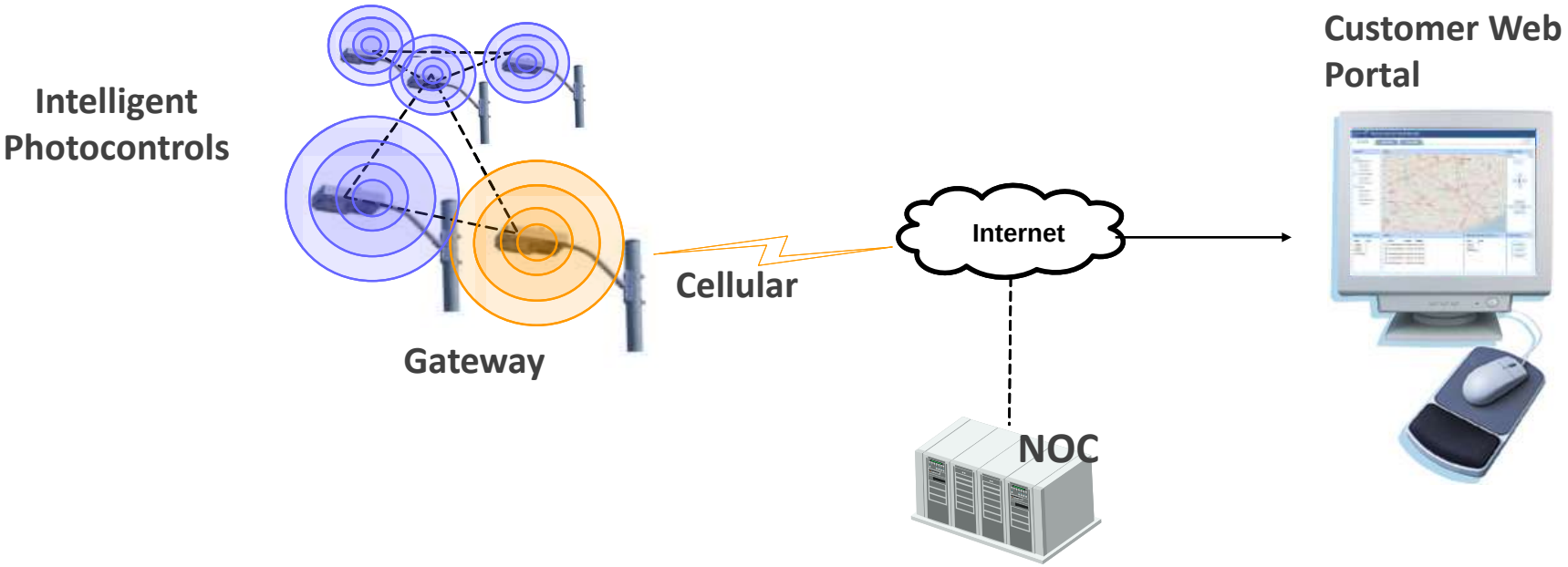
- Dark To Light Experience in Diagnostic Photo Controls
- Wireless Communication Well Established, Accepted & Secure
- Similar Technology Used For Meter Reading (AMR)

ROAM Technology

- Intelligent photocontrol is backward compatible with streetlights featuring a locking receptacle
- Photocontrol diagnoses fixture malfunction and communicates information wirelessly
- Strongest encryption utilized to ensure security

ROAM Technology

- Operational status of light fixtures travels between intelligent photo controls to a central point (gateway)
- The gateway collects data and transmits it to a Network Operations Center (NOC) via cellular or ethernet
- Customers access the data from a secure web portal



ROAM Technology

- From the web portal, customers can:
  - Access exception driven reports
  - Access specific fixture data on request (“tickle”)
  - Initiate command control
    - On/off operation (individual or group of lights)
    - Set schedule for on/off/dimming operation
    - Group fixture control
- Customer web portal includes:
  - Map based interface
  - Information on how fixtures are performing
  - GPS location of lights (captured at activation)
  - Customer specific fixture attributes (captured at activation)
- Highest priority placed on security of data

The ROAM System

ROAM is a Total Streetlight Solution equipped to network a variety of streetlights throughout a vast municipal area into one efficient monitoring system, maximizing efficiency and system flexibility. From interstates, downtown areas and stadium venues to parks, residential and industrial areas, ROAM has you covered in a manner that significantly benefits both municipalities and utilities.

Network Operations Center (NOC)

- Manages communications
- Safeguards and communicates data
- Conducts high-level diagnostics

Photo Control-Communications Node

- Compatible with any NEMA twist-lock receptacle
- Self-registering, self-hearing mesh network
- Patented diagnostics

Communications Gateway

- Manages up to 5,000 nodes
- Flexible, wireless communication to the NOC

Automated Maintenance Scheduling

- Outage information and work orders posted to ROAM handhelds
- Accessible anywhere via Internet

Secure Web Portal

- Password-protected access to system information
- Full work order management suite

ROAM Components

Fixture Hardware

Photocontrol Overview

- 70 to 1000 watts
- 320J MOV - 6500 amp surge protection
- Complies with ANSI C136.10-2006
- Voltage 120-480 VAC (120-277/347-480)
- Average power consumption is 1.6 watts
- Maximum power consumption is 2.2 watts
- -40 to +85°C operational temperature
- Optical indicator to assist line crew of malfunction
- Robust photocontrol construction, DTL standard

ROAM Components

Node

Wireless communication

- 2.4 GHz - 802.15.4
- FCC Part 15 approved
- 1000+ ft clear line of sight

Software

- Self registering installation
- GPS location enabled
- Diagnostic algorithms
- Data reporting
- Operations scheduling
- Permits wireless firmware upgrades

ROAM Components

Gateway

Wireless communication

- 2.4 GHz (new) – 802.15.4 compatible
- Cellular network uplink – GSM, GPRS, CDMA, modem
- Ethernet link for optional WAN connection via the internet
- FCC Part 15 approved
- 1000 foot clear line of sight
- Supports 2000 nodes per gateway, scalable through additional gateways

General

- 320J MOV - 6,500 amp surge protection
- Voltage 120-265 VAC
- -40 to +85°C ambient
- Mast arm mounting (2 inch)
- Powered through standard locking type receptacle on fixture
- Average power consumption: 5.5 watts (max 12 W)
- EPA: 1.62
- Weight: 10 pounds

ROAM Components

Handheld

Field Automation:

- Flexible – Can capture asset bar code and survey information as well as any digital information
- Simple – Enables a general field worker to point and click to capture accurate and timely information
- Accurate communications management between field & network

Features:

- Wireless Communication (WIFI/Bluetooth/Cellular)
- Multiple peripherals
  - Snap on Pistol and GPS Modules
  - Bar Code Reader or Imager
- Customizable Applications
  - Work Order Management
  - Virtual Inventory Management

ROAM Components

Customer Portal

Features:

- Web Based
- Manage asset GIS & Mapping
- Asset Monitoring and Control
- Integrated Work Order Tracking and Management
- Secure and Permissionable Functionality
- Daily operational dashboard
- Various reporting functions… daily status
- Historical performance
- Light grouping and scheduling
- Work order management

ROAM Components

Customer Portal

View Asset Management

- System-wide visibility
- Exception driven reports
- Fixture data on demand
- Command & Control:
  - On/off operation (individual or group of lights)
  - Schedule for on/off operation

Asset Data:

- Custom Map based interface
- Precise location of lights displayed in map-view
- Detailed Information on fixture performance
- Customer specified fixture attributes accessible

ROAM Components

Customer Portal

Color-coded icons easily distinguish problem fixtures from those operating normally

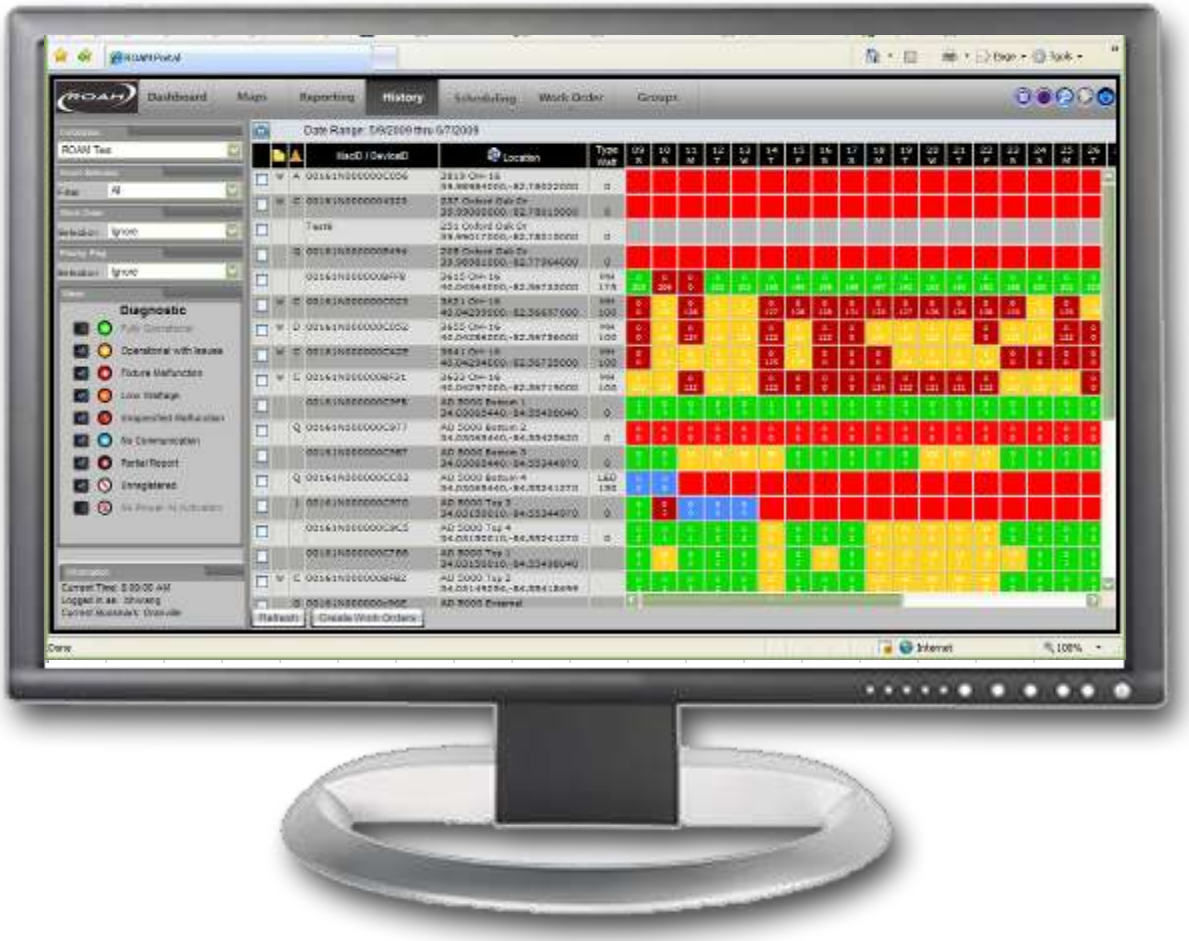
ROAM Components

Customer Portal

Details on each light, captured at activation - available for viewing on-demand

ROAM Components

Customer Portal



Access comprehensive and historical asset performance information for quick and easy problem identification

ROAM Components

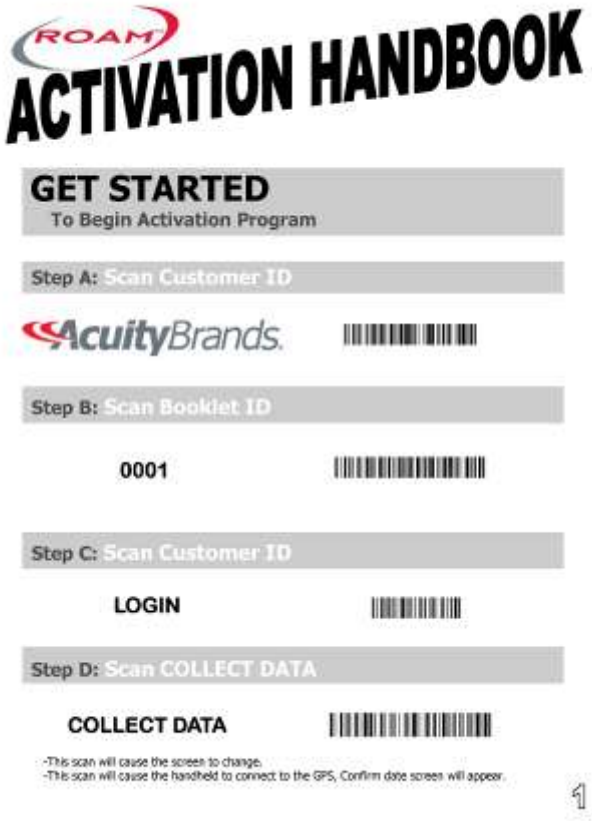
Network

- Designed to provide Wide Area Network services to large numbers of devices in order to deliver mission critical data to better manage power needs/uses
- Offers multiple network capability: Internet to the end point using 6lowpan, ROAM mesh
- Self-routing and self-healing mesh network
- Scalable to 2000 end points operating on a single gateway
- Currently using 802.15.4 technology at 2.4GHz
- Current Baud rate of 250kbit/sec
- Time to network restoration after power outage is less than one minute

Activation

Activation Process

- Automated
- Utilizes Bar Code Technology
- Simple
- Efficient
- Flexible



PROVIDES A FULL SYSTEM WIDE AUDIT OF STREET AND AREA LIGHTING ASSETS

System Capabilities and Operation

Inventory & Monitoring

FULLY CUSTOMIZABLE…ROAM WILL CAPTURE THOSE ASSET ATTRIBUTES THAT ARE MEANINGFUL TO YOU

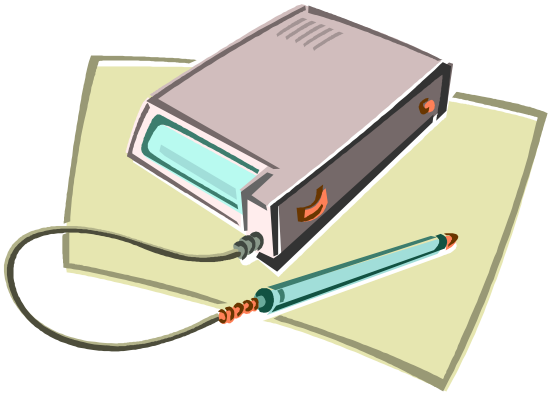
Services

- Deployment planning
- Installation support
- Remote diagnostics
- In-field training
- Work order management
- Customer support

Services

Diagnostics

- Fixture status and malfunctions
- Operational status, including issues
  - Cycling, dayburner, low/high voltage, group control, miswired fixture, etc…
  - Communication status
- Power conditions like low wattage
- Reporting status
- Registration status



Diagnostics

Reports:

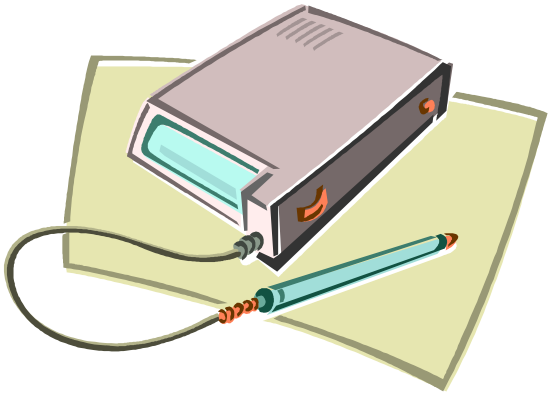
- Average Power (KWH reports)
- Burn Hour report
- Average Line Voltage
- Minimum Line Voltage
- Maximum Line Voltage

Events:

- Mis-wired Fixture
- Three configurations
- Non-HID lamp
- On/Off transition
- Low voltage alert (<103V)
- High voltage alert (>305V)
- Excessive current alert (>14A)
- Late Start Alert
- Relay Stuck Open (Node component failure)
- Welded Relay (Dayburner)

Other Diagnostics:

- Partial Reports
- High V Delta
- Excessive Power Use
- Fixture on a Group Control
- 120 PC on a 240 fixture



Case Study – Camelback Toyota

Project Overview

- Camelback Toyota – Phoenix, AZ
- New state of the art facility
  - 9.6 acres
  - Green design goals
  - Manage operating costs

Installed Lighting Equipment

- (101) metal halide fixtures
  - (77) 750W fixtures
  - (24) 400W fixtures
- ROAM Controls

Case Study – Camelback Toyota

ROAM Performance

- Turns light fixtures on and off as only a portion of the luminaries are needed during the night, after hours
- Provides outdoor luminaire monitoring and control through smart photocontrols
- Diagnoses fixture manlfuntions and communicate information wirelessly

"With the ROAM system, there is no need to continuously check on the lighting fixtures or pay a monitoring fee to confirm they are operational or require maintenance. The system allows us to call ahead for maintenance and make adjustments as needed. If a storm rolls in, for example, we can turn the fixtures on early from a computer."

Michael Spector, Facilities/Inventory Director for Camelback Toyota

Case Study – Camelback Toyota

Reduced Energy Consumption

- Lighting energy reduced by 25-50% after midnight
- Alternates lamp usage, which boosts lamp and ballast life by 25%

Economic gains indicated above will pay for the ROAM System within 3 years

"ROAM enables us to reduce our carbon emissions while attracting customer attention to our vehicles in a secure, well lit environment. I would recommend ROAM to others because the system is efficient and easy to use. It allows us to control lighting fixtures through a secure web portal rather than relying on control panels located in boxes installed throughout the parking lot."

Michael Spector, Facilities/Inventory Director for Camelback Toyota

Tools

- Some information will be available publicly and some will available in a password protected section of the website, http://roamservices.net
- ROAM price estimator for 500 node projects or less
  - Used to provide a budgetary price to your prospective ROAM customers
- CSI (Construction Specification Institute) specifications for components and the ROAM system
  - Detailed specification information for submittals or helping your customers to write their own ROAM specs.
- ROAM value calculator
  - A useful tool to assess the value of the ROAM system for individual customers
  - Allows you to adjust the system price parameters to meet your customers' payback requirements
- ROAM sales process document
  - Shows the step by step process from prospecting thru order placement

Summary

- Reduce energy consumption
- Enhance public safety, reducing liability
- Extend installed fixture life, protect LED sources
- Supports green/sustainable design initiatives
- Manage lighting operations and work orders at the fixture level

Thank You..