Energy data in Digital Buildings
2017 Connected Lighting Systems Workshop | Department of Energy

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1. Evolution of PoE, current industry
2. Convergence and benefits in a PoE-driven digital building
3. Underlying network architecture supporting energy data in buildings
Evolution of PoE as a medium of convergence

- Increased PoE Budget: up to 60W/port – higher than current standard of type 2 devices
- 802.3bt standard ratified potentially for next year offers up to 90-100W for Type 4 devices
- PoE evolving as the standard for evolving ecosystem of IoT in buildings – comm + power
Benefits of PoE lighting and building systems

- **Analytics for Better Efficiency and Security**
  - Energy and space utilization
  - Digital signage

- **Ease of Deployment, Monitoring and Scale**
  - Telemetry info to IoT devices
  - Flow / stream management

- **Modern Experiences Through IP Convergence**
  - IP network security extended to the IoT layer
  - Smart, integrated, and flexible workspaces
Network architecture supporting energy data

### Building Management & Applications
(Light, temperature control, video surveillance)

### Network Gateway
(Switching, Routing, Security)

### Building Endpoints
(Sensors, IoT Devices, Luminaires, VAV, Badging, HVAC)

#### Accessing energy data for reporting
1. SNMP
2. APIs (IETF APIs using Yang models)
3. Telemetry

#### Device energy monitoring for identification and power negotiation
1. LLDP using TLV pairs
2. Cisco Discovery Protocol (CDP)
2-event classification driving innovation in PoE

2-event classification allows for more nimble support in lighting and building applications.
CAM for IoT Intelligence
Unified Dashboard for all Your IoT Data

- Measure, manage, and track connected assets across multiple environments.
- Native support for deep analytics and machine learning algorithms
- Private, Public and Hybrid cloud deployment options
- Self-service visualization model for business user
Appendix
CAM for IoT Intelligence
Enabling New Business Models

<table>
<thead>
<tr>
<th>For Thing Owner</th>
<th>For Thing Maker</th>
<th>For Customer</th>
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<tbody>
<tr>
<td>• Real time data based insights</td>
<td>• A single view into the state, condition, availability, and security of your connected assets</td>
<td>• Personalized buying and service experience</td>
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<td>• Value creation and value capture</td>
<td>• Mass Customization and direct selling</td>
<td>• New consumption models</td>
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<td>• Two-sided Market</td>
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<td>• Improved productivity</td>
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- Historian, Reporting, Dashboards, and KPIs
- Real Time Location on Indoor & Outdoor Maps
- Historical Data Logging and Anomaly Detection
- Asset Identification, Utilization, and Optimization
- Thresholds, Notifications, and Control
Cisco Digital Ceiling

WaterPark Place III
Create an Innovative and Efficient Workspace

Challenge
• Build an innovative, energy-efficient workspace

Digital Transformation
• PoE-powered lighting with Catalyst switches
• Sensor-based access to workspaces
• Analytics with fixture-level visibility

Business Outcomes
• Converge five networks—HVAC, metering, lighting, CCTV, access—into one
• Lower CapEx (~10%) and OpEx (~$600k)
• Reduce energy costs by 50% by replacing fluorescent lights with LEDs and using PoE
• Anticipate earning Toronto’s first Enterprise Leadership in Energy and Environmental Design (LEED) Platinum Certification