Light Loss Factor

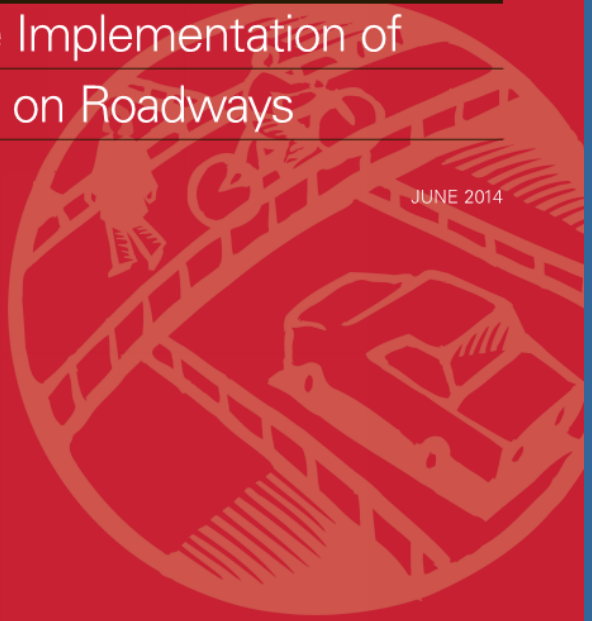
Efficiency versus longer life

- L70 results in longer useable luminaire life however less efficiency (over lighting)
- AL results in shorter useable life with greater efficiency
- Ideal – L70 with adaptive system where lighting can be dimmed with output increased over time to compensate for lumen depreciation.

Guidelines for the Implementation of Reduced Lighting on Roadways

PUBLICATION NO. FHWA-HRT-14-050

JUNE 2014



U.S. Department of Transportation
Federal Highway Administration

Research, Development, and Technology
Turner-Fairbank Highway Research Center
6300 Georgetown Pike
McLean, VA 22101-2296

Liability

TORT LIABILITY OF AGENCY OR ENGINEER

An agency implementing an adaptive lighting system, or the engineer designing such a system, may face tort liability for personal injury resulting from such a system on the theory of negligent design.

Negligence is "conduct which falls below the standard established by law for the protection of others against unreasonable risk of harm" (Restatement [Second] of Torts, § 282).[16] Engineers and other design professionals must act according to the standard of care set by their particular profession:

Liability

SOVEREIGN IMMUNITY

Sovereign immunity is a legal doctrine by which the government cannot commit a legal wrong and is immune from civil suit without its consent. The government has waived its immunity in most States, although discretionary policy decisions of employees of Federal and State agencies are still protected from suit. This protection does not extend to consulting engineers or other design professionals working on behalf of the agency.

Liability

Based on the foregoing, the decision of an agency to follow an adaptive lighting regime would likely be protected by Federal or State sovereign immunity. However, the agency would remain open to suit if the implementation or installation of an adaptive lighting system was negligent in some way. Moreover, neither the Federal exemption nor the State exemptions extend the immunity protection to engineers and design professionals who are not direct government employees but are only agents of the government. Accordingly, the engineers or design professionals creating an adaptive lighting system would not be protected from suit by sovereign immunity and would have to rely on a typical negligence defense concerning the standard of care.

City to define standards to cover all

Needs and Stakeholders

- Stakeholder engagement
- Needs analysis
- Ask the “WHY QUESTION”
- List of issues / concerns / risks / benefits
- Develop a plan – Define needs
- Budget – capital and operational
- Define standards and design criteria

Recent RFQ

Research technologies that can be incorporated in the City's streetlight network, such as small cell sites mounted on poles, street light dimming and monitoring, electric vehicle charging stations, security cameras, solar powered options, availability of fixtures or systems that allow the City to control the light color output from a single fixture and interconnectivity with the 911 system so that specific lights may be increased in brightness during an incident. Also, determine whether sensors can be employed as part of the streetlight network that will allow sensing of such things as available parking, air quality, weather conditions, location of gunshots, gathering crowds and traffic issues. Research other possible connections to the "Internet of Things" (IoT) and incorporation of other Smart City technologies as part of the streetlight network.

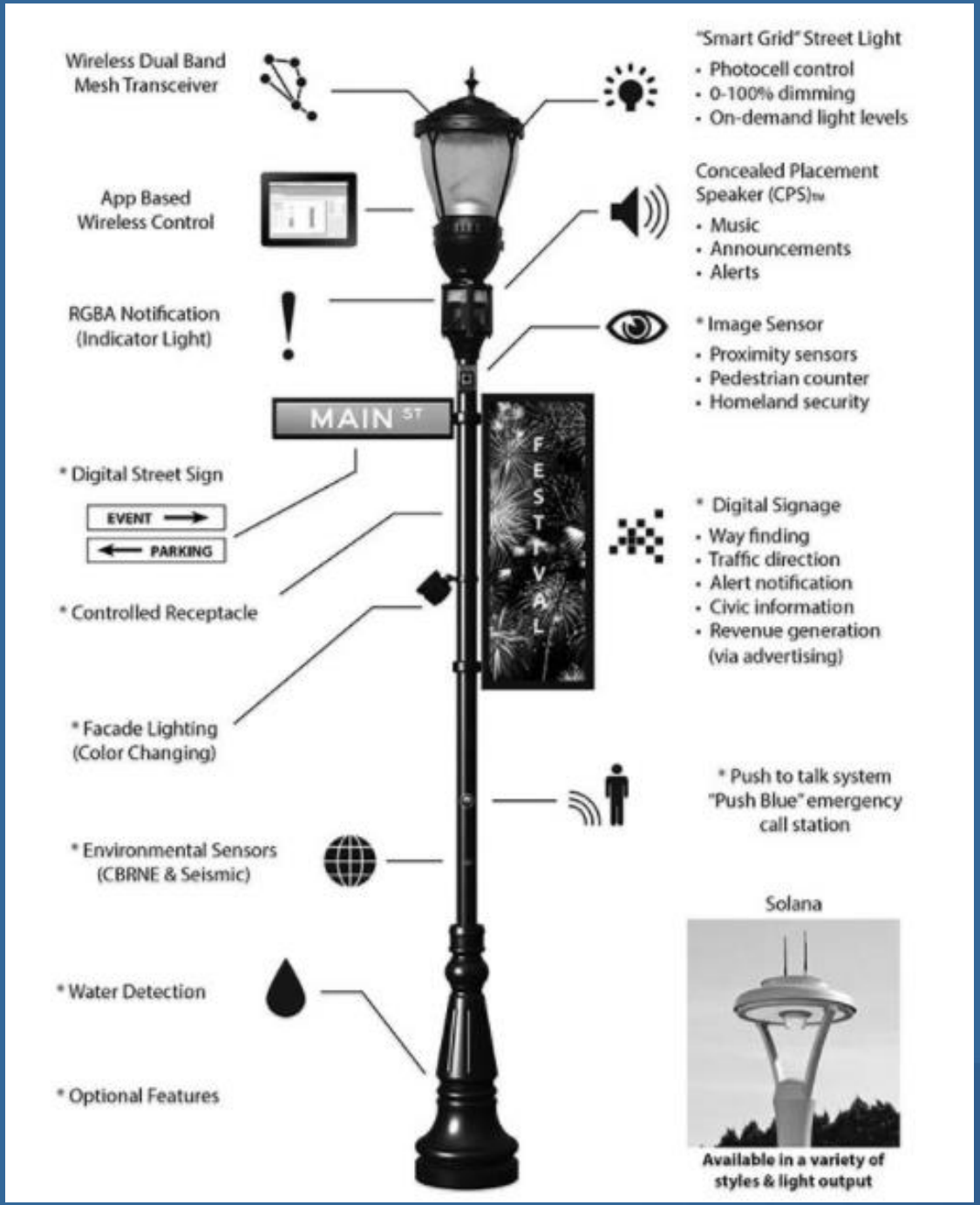
Procurement

- Lack of specifications and standards
- Consider performance specification
- May need third parties to help develop
- Price should not be the governing factor
- Consider life cycle costs
- Require references
- Test drive the system
- Do your homework up front

Key Product Considerations and Testing

- Performance
- Quality
- Durability
- Functionality
- Warranty
- Power Factor
- Technical Support


EnGo
Planet
Street Light
EnGo
Planet
Street Light
Mini
EnGo
Planet



Deployment – Determine Technology

Considerations:

1. Reliability
2. Is technology proven or are you a ginny pig?
3. Communication protocol and methods?
4. Will the system calculate energy usage?
5. Wireless (Mesh or Star network), line carrier or hardwire?
6. What are the installation costs?
7. What sort of monthly or annual costs are involved to manage the system?
8. Control and data storage? (by supplier?)
9. Security issues and integration into city network?
10. Will the system aid in managing the asset (maintenance) or be a paper weight?
11. Customer support.

Protocols

Open standard protocols

- IEEE 802.15.4 is widely used for low data rate Wireless Personnel Area Networks (WPAN) and is the basis for ZigBee which is a popular protocol.
- IEEE 802.11 for Wireless Local Area Network (WLAN) system communications in the 2.4 to 5 GHz frequency bands. This is also known as Wi-Fi.
- Cellular (3G/4G/5G) is also a common protocol.

NTCIP 1213 Standard - The National Transportation Communications for ITS Protocol (NTCIP) family of standards defines protocols and profiles that are open, consensus' based data communications standards.

The TALQ Consortium aims to define a globally accepted standard for management software interfaces to control and monitor heterogeneous smart city applications. The TALQ Specification defines the application protocol between a Central Management System (CMS) and Outdoor Lighting Networks (OLNs) to enable configuration management, lighting control and monitoring of outdoor lighting systems.

Proprietary – Protocols may lock you in

Metering

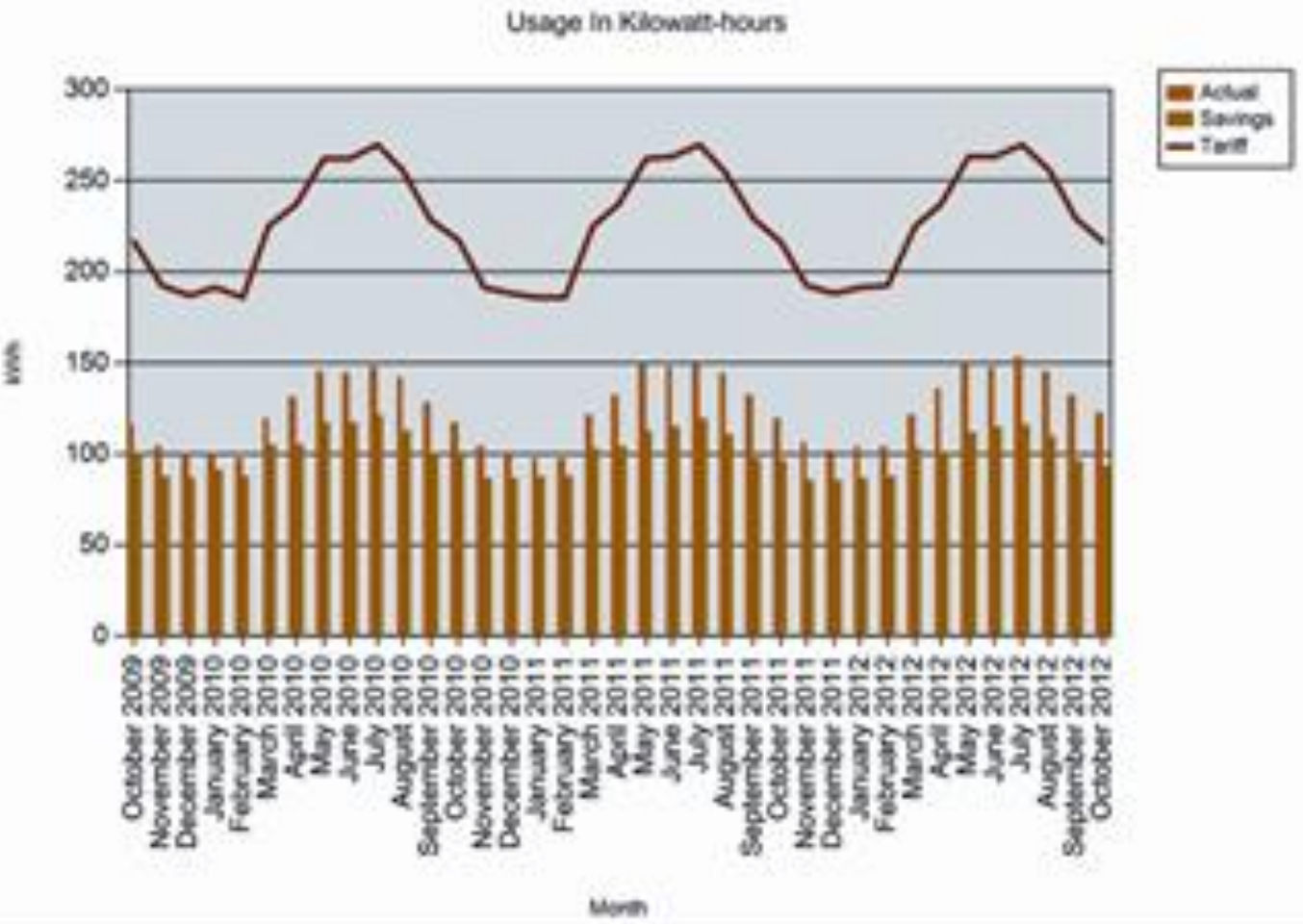
- Most street lights are un-metered
- Metering on lighting control system is not allowed as a utility grade meter
- Measurements Canada and CSA are developing a system for flat rate tariffs – Work in progress
- Billing and depute resolution method being developed. Check meters may be used.

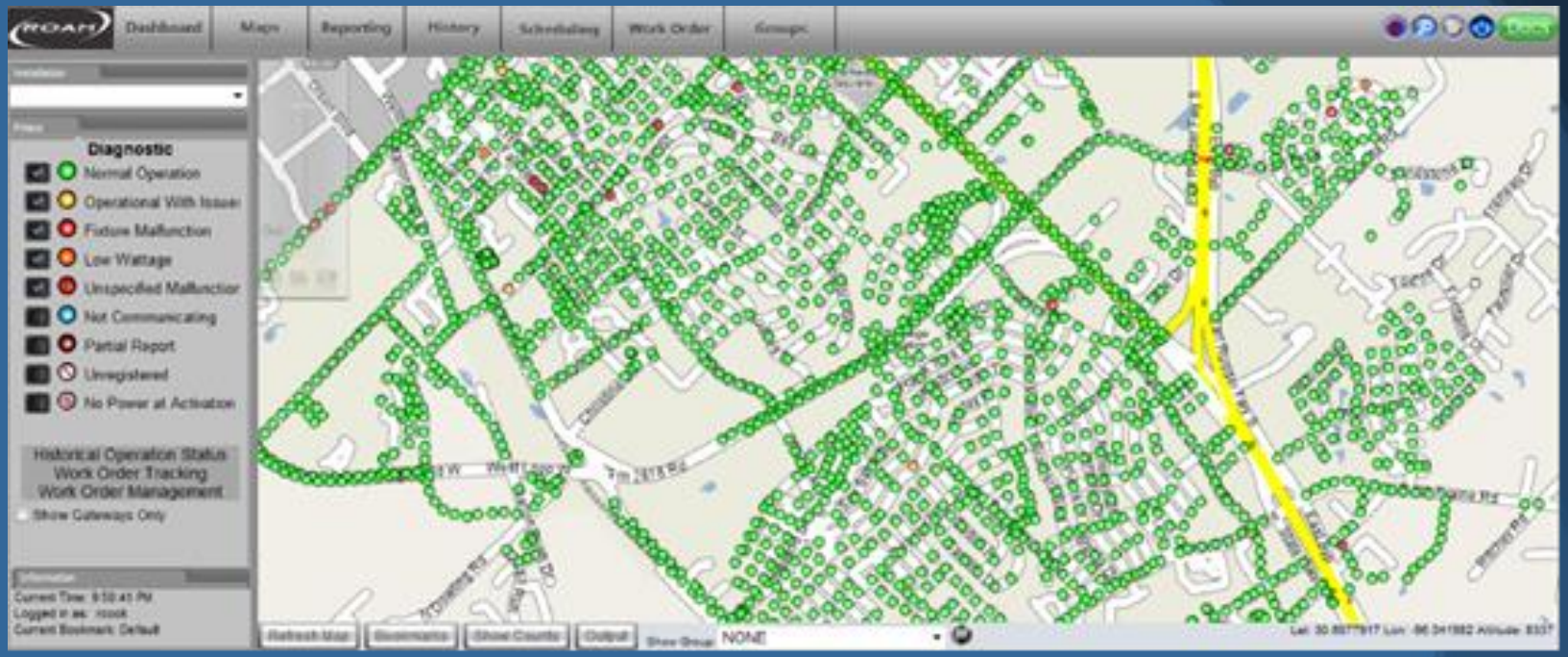
Monthly Report Criteria

From:	October 2009
To:	October 2012
Wattage:	ALL
Region:	ALL

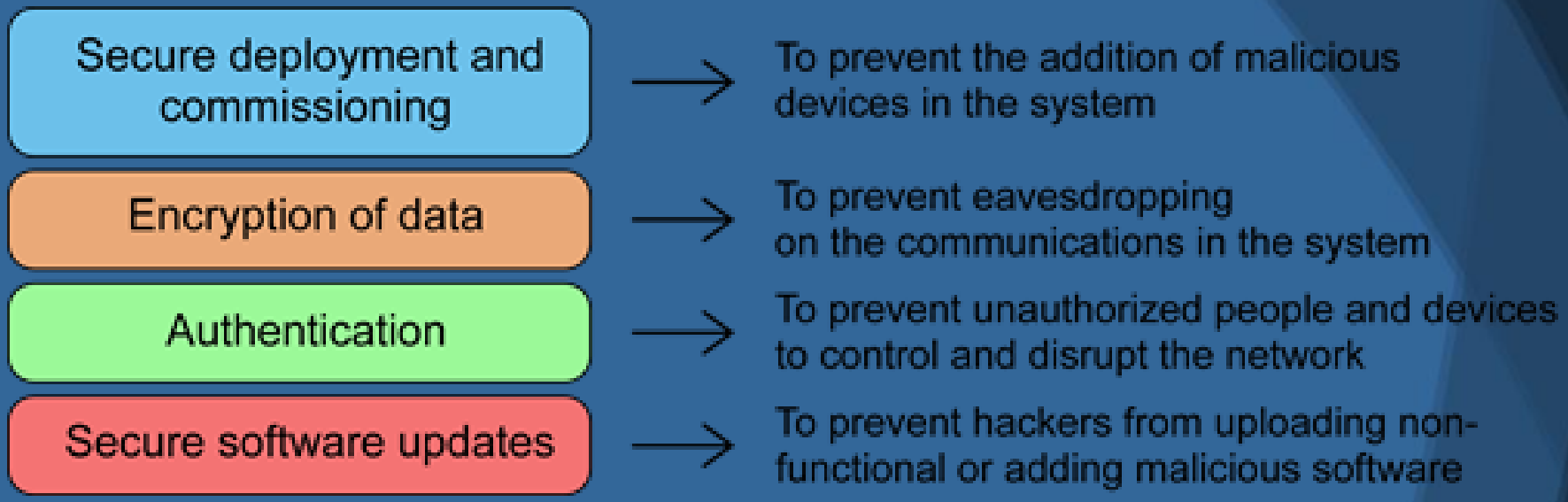
Energy Usage Details

Total Usage:	4627.96 kWh
Total Saved:	3743.12 kWh
Savings:	45%



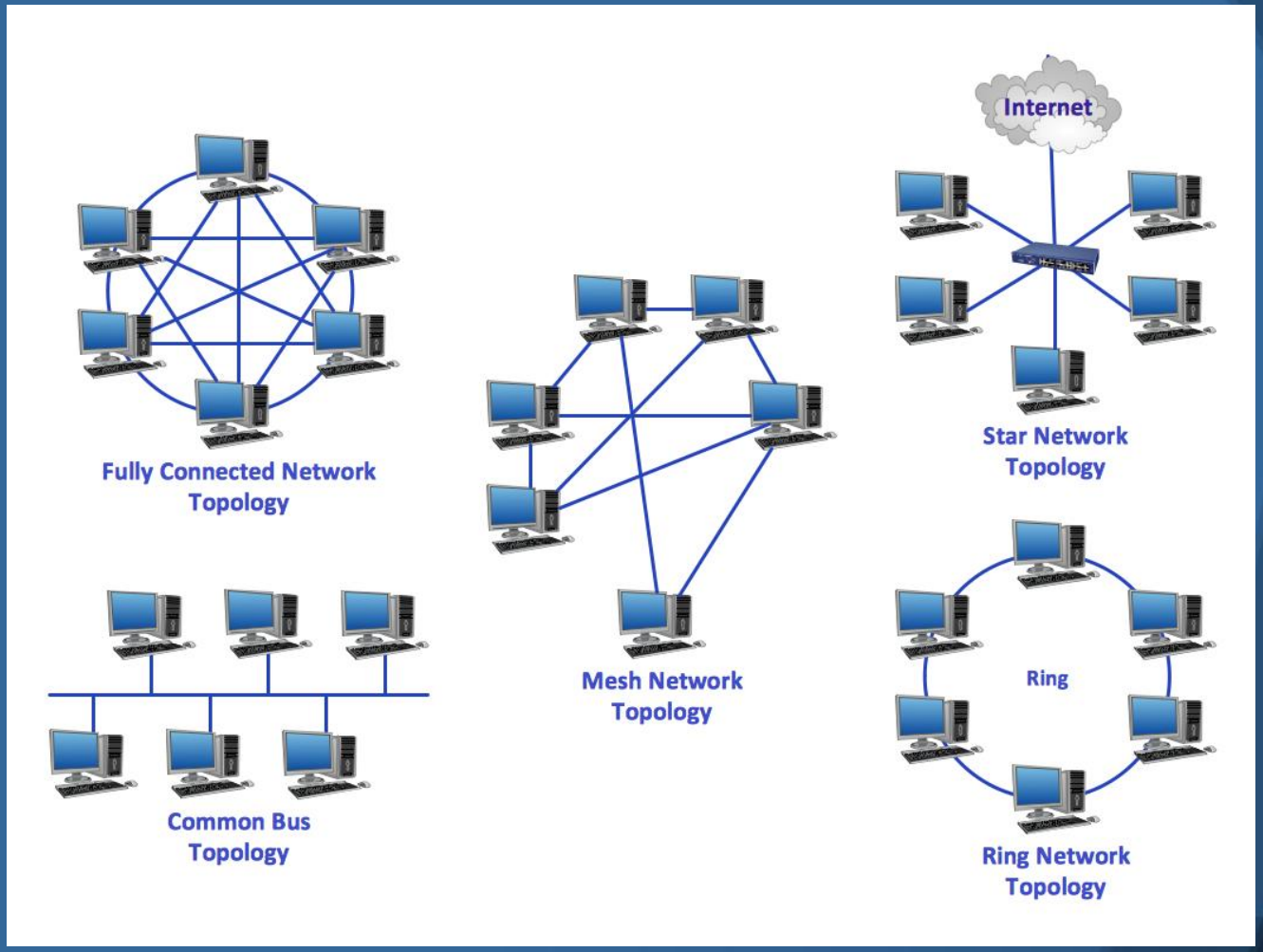

Dashboard
Maps
Reporting
History
Work Order
Diagnostic
Normal Operation
Operational With Issue
Fixture Malfunction
Low Wattage
Unspecified Malfunction
Not Communicating
Partial Report
Unregistered
No Power at Activation
Historical Operation Status
Work Order Tracking
Work Order Management
Show Gateways Only
NONE

Adaptive Lighting System Overview



Hot Topic - Cyber security

Topologies



Considerations

- Buildings and structures can impact topology. Propagation study required??
- Technical support
- Operational costs
- Managing data
- Interface with your internal IT Group
- Do you have the resources and expertise?

Surge Protection (TVSS)

Two main functions of the surge protector are:

- Provides low impedance path for conducting a lot of current to eliminate the extra voltage.
- Absorbs and diverts the extra current to ground for protecting the effects of transient or surge.

Defined by ANSI/IEEE C62.41-1991

Recommendations

- Review dimming – DMD Test Road
- Engage City IT Group and all Stakeholders
- Define needs (why)
- Meet with local electrical utility (energy savings)
- Develop standards (liability)

Copy of this presentation can be downloaded from DMD web site:

- www.dmdeng.com
- go to “Learning Center”

Questions and Answers