Streetlighting Guidelines and Design Decisions

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Guideline Outline

- Goals
- Community Expectations
- Environmental Impacts
- Safety
- Identify Types of Streets
- Select CIE 115– Luminance, Adaptive Standards

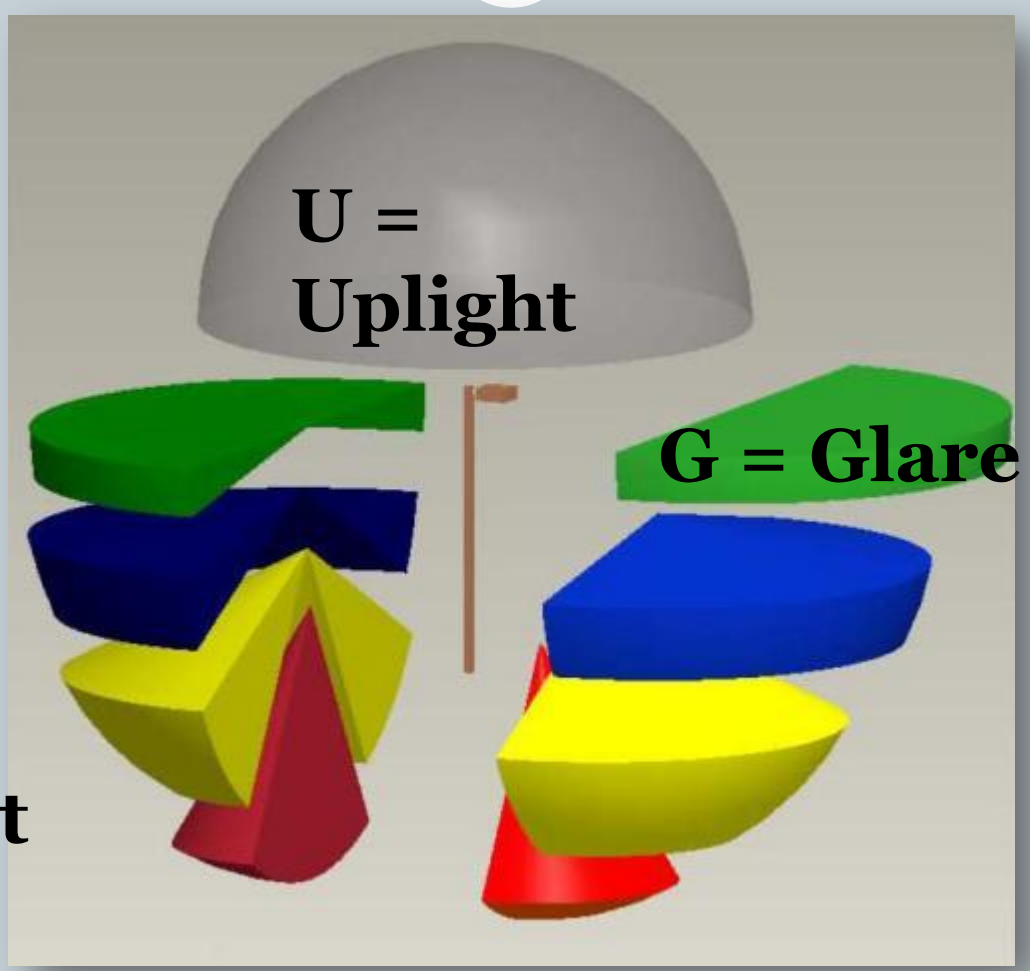
Goals (Prioritize)

1. Save Money
2. Improve Safety
3. Minimize Maintenance
4. Reduce Energy
5. Reduce Environmental Impact
    1. Light Pollution
    2. Light Trespass

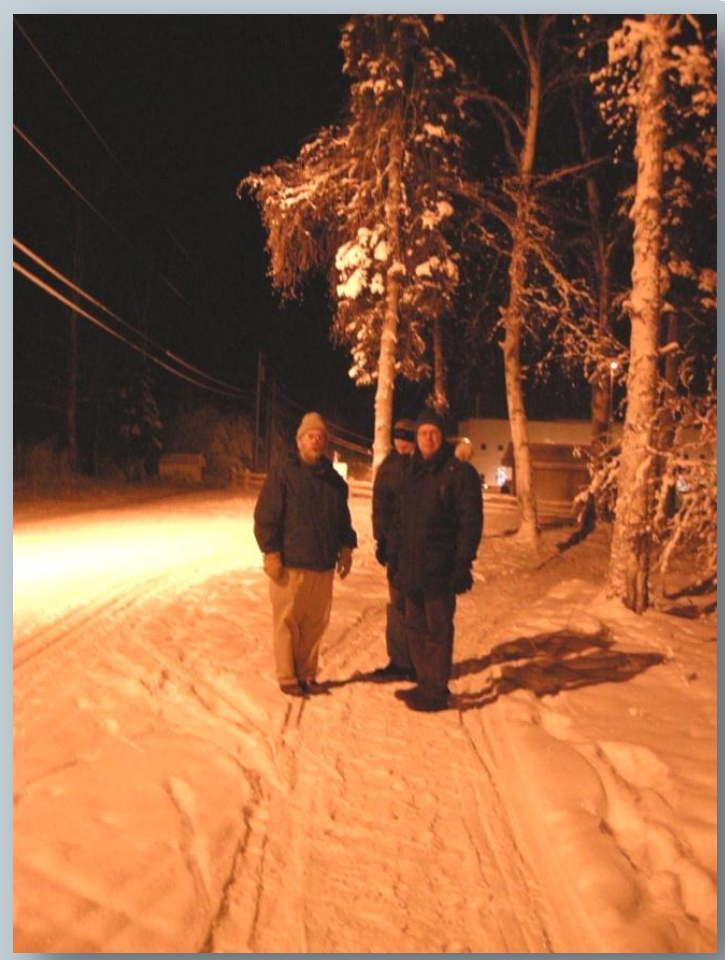
Community Expectations

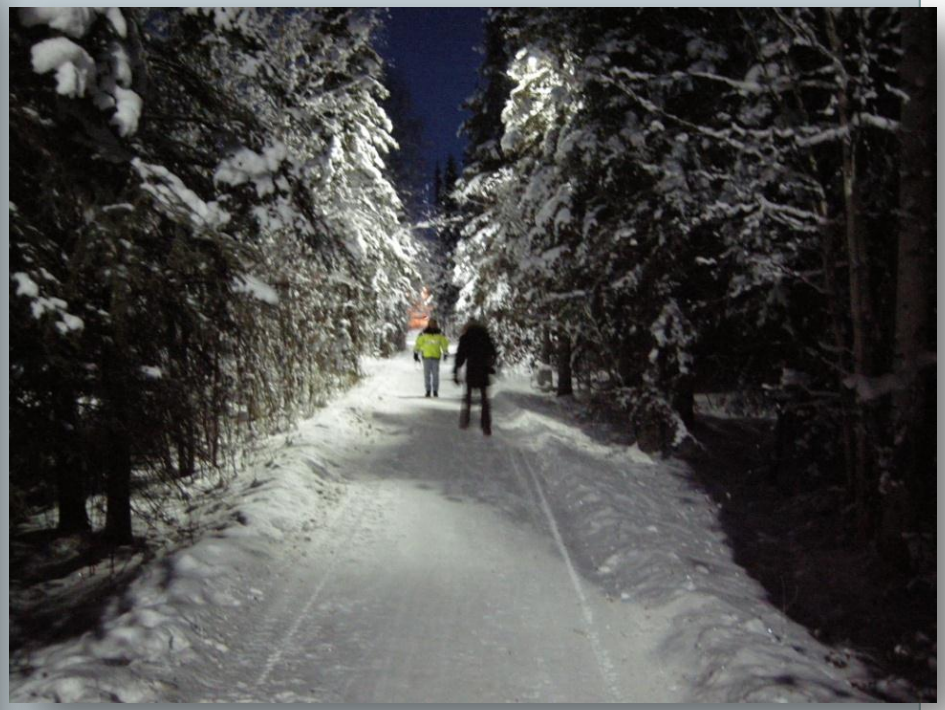
- All streets are lighted
- Some streets are lighted
- Streetlighting is reliable
- Others

IES TM-15 – Outdoor Luminaire Classification System (BUG)



Safety: Color Contrast - Detection of People

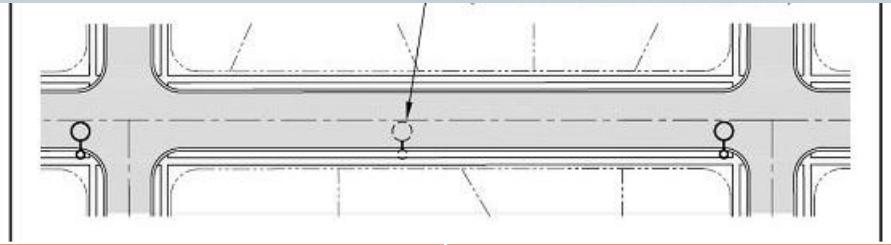




Existing Streetlight Inventory

Street Name or Description	Quantity	Lamp Type	Wattage	Luminaire Type	Typical Pole Spacing
Residential	6,000	HPV	175	Cobra style – dropped lens	75 meters
Minor Collector	2,000	HPS	150	Flat lens shoebox	45 meters
Major Collector	1,000	HPS	250	Cobra style – dropped lens	45 meters
Downtown	500	HPS	250	Cantilever	40 meters

Prescriptive Method



Residential Areas	Description
Luminaire Destribution	Type II, BO-UO-GO
Light Source Type	LED
Maximum Wattage	70
Color Temperature	3500 – 4000K
CRI	70+
Driver	Dimmable
Mounting Height	9 meters
Pole Spacing	Intersection + mid block (optional)

Performance Method
Determine Lighting Class (M, P, C) CIE 115

Table 9.1: Parameters for the selection of M lighting class				
Parameter	Options	Weighting Factor WF	WF Selected Evening	WF Selected Early Morning
Speed	Very low (walking speed)	0	0	0
	Very high	1		
Traffic volume	High	0.5	0.5	-1
	Moderate	0		
	Low	-0.5		
	Very low	-1		
Traffic composition	Pedestrians, cyclists and motorized traffic	1	1	1
	Pedestrians and motorized traffic	0.5		
	Pedestrians and cyclist only	0.5		
	Pedestrians only	0		
	Cyclists only	0		
Parked vehicles	Present	0.5	0	0
	Not present	0		
Ambient luminance	Very high	1	0	0
	High	0.5		
	Moderate	0		
	Low	-0.5		
	Very low	-1		
Facial recognition	Necessary	Additional requirments		
	Not necessary	No additional requirments		
		Sum of Weighting Factors (SWF)	1.5	0
		M Class = 6 - SWF	4.5	6

M Lighting Class

Table 8.2: M and C lighting classes of comparable lighting level; for CIE road surface reflectance from CIE publication 144:2001, table C2 with q_0=0.07 cd/m²/lx

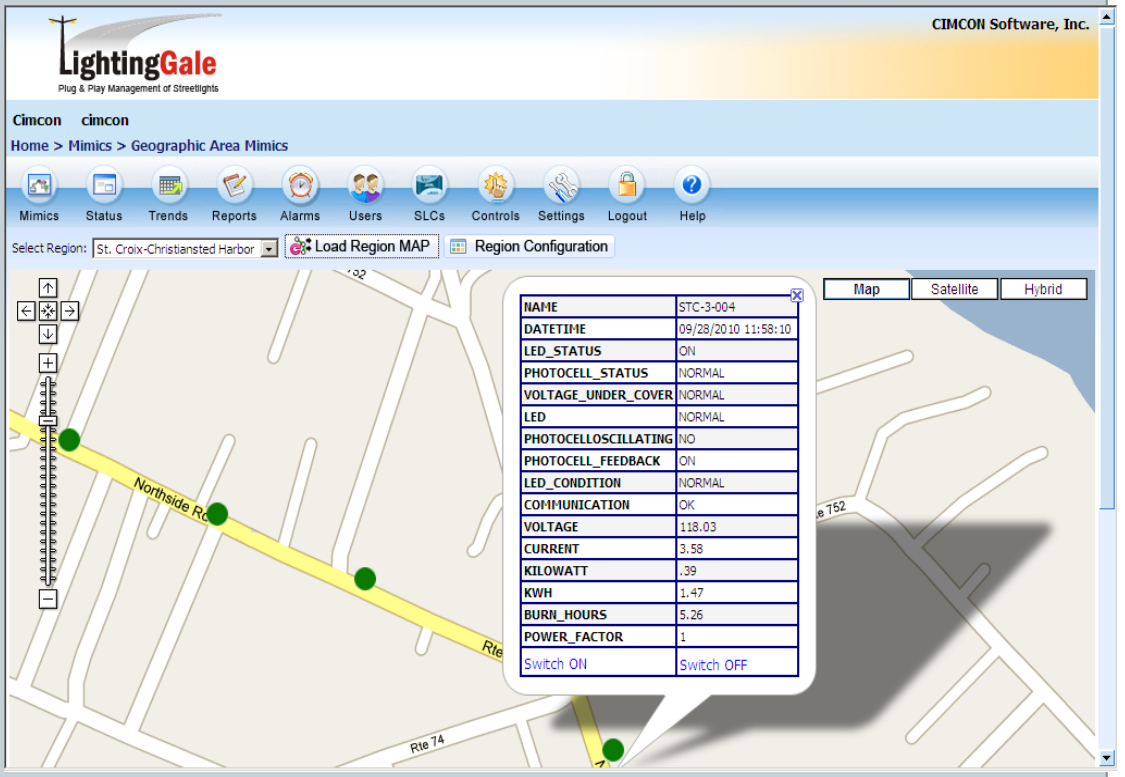
Lighting class M		**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
Average luminance L in cd/m²		*2.0*	*1.5*	*1.0*	*0.75*	*0.50*	*0.30*
Lighting class C	**C0**	**C1**	**C2**	**C3**	**C4**	**C5**	
Average illuminance E in lx	*50*	*30*	*20*	*15*	*10*	*7.5*	

Control System Architectures

- Centralized
  - Panel
  - Individual

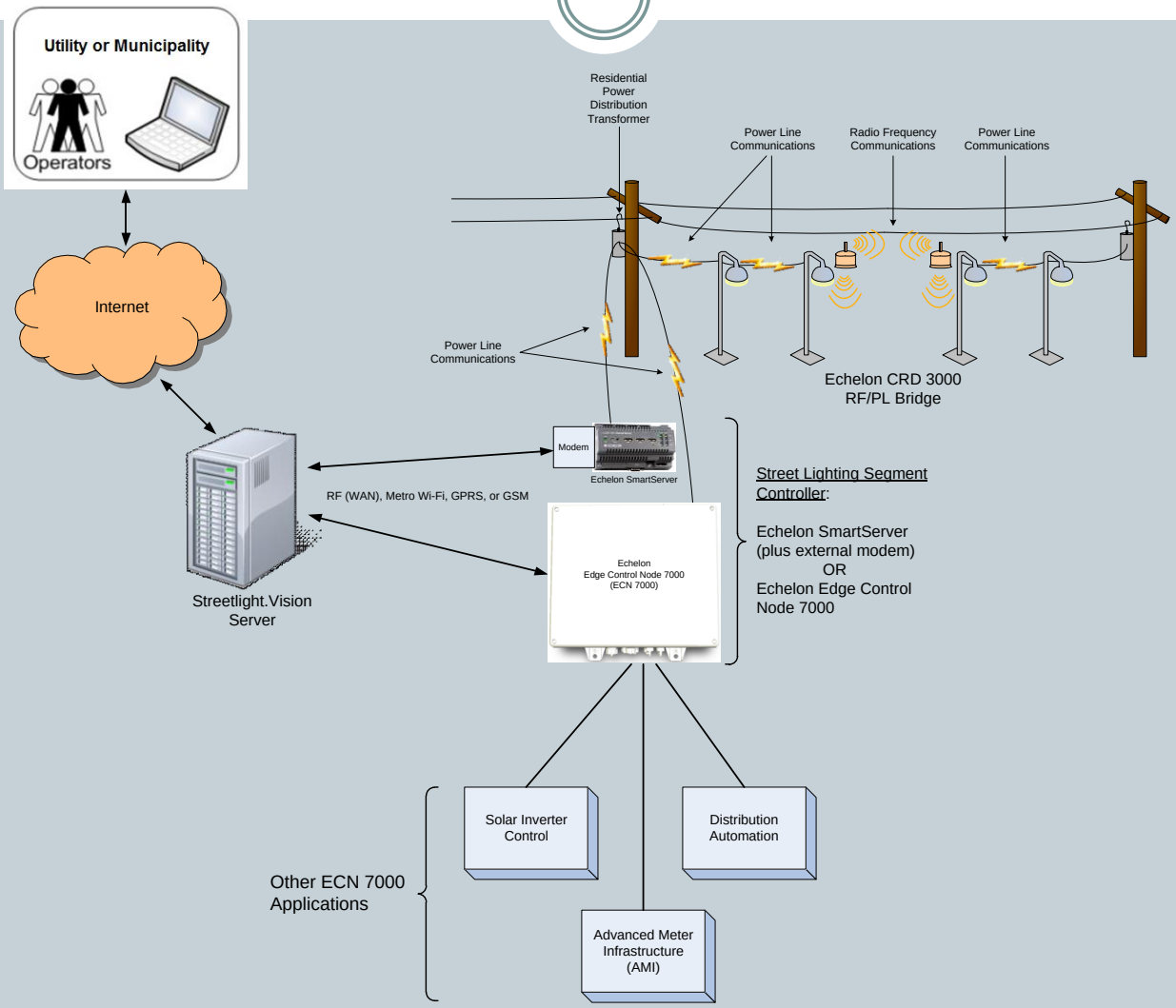
Features

- One-way vs. two-way communication
- Asset management
- Proprietary issues

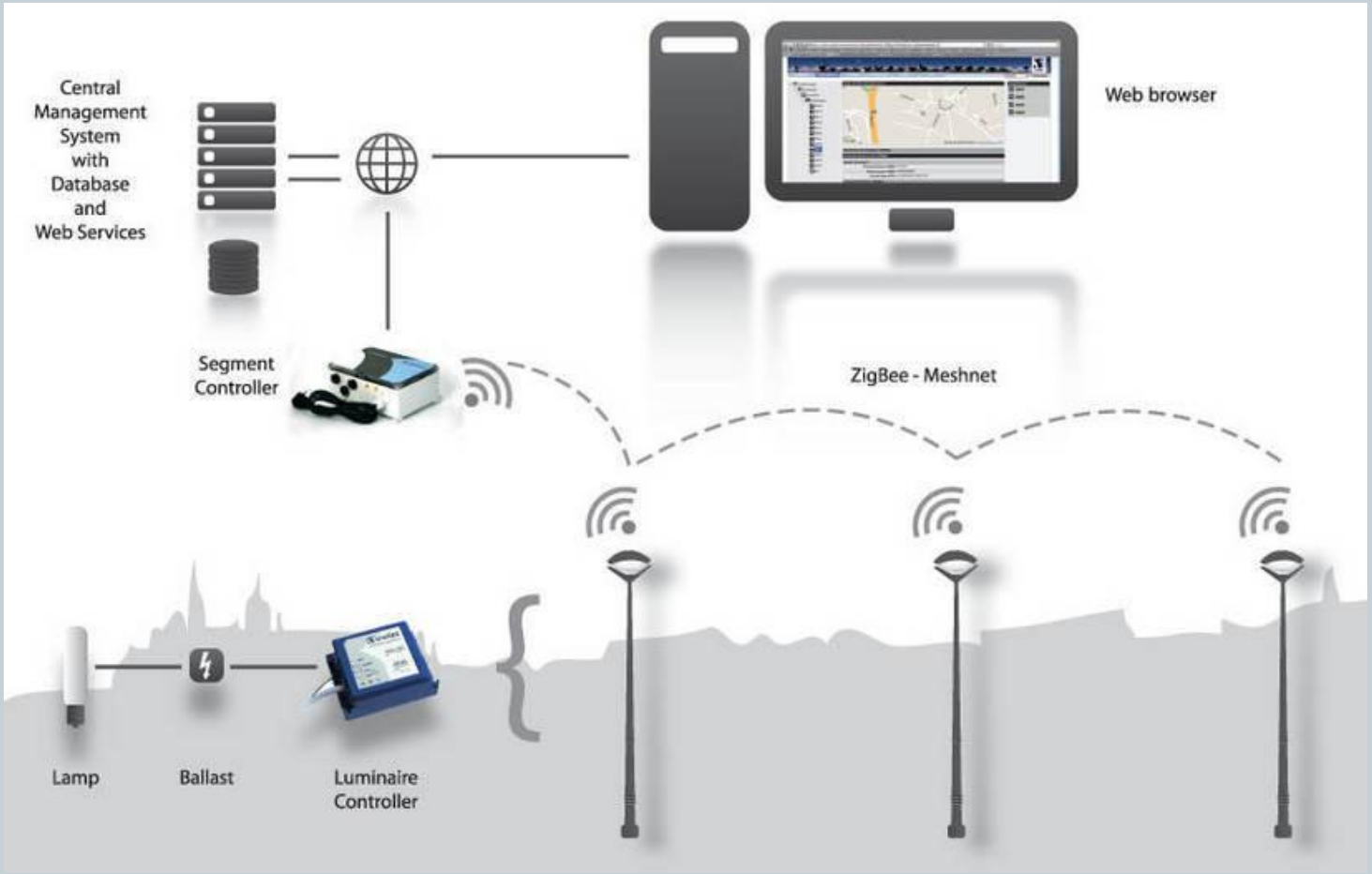


CIMCON System

Power Line Carrier



Radio Frequency



Owlet System

Installation

- Installation Procedure
  - Barcode scanner?
  - GPS?
  - Sequence of equipment installation

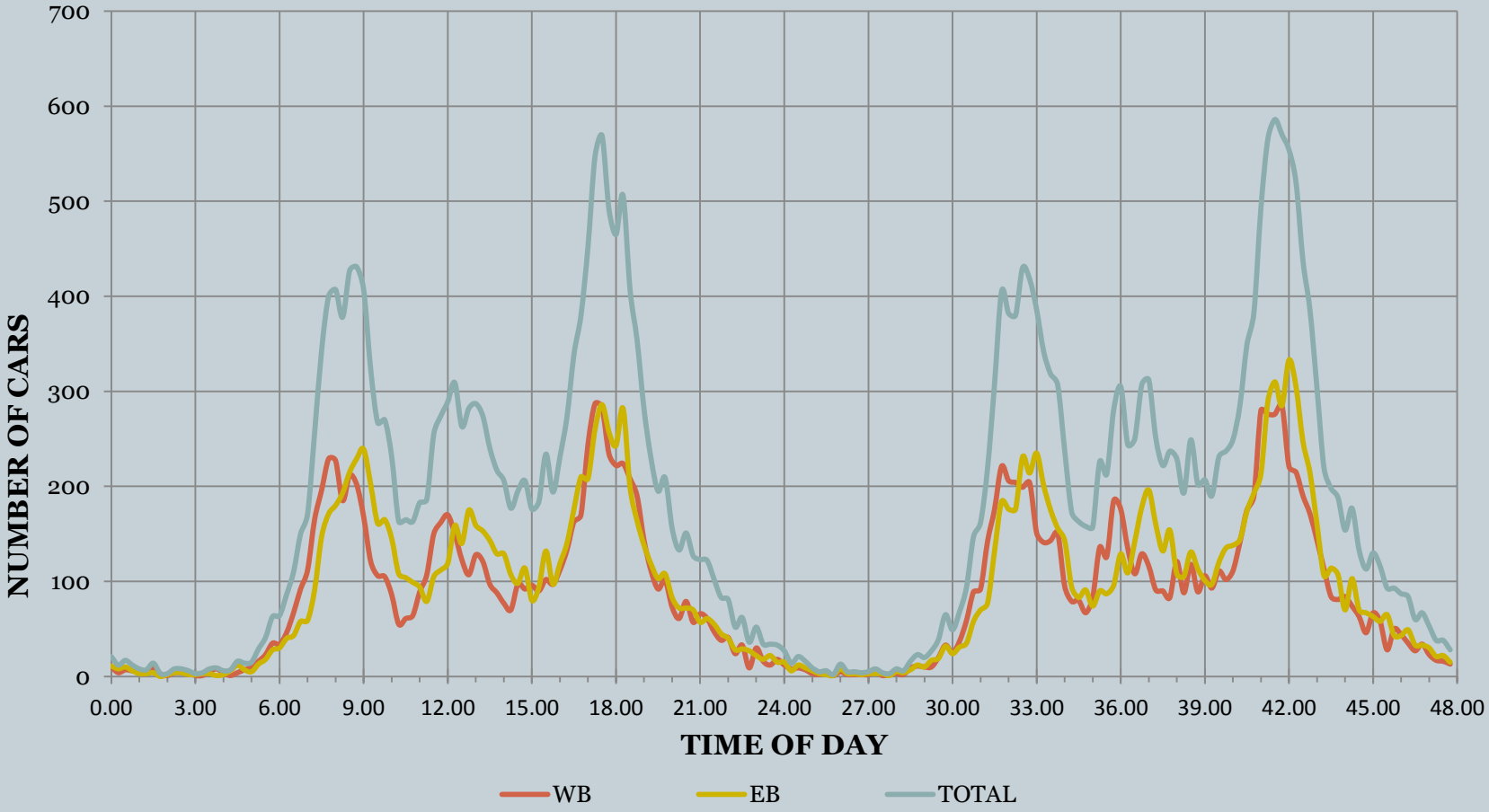
Badge #	[16-Digit ZigBee Label]	Google GPS Coord.	
		Latitude (N)	Longitude (E)
7710	1907JL0 [[G]] ELP000008143 LC-5204-2240-3100-1100 ZigBee:0013A2004060CAAE FW:2.41.10.13	1260319.261	254226.896
7709	1O27JL0 [[G]] ELP000008425 LC-5204-2240-3100-1100 ZigBee:0013A2004065D929 FW:2.41.10.16	1260240.579	254209.189
7708	1O27JL0 [[G]] ELP000008340 LC-5204-2240-3100-1100 ZigBee:0013A2004065D8EC FW:2.41.10.16	1N30JL0 [[G]] ELPD00000107 LC-5205-2240-3100-1100 ZigBee:0013A2004065DB070 FW:2.41.10.16	254103.694
7707	1O27JL0 [[G]] ELP000008517 LC-5204-2240-3100-1100 ZigBee:0013A200406AB777 FW:2.41.10.16	1260238.886	254104.010

Lessons Learned

- Luminaire and controller inte
  - Terminal block connection
  - Antenna placement
  - Modified luminaire housing

Where to Apply Adaptive Standards?

Traffic Volume



Wish List for Exterior Control System

- Equipment performance
  - GPS
  - Self commissioning
  - External to housing
  - Remote metering
- Utility tariff
  - Measured, non-metered, energy only
- National standard
  - Adaptive standards
- Smart grid compatible

Questions?