MEAN WELL

In cooperation with

Koning & Hartman

THE SAFEST CHOICE
TELEREX

Giacomo Mazzullo
Key Account Manager
Mean Well Europe B.V.

Your Reliable Power Partner
Reliable People • Reliable Product • Reliable Company

Programmable LED drivers

"the impact on current and future lighting design"

FHI LED Event - Dec 2015

- *2nd Dec – Belgium*
- *3rd Dec - the Netherlands*

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AGENDA

- Industrial And Commercial LED Lighting Market
- Applications
- Actual Technology
- Dimmable Vs Programmable
- Evolution
  - Digital Protocols
  - Scalability
  - Wireless
  - Functions
- Street Lighting Future
  - Light Pollution
  - Centralized Control
  - Smart Dimming
  - Los Angeles (USA) – Case Study
- Mean Well – Elg Series
  - ELG SERIES – Smart Dimming
  - ELG SERIES - New Technology – New Price
- Conclusions
- Q&A

INDUSTRIAL AND COMMERCIAL LED LIGHTING MARKET

Global industrial and commercial LED lighting market had a value of **13 Bln USD in 2012** and is expected to reach **86 Bln USD by 2019** with an estimated **CAGR of 30.8% (6Y 2013 – 2019).**

CAGR (Compound Annual Growth Rate)

.. is the mean annual growth rate of an investment over a specified period of time longer than one year.

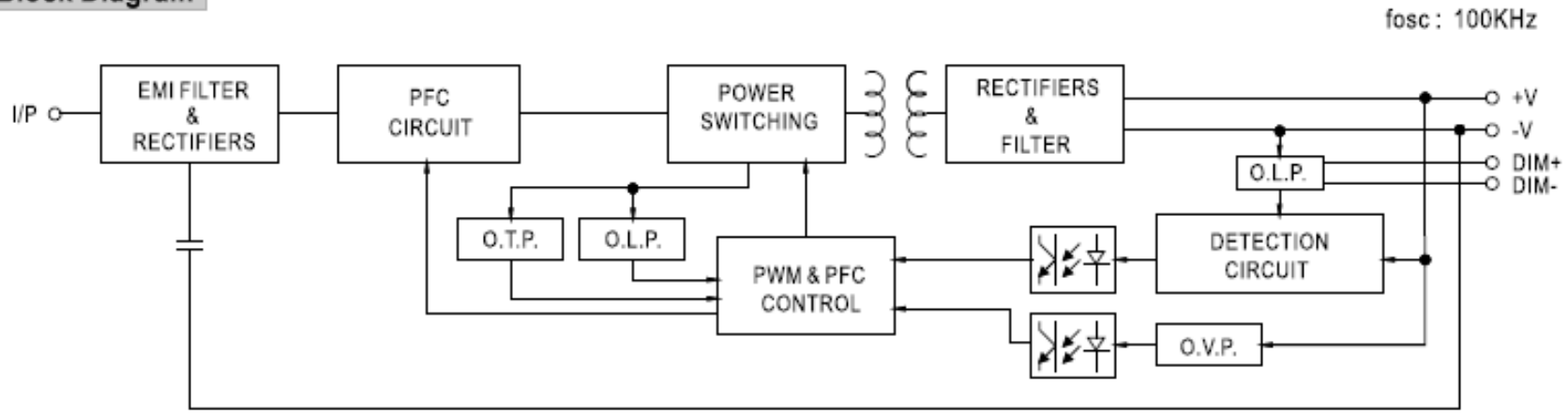
APPLICATIONS

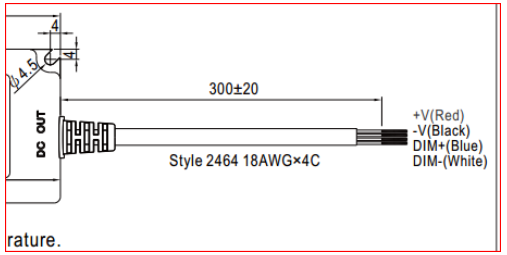
- Indoor
- Outdoor
- Industrial
- Street Lighting

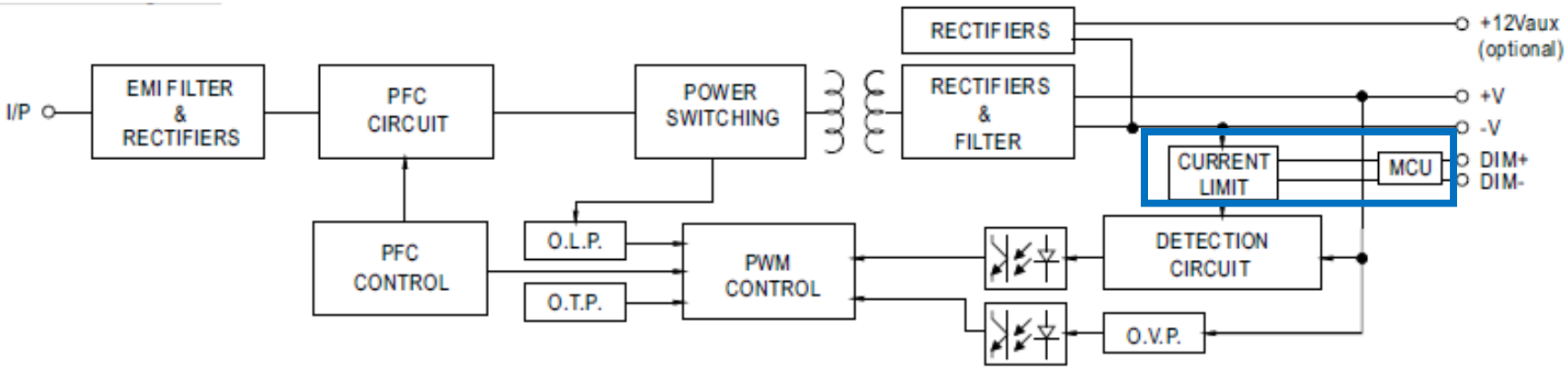


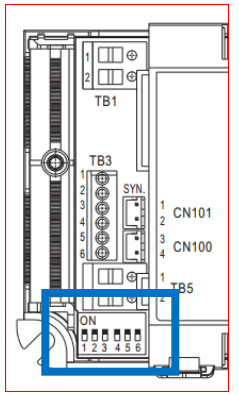

ACTUAL TECHNOLOGY

■ Block Diagram







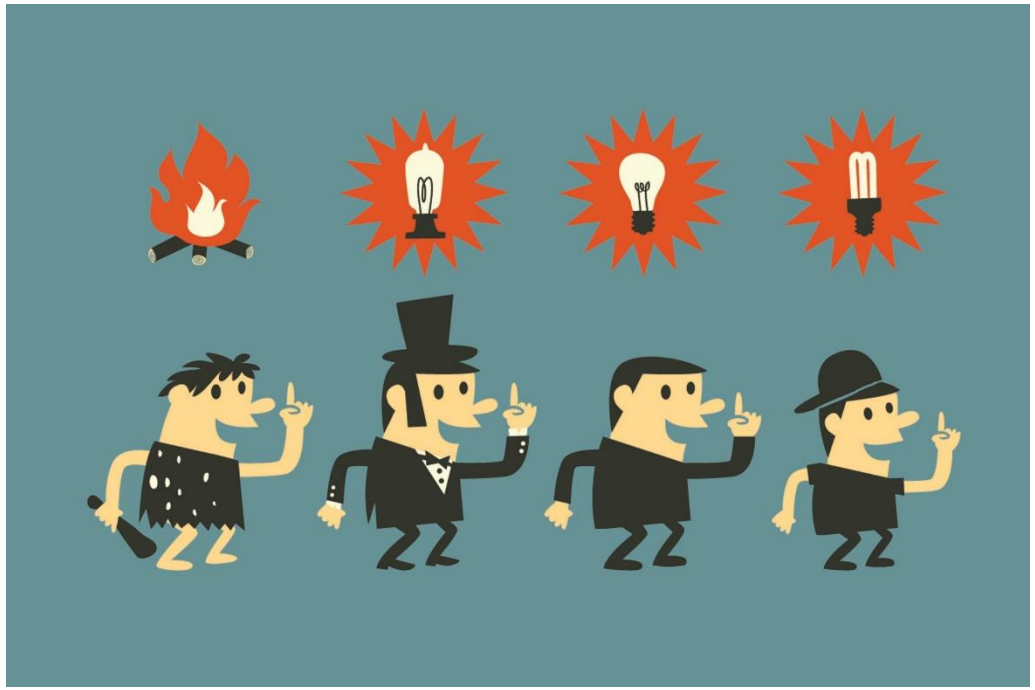


DIMMABLE vs PROGRAMMABLE

MODEL		LCM-60					
OUTPUT	SELECTABLE CURRENT Note.3	500mA	600mA	700mA	900mA	1050mA	1400mA
	DC VOLTAGE RANGE	2 ~ 90V	2 ~ 90V	2 ~ 86V	2 ~ 67V	2 ~ 57V	2 ~ 42V
	RATED POWER	60.3W					
	RIPPLE CURRENT	±5%					
	RIPPLE & NOISE (max.) Note.2	700mVp-p					
	NO LOAD OUTPUT VOLTAGE (max.)	95V			73V		
	CURRENT ACCURACY	±5.0%					
	SETUP, RISE TIME Note.5	500ms, 80ms / 230VAC at rated power					
	HOLD UP TIME (Typ.)	16ms/230VAC at rated power					
INPUT	VOLTAGE RANGE Note.4	180 ~ 295VAC 254 ~ 417VDC					
	FREQUENCY RANGE	47 ~ 63Hz					
	POWER FACTOR (Typ.)	PF≧0.975/230VAC, PF≧0.96/277VAC at rated power (Please refer to "Power Factor Characteristic" curve)					
	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 75% or higher					
	EFFICIENCY (Typ.) Note.6	92%					
	AC CURRENT (Typ.)	0.32A/230VAC 0.27A/277VAC					
	INRUSH CURRENT(Typ.)	COLD START 20A(twidth=270μs measured at 50% Ipeak) at 230VAC					
	MAX. No. of PSUs on 16A CIRCUIT BREAKER	25 units (circuit breaker of type B) / 32 units (circuit breaker of type C) at 230VAC					
	LEAKAGE CURRENT	<0.5mA / 240VAC					

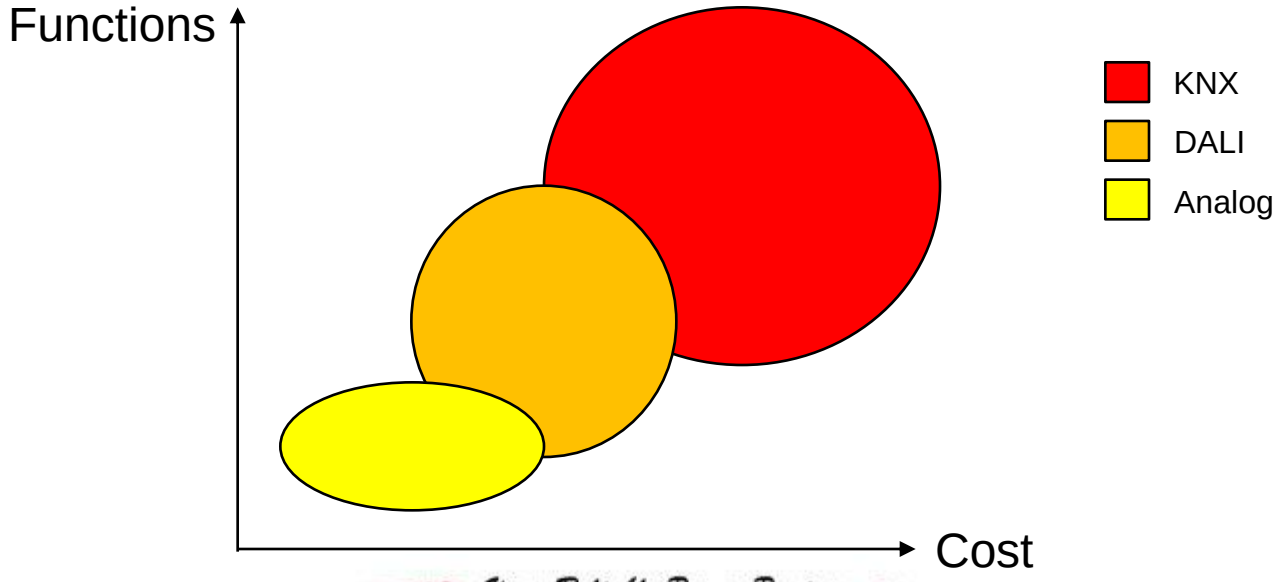
MODEL		LPF-60D-12	LPF-60D-15	LPF-60D-20	LPF-60D-24	LPF-60D-30	LPF-60D-36	LPF-60D-42	LPF-60D-48	LPF-60D-54
OUTPUT	DC VOLTAGE	12V	15V	20V	24V	30V	36V	42V	48V	54V
	CONSTANT CURRENT REGION Note.4	7.2 ~12V	9 ~ 15V	12 ~ 20V	14.4 ~ 24V	18 ~ 30V	21.6 ~ 36V	25.2 ~ 42V	28.8 ~ 48V	32.4 ~ 54V
	RATED CURRENT	5A	4A	3A	2.5A	2A	1.67A	1.43A	1.25A	1.12A
	RATED POWER	60W	60W	60W	60W	60W	60.12W	60.06W	60W	60.48W
	RIPPLE & NOISE (max.) Note.2	150mVp-p	150mVp-p	150mVp-p	150mVp-p	200mVp-p	250mVp-p	250mVp-p	250mVp-p	350mVp-p
	VOLTAGE TOLERANCE Note.3	±4.0%	±4.0%	±4.0%	±4.0%	±4.0%	±4.0%	±4.0%	±4.0%	±4.0%
	LINE REGULATION	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	LOAD REGULATION	±2.0%	±1.5%	±1.0%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	SETUP, RISE TIME Note.7	1000ms, 80ms / 115VAC at full load 500ms, 80ms / 230VAC								
	HOLD UP TIME (Typ.)	16ms/230VAC 16ms/115VAC at full load								
INPUT	VOLTAGE RANGE Note.5	90 ~ 305VAC 127 ~ 431VDC								
	FREQUENCY RANGE	47 ~ 63Hz								
	POWER FACTOR (Typ.)	PF>0.97/115VAC, PF>0.95/230VAC, PF>0.92/277VAC at full load (Please refer to "Power Factor Characteristic" curve)								
	TOTAL HARMONIC DISTORTION	THD< 20% when output loading≧60% at 115VAC/230VAC input and output loading≧75% at 277VAC input								
	EFFICIENCY (Typ.)	86%	87%	88%	89%	90%	90%	90%	90%	90%
	AC CURRENT (Typ.)	0.8A / 115VAC 0.4A / 230VAC 0.32A/277VAC								
	INRUSH CURRENT (Typ.)	COLD START 55A(twidth=270μs measured at 50% Ipeak) at 230VAC								
	MAX. No. of PSUs on 16A CIRCUIT BREAKER	8 units (circuit breaker of type B) / 14 units (circuit breaker of type C) at 230VAC								
	LEAKAGE CURRENT	<0.75mA / 240VAC								

EVOLUTION



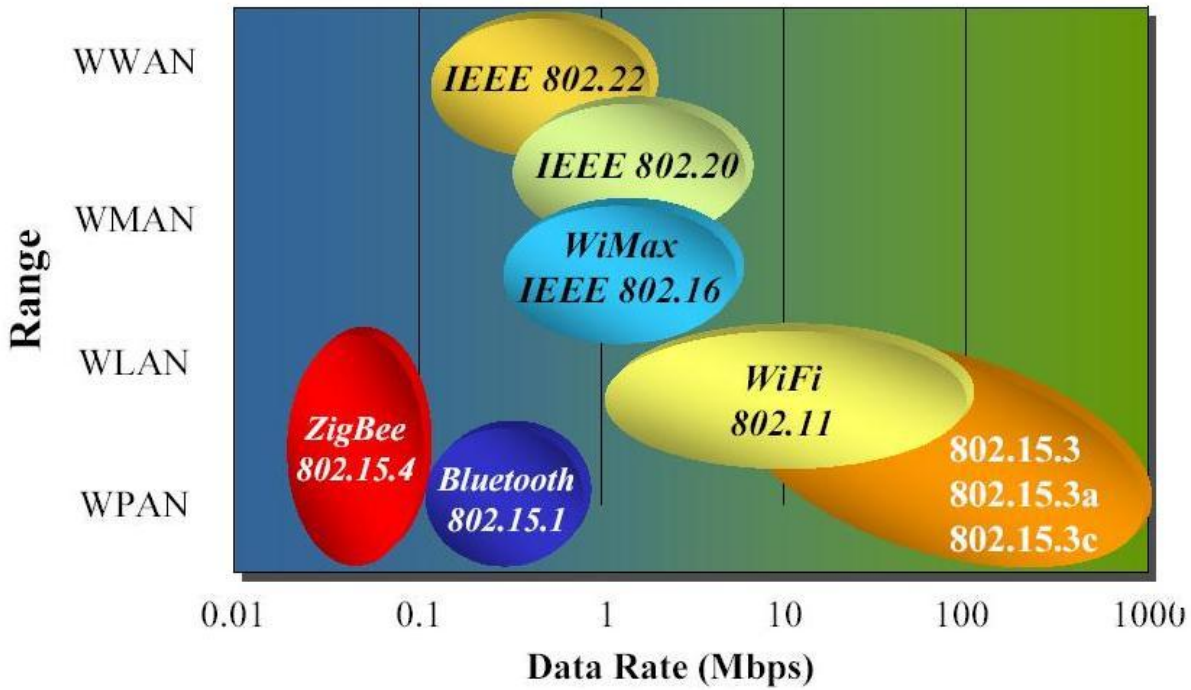
DIGITAL PROTOCOLS

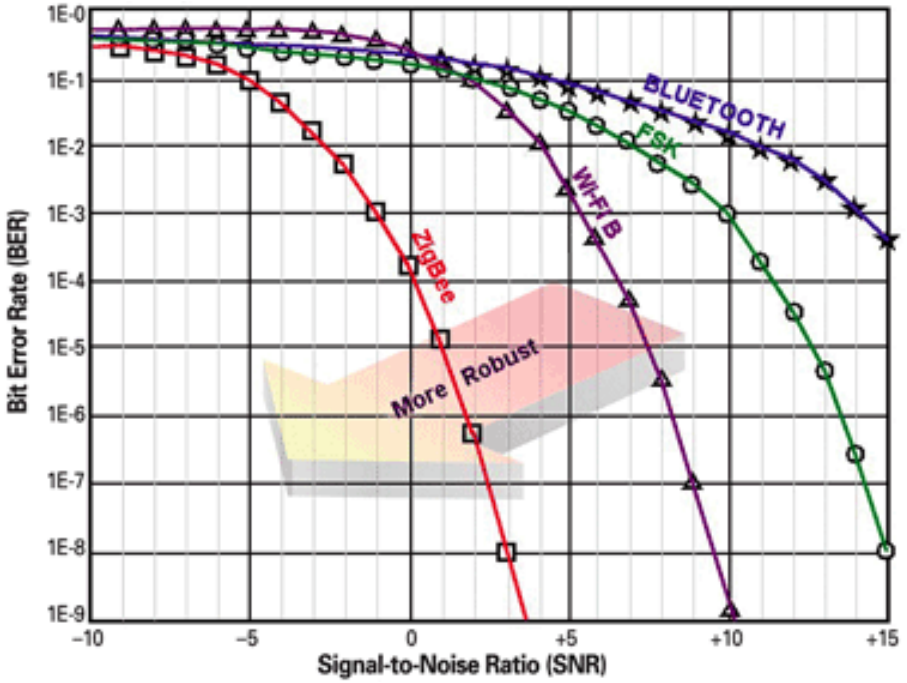
	Floating control input, basic insulation	Two-wire line (polarity-free)	Addressing	Scene memory	Status messages	Individual dimming	Memory	Stby	Auto Dimming
DALI/KNX	yes	yes	yes	yes	yes	yes	yes	yes	yes
1-10	yes	no	no	no	no	no	no	no	no
0-10	yes	no	no	no	no	no	no	yes	no
PWM	yes	no	no	no	no	no	no	yes	no



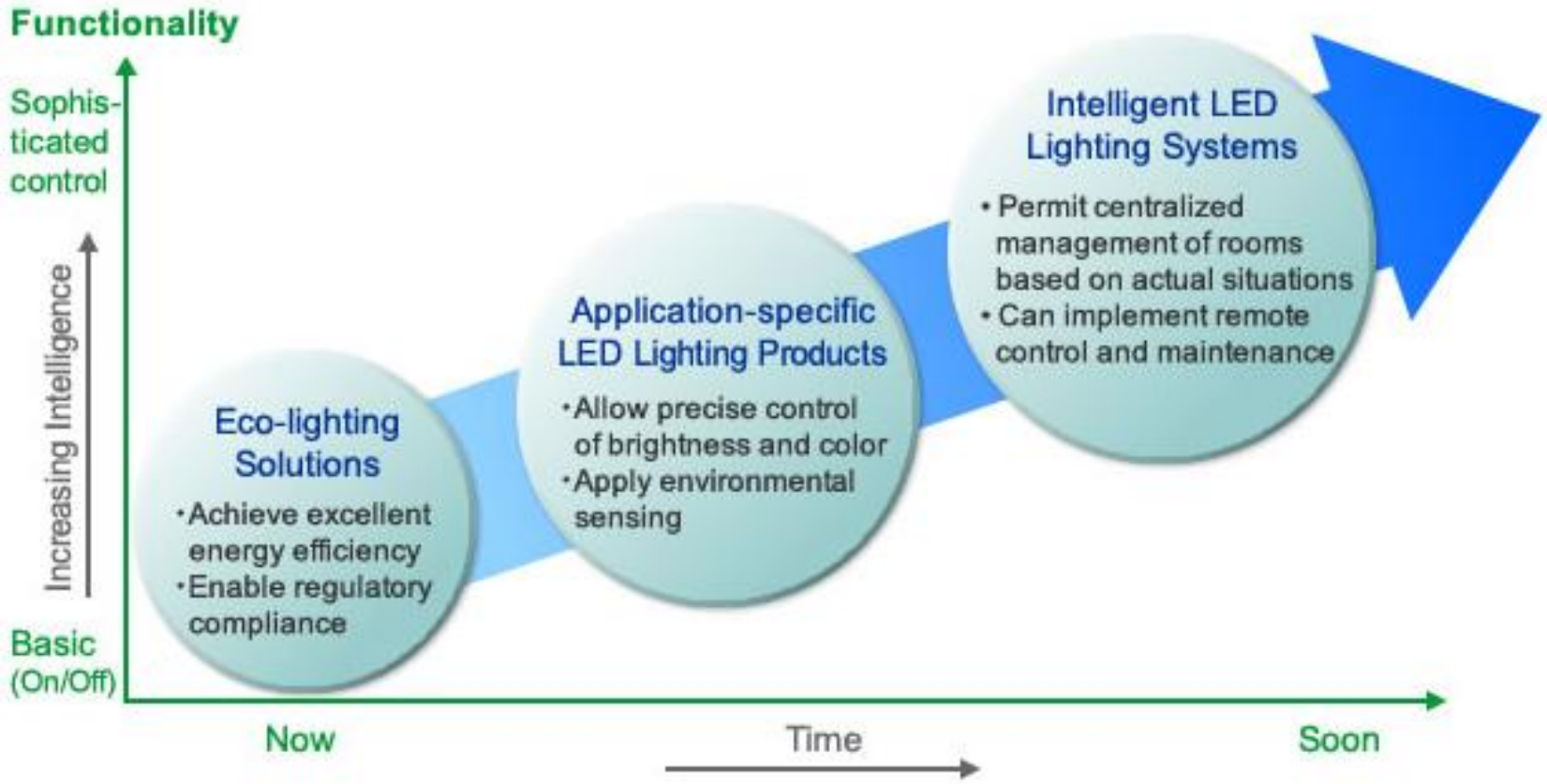
SCALABILITY

WIRELESS


WWAN
WMAN
WLAN
WPAN
Range
IEEE 802.22
IEEE 802.20
WiMax
IEEE 802.16
WiFi
802.11
802.15.3
802.15.3a
802.15.3c
ZigBee
802.15.4
Bluetooth
802.15.1
0.01
0.1
1
10
100
1000
Data Rate (Mbps)

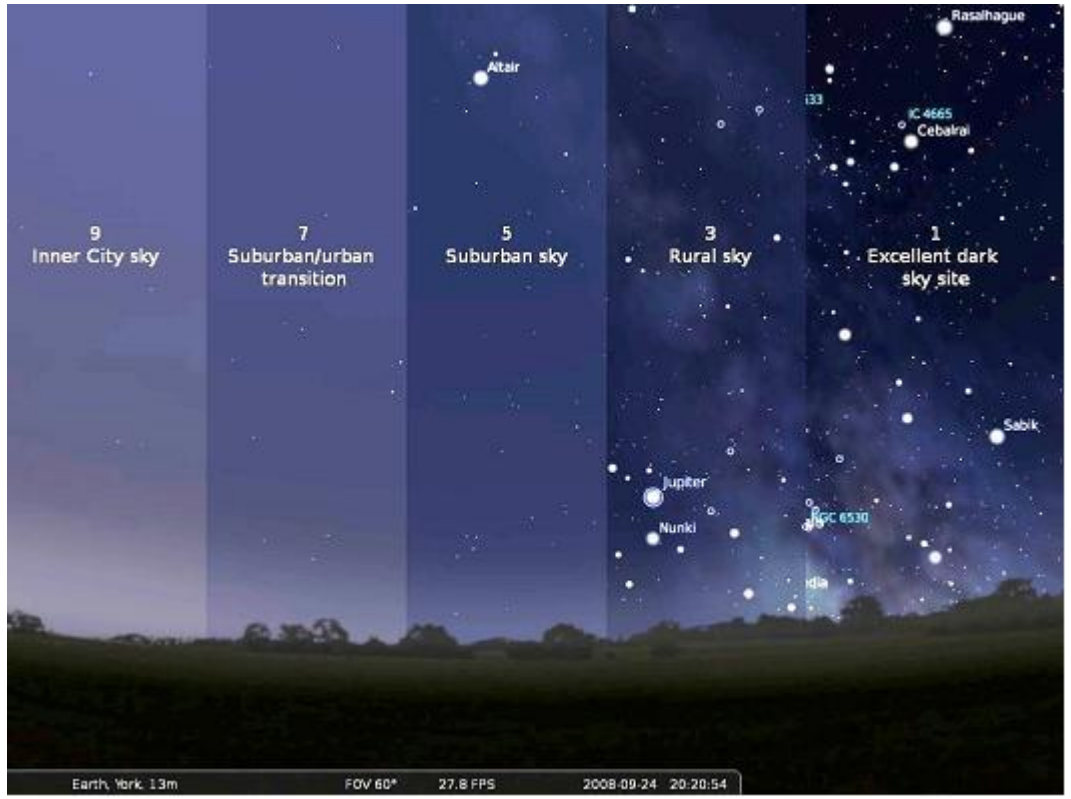

1E-0
1E-1
1E-2
1E-3
1E-4
1E-5
1E-6
1E-7
1E-8
1E-9
Bit Error Rate (BER)
BLUETOOTH
FSK
Wi-Fi B
ZigBee
More Robust
−10
−5
0
+5
+10
+15
Signal-to-Noise Ratio (SNR)

FUNCTIONS

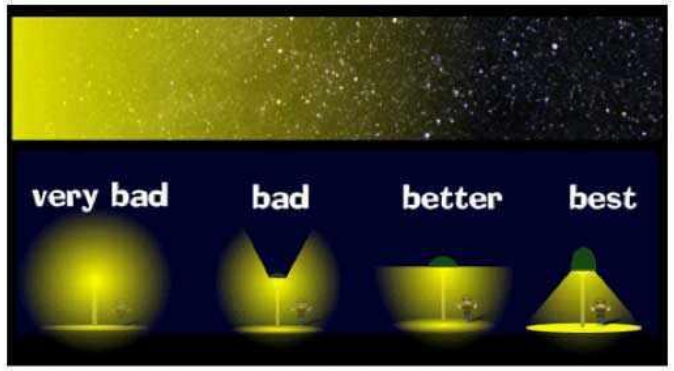

Functionality
Sophis-ticated control
Increasing Intelligence
Basic (On/Off)
Eco-lighting Solutions
•Achieve excellent energy efficiency
•Enable regulatory compliance
Application-specific LED Lighting Products
•Allow precise control of brightness and color
•Apply environmental sensing
Intelligent LED Lighting Systems
• Permit centralized management of rooms based on actual situations
• Can implement remote control and maintenance
Now
Time
Soon

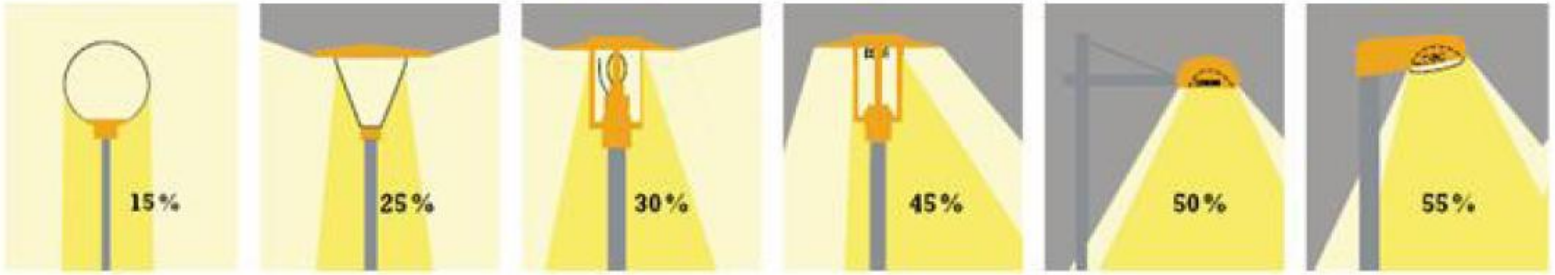
STREET LIGHTING FUTURE

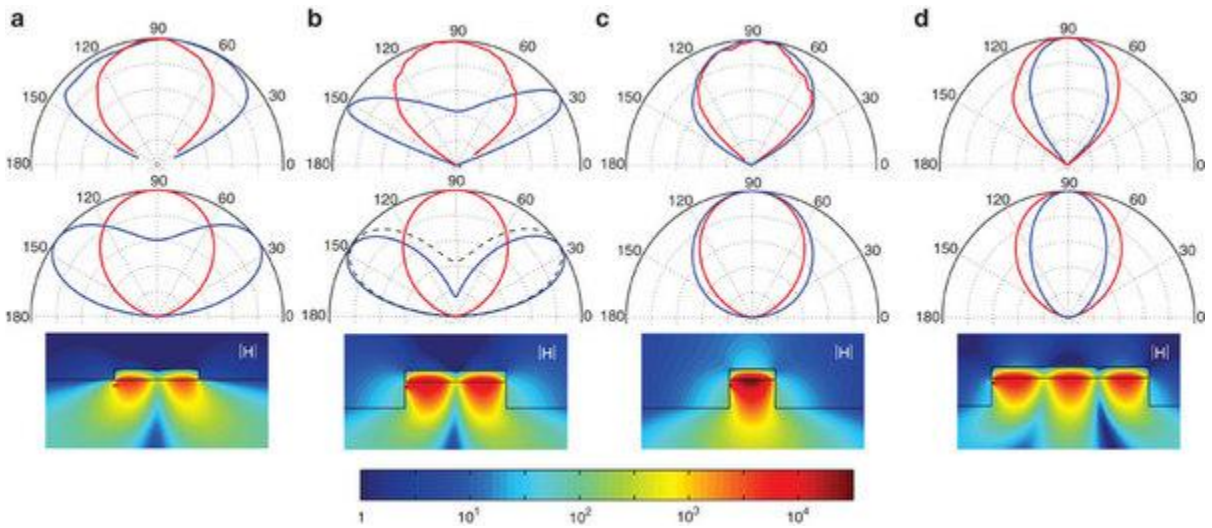
LIGHT POLLUTION



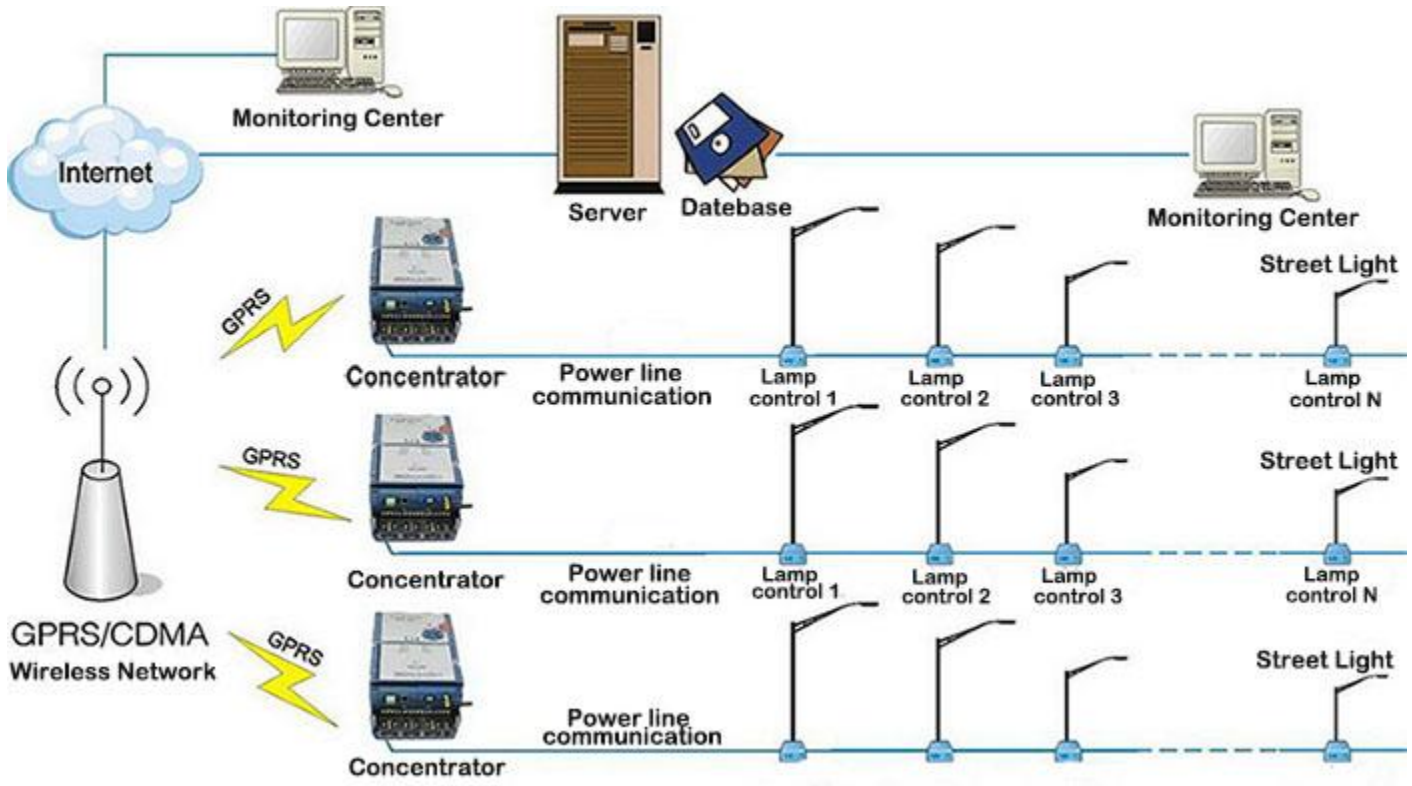
LIGHT POLLUTION



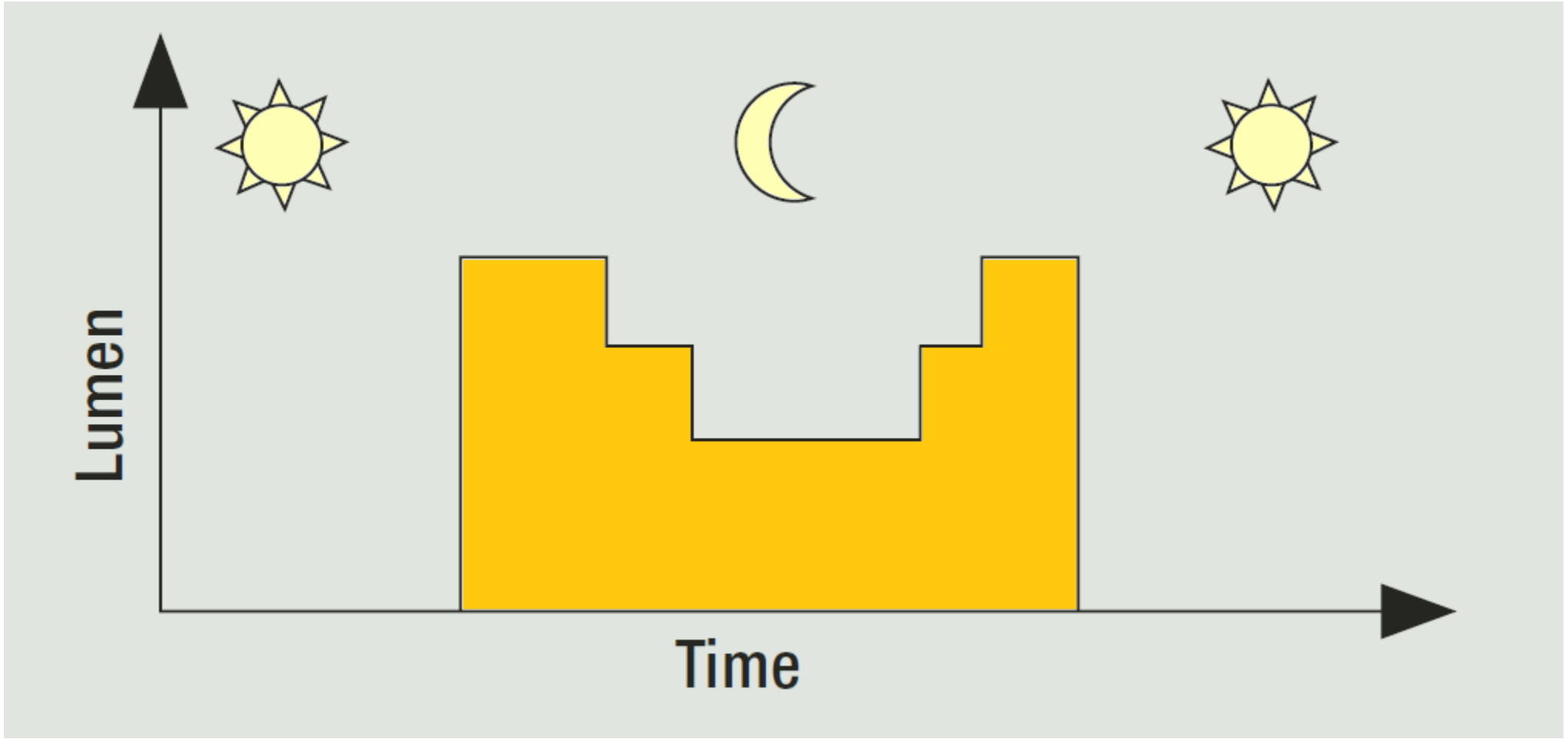




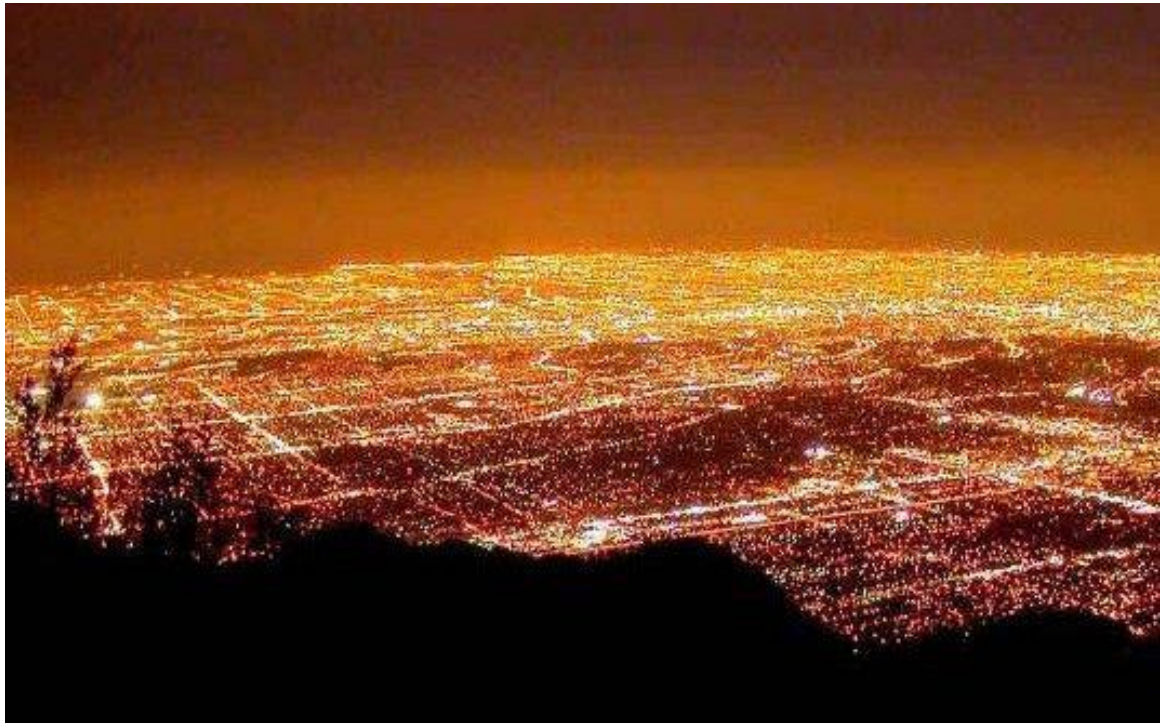
CENTRALIZED CONTROL



SMART DIMMING

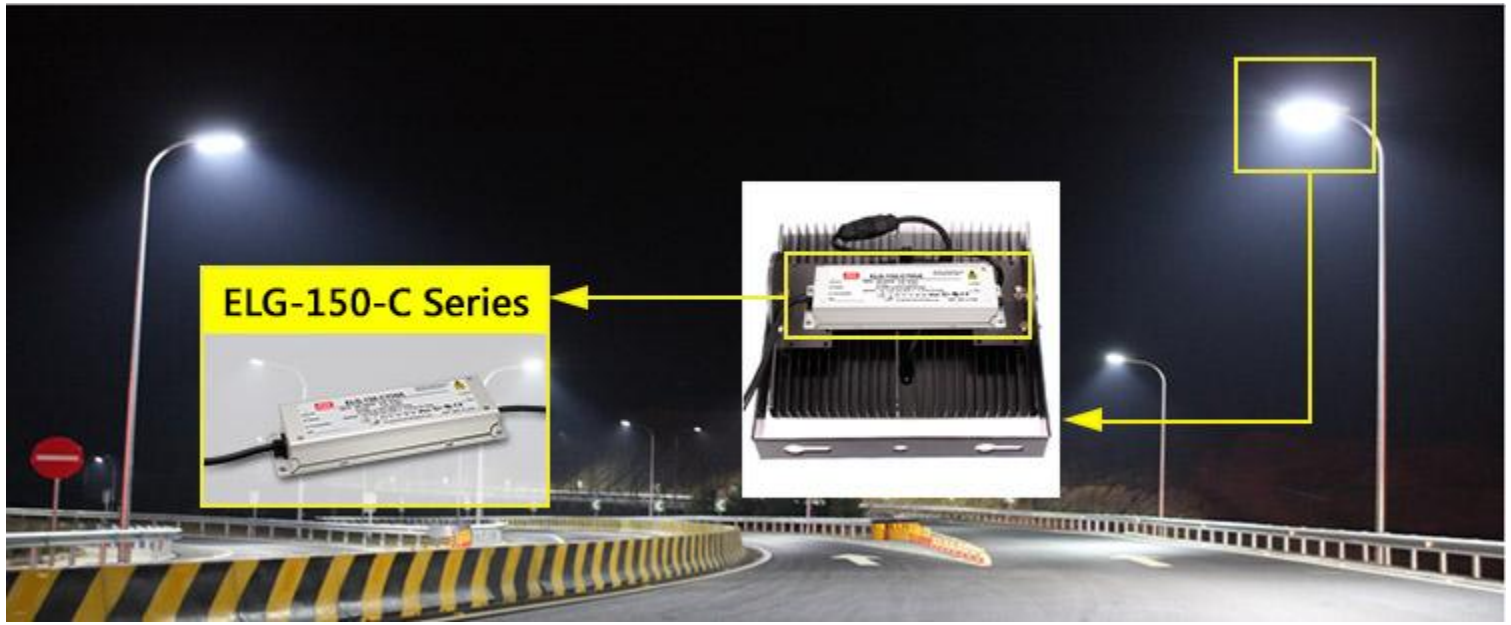


LOS ANGELES (USA) – CASE STUDY



Los Angeles has changed 140,000 street lights for highly efficient LEDs, a move that saves the city $10 million annually.
The replacement program cost is estimated at $57 million over the four years.

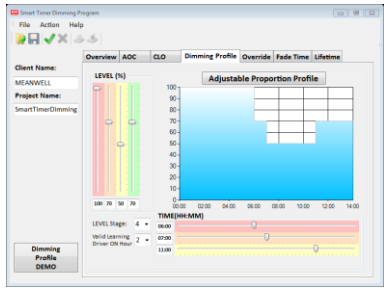
MEAN WELL – ELG SERIES



Model	Category	IP Level	Input/Output Style	Introduction
Blank	Standard	IP67	Cable	Constant current level fixed.
A	Standard	IP65	Cable	Constant current level adjustable through internal potentiometer.
B	Standard	IP67	Cable	Constant current level adjustable with additive 0~10Vdc, 10V PWM signal and resistance (3 in 1 dimming function)
D2	Optional	IP67	Cable	Smart timer dimming function. Please contact MEAN WELL for details.
DA	Optional	IP67	Cable	DALI function. Please contact MEAN WELL for details.

ELG SERIES - SMART DIMMING

- **PROGRAMMABLE output current**
  - Through a PC software, user can set the output current in percentage
- **CONSTANT LIGHT OUTPUT**
  - To compensate the depreciation of LED module over life time
- **PROGRAMMABLE DIMMING CURVE**
  - Through a PC software, user can program the dimming curve, no need TS or modifications, simple and fast to meet all customer needs.
- **ADAPTIVE DIMMING CONTROL (SELF-LEARN MODE)**
  - According to usage, automatic determine and adjust the dimming curve
- **TEST / DEMO MODE**
  - Quick test to check about the customized dimming curve



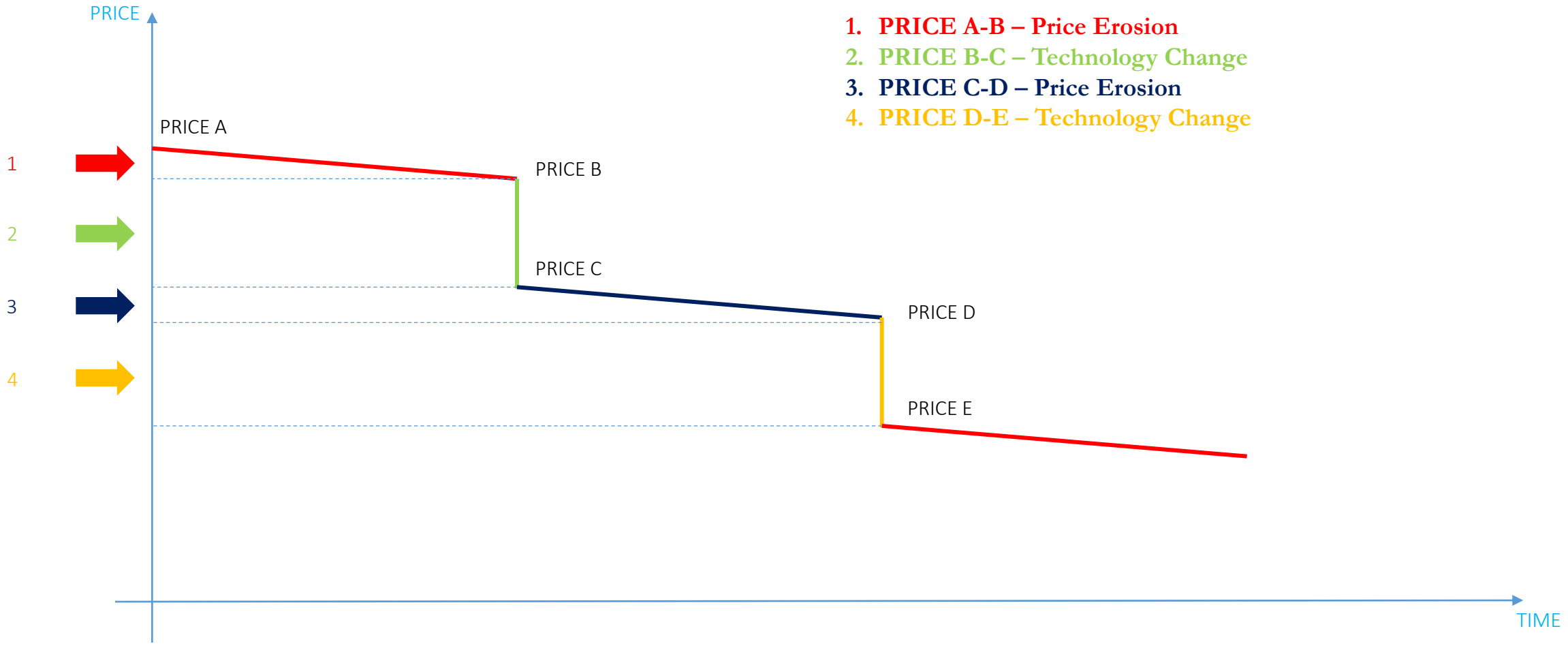
PC / Software

USB

SmartDim Programmer

ELG D2 version

ELG SERIES – New Technology – New Price



1. **PRICE A-B – Price Erosion**
2. **PRICE B-C – Technology Change**
3. **PRICE C-D – Price Erosion**
4. **PRICE D-E – Technology Change**

CONCLUSIONS

- LED high end market shows increasing demand for more complex solutions
- Simple dimming (i.e. 1-10V) is still the most economic solution
- DALI, KNX, Wireless Dimming solution will bring added value to our customers but also a price increase of the final solution
- Street Lighting is a High Potential Market
- The need to change current Street Lighting Solution comes from both energy saving demand and high level of light pollution in urban areas
- Los Angeles Case Study shows a short ROI cycle
- Mean Well Introduced ELG Series for your Street Lighting Solutions
- ELG series introduce new features integrated inside the driver (DALI – Smart Dimming - …)


Q&A

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Thank You

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