



Enabled LED Licensing Program for LED Luminaires and Retrofit Bulbs

Signify Intellectual Property (for information purposes only)

November 2018

Agenda

Introduction

Program outline

Contact info

Core Technology Examples

This presentation is for information purposes only. It is not intended to be a contract and shall not be legally binding in any respect on any party. There shall be no contract until a final written contract is signed by authorized representatives of both companies.



ENABLED

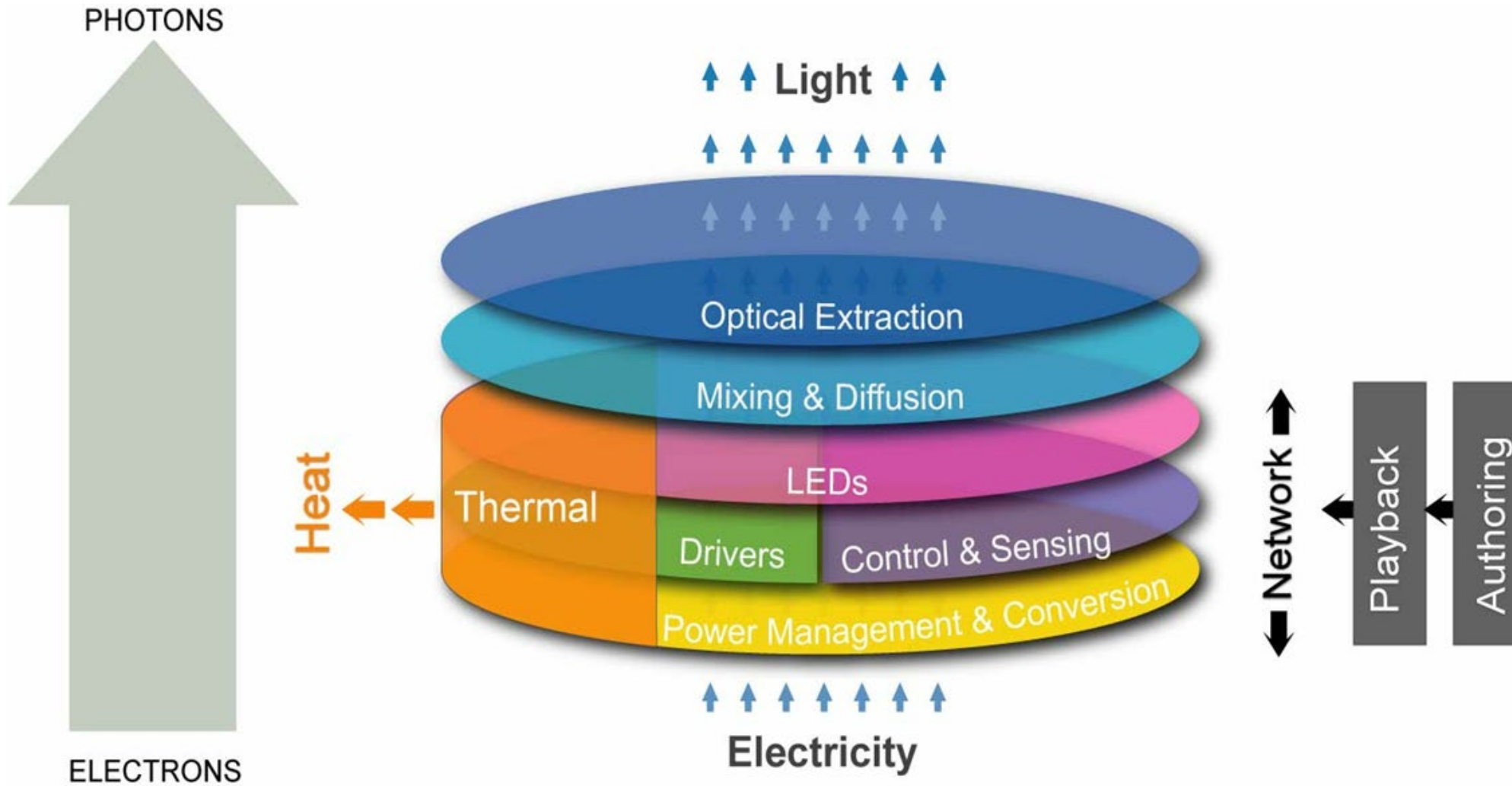
What are the benefits?



- **The business drivers for the Licensee**
 - Preferred and more economic solutions
 - More flexibility in component sourcing
 - More freedom for optimal solution
- **The business drivers for the Licensee and Signify**
 - Accelerate growth of LED luminaires and retrofit bulb markets



LED Lighting Systems - What's Involved?



What does the program cover?



- **The product scope:**
 - Finished, branded, LED Luminaires and Retrofits
- **The field of use**
 - General Illumination (Professional and Residential)
 - Architectural, Theatrical and Entertainment fields
- **The scope of the licensed patents:**
 - Basic LED control and system-level technologies
 - Optics, thermal, mechanics and safety related
 - Includes patents (and patent applications) with priority date prior to 2016
 - Covers patents from Signify Lighting technology investments and from acquisitions (eg Color Kinetics)



What is the licensed Patent Portfolio?



- More than 400 patent families
- More than 2900 issued patents
- More than 300 patents pending

- Worldwide
 - (e.g. US, Europe, China, Japan, Korea, Canada, Australia, Taiwan, Hong Kong, India, Mexico)



What are the key steps to an agreement?

1. You meet with Signify IP Licensing representative

Signify licensing specialists operate globally and are ready to respond to your questions. They will work with you on every step, so you can quickly start using our patent-protected technology

2. Portfolio Analysis

We work with you to determine which of your products are relevant and require a license.

3. Determine the historical use of the inventions and agree the past-use to be paid.

4. Choose between two royalty payment methods to conclude the agreement

1. In the **standard approach**, we list all relevant products, the corresponding royalty rate, and the countries where a royalty payment is triggered
2. In the **flat rate approach**, we use the portfolio analysis and your turnover of branded luminaires or retrofits in a reference period to determine a single percentage flat rate which will apply on a quarterly basis.



In order to protect **your and Signify's** confidential information that are exchanged between the parties prior to concluding the license agreement, a mutual, two-sided Non-Disclosure Agreement (NDA) will be signed.



What are the Royalties for LED Luminaires?

- **The royalties are based on Net Revenues**

- 3% for Single Color Luminaires
(fixed color temperature white or color)
- 4% for Tunable White Luminaires
(color temperature controllable)
- 5% for Color Changing Luminaires

(Charged only for manufacturing or sales in countries where Signify has at least one issued patent covering a feature of the licensed product)

- **Net Revenue** is the price actually charged to a customer to purchase a licensed product, excluding freight, insurances, and taxes





What are the Royalties for LED Retrofit Bulbs?

- **The royalties are based on Net Revenues:**

- 5%

- Minimum 0.25 Euro per unit*

- (Charged only for manufacturing or sales in countries where Signify has at least one issued patent covering a feature of the licensed product)

- **“LED-based Retrofit Bulb” means:**

- a LED-based light bulb designed and intended to be installed in an existing luminaire that previously utilized a conventional (non-LED) light bulb



*For Licensees who are in full compliance with their royalty payment obligations under the Agreement, Signify will waive the minimum royalty of EUR 0.25 applicable to sales of Retrofit Bulbs after 1 January 2015.

How to use qualified components?

No royalties will be due on luminaires only using Qualified provided that the following are **all** from a qualified supplier:

- **all LED light-engine modules** (LEDs placed on one or more common circuit board(s)); and
- **all LED drivers**; and
- **all components**, if any, **for controlling** the light output of the LEDs used in the luminaire

The trademark of the respective qualified supplier(s) is **identifiable** on each of the above components assembled in the luminaire.



What are the Qualified Suppliers?



- **Our qualified Suppliers are;**
 - Signify
 - Lumileds (only for light engine modules)
 - Osram
 - Zumtobel Group
- You still need to enter into a license agreement with Signify
 - even if all luminaires only include components from qualified suppliers





How to use the EnabLED member logo?

The personalized EnabLED member logo

- An official logo which you can use
 - to make your customers aware of being a member of the EnabLED Program.
 - It can be used on your website, catalogue and brochure.
- The logo also incorporates a unique QR code linking to our webpage with your details, which protects your identity as one of our valued licensee members.



Contact

Mail:

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Web:

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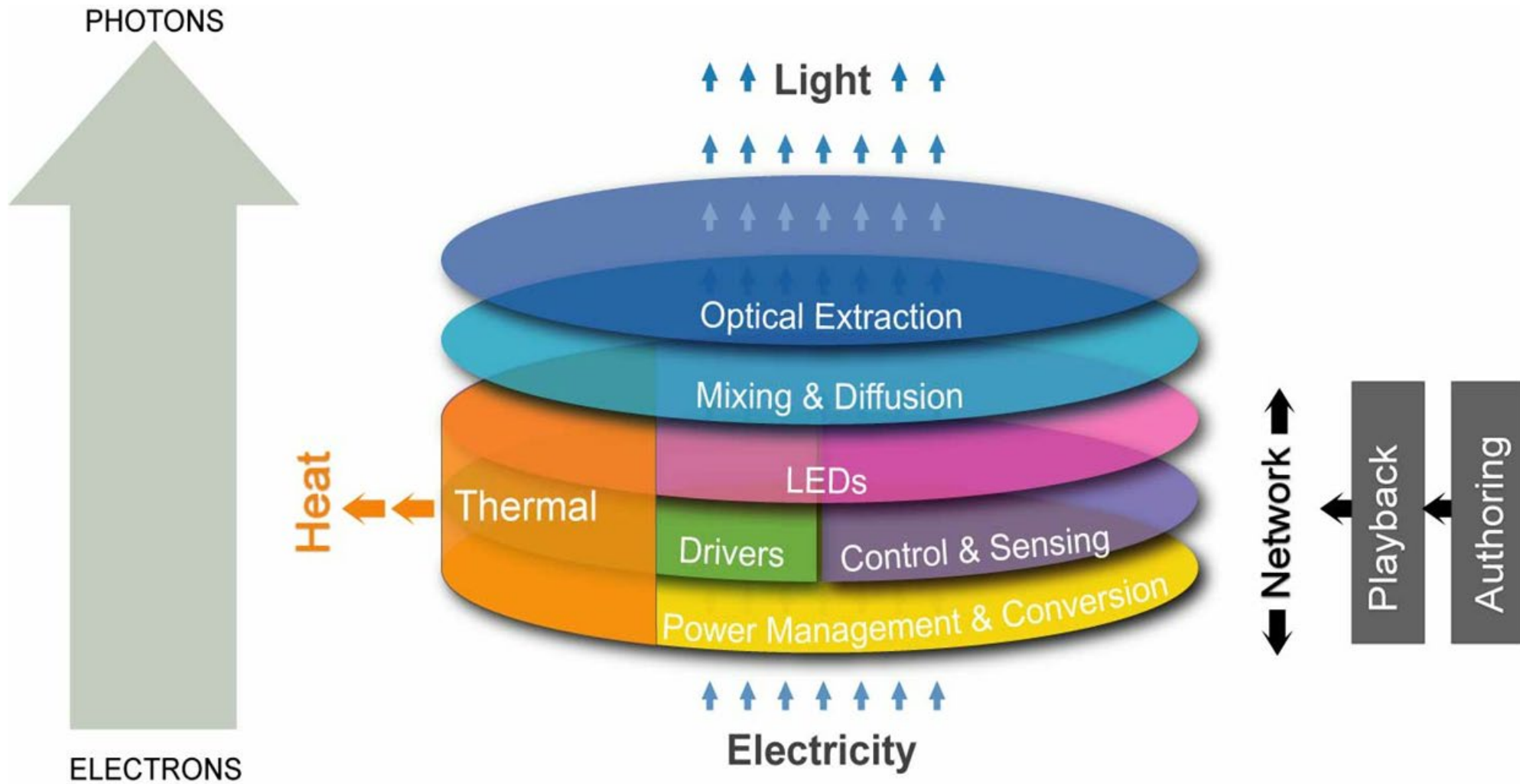


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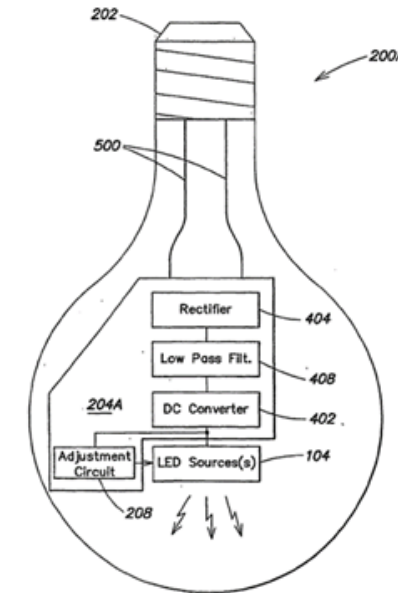
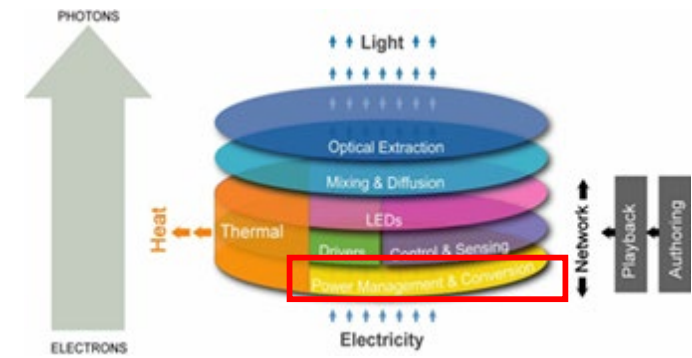
LED Lighting Systems – Examples what could be involved



Core Technologies for LED Lighting Systems

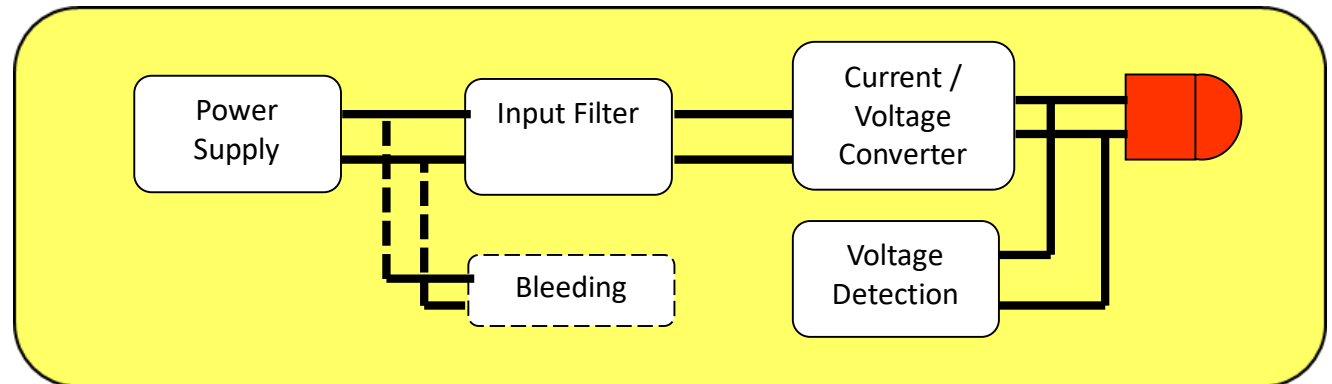
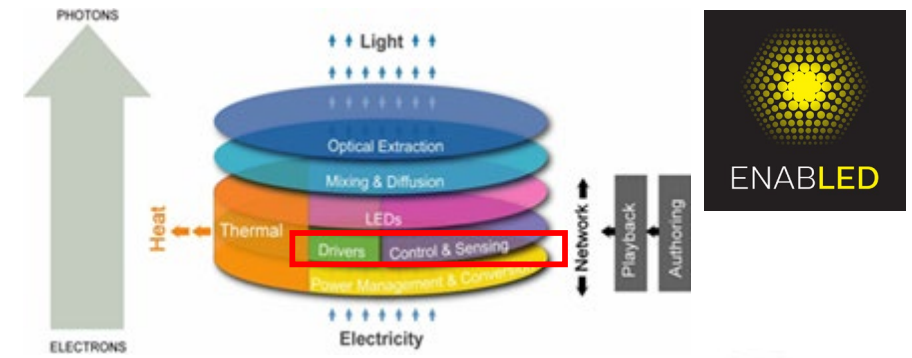
Dimming

- Application: Power control
- Advantage: Re-use existing dimmers (e.g., phase-cut, 1-10V); mimic existing incandescent look; dim without changing color temp
- Example Patents/Applications:
 - North America: US6384545, 6975079, 7038399, 7071762, 7135824, 7352138, 7358679, 7719209, 8203284
 - Europe: EP0929993, 0929994, 1459600, 1479270, 1576858, 1887836, 2143303; GB2421367
 - Asia: CN100477868, 101107885, 101663919, 1143602, 1192682, 1729722; JP4159119, 4240546, 4347794, 4633363, 4901104, 5285912, 5460940; HK1111856, 1112153; KR10-0960825, 10-0978019



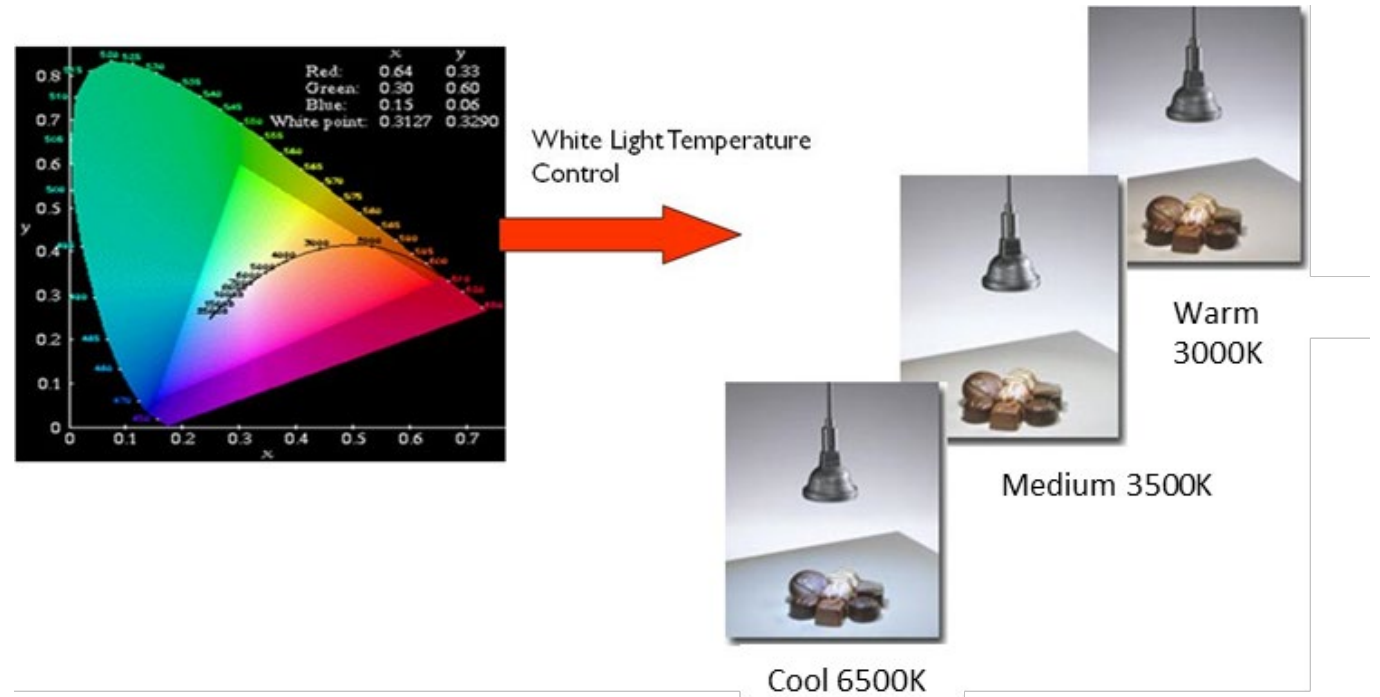
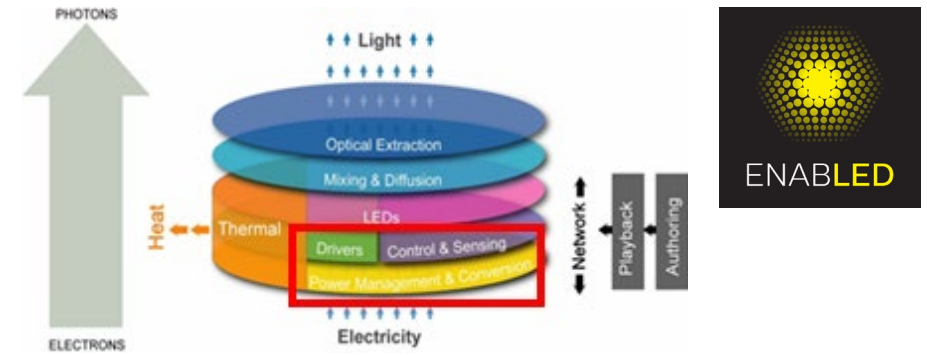
Driving LEDs

- Application: Safe conventional light source replacement
- Advantage: Allows accurate control and protection of driver circuitry in case of changes in the LEDs at the output, such as overvoltage, short circuits or malfunctioning of an individual LED in a string
- Example Patents/Applications:
 - North America: US6094014, 6147458, 6577512, 7262559, 7511436
 - Europe: EP0929992, 1034690, 1623604
 - Asia: JP4260226, 4657579, 4959325, 5426807; CN100381018, 100531486, 100558203, 1139307, 1287637



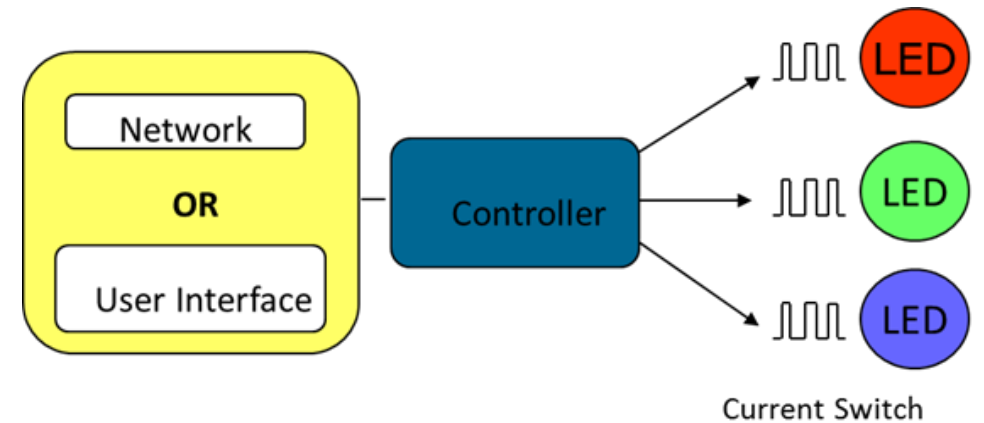
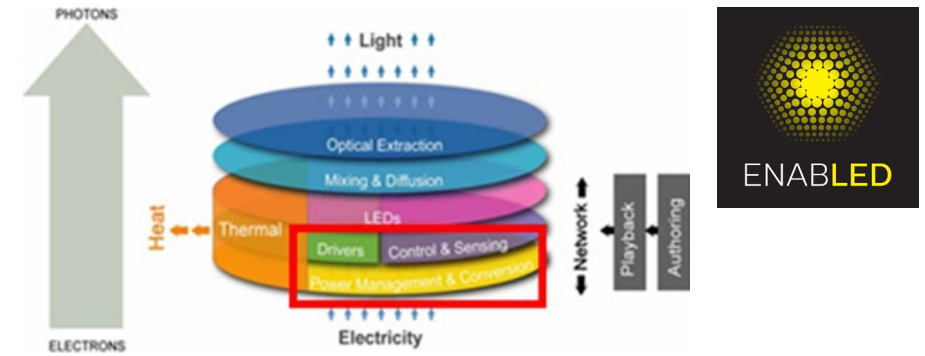
Intelligent White Light Illumination

- Application: White color temperature control
- Advantage: Produce high quality tunable white light
- Example Patents/Applications:
 - North America: US6234645, 6234648, 6513949, 6636003, 7014336
 - Europe: EP1016062, 1046196, 1047904, 1234140, 1459600
 - Asia: JP4366016, 4376464; CN1124426, 1227749; IN210549; KR10-0702273, 10-0776837



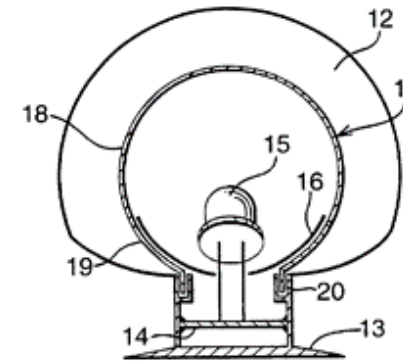
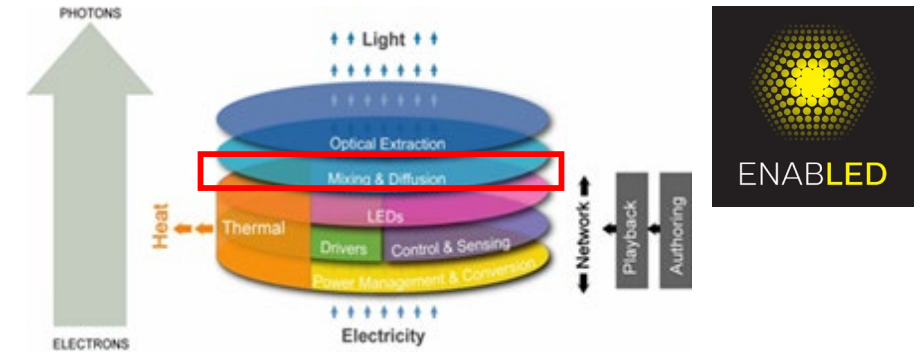
Intelligent Color Illumination

- Application: Intelligent RGB color control
- Advantage: Allows creating simple to sophisticated illumination effects
- Example Patents/Applications:
 - North America: US6016038, 6150774, 6234645, 6788011, 6806659, 7064498, 7161311, 7274160, 7462997; CA2302227, 2466717
 - Europe: EP1016062, 1047904, 1422975
 - Asia: CN1289397; HK1025416; JP4230236, 4376464
 - AU757000, 2003203584, 2006202217



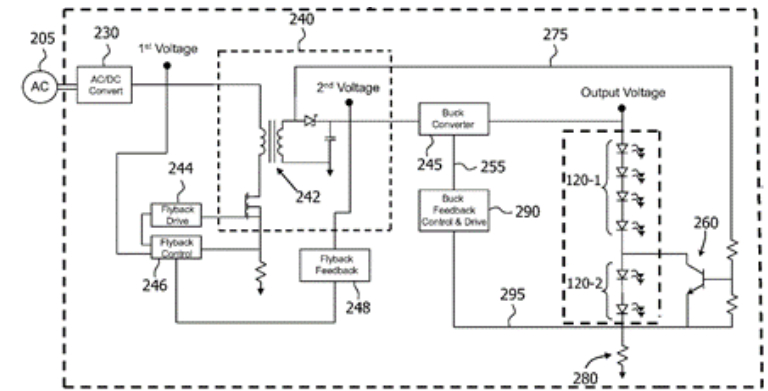
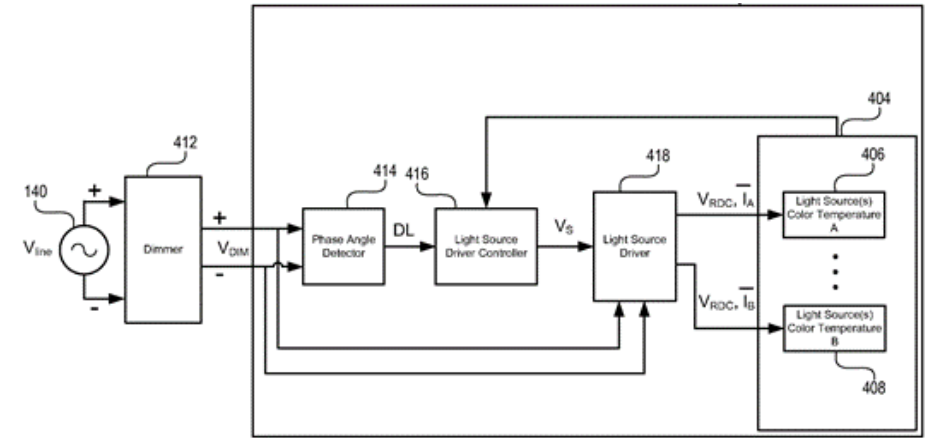
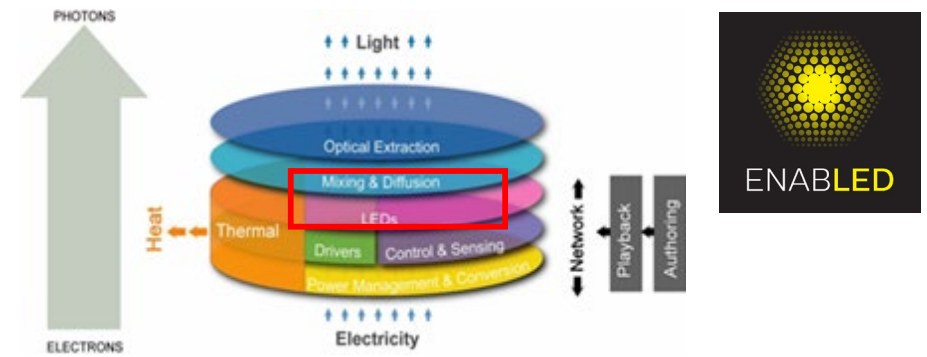
Direct View Color or White only Mixing Tube

- Application: direct view architectural and theatrical fixtures
- Advantage: create smooth, non-pixelated dimmable or color-changing effects visible on diffuser tube
- Example Patents/Applications:
 - North America: US6676284, 7064498, 7118248, 7161311
 - Europe: EP1110198, 1391650



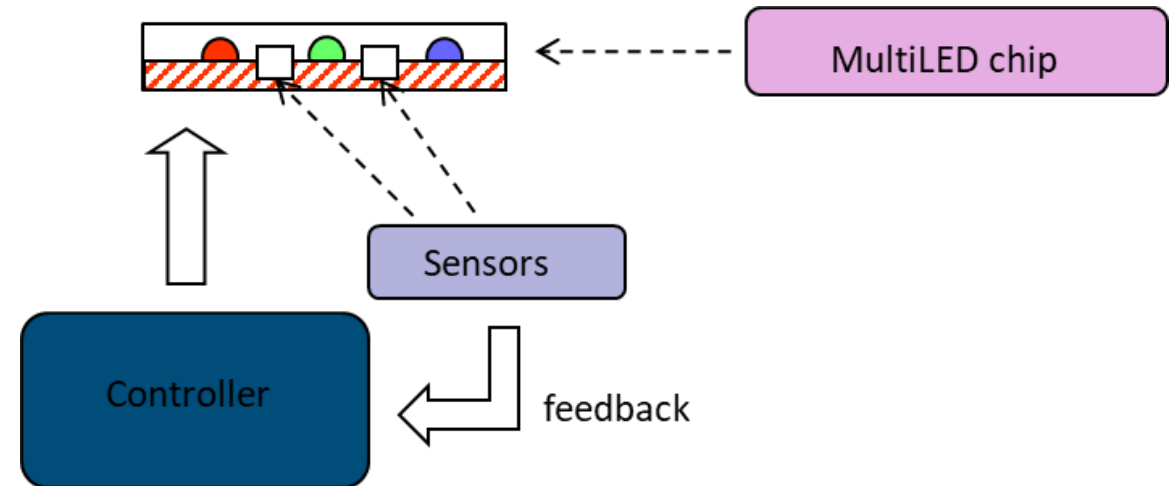
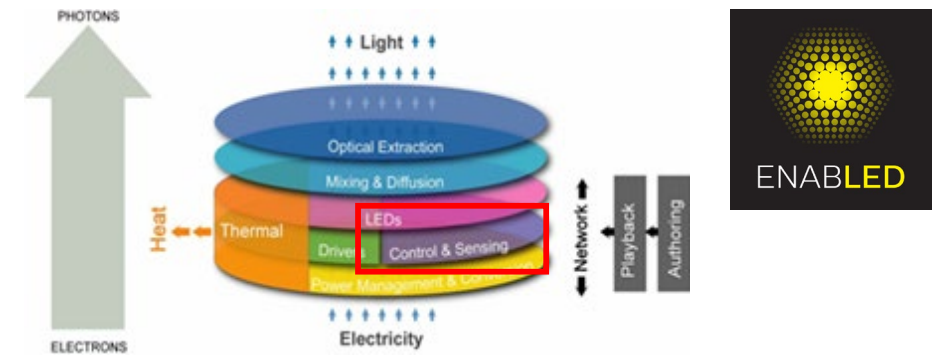
Warm dimming incandescent emulation

- Application: Using LEDs to emulate warm dimming features of incandescent bulbs
- Advantage: produces white light with natural warm dimming effects
- Example Patents/Applications:
 - North America: US7038399, 7288902, 7352138, 7719209, 8624513, 8912734, 9345079
 - Europe: EP1887836, 2130405A, 2471344; GB2421367; RU2556015
 - Asia: CN101107885, 101653042, 102484916; HK1111856; JP5285912, 5508532; TW1538553



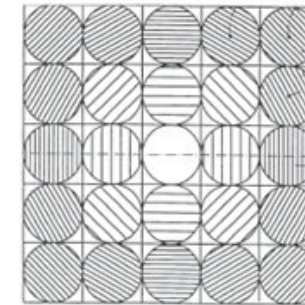
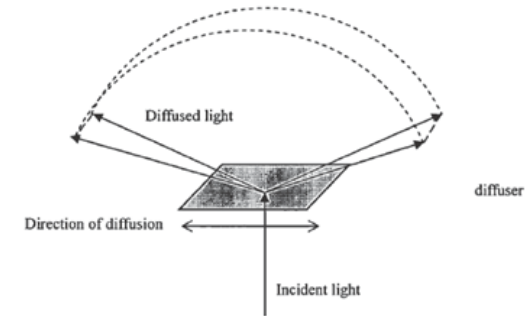
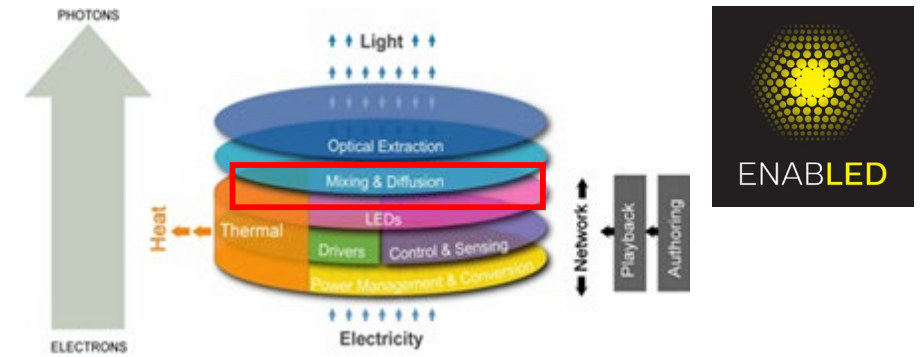
Feedback Control

- Application: Quality control
- Advantage: Produce and maintain high quality light output with less dependency on quality of discrete light source
- Example Patents/Applications:
 - North America: US6304464, 6617795, 7802902
 - Europe: EP1415345, 1459600
 - Asia: CN100383986, 101554087; JP5341517; KR10-0916178; TW-1289339, 1391600



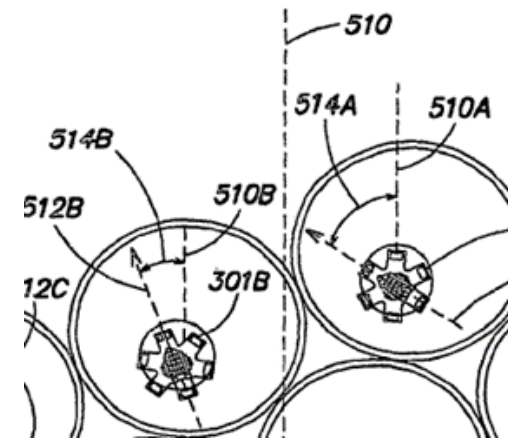
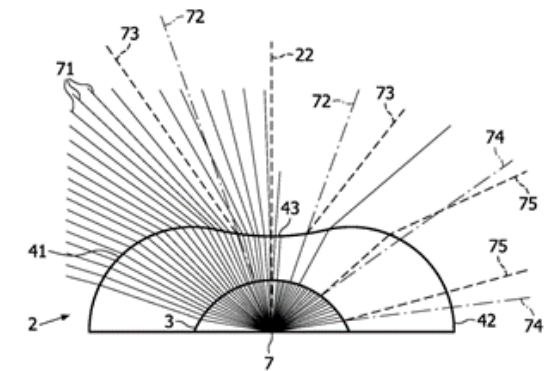
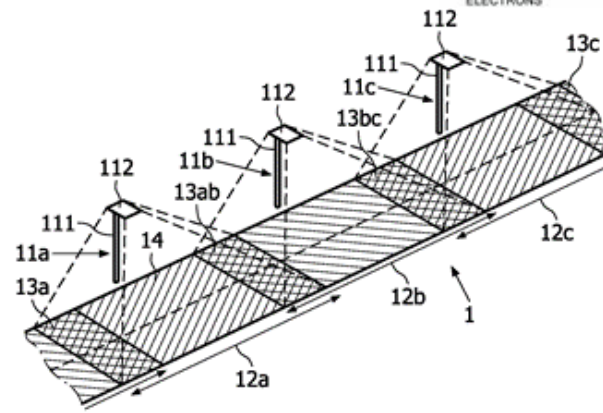
Light Mixing and Distribution

- Application: Light output control
- Advantage: Effective and efficient blending and directing of LED light output
- Example Patents/Applications:
 - North America: US6250774, 6561690, 7255458; CA2249423, 2533195
 - Europe: EP0890059, 1182396
 - Asia: JP4014227, 4749623; TW093750; CN1107193, 1211602, KR0471705



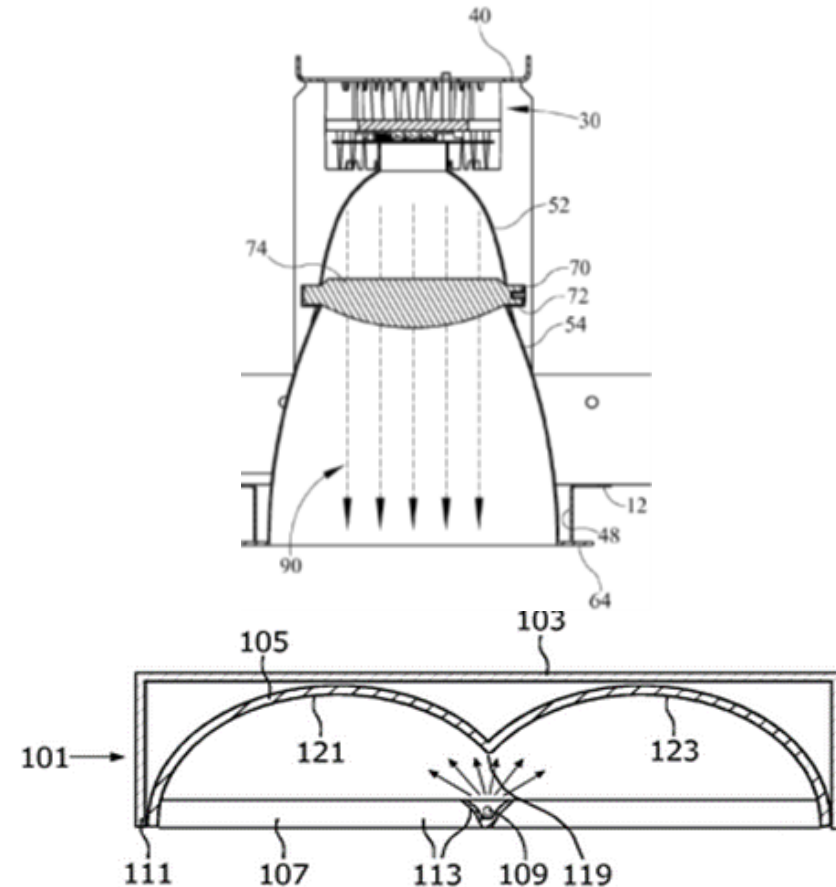
Light Mixing and Distribution

- Application: Light output control
- Advantage: homogeneous illumination of an area without dazzling the user
- Example Patents/Applications:
 - North America: US7806558, 8220958
 - Europe: EP2089656, 2135005; RU2456503
 - Asia: CN101627253, 101657678; JP5349453, 5396278



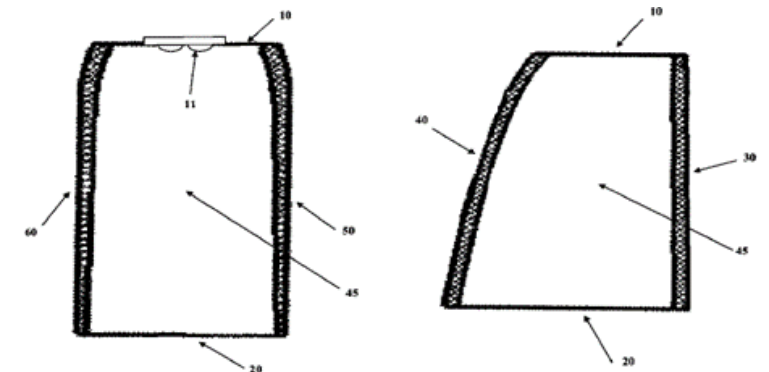
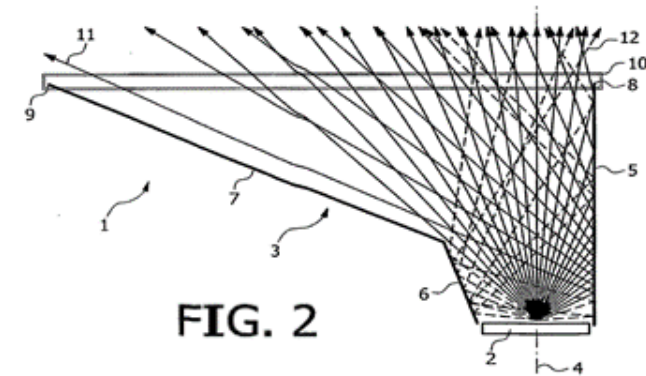
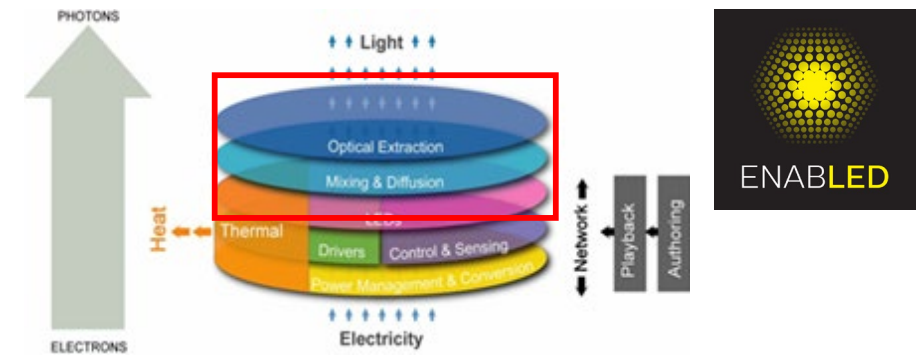
LED glare reduction

- Application: Where comfortable LED light output is required
- Advantage: Reduces LED glare effects and provides uniform light output
- Example Patents/Applications:
 - North America: US6554451, 7520636, 8425101, 8579473, 8070328, 8979319
 - Europe: EP1125085, 1948995, 2150851, 2326869
 - Asia: CN101305242, 101681059, 102149966; JP5048190, 5198278, 5290279, 5438766; KR10-0799384, 10-1207324



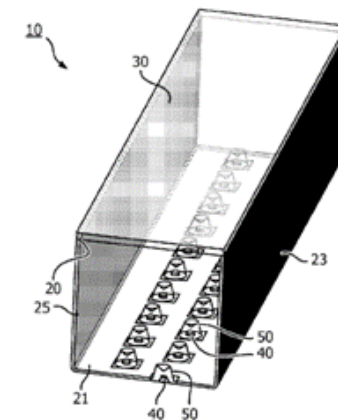
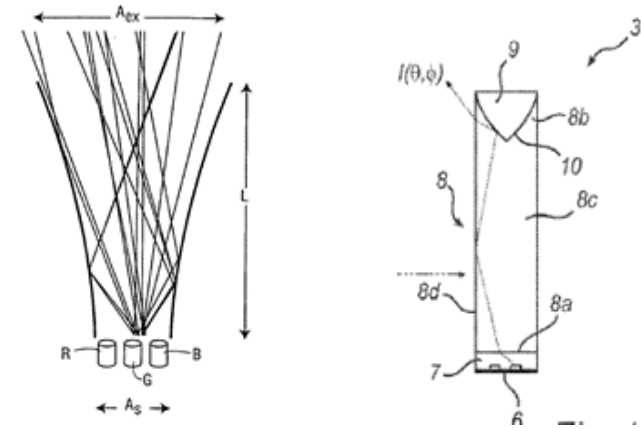
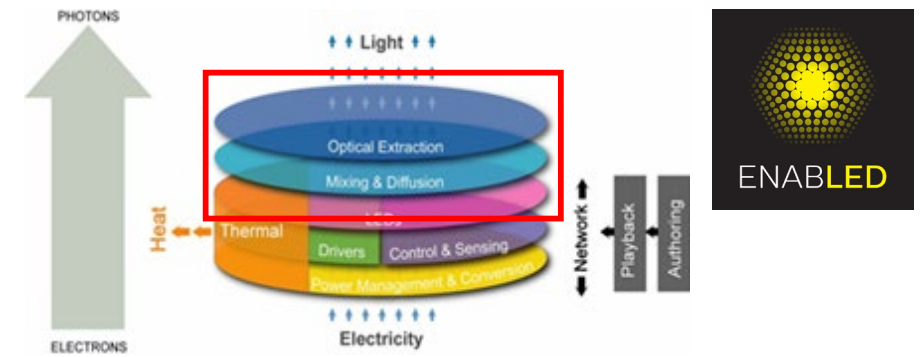
Asymmetric LED light output

- Application: Asymmetrical, directed LED light applications
- Advantage: Provides LED light output only to directions and areas that need to be illuminated
- Example Patents/Applications:
 - North America: US6676282, 7182480, 7670038, 7566155, 7652300, 7866845
 - Europe: EP1108180, 1776718, 1794491, 1996857
 - Asia: CN1130515, 1993826, 100585269, 101405538; JP5854406, 4933434, 5026969; KR1020017002264, 10-1228848, 10-1209696



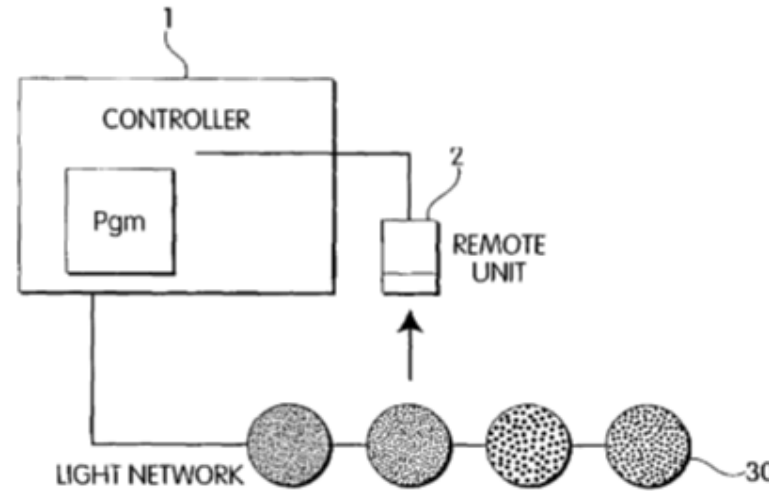
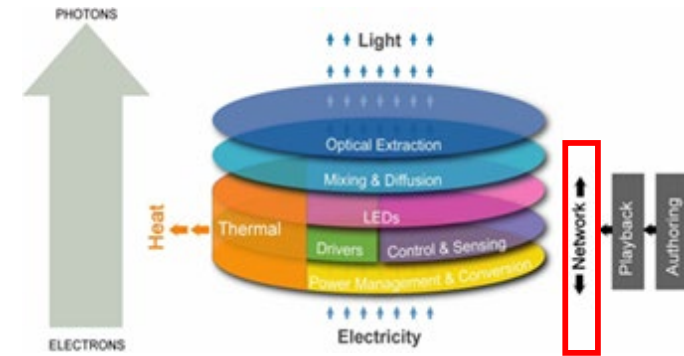
Uniform mixed LED colors output

- Application: Multi color or tunable white LED
- Advantage: Provides good color/tunable white mixing, eliminates white-LED un-equal phosphor artefacts
- Example Patents/Applications:
 - North America: US6200002, 7866845, 8628220, 7988327, 9279547
 - Europe: EP1082572, 1996857, 2386045, 2802805, 2935980
 - Asia: CN1192181, 101405538, 102272515; JP4783504, 5551714, 6133329, 6045725



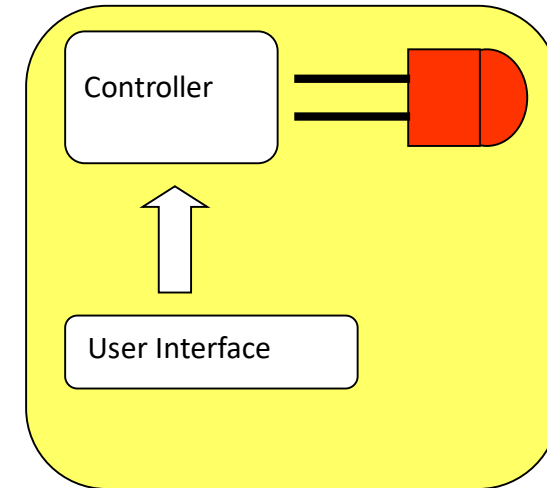
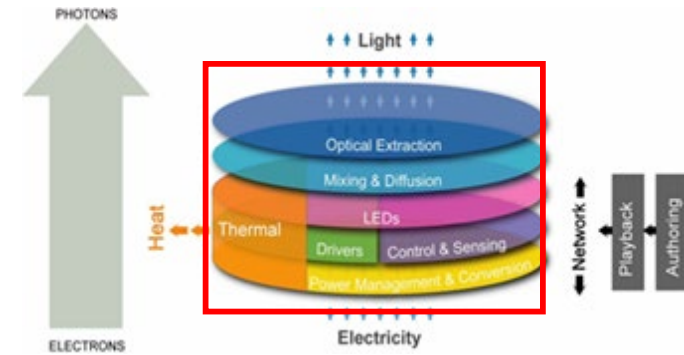
Lighting Systems

- Application: Network control
- Advantage: Effective and efficient operation, communication and/or interaction by or between multiple devices
- Example Patents/Applications:
 - North America: US5909429, 6150774, 6831569, 6969954, 7204622, 7233831; CA2236569
 - Europe: EP0870384, 0890059, 1371211, 1535495
 - Asia: JP3892909, 4141840, 4625697; CN100414943, 1119888; TW112395



Retrofit

- Application: Conventional light source replacement
- Advantage: Leverage the benefits associated with LED (e.g., efficiency) without losing value add of existing infrastructure
- Example Patents/Applications:
 - North America: US6013988, 6147458, 6150774, 6250774, 6528954, 6969954, 7038399, 7064498, 7161311; CA2249423
 - Europe: EP0890059, 0929993, 1034690, 1422975, 1887836
 - Asia: JP4014227, 4159119, 4347794; CN1107193, 1192682, 1287637; HK1112153; KR0471705; TW093750

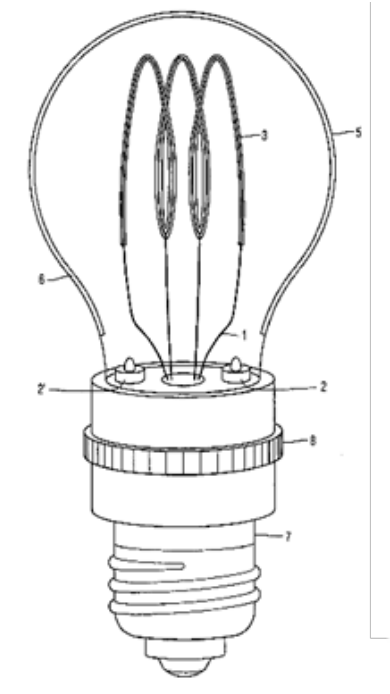
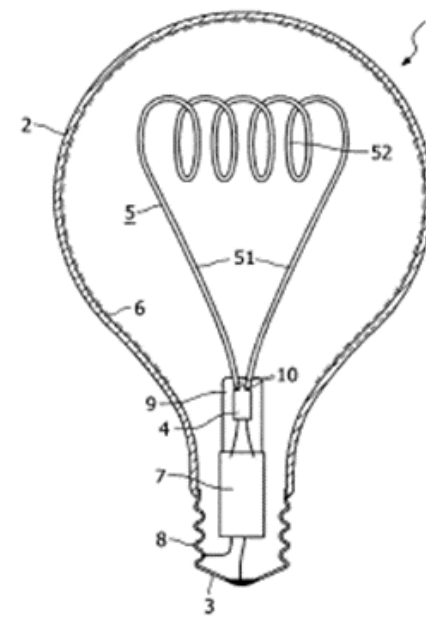
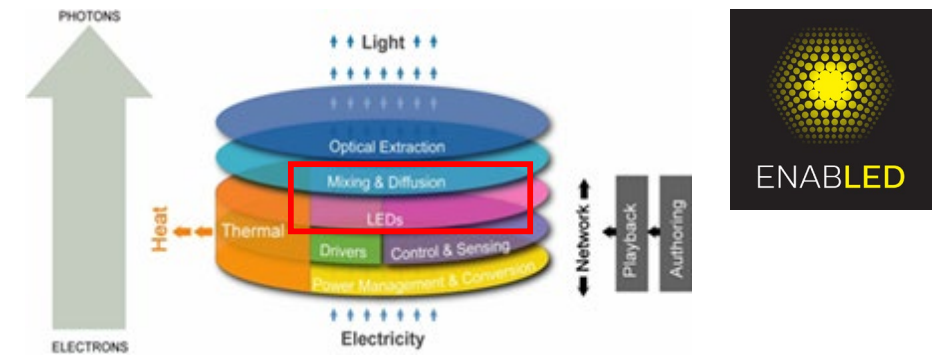


RF, IR, Power
Cycle



Filament based LED products

- Application: Using LEDs and filament forms to generate light
- Advantage: improves reliability and luminous efficacy of filament LED bulbs
- Example Patents/Applications:
 - North America: US6586882, 7810974, 8240900
 - Europe: EP1088350, 1805452, 2789894A
 - Asia: CN1171321, 100520152; JP4545952, 4931819; KR651274, 10-1147342; TW141713, 1347421

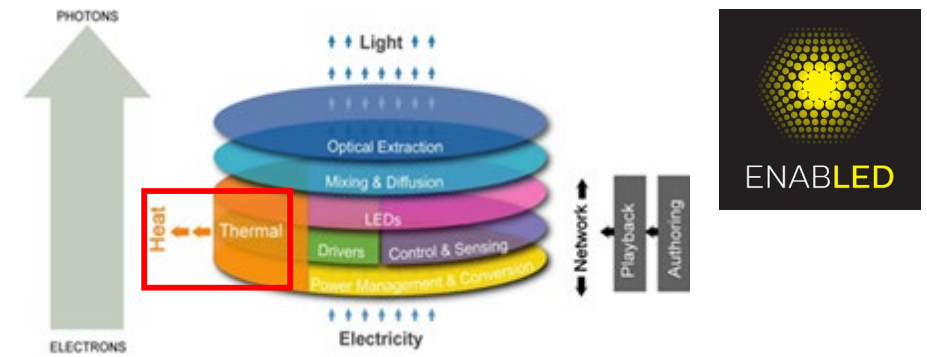


\$10M L Prize winning technology

- Application: LED lamps with omnidirectional light and award winning reliability
- Advantage: omnidirectional light output whilst maintaining cooling efficiency
- Example Patents/Applications:
 - North America: US8314537, 8760043
 - Europe: EP2359052; RU2508498
 - Asia: CN103939768, 102216669; JP5519701, 5767304; KR 10-1659505, TWI515390

U.S. Department of Energy

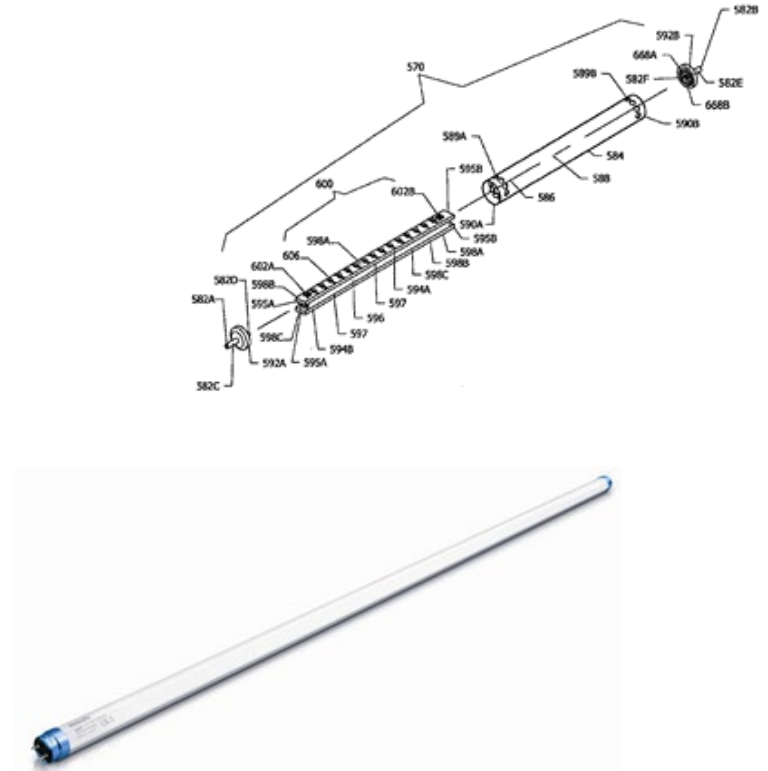
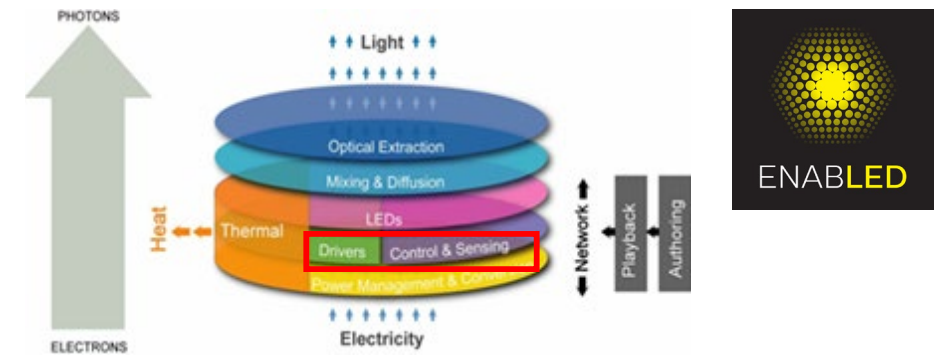
<http://www.lightingprize.org/>



L-PRIZE®
WINNER

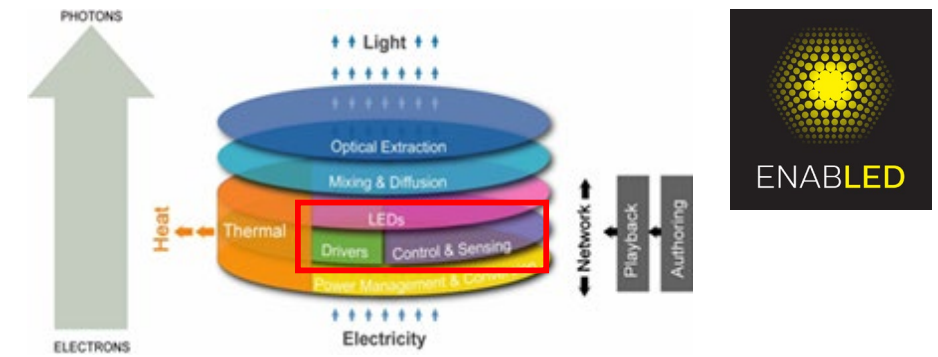
LED-based Lamp for Replacing TL Fluorescent Lamp with safety features

- Application: general illumination and specialty applications
- Advantage: energy-efficient, long-life and mercury-free alternative to fluorescent tubes with safe installation features
- Example Patents/Applications:
 - North America: US6528954, 6676284, 6762562, 6853151, 7014336, 7067992, 7350936, 7490957, 7507001, 8845127, 8858248, 9485828
 - Europe: EP1391650, 2596554, 3005834, 3028541; GB2465966; RU2567542, 2577778
 - Asia CN102985749, 103004036; JP5984804, 6058828

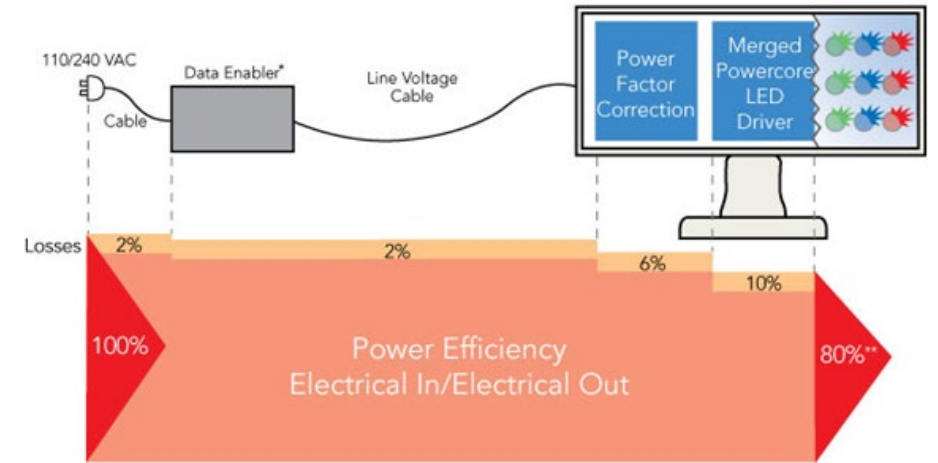


Powercore

- Application: power control (for single color or white, tunable white and color-changing)
- Advantage: increase power efficiencies; easier system installations and lower system costs by eliminating stand-alone power supplies
- Example Patents/Applications:
 - North America: US7233115, 7256554, 7358706, 7459864, 7557521, 7659673, 7737643; CA2559718
 - Europe: EP1731004
 - Asia: JP5198057, 5419918; KR10-1182674
 - AU2005222987



Powercore® System

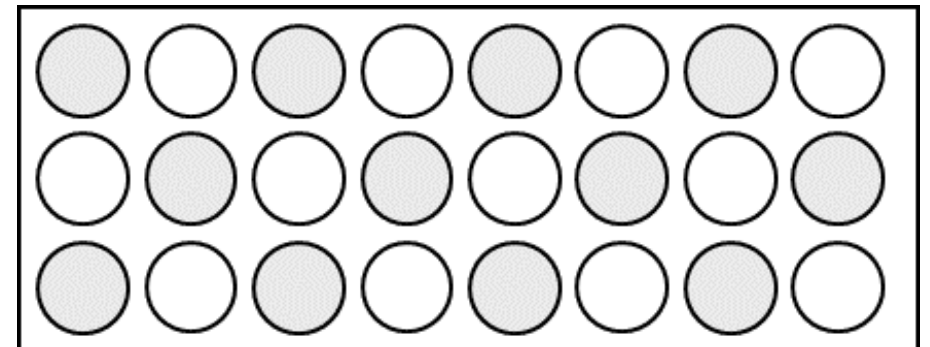
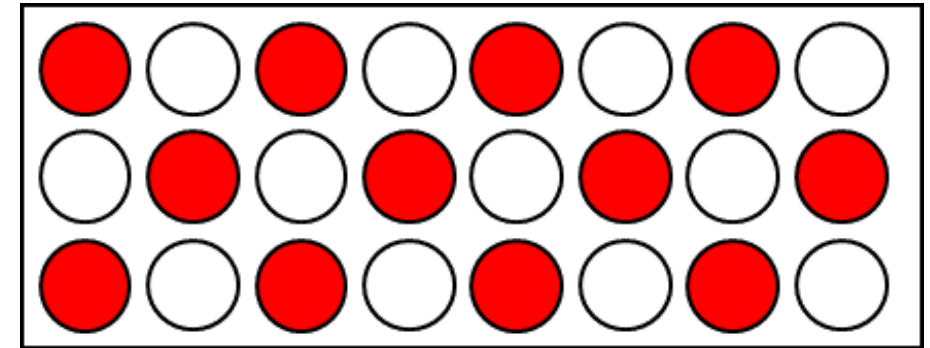
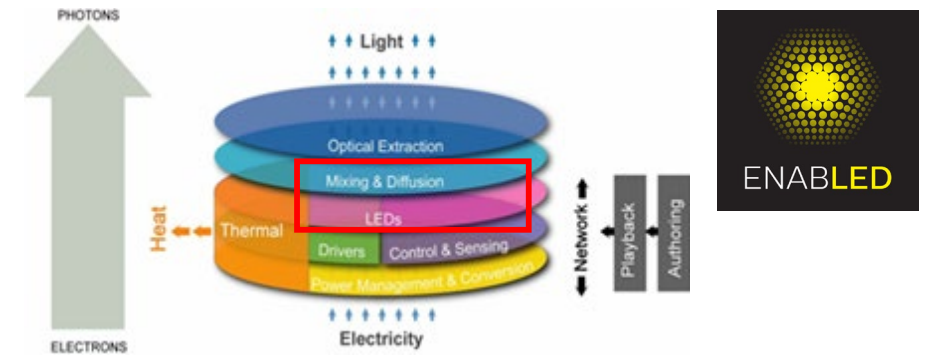


*Minimum communications electronics fixed overhead not included.

Powercore® is a patented breakthrough in digital power processing technology that surpasses traditional power supply technology by streamlining multiple conversion and regulation stages into a single, flexible, microprocessor-controlled power stage that rapidly, efficiently and accurately controls power output to LED-based systems directly from line voltage, eliminating the need for an external power supply.

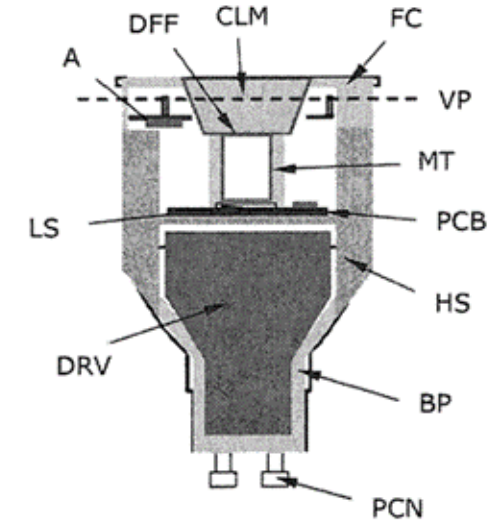
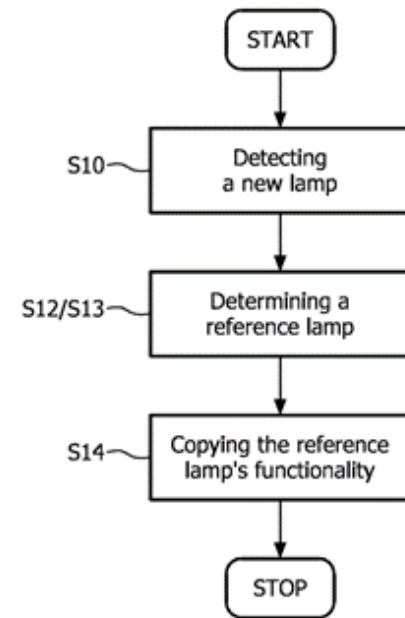
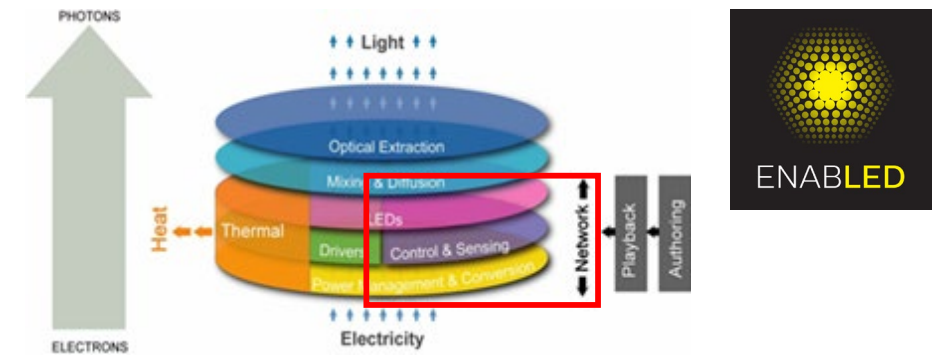
Mixing Light from Different LEDs

- Application: Using two or more different LEDs to generate light (for single color or white, tunable white and color-changing)
- Advantage: achieve desired color of light or color temperature of white light, for both static and dynamic (e.g., color-changing) applications
- Example Patents/Applications:
 - North America: US6234645, 6234648, 6513949, 6692136, 7014336, 7719209, 8203284
 - Europe: EP1046196, 1047904, 1234140, 1887836, 2143303; GB2421367
 - Asia: CN101107885, 101663919, 1124426, 1227738, 1227749; HK1112153; IN210549; JP4366016, 4376464; KR10-0702273, KR10-0776837, TW167039



Connected LED lighting technology

- Application: Systems of networked LED lighting products with Radio Frequency (RF) connectivity
- Advantage: Simplified integration in networks and improved antenna design for increased connection reliability with limited physical space available in products
- Example Patents/Applications:
 - North America: US7014336, 7064498, 7462997, 9184497
 - Europe: EP1422975, 2377371, 2438647; RU2540802
 - Asia: CN 102246600, 102804493; JP5460940, 5544372; KR10-1537522



Signify