



Voltimum – Grundkurs i belysningsstyrning

Claudio Freitas & Mikael Steise 2022.03.15

Agenda

What is Lighting control?

New challenges of Lighting control

New possibilities

Types of lighting control systems

Operating Principle of a LED light control

Lighting Protocols

Network Protocol

Wired

Wireless

Further training

What is Lighting control?

Turn on and off? Dim up and down?



New challenges of Lighting control

Conventional light sources:

- Large
- Power hungry
- Slow response
- AC powered

LED light sources:

- Small
- Power efficient
- Fast response time
- DC power
- Multiple sources can be combined in the same silicon (RGB)





New possibilities

Tunable white

Color changing (Color Kinectics)

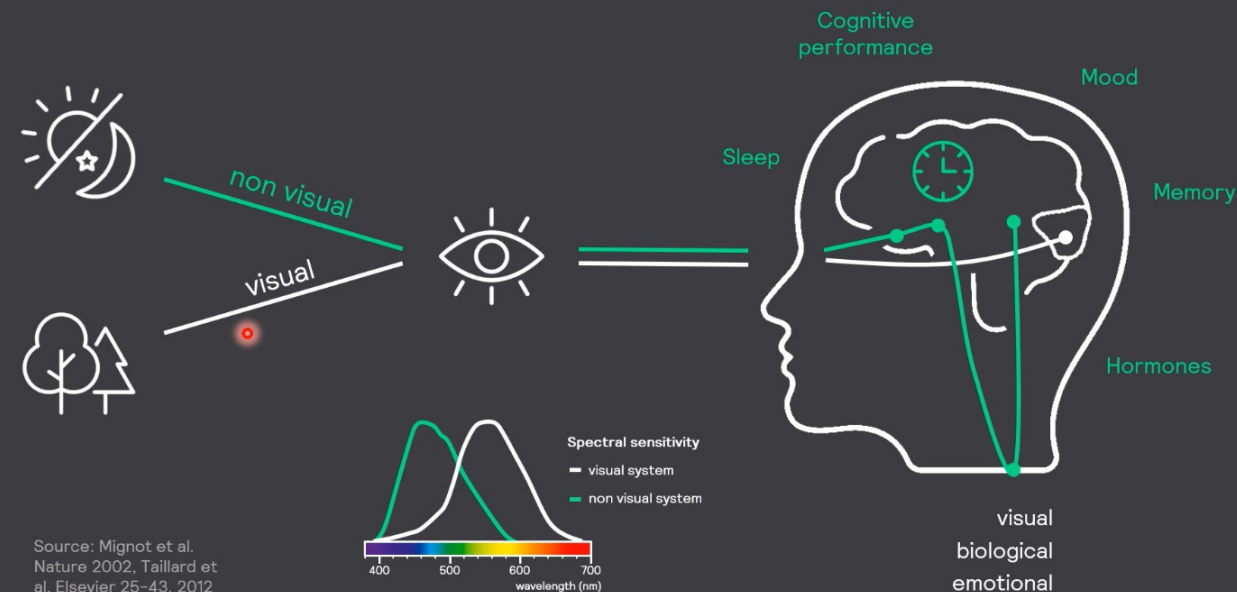
Data transmission over light (ex. VLC, LiFi)

Image rendering (ex. Luminous textiles)

Multiple form factors (3D printed)

Spectrum fine tuning (ex. Melanopsin photoreceptor)

Bring light into focus



Types of lighting control systems

Energy saving

- Control can add 75% savings

Comfort (Right light level, Color temperature)

- Right amount of light for the right task

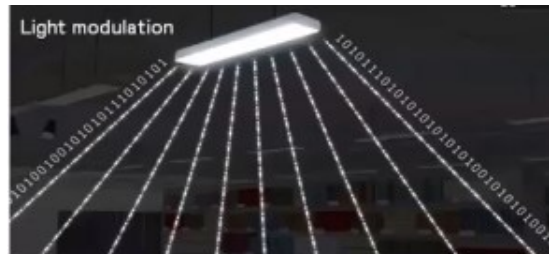


Flexibility (No rewire needed with changes)

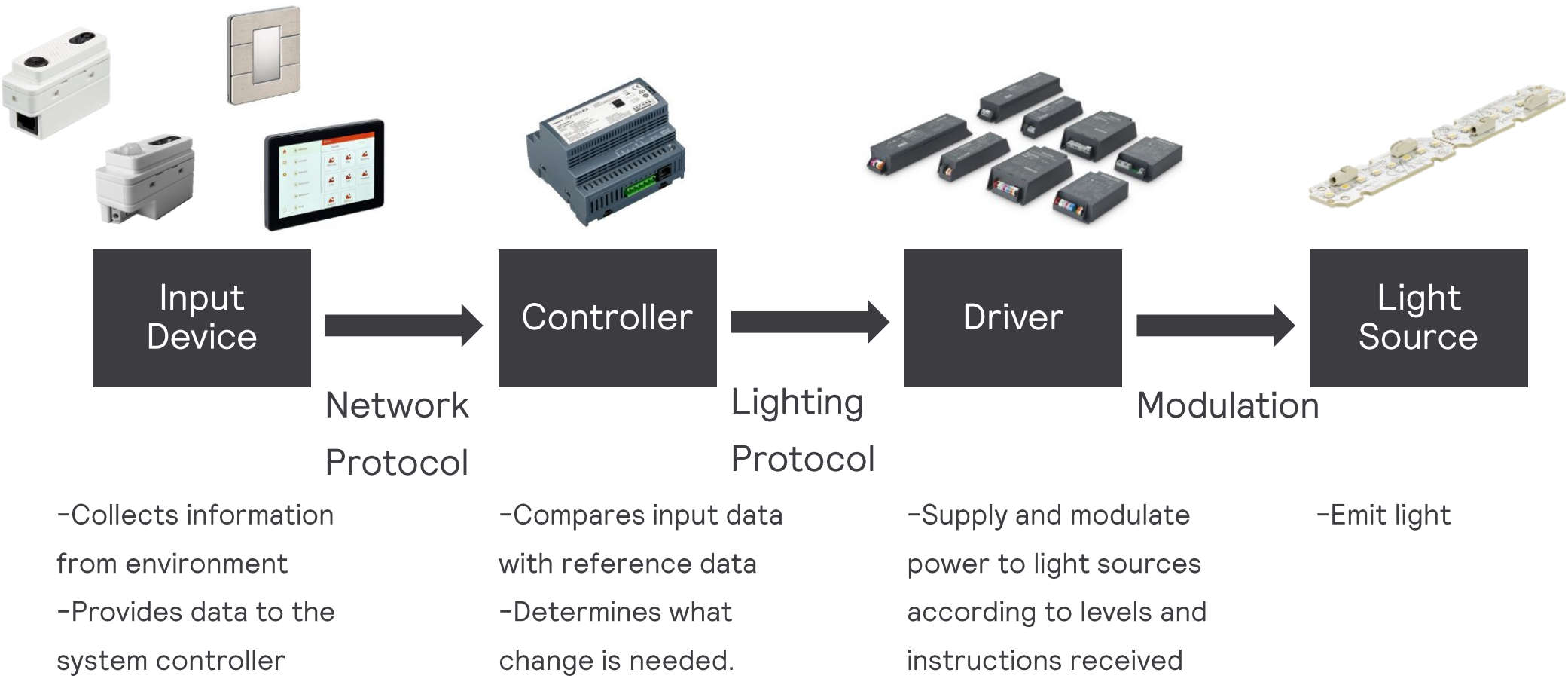
- Office spaces that change layout without changing wiring

Function (Indoor position, data transmission, signaling by color, Health)

- Light is used to inform or to perform tasks

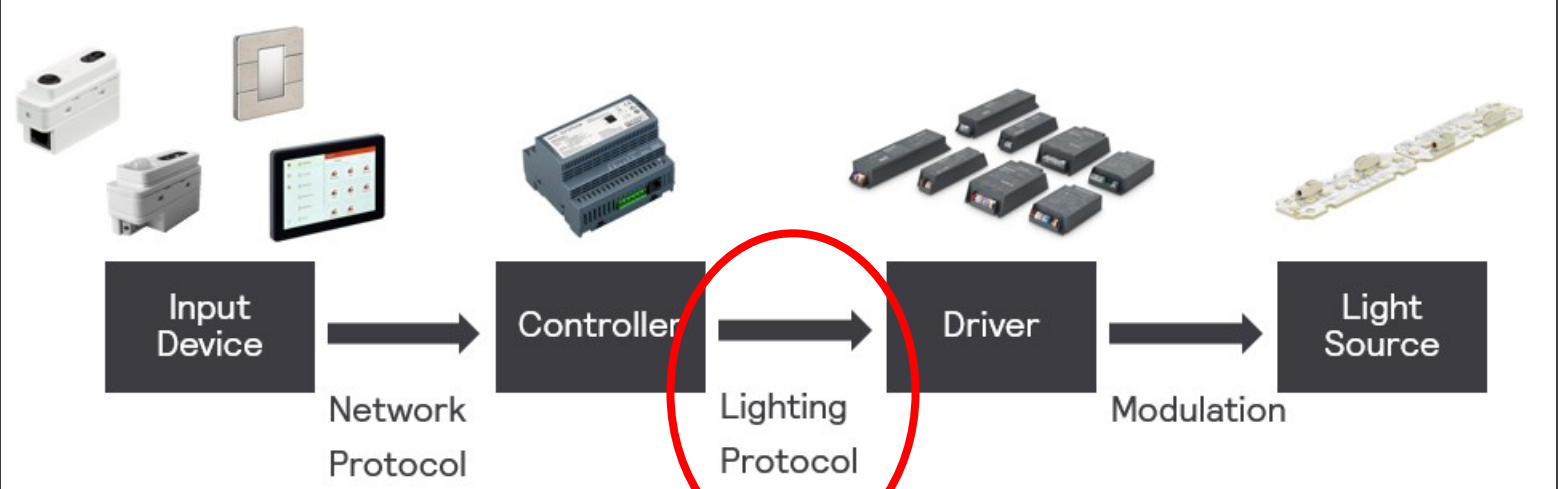


Operating Principle of a LED light control



Lighting protocols

- 1-10V
- DMX512
- DALI
- D4i



Lighting protocols

Analogue dimming (old protocol)

Control signal: 1-10V DC

-10V light at 100%

-1V light at min. level

Pros:

Well established protocol

Easy to troubleshoot

Easy to install

Cons:

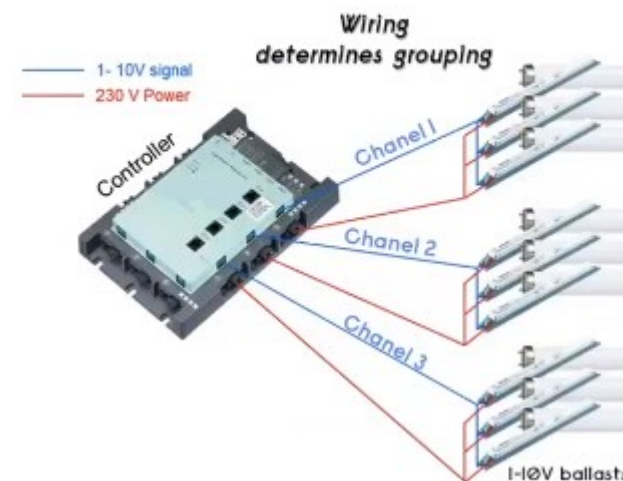
Reduced hardware availability

Depending on the wiring it can have a voltage drop causing different light levels in the same channel.

Only one channel per wire

No feedback

1-10V



Lighting protocols

1986 originated in the theater with color changing luminaires.

Pros:

Fast response

Controls to multiple points independently using one controller

Duplicated address permitted.

Cons:

One Way (Can be used with RDM)

Requires special data cabling

Fixed data topology

Luminaires have to be addressed.

Single controller

DMX512

DMX control



Lighting protocols

Create by Philips, Helvar, Osram and Tridonic

Pros:

Addressable

Mains rates cabling

Free topology

Color temperature control

Cons:

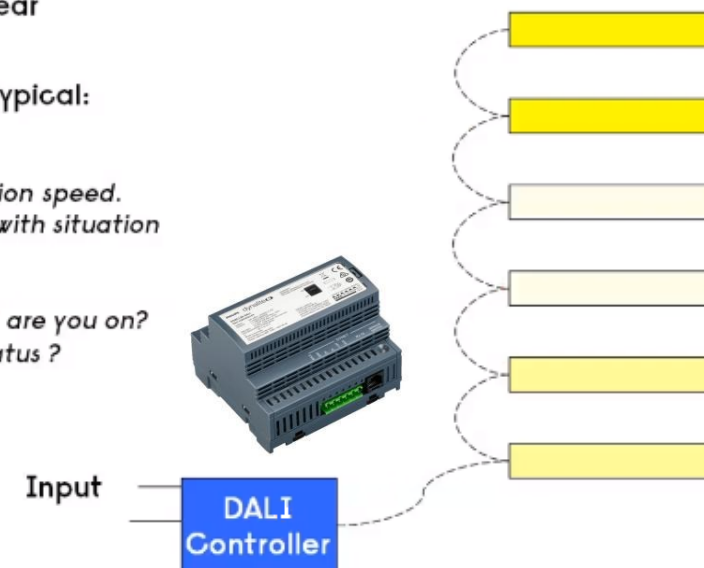
Not a fast protocol.

Max 64 addresses per bus.

DALI

DALI control

- 16 scenes stored in the gear
- Approx. **70 commands**, typical:
 - ✓ Go to light level *xx*.
 - ✓ Go to minimum level.
 - ✓ Set value *xx* as regulation speed.
 - ✓ Go to level compliant with situation *xx*.
 - ✓ Turn lamp off.
 - ✓ Query: What light level are you on?
 - ✓ Query: What is your status ?
- 2 way communication



Lighting protocols

Built on top of DALI. Designed for an internal luminaire system.

Pros:

(Same as DALI)

D4i Power supply located in the driver

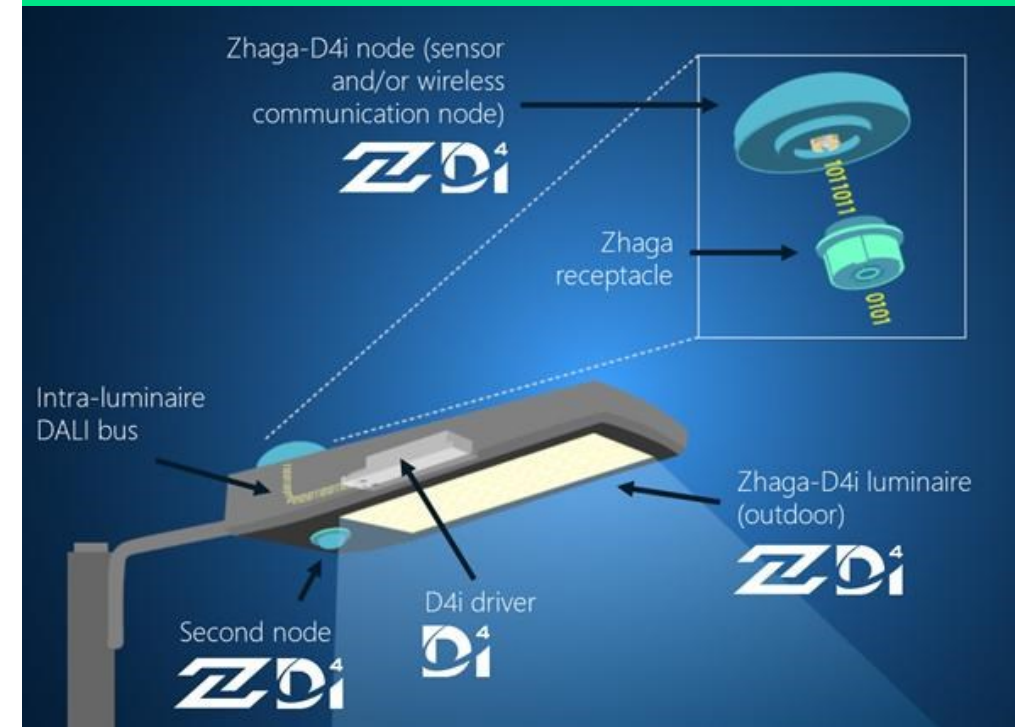
Luminaire information

Diagnostics

Cons:

Not a fast protocol

D4i



Network protocols - Wired

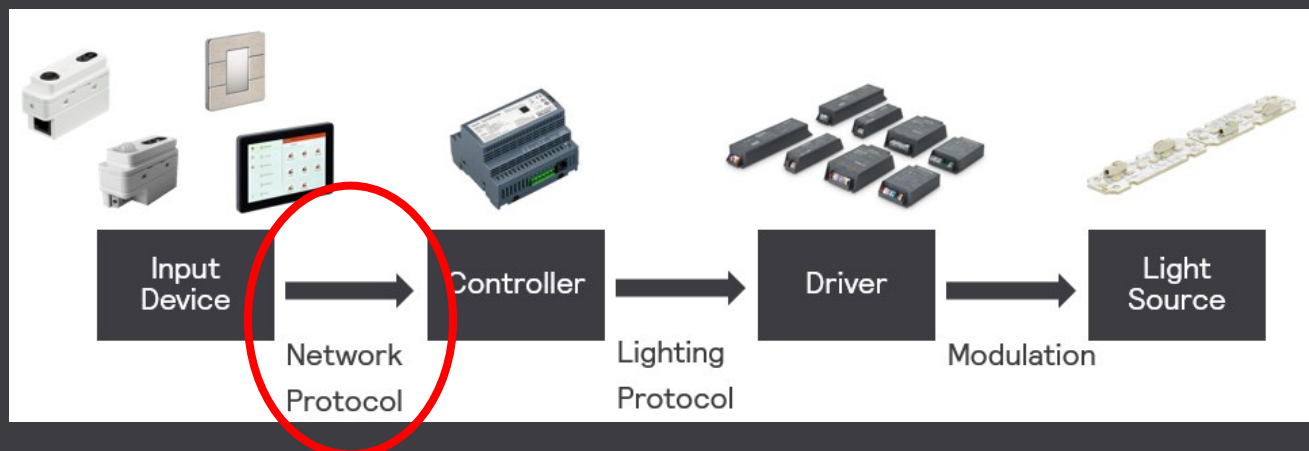
Dynet (Philips Dynalite Protocol)

ArtNet

KNX (Multi vendor standard)

BACnet (Broadly used for BMS integration)

LON (mostly used in US)





Network protocols - Wireless

Zigbee

- Mesh Protocol
- Routed
- Low energy consumption
- Encrypted
- Scale for larger networks

Bluetooth LE

- Smart phone compatible
- Point to Point

WiFi

- Point to Multi-point
- Convenient

Bluetooth Mesh

- Mesh
- Managed-Flooding
- Quick
- Smaller networks

Product examples:

Interact Pro



wiZ

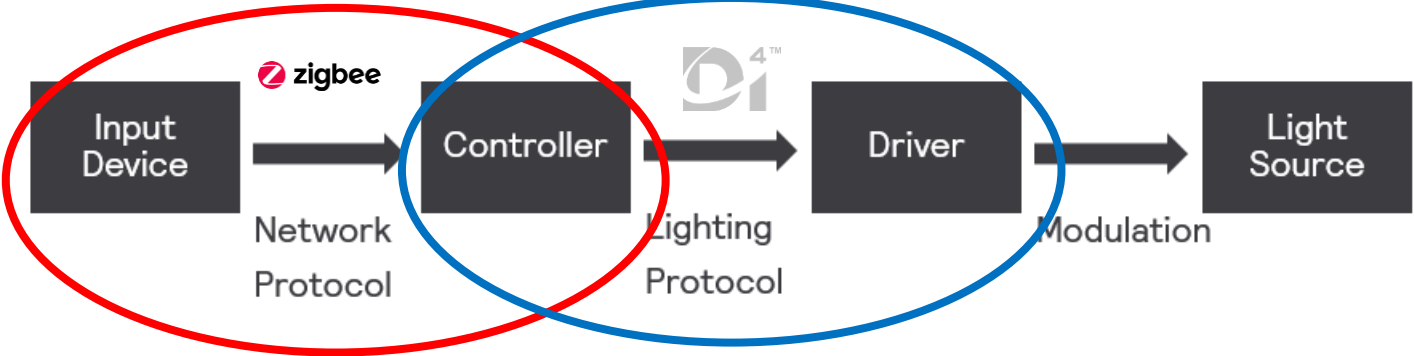


Outdoor
Multisensor



Signify

Example Wireless Lighting



Further Training
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