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Designers Lighting Forum

Well Hello, DALI!

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

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Learning Objectives

At the end of this course, participants will be able to:

1. Gain a strong knowledge of the core components in a successful DALI installation
2. Design and/or install a DALI lighting control system, understanding the requirements and constraints of the installation
3. Discuss programming requirements of a DALI system to make the system functional
4. Understand the current market research of available components used in DALI North American installations

What is DALI?

- Digital Addressable Lighting Interface
- IEC 62386 Technical Standards
- Digital Illumination Interface Alliance (DiiA)
- Allows equipment from different manufactures to be connected together in a single control system

Terms

- Bus
  - A pair of wires that carries digital control signals from input devices (such as sensors), to an application controller, or controller to power device (drivers)
- Subnet – (Formerly Loop)
  - Controller
  - Parts

IEC 62386 – Overseen by Digital Illumination Interface Alliance (DiiA)

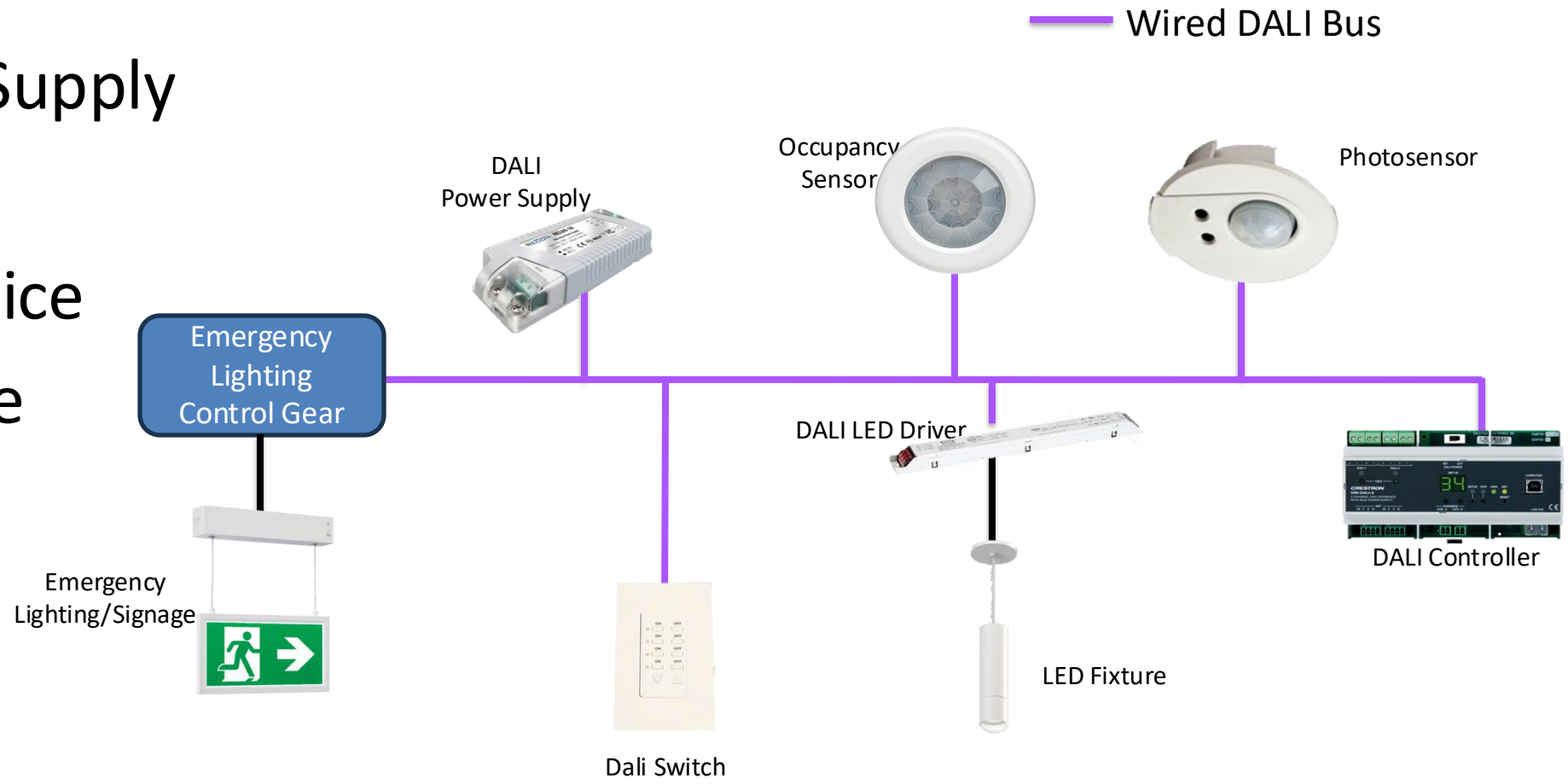
101: General Requirements – System Components

101: General Requirements – System Components
102: General Requirements – Control Gear
103: General Requirements – Control Devices
104: General Requirements – Wireless and alternative wired systems
105: General Requirements – Firmware Transfer
150: General Requirements – AUX Power Supply

2xx: Particular requirements for control gear		3xx: Particular requirements for control/input devices
Published: 201: Fluorescent lamps 202: Self-contained emergency lighting 203: Discharge lamps (excluding fluorescent lamps) 204: Low voltage halogen lamps 205: Supply voltage controller for incandescent lamps 206: Conversion to DC (0/1-10V) 207: LED Modules 208: Switching function 209: Colour control	**Published:** 216: Load referencing 217: Thermal gear protection 218: Dimming curve selection 220: Centrally-supplied emergency operation 221: Load Shedding 222: Thermal lamp protection 224: Integrated light source 250: Integrated Bus Power Supply 251: Luminaire Data (Memory Bank 1 Extension) 252: Energy Data 253: Diagnostics & Maintenance Data	**Published:** 301: Push buttons 302: Absolute input devices 303: Occupancy Sensors 304: Light sensors 305: Colour sensors 306: General-purpose sensors 332: Feedback 333: Manual Configuration **In Progress:** 351: Luminaire-mounted Control Devices

DALI Requirements

- Bus Power Supply
- Wiring/Bus
- Control Device
- Input Device
- Controller
- Others



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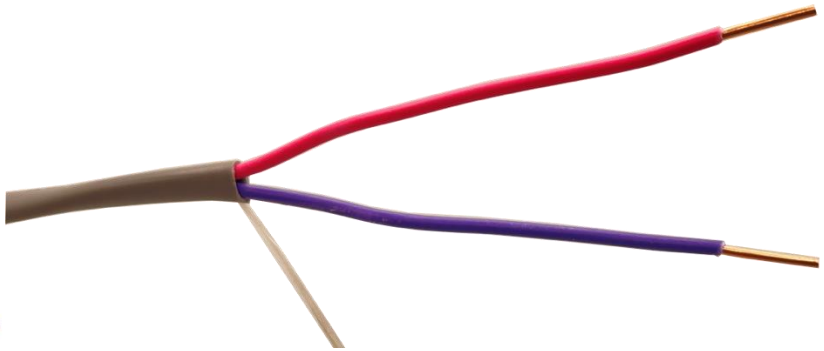
Bus Power Supply

- Always required
- Maintains bus voltage
- 250mA
- 16VDC nominal
- Needed for each Subnet
  - Can’t share

Wiring/Bus

- 2 Conductors
  - 16ga Recommended
  - Twisted Pair – Noise Reduction
- Distance limit 1,000’/300m
- Polarity
- Color Coding
  - NEC
  - NEMA



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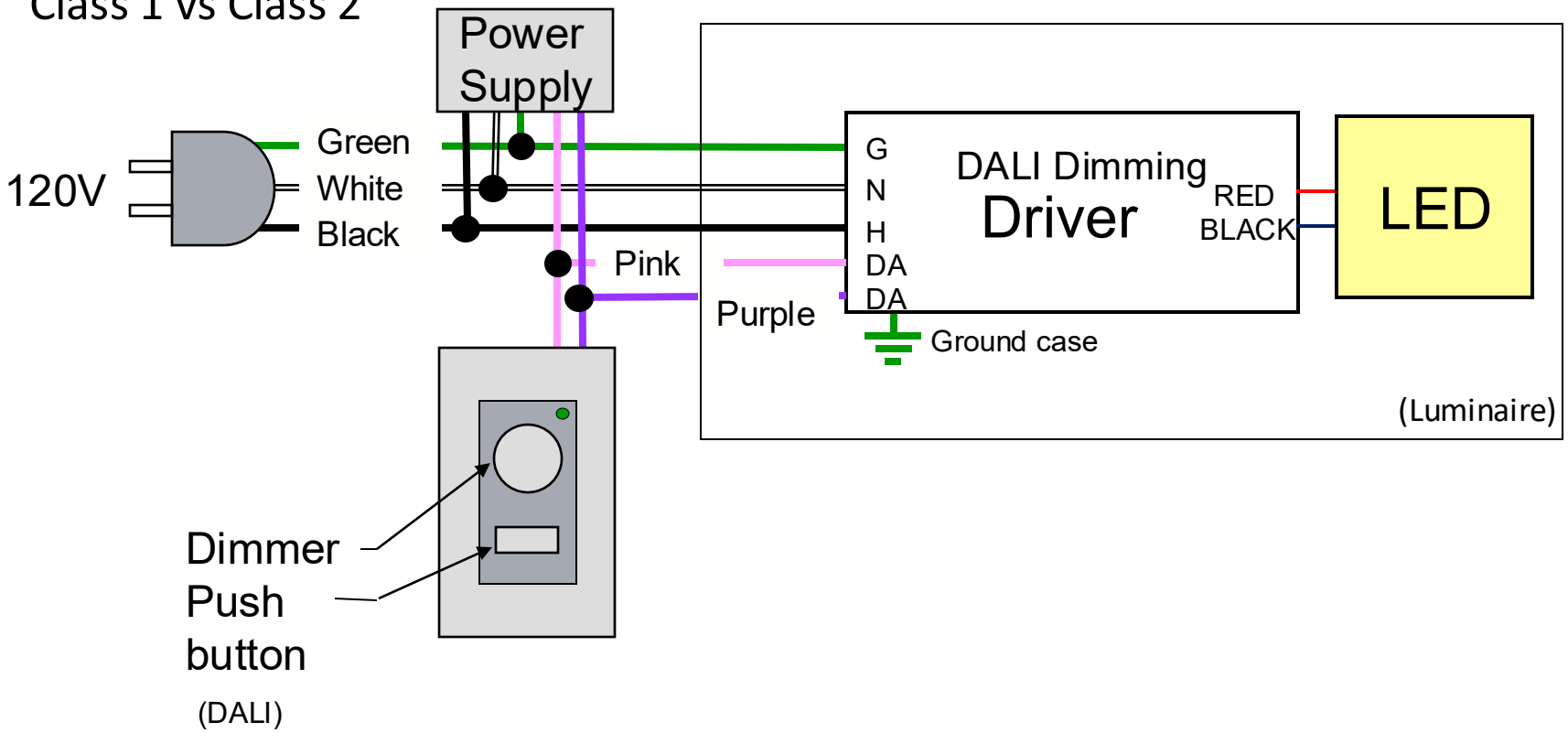
Wiring

Class 1 vs Class 2



The DALI wiring may be Class 1
(in the conduit with the line-voltage conductors), or
The DALI wiring may be Class 2
(NOT in the conduit with the line-voltage conductors).

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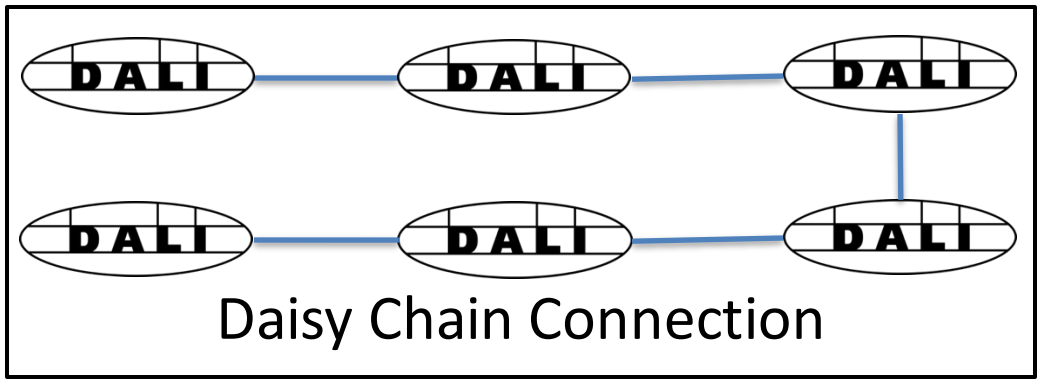
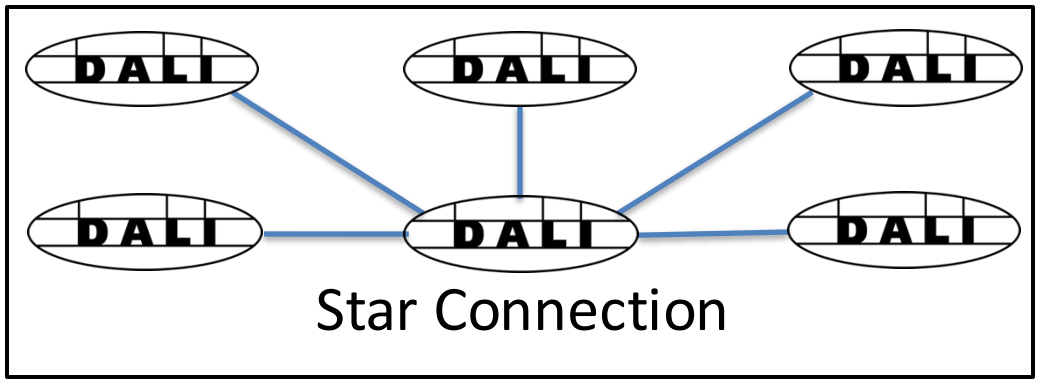
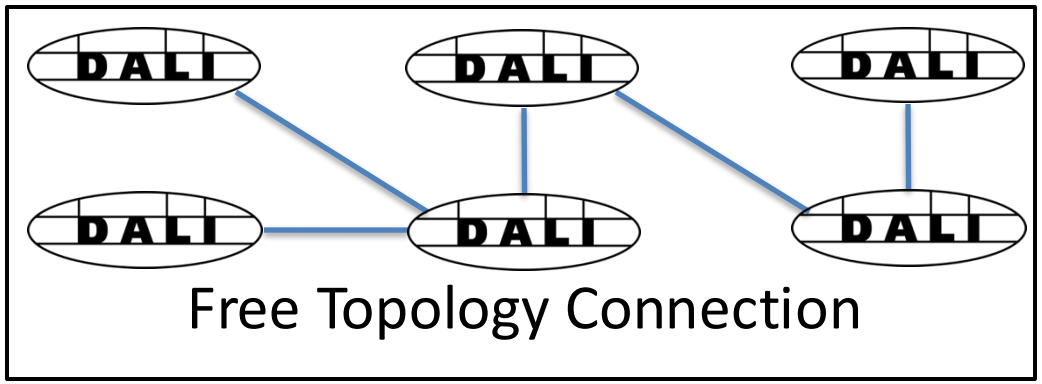
DALI Wiring Topology



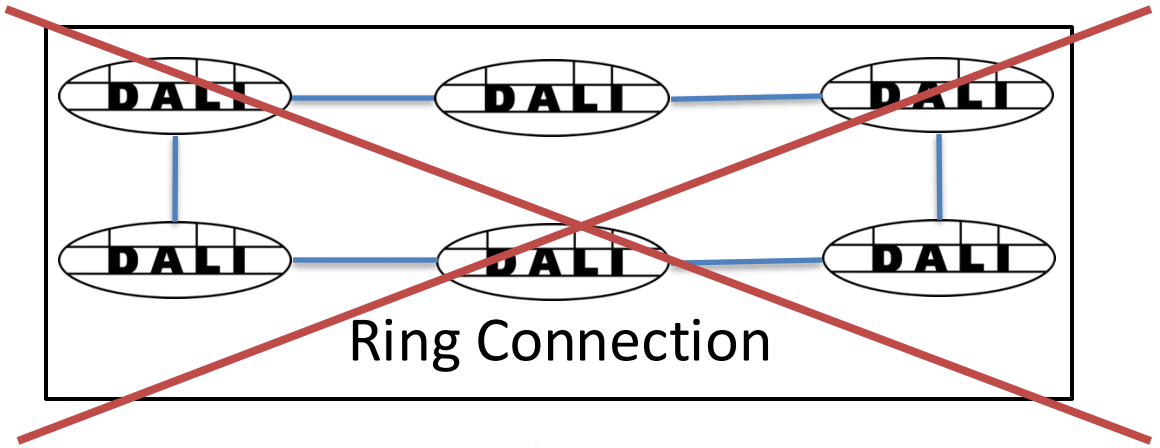
Daisy Chain Connection



Star Connection



Free Topology Connection



Ring Connection

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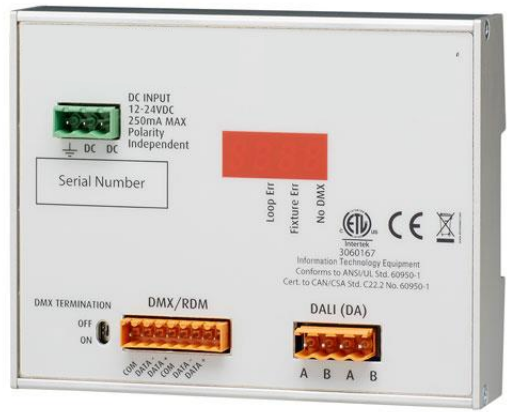
Controller

- Receives 24-bit messages from control devices
  - Device on buss, or on manufacturer's control buss
- Sends 16-bit commands to control devices



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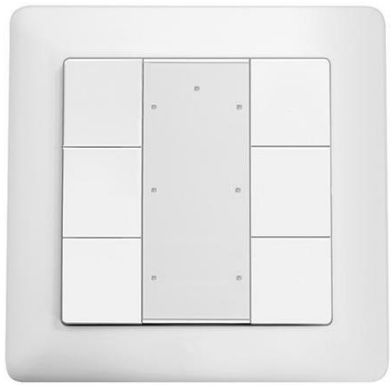
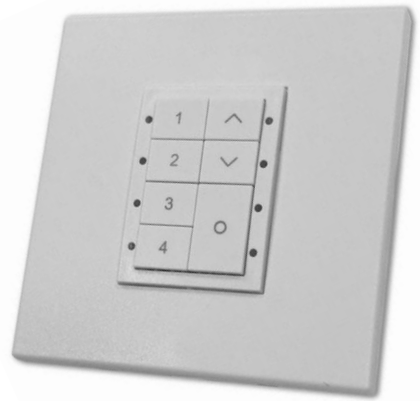
Input Devices



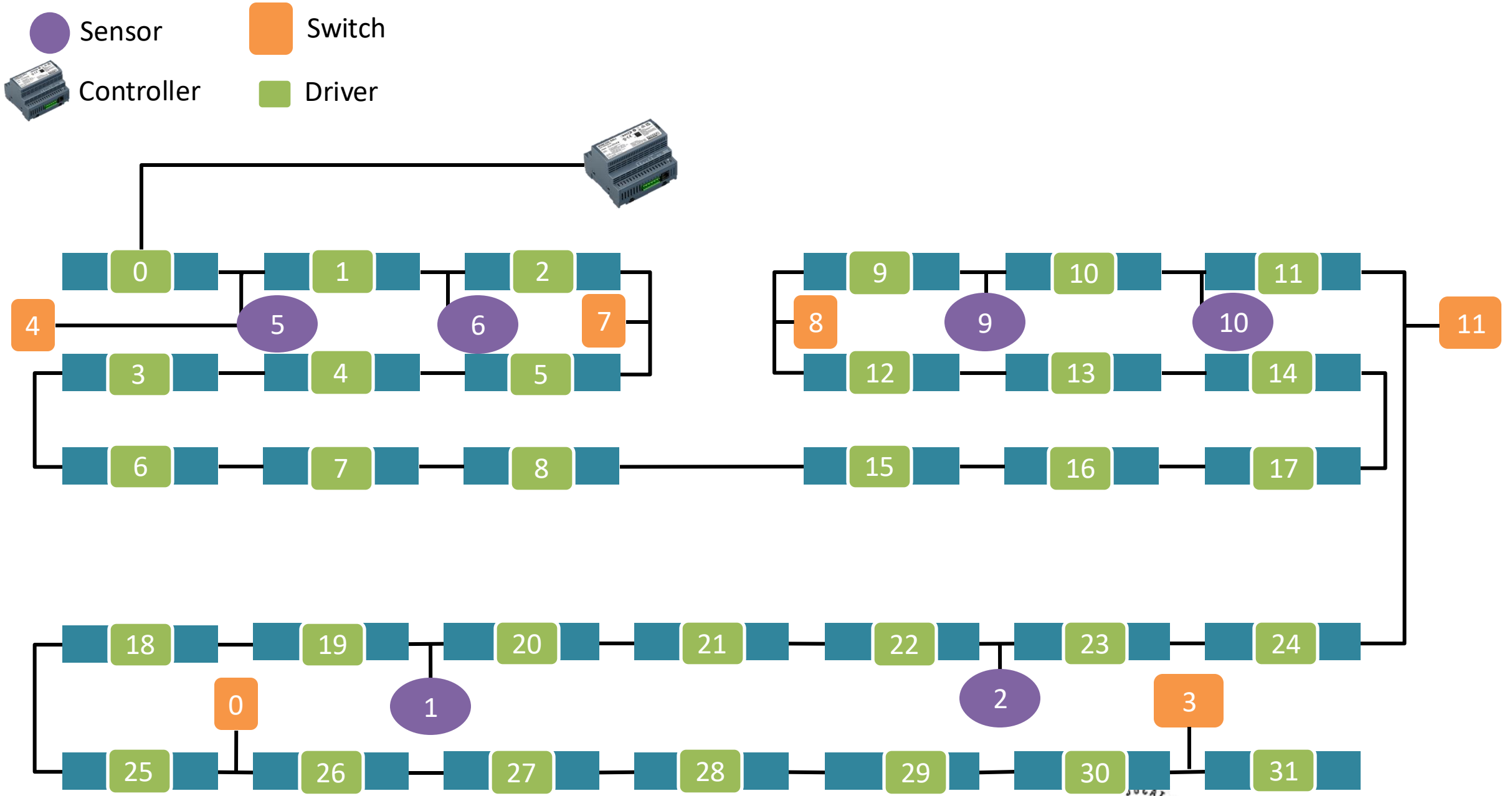


Limitations

- Up to 64 control devices (ballasts/drivers) on a DALI subnet
- Up to 64 input devices (sensor/switch) on a DALI subnet (can be same subnet as above)
- Each control and each input device are addressed (0-63)
- Each control device may belong up to 16 Groups
- Each control device may have up to 16 Scenes
- There may be up to 254 commands
- Several subnets can be linked together via a DALI Gateway to create a DALI network of more than 64 control and/or input devices
- 300m Distance
- Unlimited Subnets

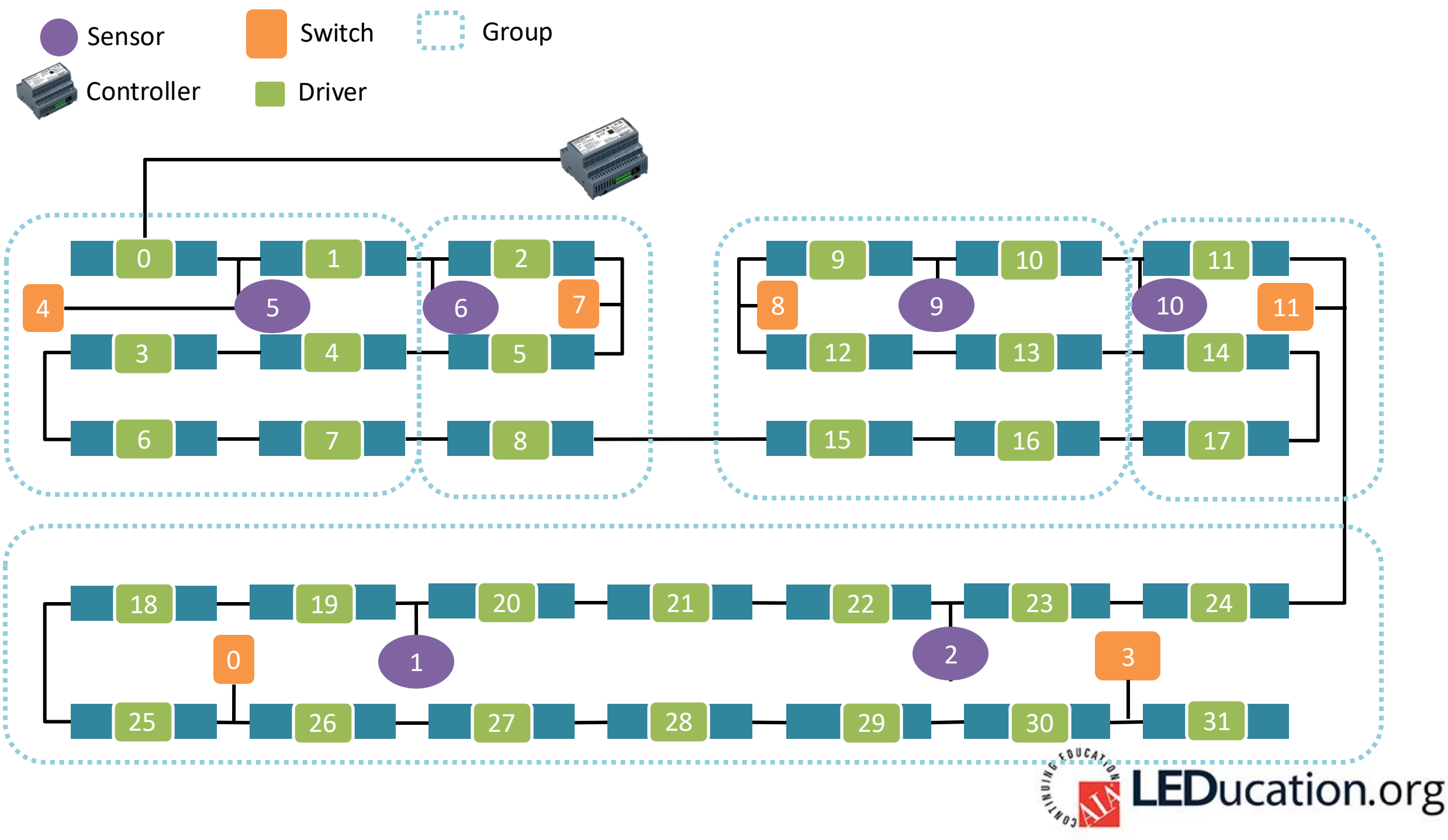
Zones and Groups

- Groups allow multiple DALI Devices on the same line to be grouped together which allows the devices to perform an action together.
- Each DALI device can be assigned membership to a group or multiple groups.
- This grouping allows commands to be sent out in groups with all members of the group reacting to one individual group command.
- If a device is not part of the group it will ignore command.



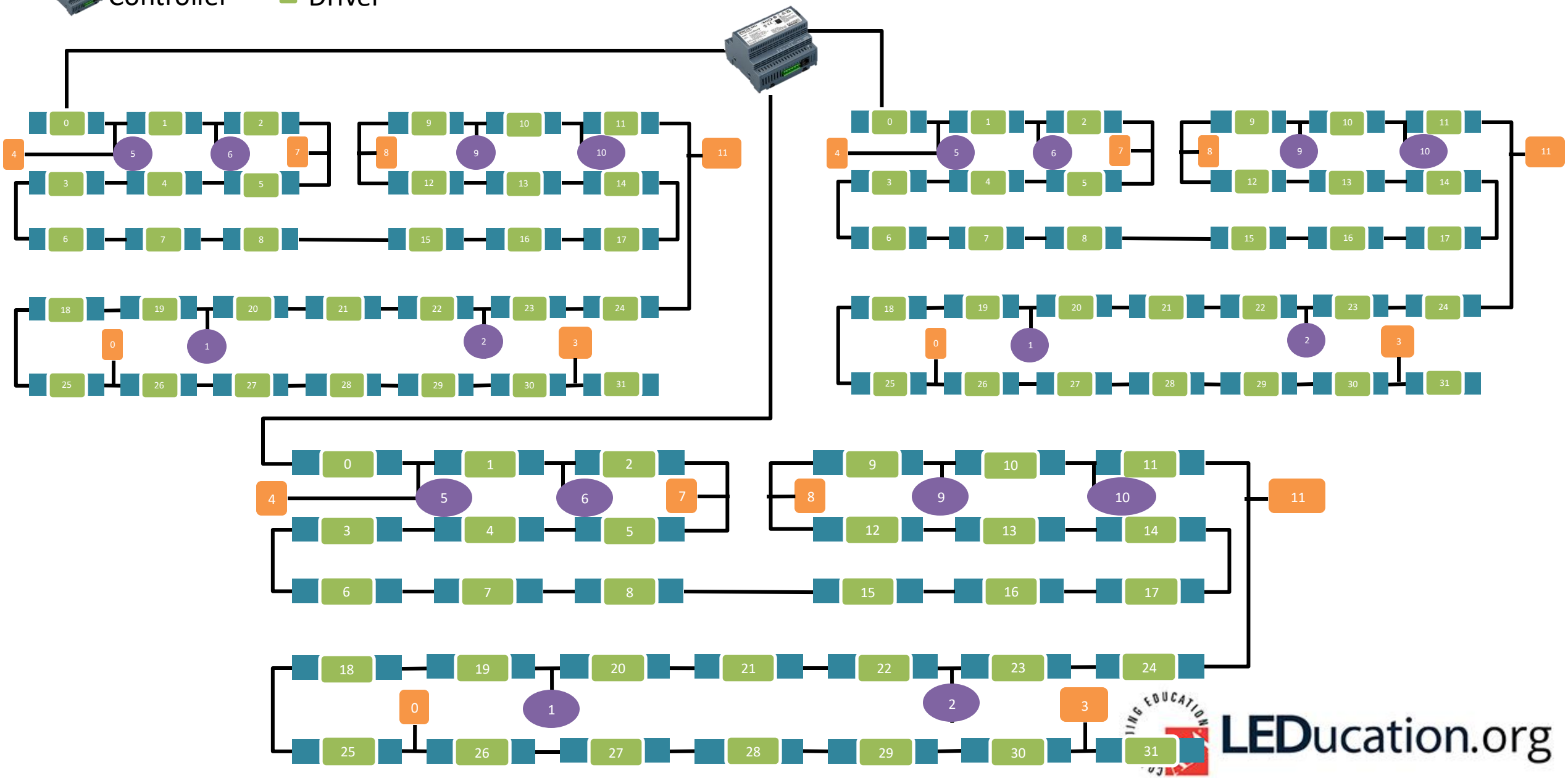
Practical Design

- Begin with groups and scenes
- Proceed to your limits
- Add in subnets as you hit your limits
  - which means a bus power supply, wiring, etc.
  - Number of subnets by controllers vary, but you scale based on those specs



Put it Together

Sensor
Switch
Controller
Driver



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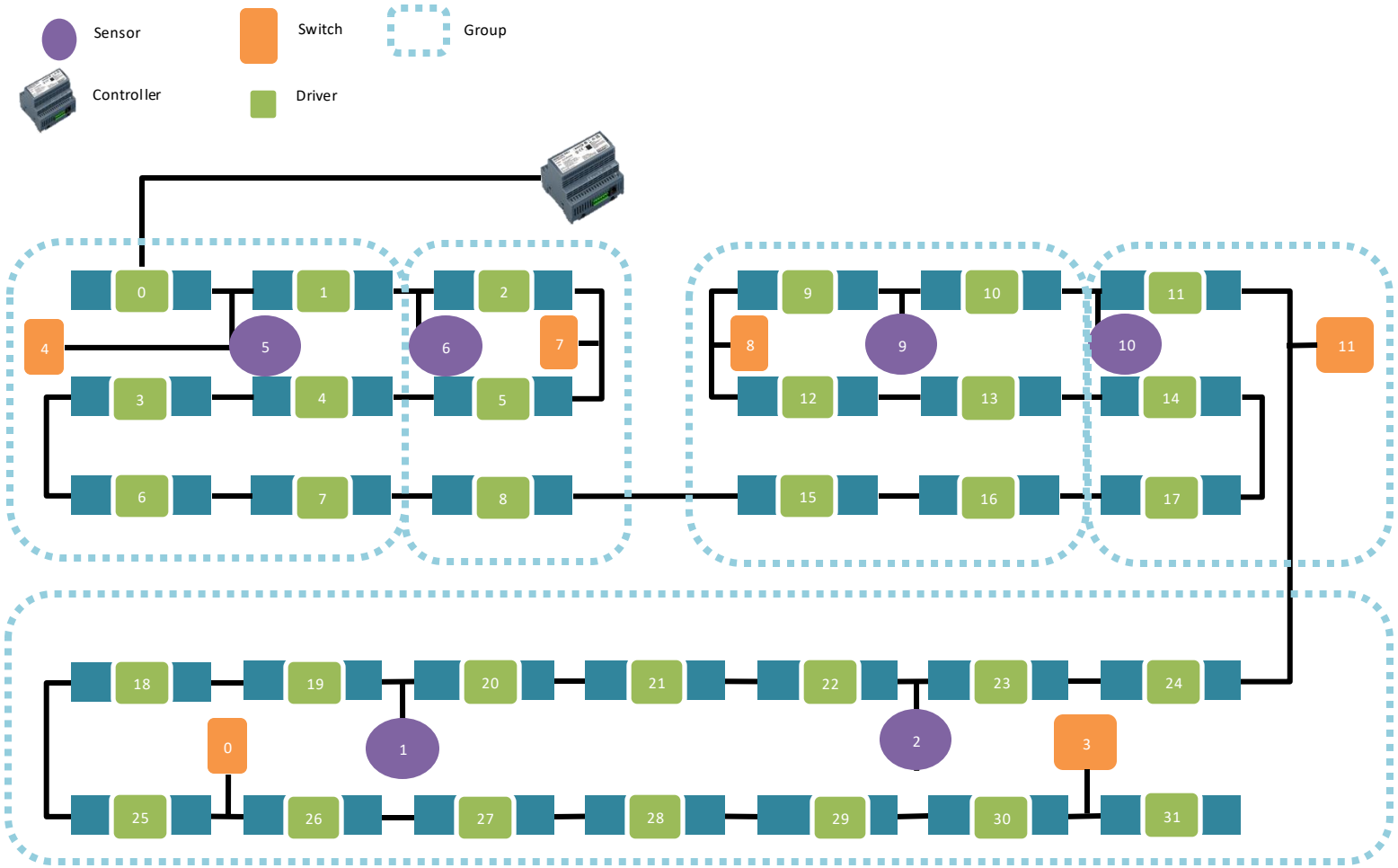
Configure

- Essential Steps
  - Address – Document
  - Groups
  - Presets



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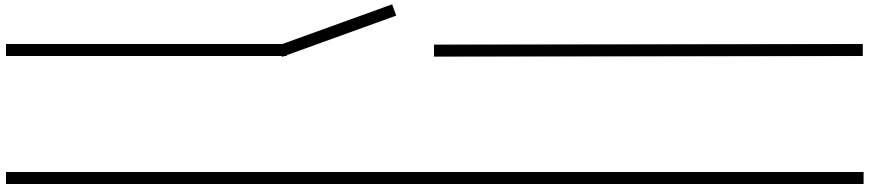
Emergency

- Falls under Part 220: Centrally-supplied emergency operation
- Interruption of data
  - Failure of Normal Power Supply, and establish Emergency Power Supply
  - Collapse the Bus Voltage

Short Bus



Open Bus

Emergency

NFPA 70 *National Electrical Code*

Article 700.24 Directly Controlled Emergency Luminaires

> “Luminaires that are energized to the required emergency illumination level by disconnection of their control input by a listed emergency lighting control device shall not be required to be listed for use in emergency systems.”

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Emergency

Normal/Emergency
Neutral (Gray)

Normal/Emergency
Power In (Black)

Dali In

Dali Thru

Normal Switched Sense (Red)

Normal Power Sense (Black)

Normal Neutral (White)

Normal Power
Sense

DALI
Normal/Emer
Fixture

Normal/Emergency Power
Out (Red)

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Emergency

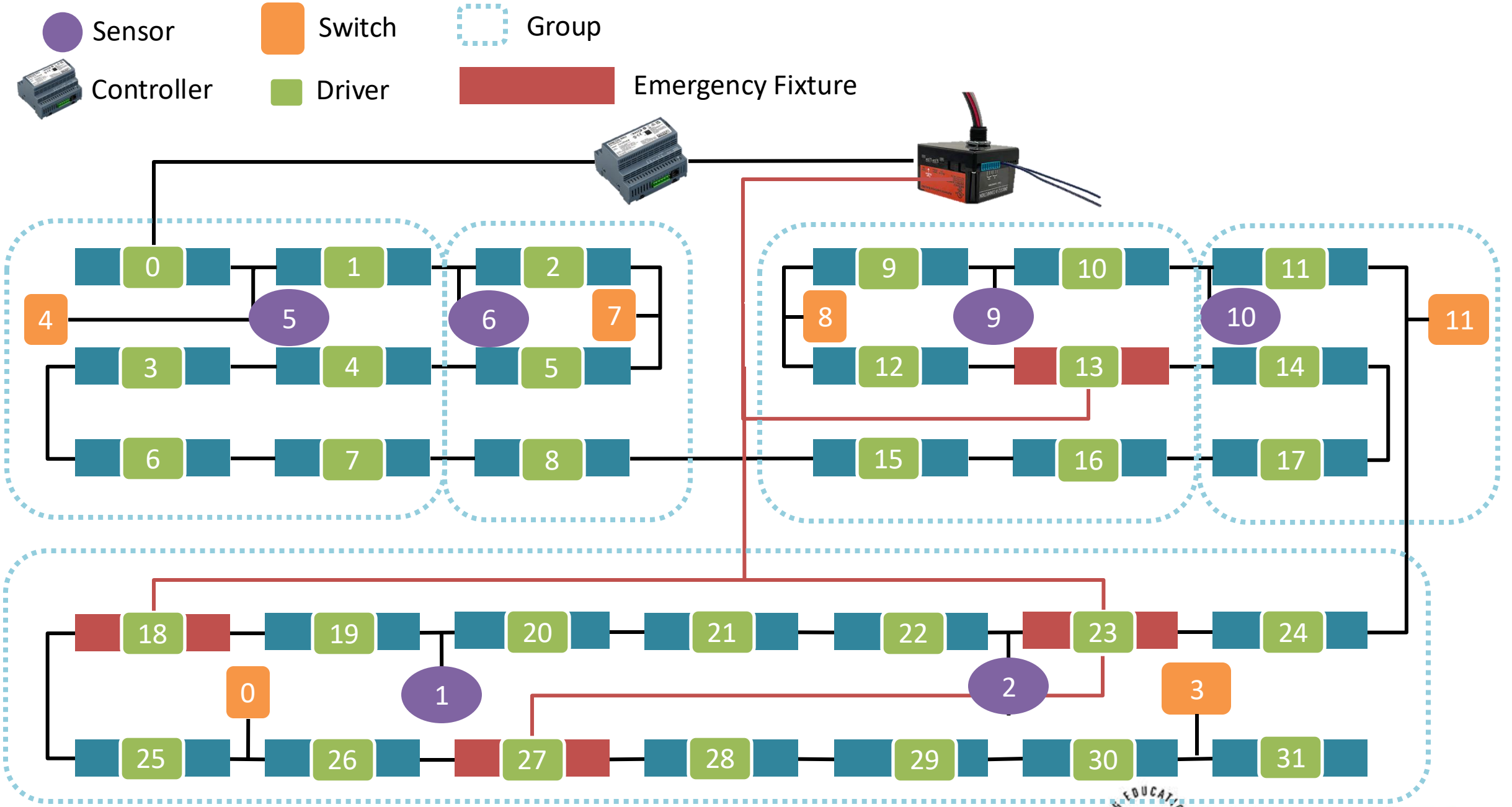
Separation of Normal and Emergency

Article 700.10 Wiring, Emergency System

"(B) Wiring from an emergency source or emergency source distribution overcurrent protection to emergency loads shall be kept entirely independent of all other wiring and equipment unless otherwise permitted in the following:"

Article 700.11 Wiring, Class-2-Powered Emergency Lighting Systems

"**(A) General.** Line voltage supply wiring and installation of Class 2 emergency lighting control devices shall comply with 700.10"



Connecting Others

- Control System
- Gateways

Conclusion

- Follow the basic rules for success
- Highly scalable, easy to mix manufacturers, consistent results


Q & A

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This concludes The American Institute of Architects Continuing Education Systems Course

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