

10BASE-T1 for Connected Lighting V1.1

Matthias Wendt, Lennart Yseboodt, Oscar Deurloo
Philips Lighting Research
September 2016

Lighting controls application

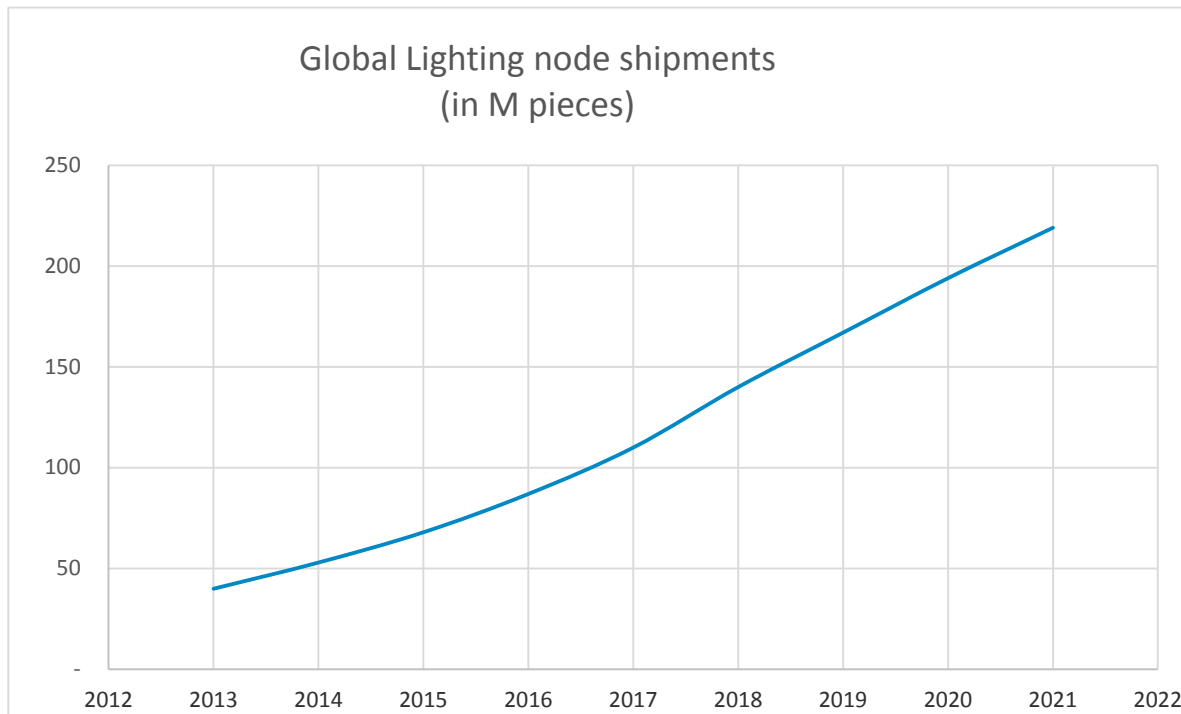
Motivation:

10BASE-T1 as a long distance single pair Ethernet standard might be perfectly fitting future requirements in building automation and lighting controls

This presentation is to inform about the currently used digital lighting controls technology and the market of connected lighting

Connected Lighting market

- Market studies show constant growth in Building Automation Systems
- The market for connected Lighting nodes grows as projected by Navigant Research



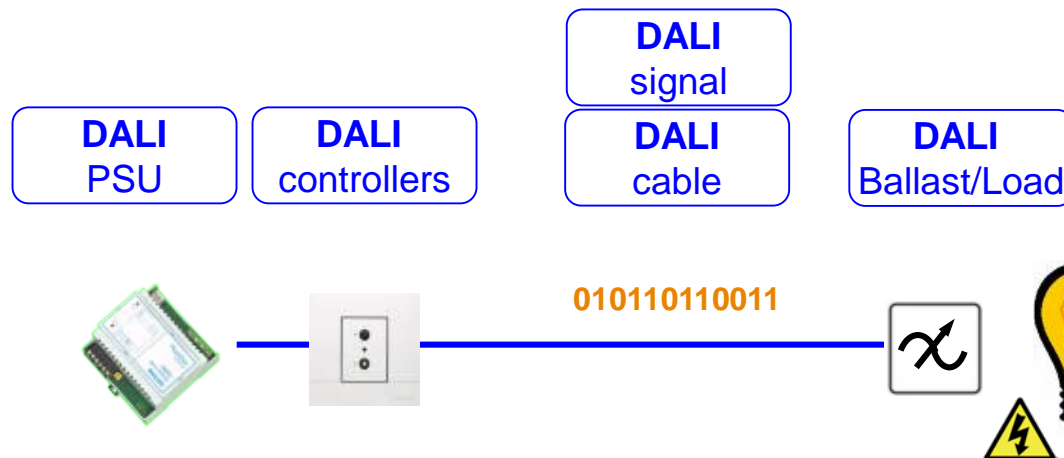
Source:

NAVIGANT
RESEARCH

Smart Buildings Networking
and Communications, 2014

DALI – Digital Addressable Lighting Interface

- A digital protocol to communicate between controller and luminaire with command and messages (on/off, dimming, status reports)
- Invented by Philips, Helvar and Osram starting in 1984
- DALI is standardized in IEC 62386
- 2 wire cabling system (often mains cable is used) total length 1000 feet



DALI bus and signal properties



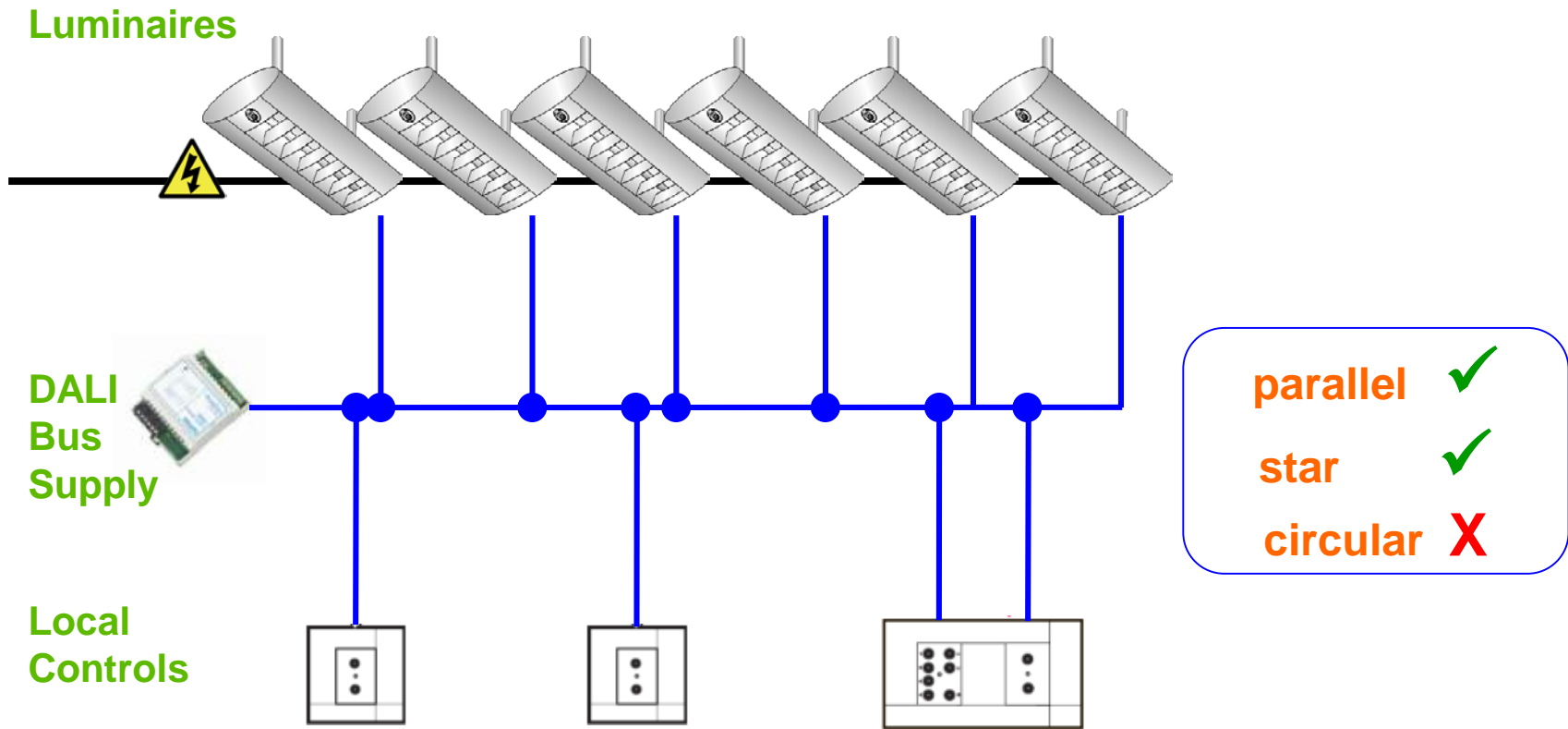
- 2 wire communication
- Free topology (next slides)
- Basic insulation
- Mains/surge protection available
- Polarity insensitive gear
- Two-way communication
- Bus powered devices possible
 - E.g. sensor, button panel etc.

- 1200 bits/s, Manchester encoded
 - Seems slow, but one command can change all light levels (scenes)
- Signal level 0 = 0 V +/- 4.5 V
- Signal level 1 = 16 V +/- 6.5 V
- Maximum bus current 250 mA

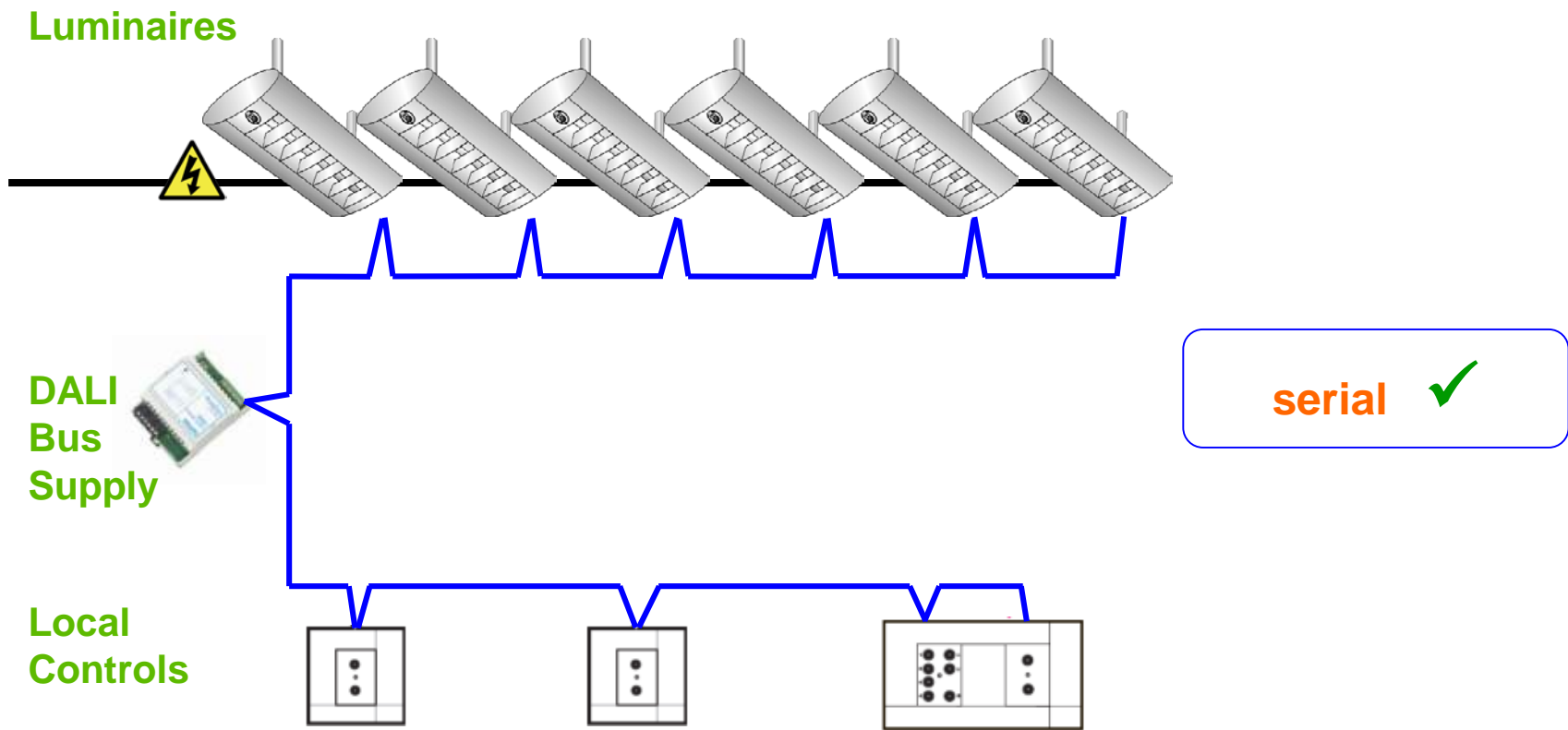
- 64 addressable units

DALI cabling - topology

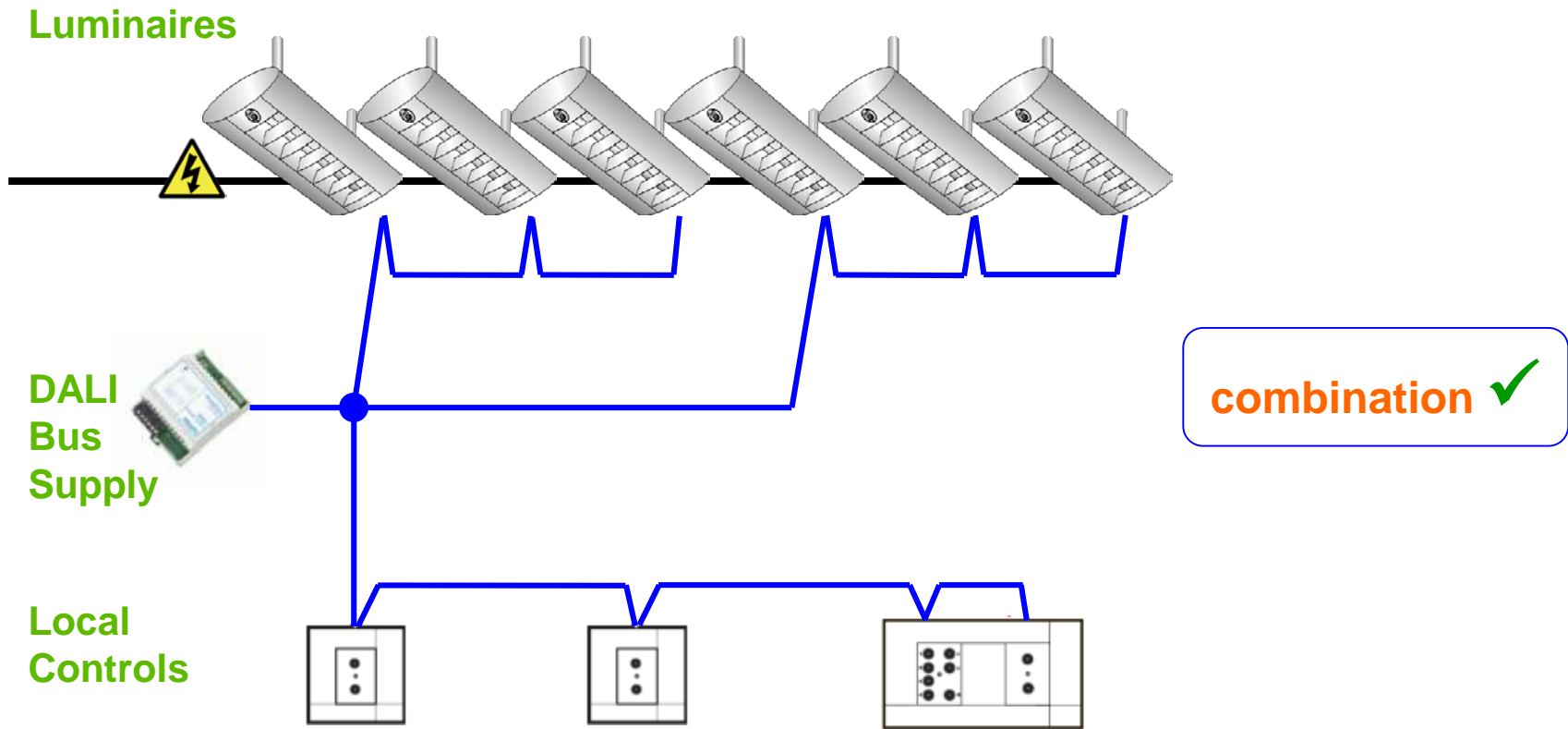
Topology with DALI is almost free
Advised total length of DALI cable <300m



DALI cabling - topology



DALI cabling - topology

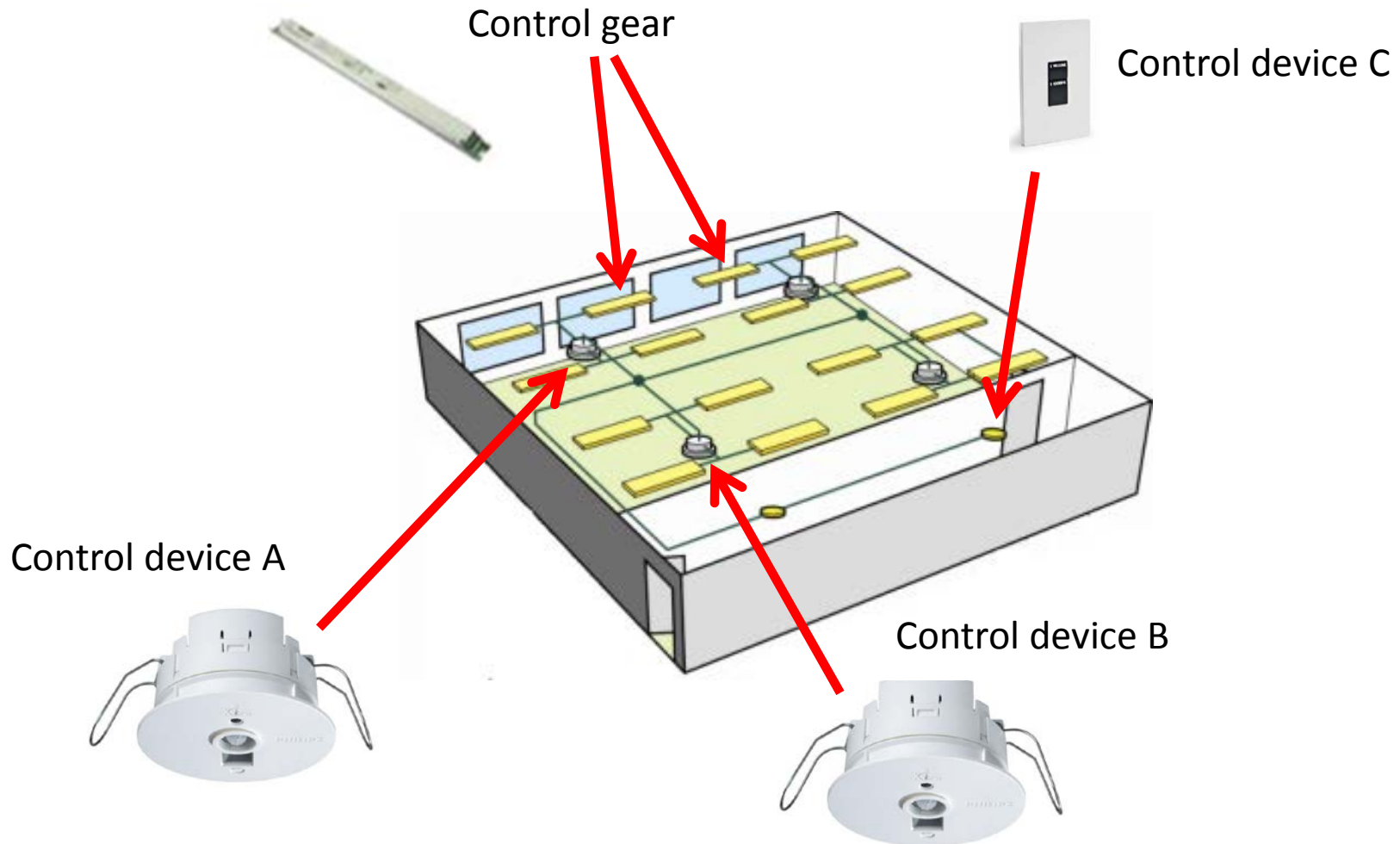


Summary

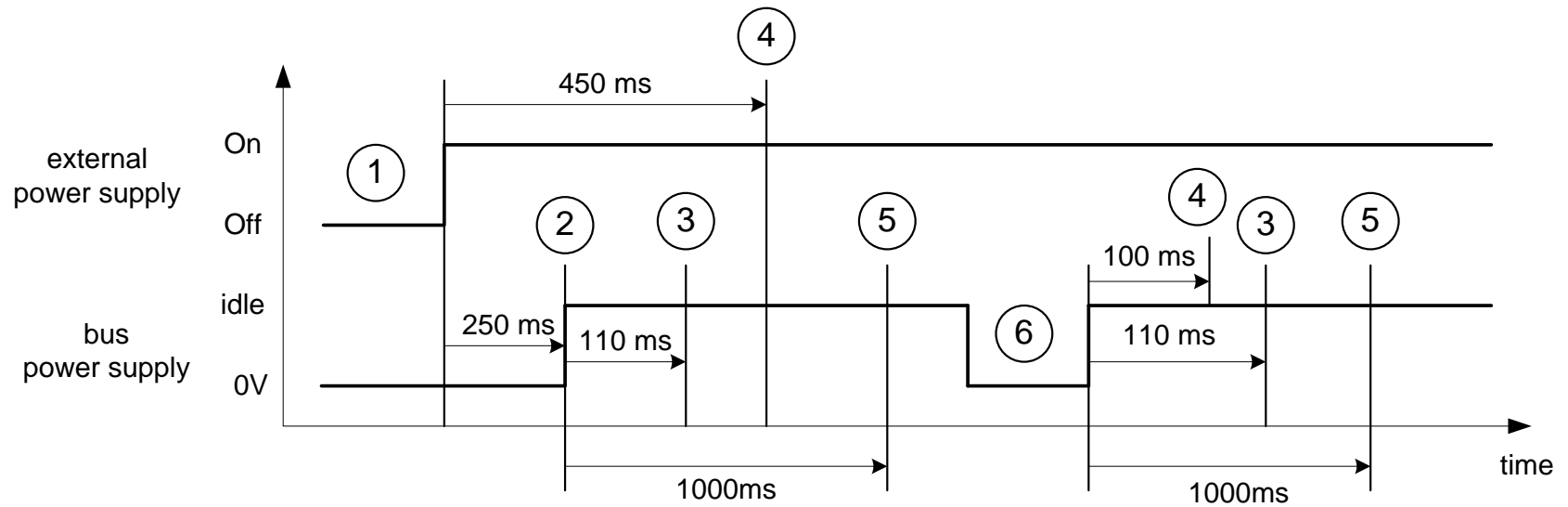
- Market for DALI is still growing
- Limits in data rate and addressing may call for a successor in the future
- A long range single pair Ethernet may be a good option



DALI Application Example



DALI System startup behavior



- ① External power cycle
- ② Latest bus power supply start-up
- ③ Earliest transmitter start-up
- ④ Latest receiver start-up of externally powered unit
- ⑤ Latest receiver start-up of bus powered unit
- ⑥ Bus power cycle