



2.4G Wireless vs DALI vs 0-10V

Lighting Control Systems Comparison

Wiring, Cost and Best-Fit Summary

8 systems compared:

2.4G Wireless • 0-10V • DALI • KNX • Mesh

Tuya • Mi Home • Apple Home

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Executive Summary

Different projects need different control solutions. This document compares 8 widely used lighting control approaches across wiring, installation, cost, functionality, scalability, ecosystem, and best-fit scenarios — so distributors, project managers, and end customers can choose the right system for the job.

SOLUXLED's Position

SOLUXLED focuses on 2.4GHz wireless lighting control for fast-moving hotel, retail, residential, and mid-size commercial projects. We do not position 2.4G wireless as a replacement for DALI or KNX in large-scale building automation — instead, we serve the 80% of projects where DALI is overkill and 0-10V is too limited.

Quick Reference

If your project is...	Best Fit	Why
Retrofit (no bus wiring)	2.4G Wireless	No new control cables needed
Hotel (room-by-room scenes)	2.4G Wireless	Panel + paired lights, no room-level bus
Retail (frequent layout changes)	2.4G Wireless	Re-pairing takes seconds, no rewiring
Office / Home (mid-size)	2.4G Wireless	Full DALI is overkill, scenes still possible
Large building automation (BMS)	DALI or KNX	Open standard, multi-vendor, central logic
Simple centralized dimming only	0-10V	Cheapest wired option, limited features

1. 8 Lighting Control Systems — Side by Side

This table compares 8 popular systems. Our 2.4G Wireless system is highlighted as SOLUXLED's solution.

Item	2.4G Wireless (SOLUXLED)	0-10V	DALI	KNX	Mesh (Bluetooth)	Tuya	Mi Home	Apple Home
Wiring & Installation	No rewiring Wireless	Extra dimming wires needed	DALI bus wiring required	Dedicated KNX bus	No rewiring, wireless	No rewiring, Wi-Fi	No rewiring, Wi-Fi	No rewiring, Wi-Fi
Installation Time	Fast & Easy	Medium	Long	Very Long	Fast	Fast	Fast	Fast
System Cost	Medium	Low	Medium - High	High	Medium	Low - Medium	Low - Medium	Medium
Functionality	Dimming, CCT, Scene, Grouping, App Control	Basic dimming	Dimming, Scene, Grouping, Feedback	Full building automation	Dimming, Scene, Grouping	Dimming, Scene, App	Dimming, Scene, App	Dimming, Scene, App
Scalability	Easy to expand	Limited	Good	Excellent	Good	Good	Good	Good
System Complexity	Simple	Simple	Complex	Very Complex	Medium	Simple	Simple	Simple
Retrofit & Upgrade	★★★★★	★★★★☆	★★★★☆	★★★☆☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
App / Ecosystem	iOS / Android Independent App	No App	No App (Need Gateway)	Professional Software	iOS / Android (Multiple brands)	Smart Life App (Global)	Mi Home App (Mainly China)	Apple Home (iOS only)
Internet Dependency	No (Local control)	No	No	No	No	Yes (Cloud dependent)	Yes (Cloud dependent)	Yes (Cloud dependent)
Privacy & Data Security	High Local control	High	High	High	High	Medium Cloud server	Medium Cloud server	Medium iCloud server
Suitable For	Renovation, Retail, Hotel, Residential, Commercial	Budget projects	Commercial, Medium-large	High-end building automation	Smart Home, Small projects	Smart Home, Mass market	Smart Home, China market	Smart Home, Apple users
Market Focus	Global (Independent)	Global	Global	Europe / Global	Global	Global	China / Asia	Global (Apple lovers)

Item	2.4G Wireless (SOLUXLED)	0-10V	DALI	KNX	Mesh (Bluetooth)	Tuya	Mi Home	Apple Home
Reliability & Stability	★★★★☆	★★★★☆	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆

Table 1. 8 lighting control systems compared across 12 dimensions. SOLUXLED's 2.4G Wireless column is highlighted.

2. 2.4G Wireless vs DALI vs 0-10V — Detailed Feature Comparison

This is the focused comparison most project managers need. It shows the practical differences between the three most common control choices in 2026 — wireless, bus-based digital, and analog low-voltage.

Feature	2.4G Wireless (SOLUXLED)	DALI	0-10V
Control wiring	None beyond power	Dedicated 2-wire DALI bus	Extra low-voltage control wires
Installation	Fast, plug-and-pair	Moderate, needs commissioning	Moderate
Retrofit friendliness	Good — no new bus wiring	Harder without existing bus	Harder without existing wiring
Scene control	Built into panel & fixtures	Yes, via controller/software	Limited, controller-dependent
CCT (warm/cool)	Yes — 2700K–6500K tunable	Yes (DALI DT8)	No
Group control	Yes — pair multiple lights	Yes — programmed groups	No
Feedback / status	Yes — paired light confirms	Yes — full status reporting	No

Feature	2.4G Wireless (SOLUXLED)	DALI	0-10V
Typical cost	Project-friendly	Medium to high	Medium
Best fit	Hotels, retail, homes, offices, mid-size projects	Large commercial buildings	Simple centralized dimming

Table 2. Focused comparison: 2.4G Wireless vs DALI vs 0-10V.

3. Which System Fits Which Project?

Different control approaches shine in different project types. Use the matrix below to identify the best match.

Project Type	Best Fit	Reason
Retrofit (no existing bus)	2.4G Wireless	No new control cables needed; pair in seconds
Hotel (room-by-room scenes)	2.4G Wireless	One panel per room, no room-by-room bus
Retail (frequent layout change)	2.4G Wireless	Re-pair without touching wiring
Office / Home (mid-size)	2.4G Wireless	Full DALI is overkill, scenes still possible
Restaurant / Café	2.4G Wireless	CCT + scene tuning for ambience changes
Warehouse / industrial	0-10V or DALI	Wired is cheaper at scale, scene needs are low
Campus / high-rise (BMS)	DALI or KNX	Open standard, multi-vendor, central logic

Project Type	Best Fit	Reason
Whole-building automation	KNX	Integrates HVAC, blinds, AV, lighting

Table 3. Project-to-system fit matrix. Green = 2.4G Wireless wins, Orange = wired wins.

4. Wiring Architecture Comparison

This section shows the practical wiring topology for each of the three main options. Less cable = faster install + lower cost.

4.1 0-10V Analog Dimming

- Each dimmer channel needs its own dedicated low-voltage pair (typically purple/gray wires) running back to a 0-10V controller or driver group.
- Cables needed per zone: Power (L/N) + 0-10V control pair.
- Limits: dimming only — no CCT, no scenes, no feedback.
- Typical use: warehouses, parking, simple on/off + dim projects.

4.2 DALI (Digital Addressable Lighting Interface)

- Single 2-wire DALI bus runs throughout the building, daisy-chained from fixture to fixture (max 64 devices per bus, 250 mA).
- Each fixture has a unique address, so it can be individually controlled and report status back.
- Requires a DALI controller / gateway, commissioning software, and trained installers.
- Typical use: large commercial buildings, open-plan offices, high-end residential.

4.3 2.4GHz Wireless (SOLUXLED)

- Only power wiring (L/N) is required to the panel and to each fixture — no control bus, no extra low-voltage pairs.
- Control is via 2.4GHz RF pairing between the wall panel and each light (one-to-many pairing, no addressing required).

- No commissioning software, no gateway, no IP configuration. Pairing is done with a 1-second long-press on the panel within 5 seconds of fixture power-on.
- Typical use: hotels, retail, residential, mid-size commercial, retrofit projects.

4.4 Cable Count Summary

System	Power (L/N)	Control Wiring	Total Cables
0-10V	Required	1× 0-10V pair per zone	≥ 4 wires per zone
DALI	Required	1× 2-wire DALI bus (daisy-chain)	Power + 2 DALI wires
2.4G Wireless	Required	None — wireless	2 wires (L/N) only

Table 4. Cable count comparison. Wireless eliminates control wiring entirely.

5. Cost Analysis

Cost is one of the biggest decision drivers. Below is a typical per-zone cost breakdown for a 50-zone commercial project.

Per-Zone Cost Components

Cost Item	0-10V	DALI	2.4G Wireless
Control cable (per meter)	\$0.40–0.60	\$0.30–0.50 (DALI pair)	\$0
Wall panel cost	\$15–25 (basic slider)	\$40–60 (DALI keypad)	\$30–45 (SOLUXLED knob panel)
Driver/controller	\$10–20 (0-10V driver)	\$25–50 (DALI driver)	\$8–15 (RF receiver)

Cost Item	0-10V	DALI	2.4G Wireless
Installation labor (per zone)	1.0 hr (extra control wire pull)	1.5 hr (commissioning + addressing)	0.5 hr (plug-and-pair)
Gateway / software	None	\$500–2,000 (DALI controller)	None
Estimated per-zone total	\$80–120	\$130–200	\$60–90

Table 5. Per-zone cost estimates. 2.4G Wireless typically saves 30–55% on a per-zone basis.

50-Zone Project Total (Estimated)

System	Total Cost (50 zones)	Savings vs DALI
0-10V	\$4,000–6,000	30% cheaper
DALI	\$6,500–10,000	Baseline
2.4G Wireless (SOLUXLED)	\$3,000–4,500	55% cheaper

Table 6. 50-zone project total cost comparison.

Note: Cost figures are factory-direct estimates for SOLUXLED products. Local market pricing for DALI/0-10V components may vary. The key savings in 2.4G Wireless come from (1) eliminated control cable, (2) faster installation labor, and (3) no gateway/controller hardware.

6. Five Questions to Choose the Right System

If you're unsure which system fits a project, walk through these five questions in order. The first 'yes' usually identifies the right choice.

#	Question	If Yes →
1	Is this a retrofit project without existing control wiring?	→ 2.4G Wireless avoids new bus cabling and speeds up installation. No control wire to pull.
2	Do you need centralized, whole-building automation with BMS integration?	→ DALI or KNX is the standard choice for large-scale, centrally managed systems. Open protocols required.
3	How many rooms or zones need independent scenes?	→ Panel-plus-group control (2.4G Wireless) scales well for room-by-room hospitality and retail zones. Each room has its own scene memory.
4	Is the project fast-moving with a tight installation schedule?	→ 2.4G Wireless installs faster with less pre-planning and commissioning. Pair in seconds.
5	Do you need multiple third-party lighting brands on one open protocol?	→ DALI's open standard suits large multi-vendor specifications. SOLUXLED also works with 3rd-party RF receivers.

Table 7. Decision guide. If most of your project fits questions 1, 3, 4 → 2.4G Wireless. If 2 or 5 → DALI/KNX.

7. Why Distributors Choose 2.4G Wireless

Distributors carry multiple control options. Here is why 2.4G Wireless — and specifically SOLUXLED — is the easiest to sell, install, and support.

1. No Rewiring	2. Easy to Sell	3. High Profit Margin	4. Stable & Reliable
Perfect for retrofit projects, saves labor cost and time. Wireless pairing means no new control cables.	Simple setup, easy operation, less technical barrier. Customers understand 'no rewiring' immediately.	Better solution value, increase 30-120% project profit. Factory-direct pricing protects distributor margin.	Local control, no cloud dependency, high security. Works in all countries, no platform or region limitations.

Table 8. Four reasons distributors carry 2.4G Wireless as their go-to option.

8. Why Cloud-Dependent Systems (Tuya / Mi Home / Apple Home) Are Risky in 2026

Many IoT lighting brands have moved to cloud-based ecosystems. This brings three concrete problems for professional projects.

8.1 Platform Dependency

Tuya and Mi Home rely on cloud servers in China. They face network delay, service limitation, or policy risk in many countries. If the cloud goes down, lights stop responding to app control.

8.2 Ecosystem Lock-In

Apple Home only works within the Apple ecosystem — limited capability with Android devices and non-Apple products. Tuya, Mi Home, and Apple Home all have geographic and brand restrictions that limit professional deployments.

8.3 Data & Privacy Concerns

Local control systems like 2.4G Wireless offer better data security and privacy protection. Cloud-based systems route user behavior, schedules, and device status through third-party servers.

Risk	Cloud-Based (Tuya / Mi Home / Apple)	Local Control (2.4G Wireless)
Server outage	App control stops working	No impact — local RF
Internet loss	Remote/app control disabled	No impact — wall panel still works
Cross-platform	Limited (Apple, Android, regional)	wall panel
User data	Stored on cloud servers	Stays local, no upload
Service subscription	Some features may require	None — one-time purchase

Table 9. Cloud vs local control — concrete failure modes.

9. SOLUXLED 2.4G Wireless — System Features

This section shows what comes in the box when you choose SOLUXLED 2.4G Wireless for your project.

9.1 Knob Dimmer Panel (Wall Controller)

- 86×86 mm standard EU/Asia wall-mount format — fits in any standard 86 wall box.
- Ø50 mm rotary knob with CCT display — 2700K–6500K visible at a glance.
- Four backlit touch zones: Bri, On/Off, CCT, Memory.
- Memory: 3 programmable scenes (M1 / M2 / M3), save with 1-second long-press.
- Pairing: 1-second long-press on On/Off within 5 seconds of fixture power-on.
- 2.4GHz RF, ≤30 m open-air range, 1-to-many pairing (one panel controls many lights).
- Optional Lout terminal: directly drives loads up to 500W without a separate controller.

9.2 Compatible Fixtures

- Wireless Downlights — CCT-tunable, 2.4GHz RF built-in, no extra receiver needed.
- 48V Magnetic Track Lighting — RF receiver built into the track adaptor.
- 24V LED Strip Controllers — RF receiver module pairs with the panel.
- Any 3rd-party light with a SOLUXLED RF receiver module added.

9.3 Group & Scene Control

- Group: any panel can pair with any number of fixtures, and any fixture can be paired to multiple panels (max 8 panels per fixture).
- Scene: 3 memory slots per panel (M1, M2, M3). Each slot stores brightness + CCT for the entire group.
- Cycle: short-press Memory to cycle M1 → M2 → M3 → off → M1.

10. Conclusion & Recommendation

Based on the comparison above, here is SOLUXLED's recommendation for the three main control choices in 2026.

10.1 Choose 2.4G Wireless if any of these apply:

- Project is a retrofit (no existing control bus).
- Project is hotel, retail, residential, or mid-size commercial.
- Customer values fast installation and easy maintenance.
- Customer wants CCT tuning and scene memory without commissioning software.
- Distributor wants high margin + easy-to-sell product.

10.2 Choose DALI if any of these apply:

- Project is a large commercial building with existing DALI bus.
- Specification requires open-protocol, multi-vendor interoperability.
- Customer has BMS integration requirements (BACnet, Modbus).
- Project budget can absorb 30–50% higher cost than wireless.

10.3 Choose 0-10V if any of these apply:

- Project is a simple warehouse, parking garage, or industrial space.
- Only basic dimming is needed — no CCT, no scenes.
- Existing 0-10V control wire is already in place.

10.4 Final Note

For professional projects and business applications, an independent 2.4G wireless system is more stable, secure and suitable for global markets — and SOLUXLED's factory-direct model supports the distributor with margin and supply.

For project-specific recommendations, contact SOLUXLED engineering:
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