

Silvair Solution Overview

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SILVAIR

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1. Introduction

Silvair delivers a complete, standards-based solution built on Bluetooth® Networked Lighting Control (NLC) for wireless control and building automation.

Bluetooth NLC is the only open protocol developed specifically for lighting and building automation applications. It combines proven interoperability, enterprise-grade reliability, and global regulatory compliance with the flexibility required in modern commercial environments.

From lighting and HVAC control to emergency lighting testing and building system integration, Silvair enables consistent operation across all layers of building infrastructure — using a unified set of tools, a shared ecosystem, and open communication standards.

With this approach, Silvair helps manufacturers, integrators, and building owners implement scalable, future-ready control systems that remain reliable, transparent, and fully interoperable over time.

This document provides a comprehensive overview of the Silvair solution — its core technologies, ecosystem, and functional capabilities — illustrating how each part contributes to a complete, standards-based building control platform.

2. Silvair fundamentals

Silvair is a global Technology Partner delivering a complete wireless solution for lighting control and building automation. The solution is built around **Bluetooth NLC**, the only open and interoperable wireless standard for connected building systems. This foundation ensures transparency, multi-vendor compatibility, and long-term reliability across every layer of building infrastructure.

By adhering to open-standard principles, Silvair provides a proven, scalable technology base for manufacturers, OEMs, and system integrators worldwide — enabling buildings to operate more efficiently, comply with regulations, and reduce energy use through smart, data-driven control.

As an active member of the **Bluetooth Special Interest Group (SIG)**, Silvair contributes directly to the ongoing development of Bluetooth NLC specifications, helping shape how wireless control is standardized across the industry.

Silvair technology is deployed in projects across **North America, Europe, and Asia**, from small-scale installations to enterprise-level infrastructure. Regardless of project size and installation type, every Silvair-based system shares the same core technical principles:

- **Open standards** — ensuring transparency, compatibility, and freedom of choice.
- **Interoperability** — guaranteed through Bluetooth qualification and compliance testing.
- **Decentralization** — self-healing mesh networks with no single point of failure.
- **Scalability** — supporting both standalone and cloud-connected systems, from single-room implementations to multisite enterprise projects.

Together, these elements define a complete platform that enables wireless lighting control, automated emergency lighting testing, efficient HVAC management, and integration with critical building infrastructure, all within a single unified framework.

Building on this foundation, Silvair provides a **complete implementation of the Bluetooth NLC standard**, supporting every stage of wireless control development and deployment:

- **Firmware** for components manufactured by our partners, ensuring qualified, interoperable performance.
- **Commissioning and management tools** that make configuration and maintenance straightforward and consistent across projects of any scale, while providing a unified environment for managing all systems and solutions — including lighting, HVAC, and emergency lighting testing.
- **Advanced monitoring services and APIs** that extend the system into connected, data-driven applications for building optimization and integration.
- **Comprehensive partner support**, including access to the Silvair Manufacturing Environment (MaTE), detailed integration guides, certification and compliance assistance, ongoing technical support, and opportunities for joint marketing and branding within the global partner network.

3. Bluetooth NLC fundamentals

Bluetooth Networked Lighting Control (NLC) defines how devices communicate within a standardized wireless ecosystem. The standard introduces **qualified device profiles** for luminaires, sensors, controllers, thermostats, and other control devices, ensuring that compliant products from any manufacturer work together as part of the same network. Each device type follows a shared specification verified through the **Bluetooth SIG qualification process**, providing multi-vendor interoperability and future-proof compatibility.

Bluetooth NLC is built upon **Bluetooth Mesh**, a standardized communication architecture designed specifically for large-scale commercial and industrial control environments. Unlike traditional point-to-point wireless systems, Bluetooth Mesh enables every device to act as a **node** that relays messages across the entire space. This creates a self-healing, decentralized network with no single point of failure — a key advantage in complex building environments where reliability and redundancy are essential.

In commercial wireless control applications, Bluetooth Mesh delivers the following key benefits:

- **Scalability** — robust wireless operation in dense commercial environments without artificial limits on nodes or sites.
- **Reliability** — redundant message routing that maintains communication even when individual nodes are offline.
- **Security** — end-to-end encryption and authentication built into the protocol.
- **Low latency** — instant response to switch and sensor events, regardless of network size.
- **Low-power operation** — enabling wireless energy-harvesting switches for convenient manual control.

Why choose open standards?

Aspect	Global Bluetooth NLC standard	Proprietary wireless solutions
Interoperability	Multi-vendor, standardized, ecosystem-wide	Vendor lock-in, limited device compatibility
Security	Transparent and verified through Bluetooth SIG and independent reviewers	Unknown vendor-specific implementations
Compliance	Standardized and certifiable	Vendor-specific and unverified against recognized standards
Future readiness	Supports continuous market and technology evolution	Subject to vendor lifecycle and product lifespan
Ecosystem diversity	400+ certified component types	Limited options, supply chain risks

4. Silvair solution – functional overview

The Silvair solution is a modular and scalable platform for building control, designed to meet the diverse requirements of commercial environments. Individual parts of the solution can operate independently or as a fully integrated network, allowing users to start with core functionality and expand it with more sophisticated services.

4.1 Lighting control

Lighting control is the foundation of the Silvair solution. Built on Bluetooth NLC, it delivers a flexible, fully distributed system that scales from small local networks to enterprise-grade deployments. All control logic runs directly in the devices, ensuring dependable operation without central controllers or continuous connectivity.

Silvair lighting control supports a wide range of strategies and configurations, including:

- **Grouping and zoning** for flexible assignment of devices into logical areas and unified behavior across spaces.
- **Luminaire-level lighting control** for individual fixture management and granular adjustment of lighting behavior.
- **Occupancy- and vacancy-based control** for automatic on/off operation based on presence detection.
- **Daylight harvesting** with continuous dimming for energy efficiency and visual comfort.
- **Photocell control** for automatic response to ambient light levels in outdoor or naturally lit areas.
- **Tunable white control** for dynamic adjustment of color temperature to support visual comfort and occupant well-being.
- **Manual override** and **scene recall** for local user control and activation of predefined lighting scenes via switches or sensors.
- **Scheduling** with time-based and astronomical triggers for automated daily operation, including switching, dimming, and behavior changes such as occupancy control or daylight harvesting.
- **High/low-end trim** and **power-up behavior** configuration for consistent performance and energy savings.
- **Zone linking** for synchronized operation of multiple zones across larger areas.
- **Automated demand response** for coordinated load reduction during peak demand periods.

Additional operational features, such as **unprovisioned device behavior** or **adjustable sensor sensitivity**, enable deeper customization of lighting control in line with device capabilities and project requirements. All strategies and features can be fine-tuned through configurable parameters defining target light levels, durations, and other operational characteristics.

These capabilities are available in standalone lighting control systems and do not require gateway deployment. However, a **Silvair Gateway** can be added to unlock remote and data-driven capabilities, such as remote schedule configuration, energy/occupancy monitoring dashboards, or fully automated emergency lighting testing.

4.2 HVAC control

Silvair technology extends beyond lighting to enable direct interaction between lighting and HVAC systems through Bluetooth thermostats and sensors. Shared occupancy and ambient data allow HVAC systems to respond dynamically to actual space conditions.

This integration is achieved entirely over the Bluetooth network, requiring no additional gateways or controllers. This allows facility managers to easily deploy smart environmental control using the same infrastructure that powers lighting, lowering costs and simplifying maintenance. Lighting and HVAC can be configured and maintained through the same Silvair app, delivering responsive zoning, occupant comfort, and improved energy performance.

4.3 Emergency lighting testing

The **Silvair Emergency Lighting Testing** service automates mandatory functional and duration tests for emergency luminaires. Once configured, the system runs tests locally on each luminaire, records the results, and securely stores them for reporting and compliance documentation.

The solution supports both gateway-free and gateway-based configurations:

- **Core emergency lighting testing** is a lightweight, gateway-free setup ideal for smaller installations. Tests are performed automatically according to a defined schedule, while results are collected on-site using the Silvair mobile app to maintain compliance with safety regulations.
- **Emergency lighting testing with remote monitoring** is a gateway-based setup that provides full automation and access to historical results. Tests are executed and logged automatically, with cloud storage, alerts, and remote access to reports through the Silvair web app.

This flexibility allows facilities to adopt the level of automation that best matches their operational needs, from small buildings to enterprise-scale portfolios. Both approaches ensure full compliance with local emergency lighting testing requirements.

4.4 Monitoring services

When Silvair Gateways are deployed, facility managers gain access to a suite of connected services providing real-time insight into building performance. These cloud-based tools enable remote configuration, status tracking, and performance monitoring across all zones and devices.

Monitoring capabilities include:

- **Energy monitoring dashboards** showing consumption levels and estimated energy savings.
- **Occupancy monitoring dashboards** based on sensor data.
- **Emergency testing logs** and **failure alerts** for compliance management.
- **System diagnostics** for ongoing supervision and optimization.

These services are accessible through the Silvair web app, providing a unified management interface for all connected systems.

4.5 BMS integration

The **Silvair BACnet Gateway** (certified by the *BACnet Testing Laboratories*) enables seamless data exchange between Bluetooth NLC lighting control networks and Building Management Systems based on the universally adopted BACnet protocol. By bridging two global, open standards, it combines Bluetooth device-level interoperability with BACnet system-level interoperability, unifying lighting, HVAC, and other building technologies within a single management environment.

Lighting, occupancy, and environmental data are shared natively with the BMS infrastructure, integrating control functions into broader energy and building automation strategies. This unified environment allows building operators to coordinate systems, monitor energy use, simplify maintenance, and meet regulatory requirements across enterprise-level installations.

4.6 APIs

Silvair's open APIs enable integrators and solution providers to build custom tools, dashboards, and analytics solutions on top of the Silvair platform. They provide secure access to project data, network performance, and key operational metrics — allowing partners to extend system functionality without relying on proprietary integrations.

Available APIs for Bluetooth lighting control networks include:

- **Energy Consumption API** — provides access to detailed energy data that can be correlated with other data streams for deeper insight and operational efficiency.
- **Occupancy API** — delivers zone-level occupancy data derived from sensor activity.
- **Scheduling API** — enables remote management of lighting event schedules.
- **Monitoring API** — enables real-time access to light levels and sensor status for diagnostics or analytics.
- **Remote Control API** — supports low-latency remote commands for immediate system adjustments.

Together, these APIs form a standardized interface layer connecting Bluetooth networks with external applications and enterprise platforms, ensuring the openness, scalability, and future-proof reliability that define the entire Silvair solution.

5. Silvair ecosystem

The Silvair ecosystem brings together a global network of companies that use Silvair technology to deliver **standards-based control solutions for commercial buildings**. It combines the expertise of hardware manufacturers, integrators, and solution providers working under a shared open standard. All devices and services are developed in line with the Bluetooth specifications, ensuring future-proof interoperability and protection from the risks typical of proprietary systems.

5.1 Partners

Silvair collaborates with a broad range of partners who play key roles in delivering qualified products and complete control systems. Together, they form an ecosystem that spans the entire value chain — from component design to system integration and facility management.

Key partner groups include:

- **Component manufacturers** — implementing Silvair firmware to create interoperable devices for a variety of applications.
- **OEM luminaire brands** — offering ready-to-install luminaires with qualified Bluetooth components.
- **Solution providers** — extending Silvair technology into broader building automation and energy management platforms.
- **System integrators** — delivering tailored, compliant systems designed around specific project requirements.

This multi-layered network of partners operates across **North America, Europe, and Asia**, ensuring global reach and local compliance. Silvair's role as a **Technology Partner** is to provide the firmware, software tools, and cloud infrastructure that enable partners to bring interoperable, standards-based products and systems to market.

Learn more about our partners at silvair.com/partners.

5.2 Products

The Silvair ecosystem includes a wide variety of components and devices developed by our partners. All are designed in accordance with Bluetooth standards and built to ensure interoperability within multi-vendor control networks. This standards-based approach provides lasting compatibility and stability — protecting projects from the risks of proprietary or discontinued solutions.

Product categories include:

- **Drivers and controllers** — DALI DT6/DT8, analog 0–10V, tunable white, constant-current, constant-voltage, and emergency-capable units.
- **Sensors** — PIR, microwave, multisensor, high-bay, outdoor, and daylight models for precise occupancy and light-level control.
- **Luminaires** — fixtures equipped with Bluetooth-enabled drivers, sensors, and/or controllers, offering out-of-the-box compatibility with Silvair commissioning and management tools.
- **Switches and scene selectors** — wired, wireless, mains-powered, battery-operated, energy-harvesting, and multi-button devices for scene or zone control.
- **Converters** — interface devices that translate between Bluetooth-based networks and DALI or 0–10V control systems, supporting integration with existing lighting infrastructure.
- **Thermostats** — enabling integrated lighting and HVAC control through data exchange and coordinated operation without additional interface hardware.
- **Supporting devices** — load controllers, wall sockets, timekeepers, and other application-specific devices developed by Silvair partners to meet specific project or customer needs.

The diversity of available devices allows system designers to assemble complete control solutions using **qualified components from multiple vendors**. The network continues to expand as new manufacturers qualify their products and join the open Bluetooth ecosystem, increasing the range and flexibility of available solutions.

Browse interoperable products from different manufacturers at [silvair.com/products](https://www.silvair.com/products).

6. Security

Security is a core element of the Silvair solution, integrated into every layer of its design — from wireless communication to cloud infrastructure. Every component is built on transparent, standards-based protection designed for commercial environments where reliability and trust are critical.

6.1 Bluetooth NLC security architecture

Silvair's wireless architecture leverages the proven security framework of the Bluetooth NLC standard. Security is mandatory across all certified devices and embedded into the specification itself. Each device undergoes strict qualification, ensuring encryption, authentication, and key management procedures that prevent unauthorized access and tampering.

Bluetooth NLC safeguards wireless communication through a multi-layered security model that includes:

- **Encryption and authentication** ensuring that all communications within a Bluetooth NLC network are protected from unauthorized access and eavesdropping.
- **Separation of concerns** through dedicated security keys for provisioning, network operations, and application data, limiting the scope of potential attacks.
- **Area isolation** using subnet-specific keys to prevent vulnerabilities in one area from compromising the entire system.
- **Key refresh** with automatic updates of encryption keys to minimize the risk of long-term exposure.
- **Message obfuscation** concealing message source and destination to prevent traffic analysis and protect device privacy.
- **Replay attack protection** using message sequence counters to detect and block retransmission of already sent packets.
- **Trashcan attack protection** ensuring devices removed from a network do not receive refreshed keys, preventing unauthorized reconnection.
- **Secure device provisioning** assigning unique keys to each device through a protected process without transmitting them over the air.

Unlike proprietary systems, Bluetooth NLC offers **full transparency** — its security architecture is open for independent verification and continuously reviewed by global experts.

6.2 Comprehensive data protection

In systems connected through Silvair Gateways, all data exchanges between devices, mobile apps, and the cloud are fully encrypted using industry-proven protocols such as **AES-128** and **TLS 1.3**. User and project data are stored securely in **AWS infrastructure** located within the European Union, following strict access control, monitoring, and privacy standards. Silvair complies with **GDPR**, giving users transparency and full control over their data.

6.3 Access and authentication

Silvair employs **role-based access control** to ensure that only authorized users can view or modify project data. All user actions within the platform are authenticated and logged, with protection against unauthorized access and credential misuse. Network and application keys are securely stored within the platform and never transmitted unencrypted over the air, maintaining full protection at the network level.

6.4 Cybersecurity

Silvair treats security as a continuous process. Real-time threat monitoring, vulnerability reporting policies, and internal security procedures ensure rapid response and ongoing supervision. With **ioXt Certification** and **PSA Certified Level 1**, Silvair meets rigorous global standards for IoT and network platform security.

7. Compliance

Compliance is fundamental to the Silvair solution, ensuring that all systems meet global standards for performance, safety, and energy efficiency. From the wireless layer to building-level integration, Silvair technology aligns with internationally recognized specifications and regulatory frameworks adopted across key markets.

7.1 Standards and certifications

Silvair technology and partner solutions are developed in accordance with a wide range of internationally recognized standards and certification programs:

- **Bluetooth NLC and Bluetooth Mesh** – qualified through the Bluetooth SIG, ensuring multi-vendor interoperability and verifiable compliance with the world's only open, standardized wireless lighting control framework.
- **DALI and D4i** – compatibility with the DALI standard for lighting applications, including D4i-compliant control gear and communication interfaces. Full support for the **Bluetooth NLC-to-DALI** interface (the DALI Part 341 specification), delivering a major step forward in the convergence of two global lighting control standards.
- **DLC NLC5** – certification under the **DesignLights Consortium's** NLC5 program, confirming compliance with advanced networked lighting control performance criteria.
- **BACnet** – the **Silvair BACnet Gateway** is certified by the **BACnet Testing Laboratories (BTL)**, confirming full compliance with the BACnet standard for building management systems.
- **OpenADR** – support for the Open Automated Demand Response standard, enabling participation in demand response programs through automated load control, grid interaction, and energy optimization strategies.

7.2 Energy and building regulations

Silvair solutions support compliance with regional and international energy codes, including:

- **California Title 24, ASHRAE 90.1, and 2021 IECC** in North America.
- **EN 15193, UK Building Regulations Part L, and French BACS Decree** in Europe.
- Other market-specific frameworks promoting energy-efficient and automated building operation.

Built-in support for occupancy sensing, daylight harvesting, scheduling, and energy reporting enables straightforward verification of system performance and contributes to certification efforts such as **LEED**, **BREEAM**, or equivalent programs. By meeting leading energy and building performance standards, Silvair-based systems qualify for multiple **regional and utility-sponsored energy efficiency rebate programs**, helping reduce project costs and accelerate return on investment.

7.3 Emergency lighting testing compliance

Silvair's Emergency Lighting Testing service meets global requirements for automated functional and duration testing of emergency luminaires. This allows full compliance with local safety and maintenance regulations while reducing manual workload and documentation effort.

8. Commissioning and management tools

Silvair provides a unified set of tools for designing, commissioning, and managing all control services within a building — including lighting, HVAC, and emergency lighting testing. The same applications are used across every system type, ensuring a consistent workflow and eliminating the need for multiple platforms or training paths.

The **Silvair web app** enables project design, device pre-configuration, and role-based collaboration between lighting designers, engineers, and on-site teams. The **Silvair mobile app for iOS/iPadOS and Android** is used on-site for commissioning, validating system operation, and fine-tuning.

The two-stage commissioning process sharply reduces setup complexity, ensuring rapid and efficient system implementation. The result is minimized facility downtime, lower commissioning costs, and faster ROI. Flexible system configuration allows users to customize lighting control parameters easily in accordance with current lighting needs or evolving energy codes.

Core usability features such as **profile copying**, **project search and filtering**, and **built-in diagnostics** streamline the entire process, allowing teams to deliver reliable results faster and with fewer errors. Together, these tools provide complete visibility and control from design to deployment.

How to get started with your project

1. Visit platform.silvair.com to create an account and launch a new project.

2. Design your system off-site

The commissioning process starts remotely to minimize time spent on-site. Using the Silvair web app, you design your system and set up desired lighting control scenarios.

- ✓ Upload floor plans
- ✓ Add collaborators
- ✓ Create lighting zones
- ✓ Choose lighting control profiles for your zones
- ✓ Customize parameters

3. Add devices on-site

Now visit the site with your mobile device. Use the Silvair mobile app to finish the commissioning process by adding luminaires, sensors, and switches to your project.

- ✓ Scan for available luminaires
- ✓ Add luminaires and sensors to zones with a single tap
- ✓ Add wireless switches
- ✓ Calibrate daylight control
- ✓ Perform tests and fine-tune parameters

9. Overview of key features and capabilities

Supported systems and integrations • Lighting control • HVAC control • Emergency lighting testing • BACnet building management systems • Monitoring dashboards • API integrations	Supported devices • LED drivers and controllers (<i>DALI DT6/DT8, analog 0–10V, tunable white, constant-current, constant-voltage, emergency lighting devices</i>) • Sensors and sensor controllers (<i>PIR, microwave, multisensor, daylight, high-bay, outdoor, integrated/standalone</i>) • Luminaires (<i>indoor, outdoor, track-mounted, retrofit</i>) • Switches and scene selectors (<i>wired, wireless, mains-powered, battery-operated, energy-harvesting, multi-button</i>) • Converters (<i>DALI, 0–10V, interface devices for hybrid systems</i>) • Thermostats • Auxiliary devices (<i>load controllers, sockets, timekeepers, application-specific hardware</i>)
Lighting control features • Grouping and zoning • Luminaire-level lighting control • Occupancy and vacancy control • Daylight harvesting • Photocell control • Manual override and scene recall • Scheduling (time-based and astronomical) • High/low-end trim • Power-up behavior • Zone linking • Automated demand response • Tunable white • Sensor sensitivity adjustment • Unprovisioned device behavior • OTA firmware updates	Compliance and certifications • Bluetooth NLC / Bluetooth Mesh • DALI/D4i • DLC NLC5 • BTL BACnet Certification • OpenADR • California Title 24 • ASHRAE 90.1 • 2021 IECC • EN 15193 • UK Building Regulations Part L • French BACS Decree • LEED/BREEAM alignment • ioXt Certification • PSA Certified Level 1 • GDPR compliance
Monitoring and data services • Luminaire diagnostics • Energy monitoring • Occupancy monitoring • Emergency lighting monitoring • Historical data export • Energy savings calculator	API integrations • Energy Consumption API • Occupancy API • Scheduling API • Monitoring API • Remote Control API