



Plug Load Control and the Building Automation System



Complement, not replace

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Figure 1. After hours, much of the equipment on an office floor is still running.

EXECUTIVE SUMMARY

A building automation system (BAS) does its job well: it runs the large, physically fixed, central systems in a building — HVAC, central plant, and selected lighting. Plug and process loads are a different kind of problem. They're numerous, individually low-value, and sometimes physically mobile: a desk gets reassigned, a printer gets swapped for a water dispenser. That mismatch is a real reason whole-building integration between plug load management and a BAS has been rare — not because it can't be done, but because it hasn't fit how BAS hardware and licensing are usually scoped. Plug load management works standalone by design for exactly this reason, and it integrates with a BAS through open protocols when a project calls for one. BERT calls this capability B.A.X Building Automation Expanded™: automating the plug and process loads most buildings leave unmanaged, on its own through BERTBrain, and linked to the systems a building already has, a BAS through BERT Connect or other systems through BERT's REST API. This paper explains that division of labor, and where BERT fits in it today.

What We Call It: B.A.X Building Automation Expanded™ is BERT's approach to automating the equipment most buildings leave unmanaged: their plug and process loads. It stands on its own through BERTBrain, with scheduling, control, monitoring and reporting, and no building automation system is required. When you want more, it can link to the systems you already have: your building automation system through BERT Connect, or other systems through BERT's REST API. Everything works together in whatever way fits your building.

1. The BAS Handles What's Physically Fixed; Plug Loads Are Neither Fixed Nor High-Value Individually

A BAS is built around zone and equipment controllers wired to specific, permanent systems: an air handler, a chiller, a lighting circuit. That architecture is efficient precisely because those systems don't move and are worth the engineering effort individually.

Plug and process loads don't fit that model as cleanly. A smart outlet installed at a desk may find itself powering a different kind of equipment entirely within a year, as offices get reassigned and equipment gets swapped. Managing hundreds or thousands of small, shifting loads through the same architecture used for a handful of large, fixed ones is a scalability and interoperability problem, not just a wiring problem — which is a meaningful part of why, historically, plug load management and building automation have mostly developed as separate systems rather than one integrated whole.

2. A Published Integration Approach

A research team from UC San Diego and the National Renewable Energy Laboratory, working on a California Energy Commission- and National Science Foundation-funded project, published a description of integrating a smart-outlet-based plug load management system with UC San Diego's existing Johnson Controls Metasys building automation system across multiple campus buildings.

Their approach, in outline: the smart outlets reported over the campus network to BACnet gateway software running on a campus-hosted server; that gateway translated the outlets' data into BACnet, the standard protocol most building automation systems use; and a virtual network automation engine made the resulting BACnet devices visible inside the campus's central Metasys interface, alongside its existing HVAC points. That let facilities staff see and, in their demonstration, schedule the outlets from the same interface used for the building's HVAC systems.

The smart outlets in that study were BERT controllers.

BERT is citing this work for its integration approach only — the BACnet gateway design and the idea of BAS-driven schedules reaching outlet-level equipment. This paper does not use or repeat any of that project's reported savings or building-electricity-share figures; those numbers describe a different, small-scale pilot and aren't part of BERT's approved figures.

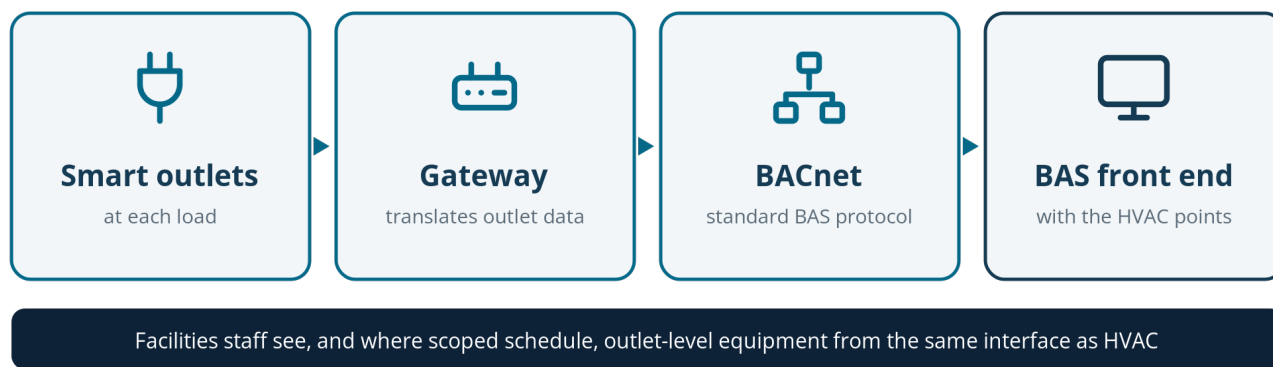


Figure 1. The general integration approach described in the cited study, drawn by BERT. Not a reproduction of the study's own figures.

3. How BERT Approaches the Same Problem

BERT runs standalone by default. A BERT system needs no changes to BAS programming, no BAS licenses, and no customer-provided server — facility and energy staff can manage plug loads in BERTBrain without BAS programming privileges. That's the right default for the majority of projects, where the building may have no BAS at all, or where the simplest path is the best one.

Where a project calls for it, BERT Connect provides optional BACnet/IP integration: it exchanges approved BERT device information and commands with a BAS as BACnet/IP objects and points, so a BAS can see and, where scoped, command BERT-controlled equipment. BERT Rest provides a REST integration for other systems and custom workflows. Both are separately specified, licensed, secured, and commissioned — they are not included in a standard BERT system. A BAS can also command BERT controllers from occupancy data through BERT Connect, where that's the integration a project wants.



Figure 2. A standalone BERT system: controllers, the on-site BERTBrain Gateway and BERTBrain software.

4. Division of Labor: What Stays With the BAS, What Plug Load Management Reaches

In practice, the two systems divide the building cleanly:

- The BAS keeps running HVAC, central plant, and selected lighting — the large, fixed systems it was designed for.
- Plug load management reaches the equipment a BAS usually doesn't: workstations, printers, displays, charging carts, vending machines, water coolers, window air conditioners, and packaged terminal air conditioners and heat pumps.

Neither replaces the other. A building with a strong BAS and an unmanaged third of its electricity in plug and process loads has a BAS doing its job well and a gap next to it — not a BAS problem.

The BAS keeps running	Plug load management reaches
 HVAC	 Workstations, printers, displays
 Central plant	 Charging carts, vending, water coolers
 Selected lighting	 Window AC, PTACs and PTHPs

Figure 3. Division of labor: the BAS runs the large, fixed systems; plug load management reaches the equipment it usually doesn't.

5. What This Means for a Design or Specification

Standalone is the simpler, more common path, and it's the right default when a project doesn't call for a single system of record. Scoped integration is available when it's wanted, and the design decisions that matter — points, commands, responsibilities, and what happens if communication is lost — are worked out during design, not discovered during commissioning. BERT's Core Guide Specification (Section 26 09 80) covers both standalone operation and optional integration, with coordination to the building automation division when integration is included. Whichever path a project takes, it's the same capability — B.A.X Building Automation Expanded™ — standing on its own through BERTBrain, with no BAS required, and linking to the systems a building already has when the project calls for it.

6. What This Isn't

This paper describes an architecture, not a promise about any specific project's outcome, and it doesn't claim any protocol support beyond BACnet/IP (through BERT Connect) and REST (through BERT Rest). It isn't a code-compliance claim, and it doesn't commit to a product roadmap.

Sources

1. Chia, K., LeBar, A., Agarwal, V., Lee, M., Ikedo, J., Wolf, J., Trenbath, K., & Kleissl, J. "Integration of a Smart Outlet-Based Plug Load Management System with a Building Automation System." UC San Diego and National Renewable Energy Laboratory; funded by the California Energy Commission (grant EPC-20-009) and the National Science Foundation (ECCS-1947050). Proceedings of the 2023 IEEE PES Grid Edge Technologies Conference & Exposition, San Diego, CA, April 2023. IEEE Xplore document 10102749.
2. BERT website and FAQ; BERT Core Guide Specification, Section 26 09 80.

Metasys is a registered trademark of Johnson Controls.



About BERT

BERT (Best Energy Reduction Technologies, LLC) has focused on commercial plug and process load management since 2011, based in Wayne, PA, just outside Philadelphia. bertbrain.com