CONFIGURABLE TO CUSTOMIZABLE: SCALED SOLUTIONS

Exploring the end-to-end control capabilities of 75F's IoT-based Building Management System.



At 75F, we believe in the power of smart, efficient, and straightforward solutions. In the minds of most building technology professionals, this concept probably isn't synonymous with commercial building controls. Since the 1980s, building controls have evolved into complicated and expensive behemoths that are highly dependent on specialized labor and customized programming at each and every installation site, regardless of the equipment in the building.

75F adopted a works-out-of-the-box philosophy that redefines the state of the art for commercial building controls. Instead of an on-premise BMS that must be programmed to do anything, 75F created an IoT-based BMS that is pre-programmed to do most things. Our full-stack BMS contains hardware and software that use data natively tagged with Project Haystack standards to influence pre-programmed sequences of operation for commercial buildings' most common equipment types. Cloud access from the ground up means 75F users can see all their data in real time, and even adjust complex building parameters remotely. Within this pre-programmed manifesto, 75F still must account for inevitable building variations that fall outside our pre-programmed profiles. To account for these variations while keeping our works-out-of-thebox mantra, 75F has developed a sophisticated playbook for custom and integrated solutions that prioritizes ease and simplicity for partners and users.

With this playbook, 75F can deliver a seamless experience ranging from configurable solutions with minimal setup to customizable solutions flexible enough to accommodate the variations inherent in every building. In the following chapters, we'll address:

- 75F's out-of-the-box approach to controls
- Different use cases for customized applications and how we approach them
- 75F tools like Hayloft and Site Manager and how they lead to model conformity to make systems integration consistent, no matter the integrator







IOT-BASED BMS SYSTEM ARCHITECTURE

75F's IoT-based BMS is vertically integrated and completely full stack. It contains all the necessary components for a complete solution, including field devices, cloud-based user portals and mobile apps, and pre-packaged control sequences following ASHRAE Guideline 36. The system creates a digital twin of any commercial building, feeding data from a wireless sensor network and third-party weather forecasts to the built-in AI to predictively and proactively redirect air where it is needed most via software-defined controllers. Installers simply select from a drop-down menu of available equipment profiles during installation to enable this sophisticated feature set.



PRE-PROGRAMMED FOR THE MAJORITY

75F's IoT-based BMS is programmed to work with most HVAC equipment found in commercial buildings. From multi-zone packaged RTUs and AHUs, single-mode equipment like unit heaters and exhaust fans, to fan coil units and water-source heat pumps, the 75F system is designed with all the hard programming work around sequences, user interfaces, analytics and alerting completed upfront. These out-of-the-box solutions are configurable by way of field settings, tuners, and easily customizable analytics dashboards using data pre-tagged to Project Haystack standards. This approach minimizes cost and complexity while providing enough flexibility to conform to individual building requirements and operator preferences.







Modbus RTU

Wired / Wireless Ethernet Connection

BACnet MSTP BACnet IP 900 MHz wireless mesh

Wired Analog/Binary controls



METHOD OF INTEGRATION		ADVANTAGES
75F HyperStat BACnet to Third-Party BMS	 Customer requested a BACnet or Modbus thermostat 	 Easily shelf-stocked by customers, with better ability to be stocked on service trucks Customer can easily add to their existing BMS
75F Central Control Unit to Third-Party BMS	 When Internet connection is not possible or desired Where customers have a large, existing system 	 Can integrate 75F to large existing enterprise systems containing multiple system types (i.e. security, fire systems, asset management, and more) Wireless field devices (no RS-48 or ethernet to each device) Maintain the offline benefits of 75F technology
CCU Connection to Modbus / BACnet Equipment	 With energy meters When custom points need alerts When custom points need local override capability 	 Uses 75F digital twins for consistency Shows points on CCU interface Writable points adjustable on CCU Custom alerts easily created and distributed using 75F framework Plug and play once models are created in Hayloft CCU is integrated as a managed device with cloud data buffering and over-the-air updates Simple install with no enclosure necessary
Third Party to 75F Cloud via Niagara Jace Driver	 Site has existing BMS and wants to cloud host and monitor data Benchmarking existing BMS in a cloudhosted platform Customer uses a third-party controller for custom control applications Customer uses a third-party Jace or data pump 	 Existing systems can be integrated into the 75F platform Cloud hosting Excellent option when only replacing a portion of a building with 75F equipment
75F Data Pump	 Small integrations with existing BMS or equipment that is non BACnet or Modbus Control sequences not needed With energy meters Multiple port/runs of RS-485 Data is pumped into 75F cloud and visualized / analyzed in Facilisight 	 Cost effective No annual hardware license Lightweight Comes with native embedded VPN Plenty of available drivers with no driver limits on each device Uses normalized data and 75F digital twin models
75F Jace	 Equipment control (plants, AHUs, full custom control applications) Large site with high device count Misc. devices where cable pulls are required, such as a Jace used in the same area as BTU/electrical meters Customer uses or installs third-party device for custom control application 	 API driver enables auto discovery of entire site and hierarchy Large number of protocols supported Widely known in the industry Tags can be applied to all points Capable of equipment control with NRIO based IO expansion



METHODS OF INTEGRATION — HYPERSTAT BACNET TO THIRD PARTY BMS



WHEN TO USE

Customer requested a BACnet or Modbus thermostat

ADVANTAGES

Easily shelf-stocked by customers, with better ability to be stocked on service trucks

Customer can easily add to their existing BMS





When Internet connection is not possible

- When Internet connection is not desired
- Where customers have a large, existing system

ADVANTAGES

Can integrate 75F to large existing enterprise systems containing multiple system types (i.e. security, fire systems, asset management, and more)

Wireless field devices (no RS-48 or ethernet to each device)

Maintain the offline benefits of 75F technology





Energy meters

When custom points need alerts

When custom points need local override capability

ADVANTAGES

Uses 75F digital twins for consistency

Shows points on CCU interface

Writable points adjustable on CCU

Custom alerts are easily created and distributed using 75F native framework

Plug and play once models are created in Hayloft

CCU is completely integrated as a managed device with cloud data buffering and over the air updates

Simple install with no enclosure necessary





Site has an existing BMS and the customer wants to cloud host and monitor data

Benchmarking existing BMS in a cloud-hosted platform

Customer uses a third-party controller for custom control applications

Customer uses a third-party Jace or data pump

ADVANTAGES

Existing systems can be integrated into 75F's platform

Cloud hosting

Excellent option when only replacing a portion of a building with 75F equipment





- Small integrations with existing BMS or equipment that is non BACnet or Modbus (e.g. LonWorks or DALI)
- When control sequences are not needed
- Energy meters
- Allows multiple port/runs of RS-485

Data is pumped into 75F cloud and visualized/analyzed in Facilisight

ADVANTAGES

- Cost effective
- No annual hardware license
- Lightweight
- Comes with native embedded VPN
- Plenty of available drivers with no driver limits on each device
- Uses normalized data and 75F digital twin models





Wired / Wireless Ethernet Connection

BACnet IP

WHEN TO USE

Equipment control (i.e., plants, AHUs, full custom control applications)

Large site with a high device count

Miscellaneous devices where cable pulls are required, such as a Jace used for custom control in the same area as BTU/electrical meters

Customer uses or installs third-party device for custom control applications

ADVANTAGES

API driver enables auto discovery of entire site and hierarchy

Large number of protocols supported

Widely known in the industry

Tags can be applied to all points

Capable of equipment control with NRIO based IO expansion



BRINGING PLUG AND PLAY TO INTEGRATIONS

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USING HAYLOFT TO ACCELERATE INTEGRATION

Building spaces have vast, disparate systems that need experts who both understand equipment from various OEMs in this space and comprehend the siloed modeling of data across each of these systems. This can hamper exchange and comprehensibility needed for collaborative projects and requires manual re-mapping of data prior to machine-to-machine communications across various systems.

Project Haystack has eased many of the hassles that come with those data silos. However, using a set of Haystack-defined models shows semantic interoperability challenges when they are created by different OEMs or system integrators. Among these challenges is the lack of consistency among Haystack users in defining equipment entities, thus preventing the automatic processing of information across these systems.

75F created Hayloft to enforce conformity so integrations are faster and simpler, no matter the integrator. A Project Haystack-based data modeling tool for creating mapped logical, physical, or conceptual data models in the smart BMS space, Hayloft is both a comprehensive repository for equips and a tool for creating models specific to each physical equipment type needed. Once a digital twin model is created, any other Hayloft user may recycle it in their own application.



BRINGING PLUG AND PLAY TO INTEGRATIONS

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SITE MANAGER: HAYLOFT'S FIRST CONSUMER

75F built Site Manager to integrate data at the cloud level using models created or stored in Hayloft. If Hayloft is the stamp, think of Site Manager as the ink. Site Manager offers a structured tree view for a site's affiliated floors, zones, and equips, and it's where new equipment can be added to that hierarchy by leveraging Haystack model templates created and stored in Hayloft. Accomplishing this is as simple as searching for the modeled template that matches an application, instantiate it in the correct space, tweak the model to your specific needs if necessary, and link the points from the data pump or Niagara station. Then, one need only log into 75F's suite of Facilisight tools to visualize the data.



NATIVE ANALYTICS AND VISUALIZATIONS OF CUSTOM INTEGRATED EQUIPMENT



CENTRAL PLANT MANAGER

Central Plant Manager (CPM) is user portal Facilisight's hub for visualizing, monitoring, and managing central plant equipment. This tool makes it easy for end users to visualize and manage their integrated equipment, whether it's a cooling tower, chiller, or more. Real-time data, active alerts, and analytics make this tool sophisticated and, thanks to tools like Hayloft and Site Manager, more intuitive than ever to set up and manage.

MORE ABOUT CPM



