

# HOW TO COMPARE EMS NETWORKS





For those looking to invest in a property-wide energy management system, this white paper details EMS software considerations, inasmuch as the software can be segregated from hardware. Please see the companion white paper, ***How to Compare EMS Hardware*** for a comprehensive look at the entire EMS platform.

When you are evaluating EMS platforms, consider the features outlined herein, and evaluate them on a scale of importance for YOUR project.

There is a handy checklist at the end of this document for use as you compare EMS platforms. There's a space for you to assign an importance level based on your project.

## Definition of EMS

An EMS (energy management system) is an electronic system that monitors, controls, and tracks energy usage in a building.

EMS is not the same as a BMS/BAS (building management or building automation system). At a high level, the purpose of an EMS is to save energy, and the purpose of a BMS/BAS is to automate controls like the elevators, fire and safety, HVAC, and metering.



## What We Mean by “EMS Platform”

In the past, an energy management system referred only to the software a property used to save energy. With the Internet of Things explosion, EMS platforms now extend well beyond the software, to the hardware with which it communicates.

The software and hardware functionalities are closely integrated. They no longer easily fall strictly into one category or the other.

## The Deal Breaker

### *Is the network secure?*

The EMS should reside on a secure network. If the EMS company uses a proprietary protocol, be sure it's a secure proprietary protocol.

If the EMS uses ZigBee, ask whether they use the secure or unsecure ZigBee protocol. “Secure” ZigBee means there is a unique credential (or “key” in the ZigBee lexicon) for every property.

Whatever EMS network you choose, be sure there is built-in security protection.

## EMS Software Platform

### *Will the software be installed on your system, or does it reside in the cloud?*

Software “on premises” means the software is manually installed and maintained on your computer, sometimes requiring dedicated computer hardware, and manual upgrades and data backups.

The advantages of an EMS on premises are:

- It can be used even when your internet connection is down
- It used to have a reputation for being more secure because it isn't ‘out on the web’, but this is now an outdated notion

“SaaS”, or software as a service, means the software resides on the provider's server. Advantages are:

- You access it on the internet instead of installing software and hardware on your computer
- Costs are generally lower for upgrades and new releases
- The providers (and not you) manage access to the

application, including security, availability, and performance

- The providers are responsible for upgrades and backups

A disadvantage of SaaS is:

- It is not accessible if the internet is down

SaaS is also known as on-demand software, web-based software and hosted software. Demand for SaaS is now outpacing demand for “on premises” software.

### *How easy is it to use?*

Take a deep dive into the software. Is it intuitive? Is it easy to navigate? This will be critical if there is a high turnover rate among users of the system. A complicated system does little good if your staff cannot work with it.

### *Can it identify trends?*

EMS software collects a cache of data, which is of most value when it is analyzed. The raw data in and of itself has limited value. It becomes a powerful tool when that data is analyzed for you and presented in ways that make it easy to understand. One way to present such data is in pie charts and color-coded graphs.

Another way to present data is to frame it along with corresponding data. Let's take runtime as an example.

Runtime data can be indicative of systems needing repairs or replacement, if it is gathered and sorted in list format. Here are three ways to present a list of HVAC systems in a building based on their individual runtime values:

- List of devices which differ significantly from the average value.
- Lists of devices sorted by the number of hours they ran during the last 30 days.
- Lists the devices with the highest and lowest runtimes.

Communication Protocol	Advantages	Disadvantages
<b>ZigBee</b>	Mesh network 15 channels Mature Widely adopted Flexible protocol Multiple manufacturers	10 meter range Complex protocol Must ensure no WiFi channel overlap when commissioning Higher frequency-less effective through concrete construction.
<b>WiFi</b>	Heavily used by computers and phones 23 channels Open protocol Mature Widely adopted for home use Multiple manufacturers	Security concerns for IoT devices when riding on IT network. Bandwidth concerns due to heavy use by computers and phones Not widely adopted commercially 10 meter range
<b>900 mHz (Z-wave)</b>	30 meter range Better propagation in construction material Heavy IoT industry acceptance Widely adopted commercially and in-home	Proprietary protocol Only 3 channels (in US)-therefore less flexible Low data range-cannot transfer a lot of data Single manufacturer
<b>BLE (Bluetooth)</b>	Newer technology Most smart devices now have BLE Low power	Less mature Not widely adopted yet 5 meter range Star network only (would need a coordinator in every room)

### *Do they offer a mobile version of their EMS software?*

Facilities engineers no longer need to be anchored to their desks to use their EMS platforms. With mobile EMS platforms, they can remain hands-on out on the property, avoiding frequent returns to the office to verify information on the EMS, or to individual rooms to assess a thermostat.

Issues can sometimes be resolved without even entering the living space, like a 2 AM call that the air conditioning is not functioning properly, which quite possibly can be rectified from a smart phone.

### *Is it quick and simple to identify the most urgent alerts?*

You'll want to reach a list of alerts quickly. How easy is it to find a list of alerting devices in the EMS? Is there some kind of alert summary or notification on the home page?

### *Can I set up automatic alerts?*

Alerts are one of the main advantages of an EMS system. Alerts, along with reports, are a tool to help you work proactively instead of reactively. Here are some popular alerts.

- Device has low battery
- Door/window has been left open
- Temperature protection active

### *In what format can you receive the alerts?*

Email and text messages are the common formats. Sometimes a phone call is an option.

### *How often will you receive the alert?*

What time will you receive the alert? Do you want the alert immediately, or once a day?

## Can I configure pre-set scenarios on your EMS system?

The beauty of an EMS is that groups of thermostats can be configured to work the same way.

Here are some ways pre-set scenarios are currently used:

- All the thermostats can switch to heat mode in the winter, then cool mode in the summer
- All rooms on the sunny side of the building are assigned different temperature and mode settings than on the shady side of the building
- In the hospitality industry, thermostats can be configured for preset scenarios when rooms are sold and unsold
- In dormitories, winter break, spring break and summer sessions can be configured; in cold weather climates, this can help avoid freezing pipes if students attempt to completely shut off their thermostats over winter break; in humid climates humidity control can run more aggressively over spring break and summer sessions when occupancy is lower

These pre-set scenarios or “profiles” contribute to energy savings.

## What kinds of reports can I run?

The valuable data that an EMS continuously gathers should be available in usable, actionable reports.

Reporting data may include:

- Energy savings
- Performance
- Occupancy
- Maintenance
- HVAC run times
- Low battery
- Duty cycles

Consider what data will be valuable to you. Perhaps reports can even be customized for you.

## Can it integrate with Building Management Systems?

The communication platform that the EMS system runs on may allow integrations with BMS systems.

If your building already runs a building management system, and you are interested in integrating it with an EMS system, it may be possible. Most likely, if they are capable of communicating with each other, they will use an intermediary software called BACnet.

## BMS as Primary Control

If running both, you might have the choice of which you will use for your primary control, the EMS or the BMS. If you intend to use your BMS as your primary control, there are some questions you should ask.

## Data Points

### What data points does your EMS send to the BMS?

Common ones are:

- Room temperature
- Set point
- Fan status
- Cool/heat mode
- Control



Beyond data points, will you want to control thermostat-related functions from your BMS? It is less common for EMS systems to have this capability, so if it is important to you, find out up front.

### *Can it integrate with Property Management Systems (Hospitality)?*

In the hospitality industry, property management systems can integrate with some EMS systems. Significant benefits are derived from occupancy-based energy savings. For example, if a room is unoccupied, the temperature may be configured to drift 10°; if the room is unsold and unoccupied perhaps you'd want to temperature to drift by more—maybe 15°.

PMS integration has another advantage: guest satisfaction. Upon check-in, you can have the room temperature begin its return to setpoint, so it's already a comfortable room temperature when they open the door. You can also configure "welcome scenes", so that when guests enter their rooms for the first time, the lights turn on, the drapes open, perhaps the TV is displaying a welcome message.

If this is important to you, inquire about PMS integrations. If they do offer PMS integration, do they integrate specifically with YOUR PMS system?

### *Do you want your EMS to assist in your load shedding efforts?*

Some larger cities institute load shedding during peak energy usage. If you have an agreement with your utility company to reduce your power consumption on a regularly scheduled basis, it's a perfect fit for an EMS. Cities with aging electrical grids, and high-density areas such as New York City require businesses to shut off HVAC systems on a regular schedule to save energy. With an EMS in place, you no longer have to send staff to every room to shut down thermostats.

### *Is there a landing page with the most important high-level information displayed?*

If software isn't easy to use, it likely won't get used. Opening an application and having your system summary instantly displayed is a valuable commodity.

The unofficial "three-click rule" states that content should be accessible using no more than three clicks. There are no scientific studies supporting this. It's anecdotal. However, even software that's used on a regular basis (such as your new EMS) should

provide easy access to data. In fact, one could argue that if it is used regularly, it should be easier to access than software that's used only occasionally. Quick, easy, accurate: all important.

### *Is the information presented in real time?*

If an HVAC system fails, do you want to know about it now or tomorrow? You'll likely want to know about it immediately, particularly if your room is sold (in the hospitality industry), or otherwise occupied. You may want to investigate recent thermostat settings and occupancy, for example. Up to the minute data can help you pinpoint the cause of malfunctions much more efficiently.

### *Does it display your energy savings?*

Displaying the energy you've saved is an absolute must in an EMS. It's the primary reason an EMS is installed, and monitoring its ROI is a high priority for someone in the organization. How easy is it to find this information? How clearly is it presented? Is there detailed data to back up the analysis?

### *Are you able to change individual thermostats remotely from the EMS system, for one-off troubleshooting and guest satisfaction?*

Although the ability to correct thermostat settings remotely, thereby avoiding entering a guest's room, is not the absolute highest priority in an EMS, or the driving factor in investing in one, you will find that it is such a boon to your organization's efficiency, that it's smart to include this factor in your EMS comparison study.

## **Summary**

Energy Management Systems have become so highly technical, they can be baffling at times to navigate and understand. They can be baffling to shop for, as well.

Doing some research in advance will help prepare you for this process. Be an informed buyer. Know your options, and decide how they rank in terms of importance for your particular project.

Complete the enclosed checklist. And by all means, ask questions!

Feature	Your Priority	Notes
The Deal Breakers		
What HVAC models does the EMS work with?	High	
Can the EMS accommodate multiple HVAC models at the same property?	High	
Is their network secure?	High	
Is the system occupancy based?	High	
EMS Software Platform		
Will the software be installed on your system, or does it reside in the cloud?		
Can it identify trends?		
How easy is it to use?		
Do they offer a mobile version of their EMS software?		
Can I set up automatic alerts?		
Can I configure pre-set scenarios on your EMS system?		
What kinds of reports can I run?		
Can it integrate with Building Management Systems?		
BMS as Primary Control		
Can it integrate with Property Management Systems (Hospitality)?		
Do you want your EMS to assist in your load shedding efforts?		
Is there a landing page with the most important high-level information displayed?		
Is it quick and simple to identify the most urgent alerts?		
Is the information presented in real time?		

Feature	Your Priority	Notes
Does it display your energy savings?		
Are you able to change individual thermostats remotely from the EMS system, for one-off troubleshooting and guest satisfaction?		
Hardware		
Does the EMS system feature humidity control? Is it standard or is there an additional charge?		
Does your EMS platform integrate with devices from other manufacturers?		
Do you offer wired and wireless options?		
What is your thermostat voltage range?		
What communication protocol does your product use?		
What is the warranty program?		
Other		
What kind of support do you offer?		
Installation		
Can I invest in hardware this year, then network in the future?		





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