

600 W to 4600 W, Tier 1, Local Edge Solution

DESIGN OVERVIEW

Nine Micro Data Center Reference Designs

Target Availability
Tier 1

Data Center Overall Space
4.0 ft² to 14.7 ft²

Regional Voltage and Frequency
120V/208V, 60Hz

ABOUT THIS DESIGN

Nine Micro Data Center Reference Designs for Local Edge Computing Infrastructure for North America (NAM) Region

Includes hardware infrastructure, physical security and monitoring software (EcoStruxure IT)

Flexible Designs with the ability to add and/or remove items within the Reference Designs to address specific customer needs

Physical Security: NetBotz suite provides enclosure door locks & surveillance along with variety of environmental monitoring

Monitoring Software and services: range of monitoring software packages available from support of DIY to fully managed by Schneider

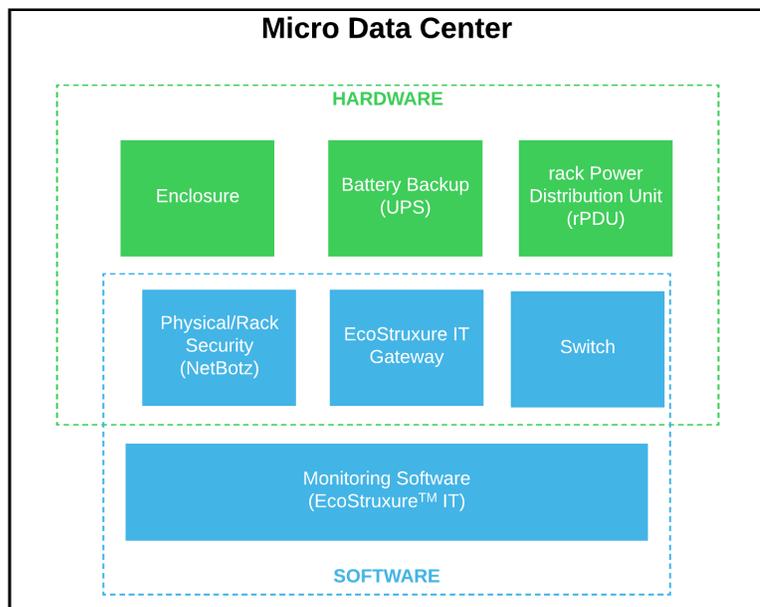
INTRODUCTION

APC by Schneider Electric provides physical infrastructure and monitoring software to support Local Edge Computing. Micro Data Center Reference Designs are hardware and software solution that can be used as a starting point to design customers' Local Edge Computing Infrastructure. The Reference Designs can be customized by adding or deleting items off from the Reference Designs to address specific customer needs.

Micro Data Center Reference Designs consist of an enclosure, a battery backup (UPS), rack Power Distribution Unit (rPDU), cooling, physical security (temp/humidity sensor, rack door access, and/or camera) , monitoring software (*EcoStruxure™* IT) as well as option to have Schneider monitor the infrastructure and Schneider assembly and start-up services.

Micro Data Center Reference Designs are in the Local Edge Configurator (LEC) in the APC by Schneider Electric's Design Portal website. The Design Portal website is currently accessible to certified partners and Schneider Electric internal employees (Sales rep) only.

There are nine Micro Data Center Reference Designs specifically designed for North America (NAM) region.



Micro Data Center System Overview

Micro Data Center consists of hardware and software components to support the Local Edge Computing Infrastructure.

The physical infrastructure includes an enclosure, battery backup (UPS), rack Power Distribution Unit (rPDU), as well as NetBotz to support physical/rack security and additional hardware such as EcoStruxure IT Gateway appliance/hardware and 8-port switch to support the monitoring software (EcoStruxure IT Expert).

Note: The 8-port unmanaged switch need to be purchased separately. Recommended third party switch: Net gear F108NA.

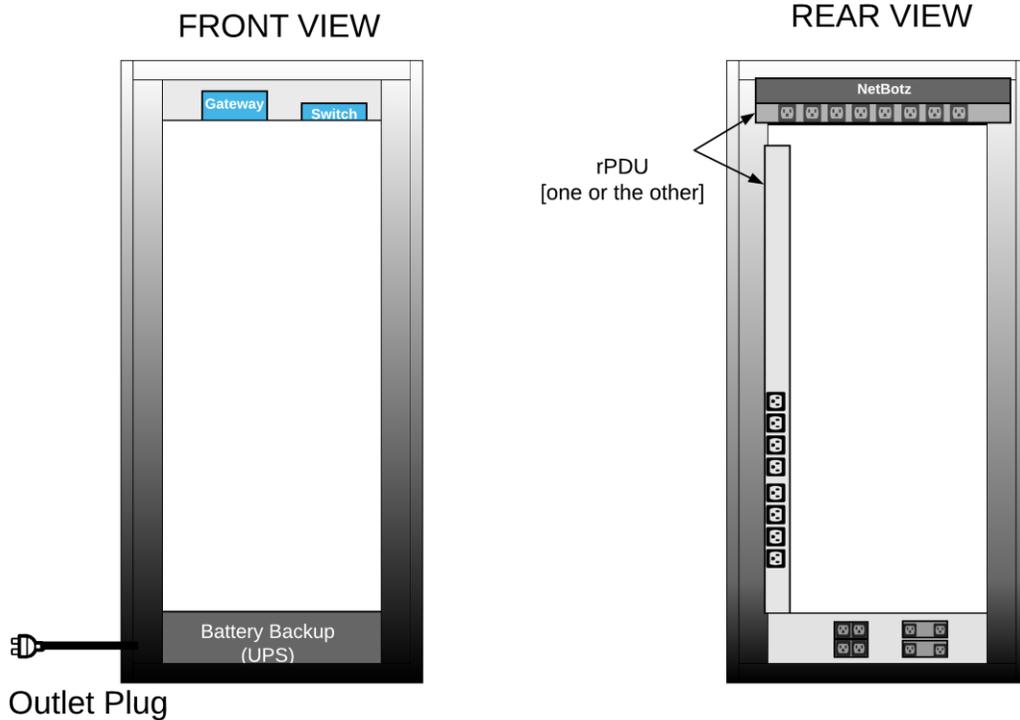
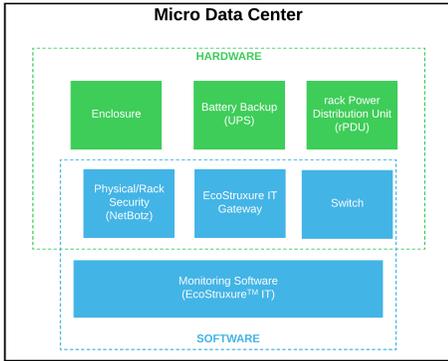


Figure 1 Micro Data Center Enclosure Layout

Nine Micro Data Center Reference Designs

There are nine different Micro Data Center Reference Designs that have been designed specifically for North America Region. These Reference Designs vary by enclosure type, enclosure size, battery backup (UPS) size, and cooling capacity. For all the designs, the same package for the physical security (NetBotz), monitoring software (EcoStruxure) and Schneider on-site assembly & start-up services are offered.

One of the advantages of a Micro Data Center Reference Design is its flexibility. Items within the Reference Designs can be removed, increased in quantity, or new items be added to address specific customer needs.

See Figure 2 on how each Reference Designs vary from each other.

Categories for Micro Data Center Reference Designs

The Micro Data Center Reference Designs have been divided into two categories:

- IT Category (Network Closet/Small Server Room)
- Office Category (Office and Commercial Space)

IT Category (Network Closet/Server room)

Micro Data Center Reference Designs within the “IT” category are recommended for the network closet and server room. These environments can be found anywhere from corporate headquarters to retail stores to warehouses. In these use cases, the room or environment that Micro Data Centers are in should be temperature controlled 24 hours a day, 7 days a week per ASHRAE standards.

Office Space (Office and Commercial)

Micro Data Center Reference Designs within the “Office” category are recommended for office and/or commercial usage. For example, these environments can be in a retail store front, bank branch, manager’s office, or IT office. In these use cases, the room or environment that Micro Data Center will be located in might not be temperature controlled 24 hours 7 days a week per ASHRAE standards or the Micro Data Center needs to be quiet and therefore, the soundproof enclosure (CX) is preferred. Additionally, these use cases will be in areas that require the Micro Data Center to provide enhanced physical security since it is located in a public space.

Market Segments

Some of the market segments for Micro Data Center Reference Designs are IT, Healthcare, Education, Finance, Retail, and Industrial customers which require local edge computing infrastructure.

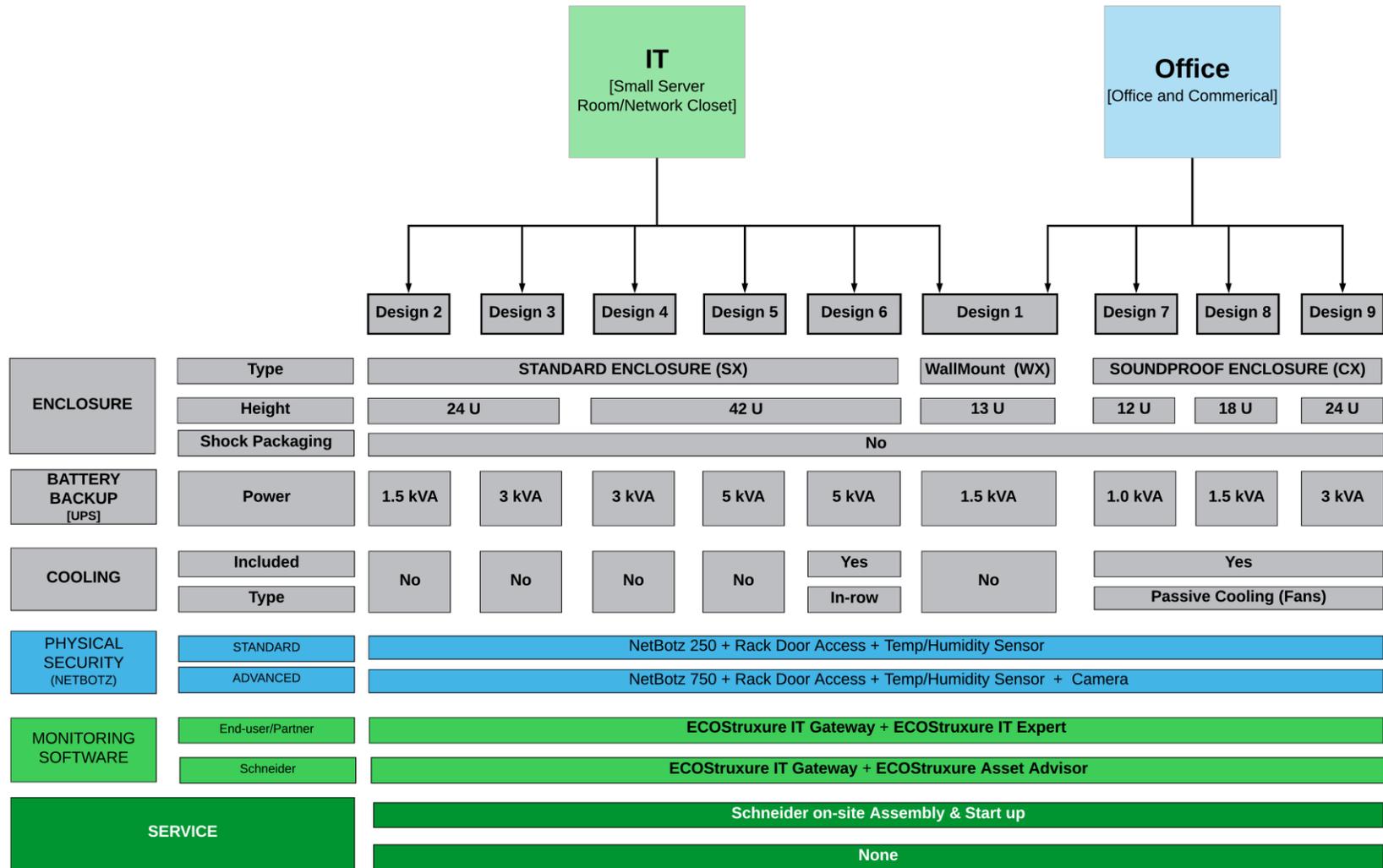


Figure 2 Micro Data Center Reference Designs Architecture

Battery Backup (UPS)

The power to the Micro Data Center is provided by the battery backup also known as **Uninterruptible Power Supply (UPS)**.

Design Criteria for selecting Battery Backup (UPS)

The criteria used to select the specific UPS were network connectable, minimum U-height, ability to have extended run time, lowest price point and maximum power factor (kW/kVA).

Network Connectable: To support remote monitoring, all UPS selected in the Micro Data Center Reference Designs includes a network card.

Minimum Rack U-height: To maximize the rack space for IT Equipment/servers, the minimum rack U-height for each UPS was desired.

Extended Run time: Selecting a UPS with the capability to extend the runtime provides the customers with flexibility to add additional battery pack(s) to get higher run time if so desired.

Price: Price sensitivity was also one of the criteria used while selecting the specific UPS.

Power Factor (kW/ kVA): To maximize the Watts for the IT Equipment, highest power factor was desired.

Lithium Ion UPS Upgrade: Some of the Micro Data Center Reference Designs have an ability to upgrade the batteries in the UPS from a traditional lead-acid to lithium-ion.

To learn more about advantages of Lithium-ion UPS visit: [Lithium-Ion Batteries with a UPS](#)

Electrical One-line Diagram

The two figures below show the electrical distribution and the network connection in the Micro Data Center.

The rack Power Distribution Unit (rPDU) plugs to the battery backup (UPS). All the other devices and equipment such as NetBotz, the EcoStruxure IT gateway, the network switch, and the IT equipment will plug into the rPDU.

Note: There is only 1 rPDU per Micro Data Center reference design. There are two types of rPDU that can be found in Micro Data Center Reference Designs, either a 0 U (vertical) or 1 or 2 U (rack-mount) rPDU.

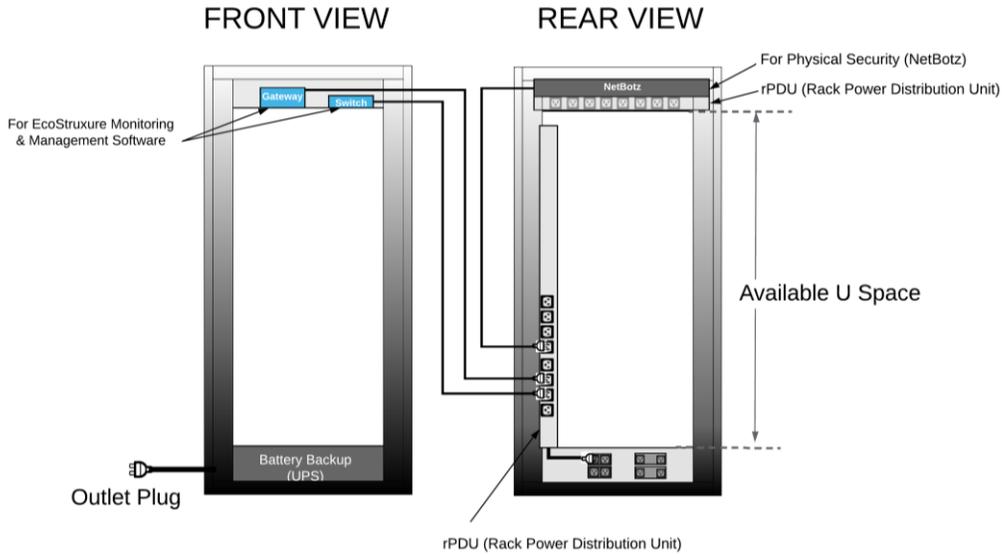


Figure 3 The Electrical Distribution in a Micro Data Center

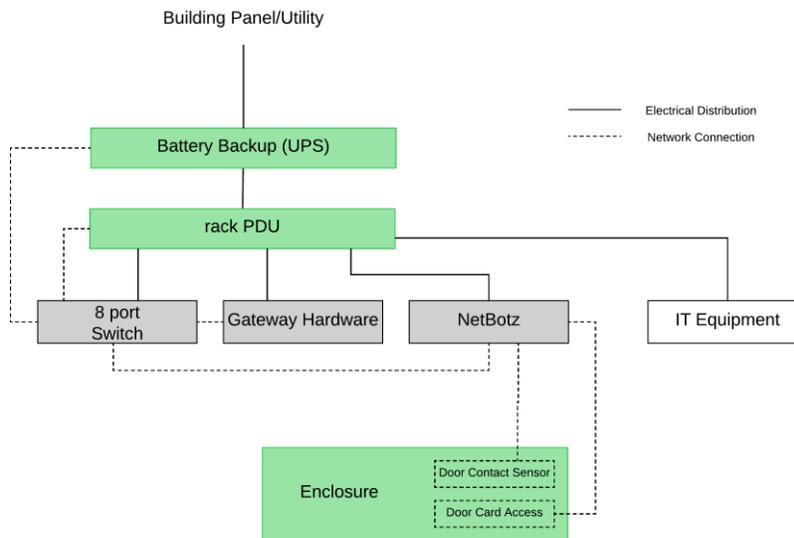


Figure 4 : One-line Electrical Diagram for Micro Data Center

Cooling

For most of the Micro Data Center Reference Designs, cooling the IT equipment will rely on the building HVAC system or existing cooling units. These designs provide perforated doors and/or fan ventilation to keep a uniform airflow through the enclosure. The passive fan cooling is included within the enclosure itself.

Micro Data Center Reference Design 6 has an active cooling unit attached to it called InRow cooling. This system uses a specifically designed air containment system to provide active, precision cooling to the IT equipment. The InRow system has many benefits including energy efficiency and ability to cooling higher density deployments.

To learn more about InRow cooling in reference design visit: [InRow SC, 300m, Self-contained](#)



Figure 5 Micro Data Center Reference Design 6 with in-row cooling

Calculation of Maximum IT Load (Watt)

For Micro Data Center Reference Designs with no passive or active cooling, the maximum total IT load is calculated using the battery backup (UPS) output power capacity (Watts). 200 W was reduced from the UPS output power capacity to calculate the total maximum IT load to compensate for the power usage by the physical security hardware (NetBotz) and monitoring software hardware (EcoStruxure IT gateway and the switch).

For Micro Data Center Reference Designs with passive cooling (fan) or InRow cooling, the maximum total IT load is limited by either:

1. The maximum heat rejection by cooling (passive or InRow cooling)
2. The output power capacity of the battery backup (UPS).

From those two scenarios, the lowest number was used to the calculate maximum total IT load.

200 W was reduced from the UPS output power capacity to calculate the total maximum IT load to compensate for the power usage by the physical security hardware (NetBotz) and monitoring software hardware (EcoStruxure IT gateway and the switch).

Physical Security (NetBotz)

NetBotz from APC by Schneider Electric protects the Micro Data Center from physical threats such as high temperature, humidity, and both malicious and unintentional access events.

In Micro Data Center Reference Designs, there are two packages for Physical Security (NetBotz):

- Standard
- Advanced

The standard physical security includes a keycard access control to the enclosure, a temperature/humidity sensor, door contact alarm sensors, and the NetBotz 250 intelligent device.

The advanced physical security includes a keycard access control to the enclosure, a temperature/humidity sensor, door contact alarm sensors, High Definition camera monitoring, and the NetBotz 750 intelligent device.

To learn more about NetBotz products go to
NetBotz Introduction Video: [Introduction to the NetBotz Product Line](#)
Detail on NetBotz 250 & sensors: [NetBotz 250 Brochure](#)

Detail on NetBotz 750, sensors, camera: [NetBotz 750 Brochure](#)

Monitoring Software (EcoStruxure™ IT)

Along with physical security, the end-user/customer can also purchase a monitoring software from APC by Schneider Electric. The monitoring software from APC by Schneider Electric is called “EcoStruxure IT Expert”.

EcoStruxure IT Expert is a web interface software that can provide the end-user/customer with real-time monitoring, incident management, analysis and asset utilization.

To learn more about the advantages and features of EcoStruxure IT Expert please visit:

<https://ecostruxureit.com/ecostruxure-it-expert/>

The end user/customer can purchase a monitoring software and have three choices to manage Micro Data Center. The end user can manage their Micro Data Center themselves or let a partner or Schneider provide remote monitoring services so the end-user does not have to manage the Micro Data Center.

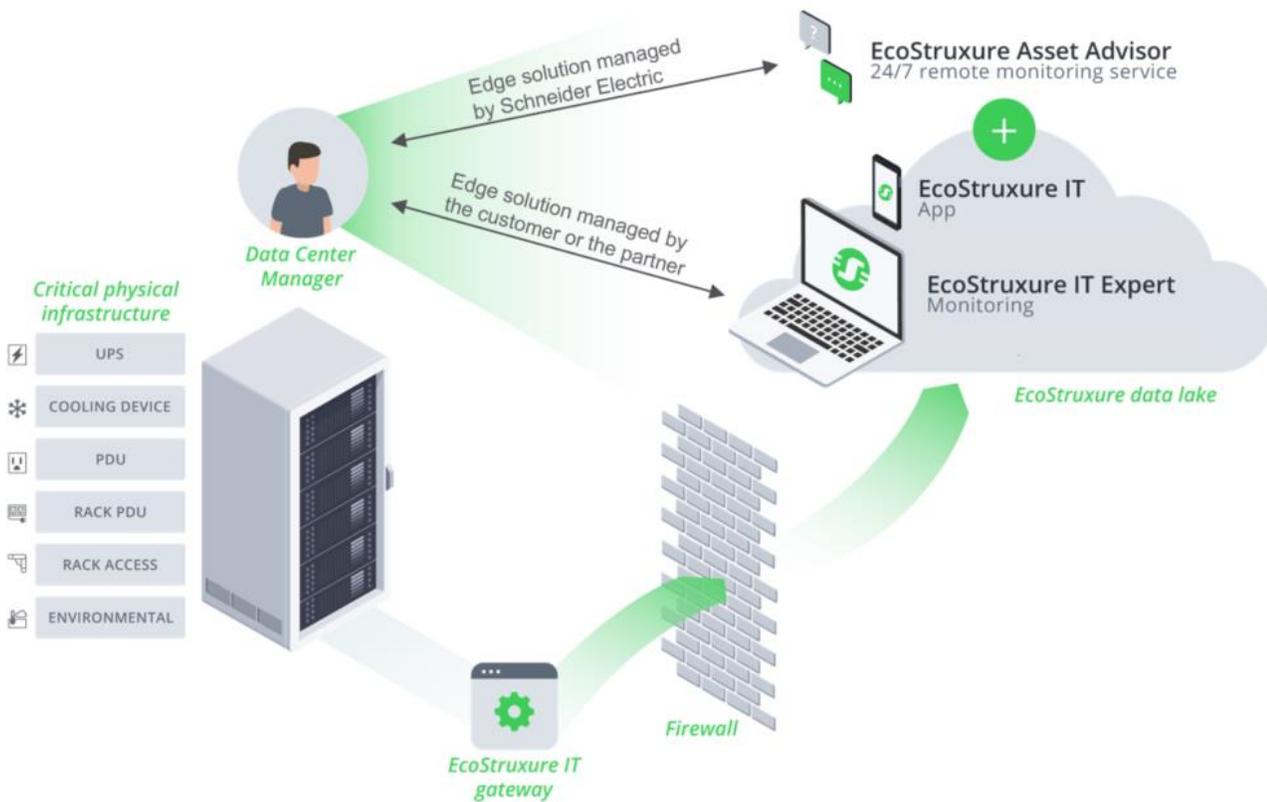


Figure 6 EcoStruxure Monitoring Software and Services Architecture

Once the end-user/customer purchases a monitoring software, three scenarios that can occur:

1. **End user:** The end user/customer can choose to purchase a monitoring software from APC by Schneider Electric, however do not want any additional monitoring services from Schneider or any partners.
2. **Partners:** The end user/customer can choose to purchase a monitoring software from APC by Schneider Electric, but would like a partner to provide monitoring services so that the end-user does not have to manage the Micro Data Center.
3. **Schneider:** The end user/customer can choose to purchase a monitoring software from APC by Schneider Electric, but would like Schneider to provide monitoring services so that the end-user does not have to manage the Micro Data Center. Schneider Electric's monitoring service is called EcoStruxure Asset Advisor.

Note: If the end user/customer chooses to use Schneider's monitoring service (EcoStruxure Asset Advisor), the end user/customer needs to purchase EcoStruxure IT gateway and EcoStruxure Asset Advisor only.

During the initial set up, the end user/customer would need to download the free version of EcoStruxure IT Expert app to connect to EcoStruxure Asset Advisor. However, they do not need to purchase the EcoStruxure IT Expert software subscription.

To learn more about APC by Schneider Electric's monitoring service, EcoStruxure Asset Advisor, please visit: <https://ecostruxureit.com/ecostruxure-asset-advisor/>

EcoStruxure IT Local vs. Cloud-based Interface

APC by Schneider Electric provides a monitoring software called EcoStruxure IT.

There are two interfaces that an end-user/customer can use to monitor their Micro Data Center.

Local Interface: The end-user/customer can view their Micro Data Center using a local interface in EcoStruxure IT Gateway.

Cloud-based Interface: The end-user/customer can also view their Micro Data Center using a cloud-based web interface called EcoStruxure IT Expert.

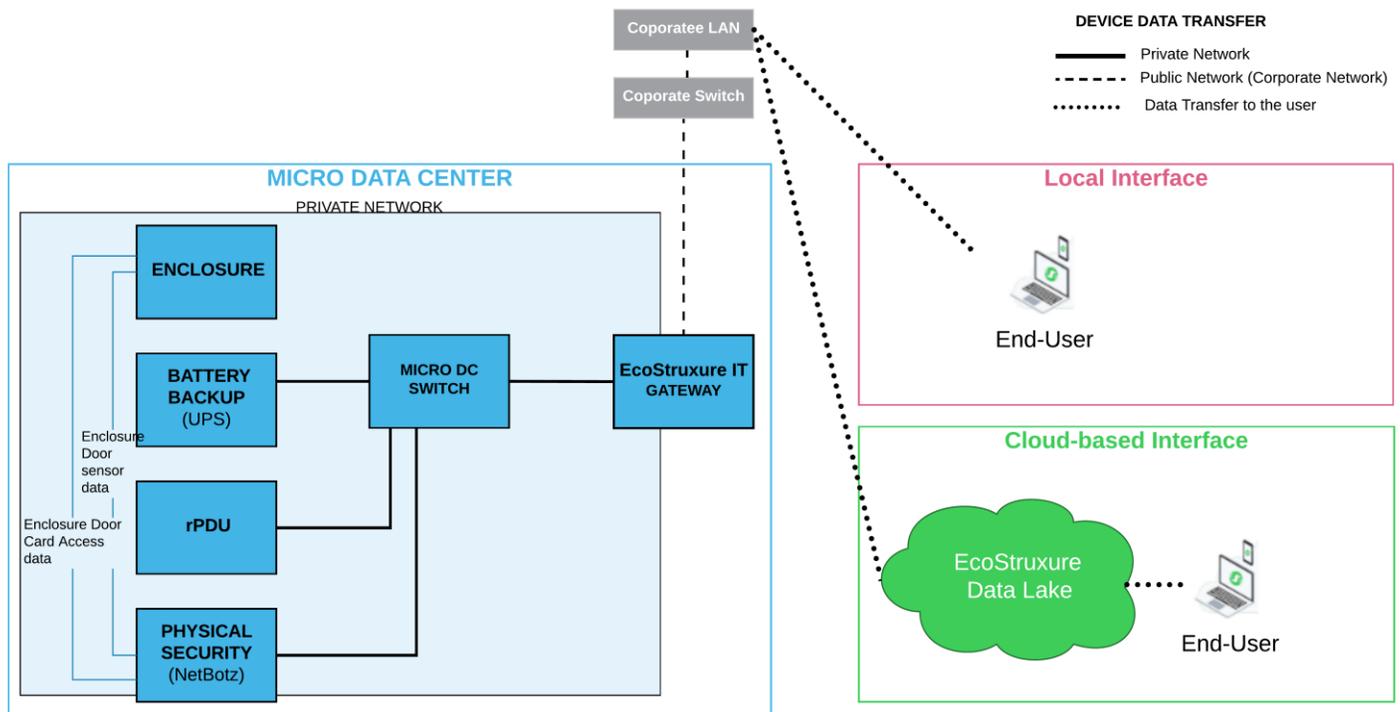


Figure 7 Local (EcoStruxure IT Gateway) vs. Cloud-based (EcoStruxure IT Expert) Interface

Connectivity

All the Micro Data Center’s devices are connected to an unmanaged switch¹ (shown as “Micro Data Center switch”). Then, the switch transfers the device data to the EcoStruxure IT Gateway hardware/appliance.

Then EcoStruxure IT Gateway is then connected to the company’s network (Corporate LAN Network). From there, the UI can be viewed either through EcoStruxure IT Gateway software interface (Local Interface) or EcoStruxure IT Expert web interface (Cloud-based Interface).

¹ Any switch can be used for this purpose. However, once a switch is selected, it cannot be used for any other purpose while it is serving as Micro Data Center switch. The Micro Data Center switch needs to be purposed separately.
Recommended third party switch: Net gear F108NA.

Local Interface: EcoStruxure IT Gateway Interface

Once the Micro Data Center's EcoStruxure IT gateway hardware is connected to the corporate network, the end-user/customer can access EcoStruxure IT gateway's software to view the Micro Data Center device status and information. The end-user/customer can only view this EcoStruxure IT gateway software if they are in the same network as the Micro Data Center's EcoStruxure IT Gateway.

Example: The Micro Data Center can be connected in a lab and the end-user/customer can access/view the Micro Data Center's device's status and information from their desk.

Cloud-based Interface: EcoStruxure IT Expert Web Interface

The end-user/customer can also purchase subscription for a cloud-based web software called EcoStruxure IT Expert. EcoStruxure IT Expert is a web interface software that can provide the customer with real-time monitoring, incident management, analysis and asset utilization. EcoStruxure IT Expert software uses the EcoStruxure IT gateway to pull the Micro Data Center devices' information and display it in a website interface in EcoStruxureit.com.

To access the EcoStruxure IT Expert, the end-user/customer must purchase the EcoStruxure IT Expert software subscription which is billed yearly. The software subscription is structured around the number of devices that the end-user/customer owns.

If the end-user/customer has multiple Micro Data Center in multiple locations, EcoStruxure IT Expert is ideal as it aggregates all Micro Data Center device information using the EcoStruxure IT gateway from different locations and display in one web interface.

To learn more about **EcoStruxure IT Platform** such as **EcoStruxure IT Expert** visit: [What-Is-EcoStruxure-IT](#)

To learn more about EcoStruxure IT Gateway: [Online Help Center for EcoStruxure IT Gateway](#)

Advantage of EcoStruxure IT Gateway (private and public ports)

The EcoStruxure IT gateway has two connections/ports: a private port and a public port. All the Micro Data Center devices are connected to the private port, and the corporate switch/corporate LAN are connected to the public port.

The advantages of the EcoStruxure IT gateway having a private and public ports are two folds. One, the customer/end user only need one IP address per Micro Data Center instead of having multiple IP addresses for each Micro Data Center devices. Two, it created additional security for the Micro Data Center devices as now it can only be accessed through the EcoStruxure IT gateway.

Service: Assembly, Install, and Start-Up

In many Local Edge deployments, a Micro Data Center will be placed in an area that is critical to operation of the business. The expectation is that the Micro Data Center can be quickly assembled and operational, so this space can be returned to critical business purposes. Additionally, many sites will not have dedicated IT staff or skilled IT employees to install and/or service the IT equipment and infrastructure.

An option for Schneider Electric trained Field Service Representatives (FSR) to complete the assembly, installation, and start-up of the Local Edge infrastructure is provided in each Micro Data Center Reference Design. This is a streamlined service, specific to Micro Data Center deployments that includes a scope of work that is right for Edge.

Scope of Work

Assembly: The trained FSR will unpackage, de-palletize, and move components/devices to their final destination.

Install: The trained FSR will place the APC by Schneider Electric components and devices into the designated rack space. They will also properly connect power and network cabling between the components and devices for proper operation.

Start-Up: The trained FSR will start-up all the APC by Schneider Electric components and devices in accordance with standard product procedures and warranties (including In-Row cooling units). The Micro Data Center will then be handed to the customer, fully operational, and a short training will be provided if desired.

Micro Data Center Reference Designs can only be accessed by certified partners and Schneider employees (Sales team). Please contact your local partners or Schneider Sales Team to learn more about Micro Data Center Reference Designs.

For Technical more information visit: [Technical Data Spec](#) [Schneider employees access only]

Design Attributes

		DESIGN 1	DESIGN 2	DESIGN 3	DESIGN 4	DESIGN 5	DESIGN 6	DESIGN 7	DESIGN 8	DESIGN 9
Enclosure	Enclosure Type	WALLMOUNT	STANDARD ENCLOSURE (SX)				SOUNDPROOF ENCLOSURE (CX)			
	Enclosure Height	13 U	24 U		42 U		42 U	12U	18U	24 U
Battery Backup (UPS)	Power (kVA)	1.5 kVA	1.5 kVA	3 kVA	3 kVA	5 kVA	5 kVA	1.0 kVA	1.5 kVA	3 kVA
Cooling	Type	N/A	N/A	N/A	N/A	N/A	In-row Cooling	Passive Cooling (Fans)		
Physical Foot Print	Width-Depth-Height m ³ (ft ³)	0.58 x 0.63 x 0.67 m ³	0.60 x 1.07 x 1.20m ³	0.90 x 1.48 x 1.99 m ³	0.70 x 0.93 x 0.70 m ³	0.75 x 1.13 x 1.02m ³	0.75 x 1.13 x 1.29m ³			
		(1.9 x 2.1 x 2.2)ft ³	(2.0 x 3.5 x 4.0)ft ³	(2.0 x 3.5 x 4.0)ft ³	(2.0 x 3.5 x 6.5)ft ³	(2.0 x 3.5 x 6.5)ft ³	(3.0 x 4.9 x 6.5)ft ³	(2.3 x 3.1 x 2.3)ft ³	(2.5 x 3.7 x 3.3)ft ³	(2.5 x 3.7 x 4.2)ft ³
Electrical Spec	Input Power Voltage (V)	120 V	120 V	120 V	120 V	208 V	208 V	120 V	120 V	120 V
	Runtime (minutes) at max kW	5.0 mins @ 1.35 kW	5.8 mins @ 1.2 kW	7 mins @ 2.5 kW	7 mins @ 2.5 kW	3.5 mins @ 4.8 kW	3.5 mins @ 4.8 kW	8.1 mins @ 0.8 kW	5.8 mins @ 1.2 kW	7 mins @ 2.5 kW
IT Equipment Spec	Available U Space (U)	8	20	19	38	37	37	8	14	19
	Total Maximum IT Load (Watt) ¹	1150	1000	2500	2500	4600	4600	600	1000	2200
	Maximum Depth for IT Equipment mm (inch) ²	432 mm (17 inch)	915 mm (36.0 in)	915 mm (36.0 in)	675 mm (26.6 in)	840 mm (33.1 mm)				