# Design and Quote

EcoStruxure Power Monitoring Expert

Digital Power
Oct 30, 2019

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# Welcome to EcoStruxure Power Monitoring Expert 2020

Design and Quote Training

The intended audience for this presentation is:

- Tendering Teams

- Sales and Marketing teams

- Critical Power EcoXperts

- Solution Architects and Segment teams

Prerequisites:

- Familiarity with PME is preferred



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# EcoStruxure™ Power - Digitizing your electrical distribution system with a future proof IoT Power Management platform

## We deliver safe, reliable, efficient and compliant Power Management systems for large & critical facilities

**Data Centres**
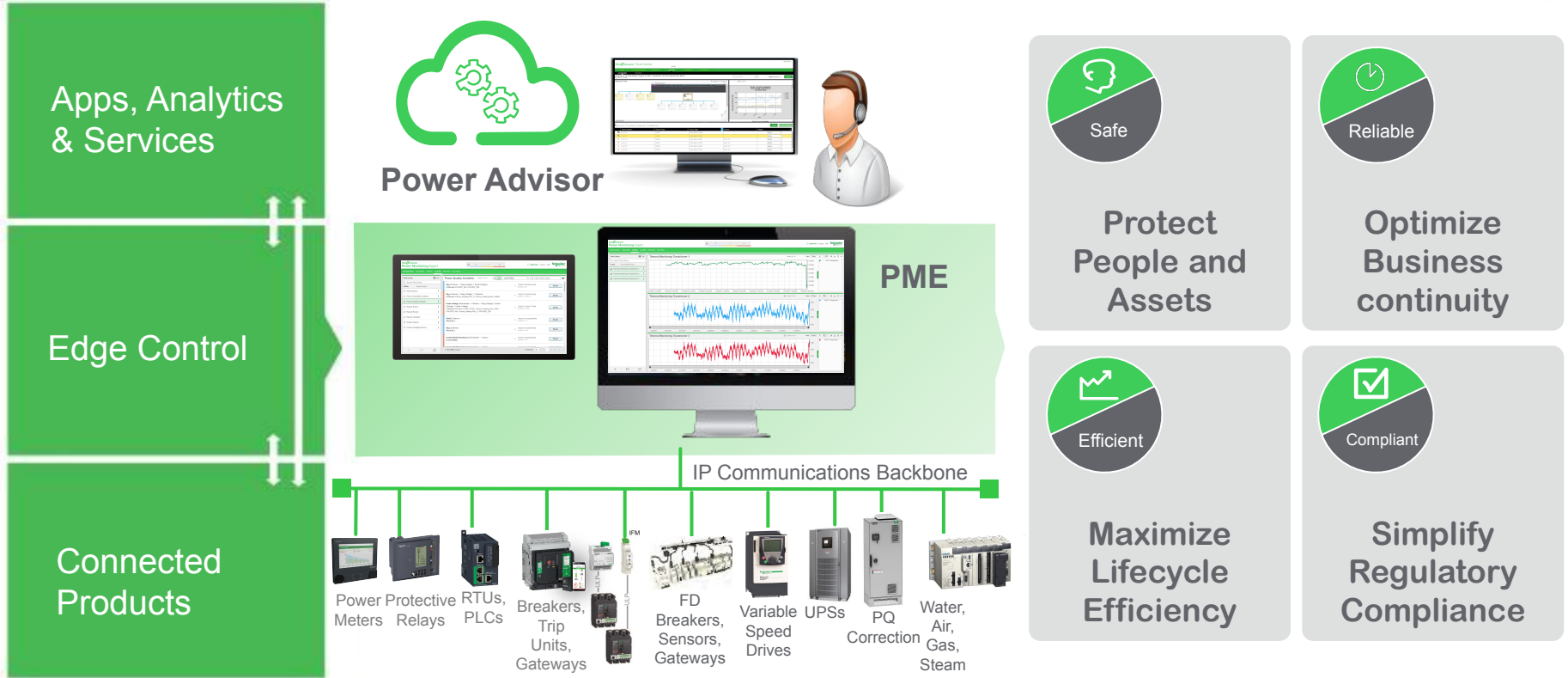
**Healthcare**

**Industry**

**Infrastructure**

**Buildings**

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# Gain and Edge on your Competition

Power Monitoring Expert brings edge control to power distribution

**Apps, Analytics & Services**

**Edge Control**

**Connected Products**

**Power Advisor**

**PME**

IP Communications Backbone

Power Meters | Protective Relays | RTUs, PLCs | Breakers, Trip Units, Gateways | IFM | FD Breakers, Sensors, Gateways | Variable Speed Drives | UPSs | PQ Correction | Water, Air, Gas, Steam

Safe — **Protect People and Assets**

Reliable — **Optimize Business continuity**

Efficient — **Maximize Lifecycle Efficiency**

Compliant — **Simplify Regulatory Compliance**

# Agenda

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# Introduction

# Respond to a Request for Proposal/Quote (RFP/RFQ)

RFPs/RFQs vary greatly from segment to segment and country to country. In order to create a proposal and define a scope of work some clarifying questions are required in many cases.

- Applications? How will the system be used?

- Communication network details

- Number of devices or data points

- Integration to third party systems

- Cybersecurity requirements

- Number of users

- Etc…

**Section 16291 Power Quality Monitoring Equipment**

PART 1 GENERAL

1.1    DESCRIPTION

    1.1.1    Provide Digital Power Monitoring and Power Quality Meters and Power Quality Monitoring System.

1.2    SCOPE

    A.    The Utility Metering System (UMS) shall include electricity sub-meters, domestic water meters, chilled water energy (BTH) meters, current transformers (CT), and programming graphics, software, analytics, trending and benchmarking as required, and specified herein, for a complete and operational system.

A.    Software:  Configured for a server and multiple client PCs, each with capability for accessing multiple devices simultaneously.  Software shall include interactive graphics client and shall be Web enabled.  Workstations and portable computers shall not require any software except for an Internet browser to provide connectivity and full functionality.  Include a firewall recommended by manufacturer.  100 Base-T Ethernet, Modbus TCP/IP RS-232, and RS-485 digital communications.

Part 1        General

1.1            SUMMARY

    .1    This section describes a complete microprocessor based electrical power monitoring system.

2.10    CRITICAL POWER MANAGEMENT SYSTEM

    A.    Provide a Critical Power Management System (CPMS) solution for direct monitoring and control of the automatic transfer switches, for monitoring of the generators and for providing analysis of continuously recorded waveforms at the power quality meters.

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# RFP/RFQ Considerations (Cont.)

## Typical Projects

### Greenfield New Software and Hardware:

- Typical for new constructions

- Meters usually included as part of electrical system spec with MV and LV equipment

- Applications required vs functional requirements

- Project timing, deployment

- FAT/SATs requirements

- Support and warranty requirements

- Systems details: PQMS, EPMS, PCMS, EMS, PEMS, BEMS

### Brownfield New Software and Hardware:

- Retrofit to existing facility

- Scope include meters and software

- Existing devices equipment to be integrated also to the system

- Available infrastructure and networks important for the proposal

- Hardware installation on existing infrastructure

- Facility walk through

### Brownfield New/Existing Software, existing hardware:

- Software upgrades, software replacement (competitor), or new software for existing metering system.

- Types of meters, devices, and quantity

- Type of network, protocols

- Upgrade considerations

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# Competency Center Design Support

## Pre-Sales Support

Support countries during pre-sales activities

- Increase chance of success by bringing high level of expertise to projects
- Subject Matter Expert in DOA to qualify opportunity
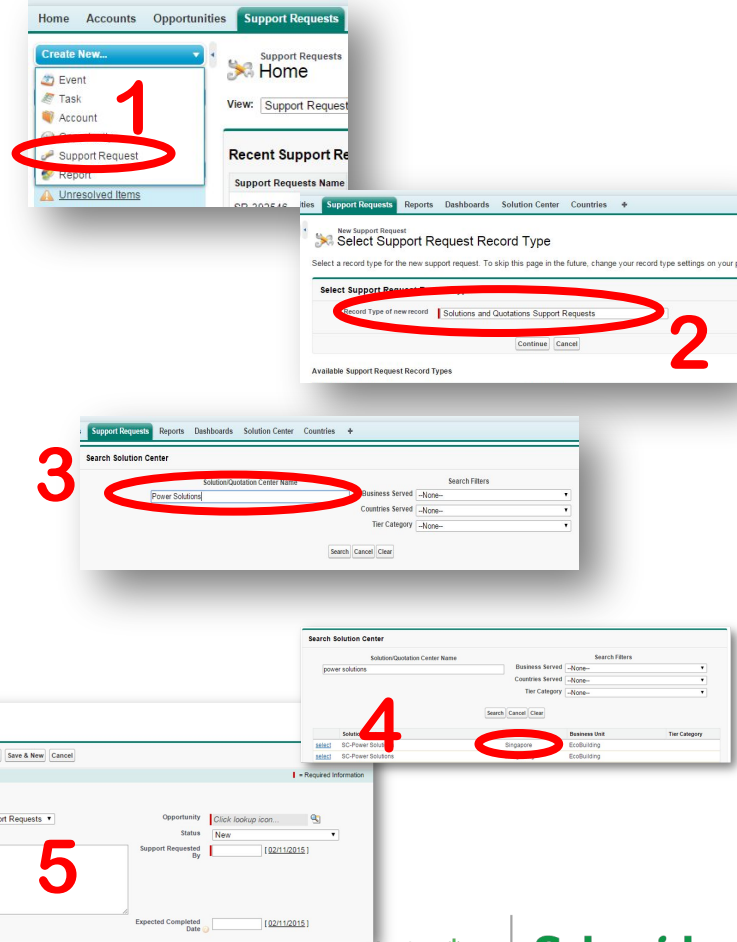
Build application knowledge

- Provide design guideline and referenced architecture for our systems
- Develop application notes and customer success stories

Contribute to the Power Solutions Exchange Community

- Contribute to and animate Power Solutions Exchange Community
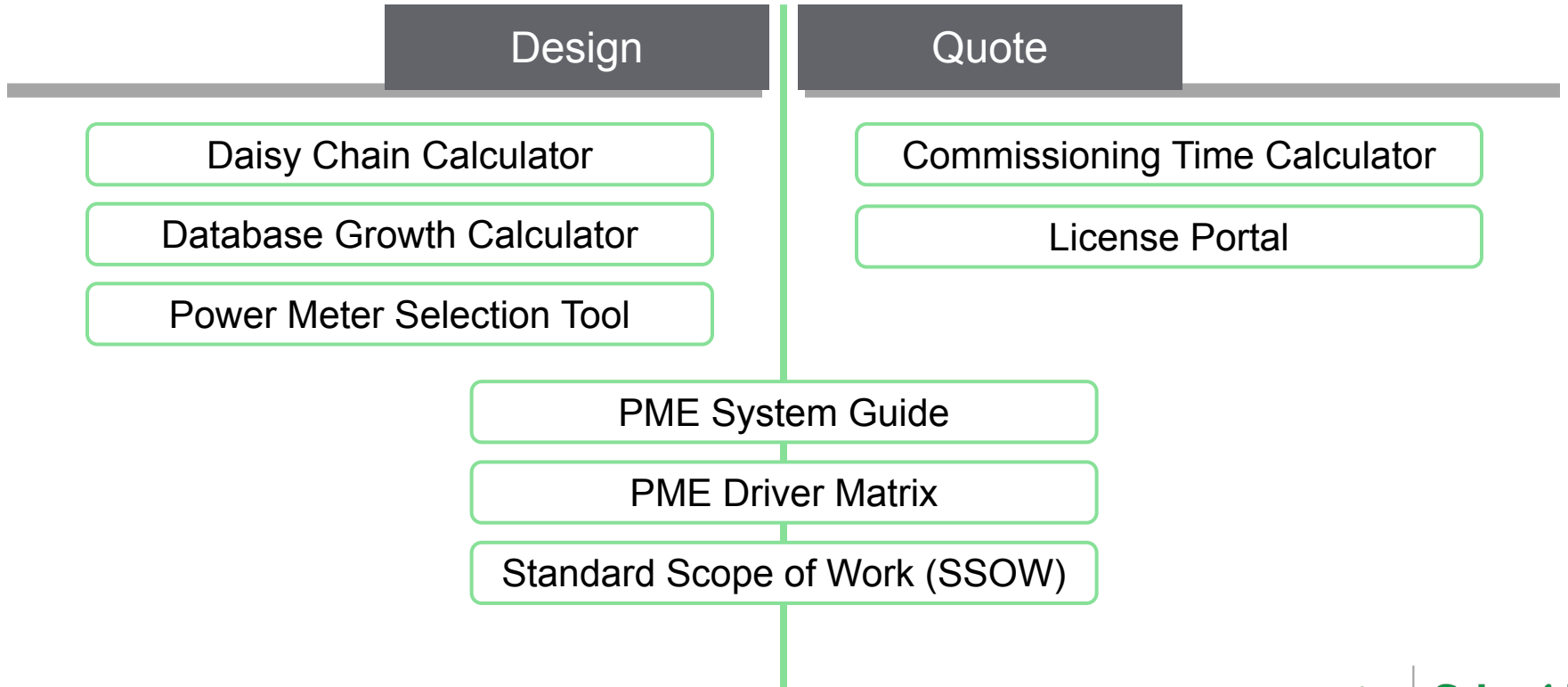- Animate country competency center PAE team

Execution support

- Provide execution support for bFO support request cases logged during pre-sales phase

# PME Design and Quote Assets

Tools and Docs Available

| Design | Quote |
|--------|-------|
| Daisy Chain Calculator | Commissioning Time Calculator |
| Database Growth Calculator | License Portal |
| Power Meter Selection Tool | |

PME System Guide

PME Driver Matrix

Standard Scope of Work (SSOW)

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# Designing PME

# Designing PME

Things to consider

- Device selection

- Device support

- Communication design

- System architecture

- IT

- Integration with other systems

- Other

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# Designing PME - Device Selection

What is the best device for project?

## Meter Type

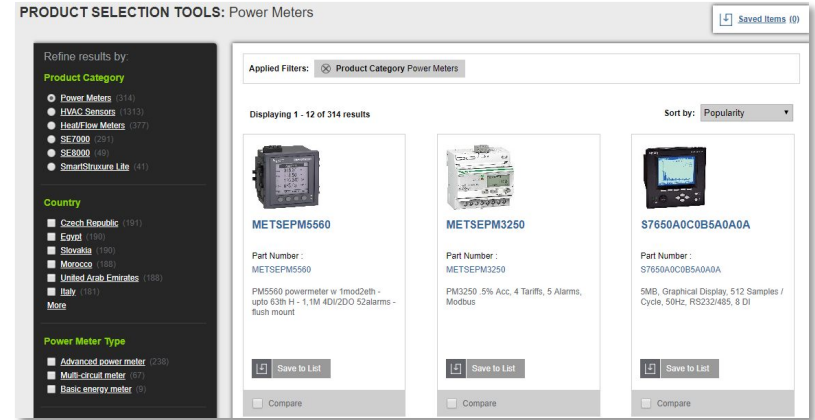| Application | Function | Form Factor | Measurement and Accuracy | Communication & Protocols | Cost vs Performance |
|---|---|---|---|---|---|
| •Power Quality Monitoring<br>•Capacity management<br>•Bill verification<br>•Energy analysis<br>•Backup Power Management<br>•… | •Data logging<br>•Gateway<br>•Modbus Master<br>•Digital or Analog Input or Output<br>•… | •Din Rail Mount<br>•Remote Display<br>•Integrated Display<br>•No Display | •Power Quality<br>•Billing<br>•Power Factor<br>•Time of Use<br>•Standard measurements<br>•… | •ION<br>•Modbus<br>•BacNet<br>•… | •A basic meter provides less value so cost becomes a key differentiator |

# Designing PME - Device Selection

Power Meter Selection Tool

Details as specified in the RFP/RFQ will define the meter selection for the project. Consideration should include (but are not limited to):
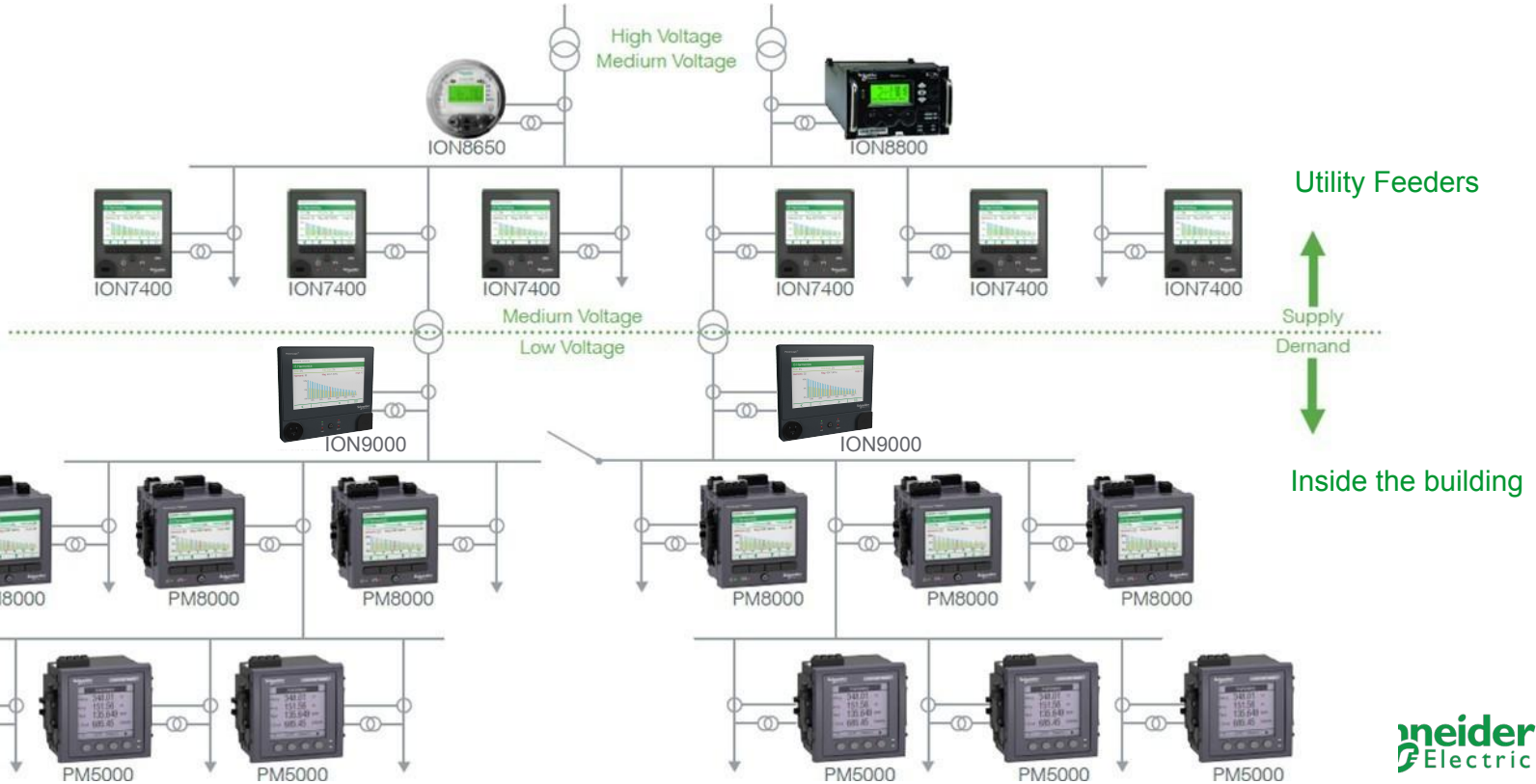
- Application

- Function

- Form factor

- Accuracy

- Communications and Protocols

- Cost

- Etc.



https://ecobuilding.schneider-electric.com/product-selection-tool/powermeters

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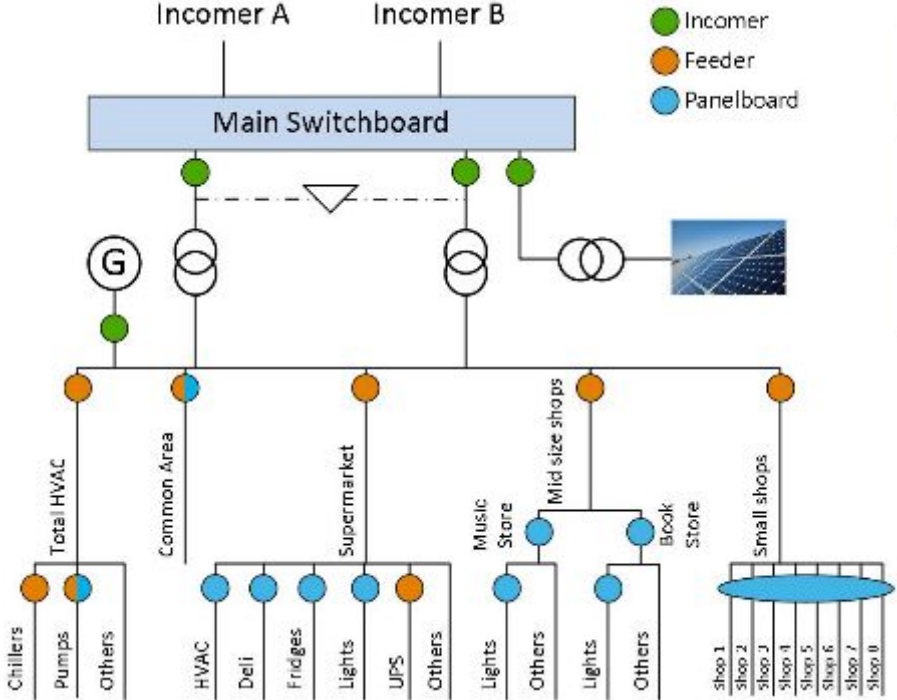
# Designing PME - Device Selection

Right Device at the Right Place

# Designing PME - Device Selection

Example: Commercial Building



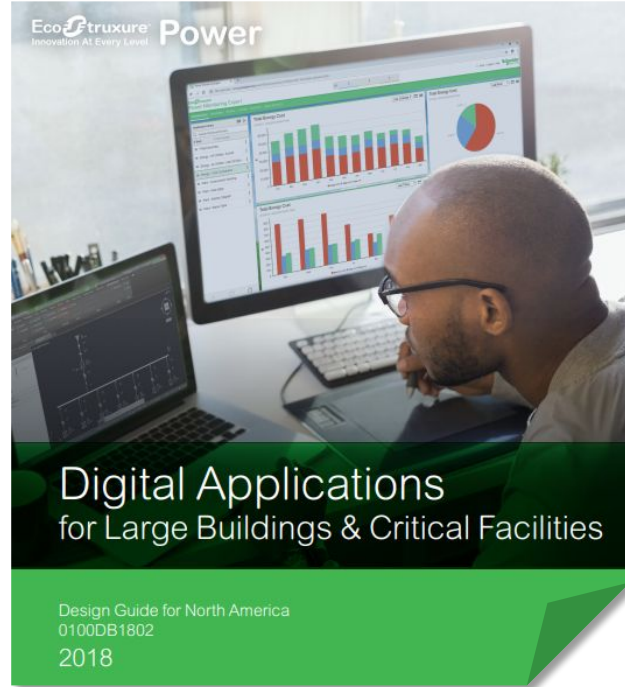What meter type would you recommend?

| Incomer | PM8000 Series | ION9000 | |
|---------|---------------|---------|---|
| Feeder | PM8000 Series | PM5500 Series | PM3000 Series |
| Panelboard | iEM3000 Series | iEM2000 Series | Branch Circuit Power Meter |

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# Designing PME - Device Selection

Select Devices by EcoStruxure Power Digital Applications



ESXP Digital Applications Design Guide – IEC



ESXP Digital Applications Design Guide – NEMA

# Designing PME - Device Selection

## Select Devices by EcoStruxure Power Digital Applications

Select Application → Understand Application → Implement Application



### Safe & Reliable*

**BENEFITS**
- Help Avoid Electrical Fires and Improve Protection
- Help Avoid Downtime by Preventing Power Failures
- Increase Electrical System & Asset Reliability

**Related Applications**
- Continuous Thermal Monitoring
- Electrical Distribution Monitoring & Alarming
- Power Quality Monitoring
- Insulation Monitoring
- Capacity Management
- Power Quality Correction
- Backup Power Testing
- Circuit Breaker Settings Monitoring
- Power Events Analysis
- Source and Network Control

### > Power Quality Monitoring
**Capture, Analyze and Understand Power Quality Disturbances**

**Context of Application**
There are many different Power Quality disturbances which can adversely affect critical or sensitive equipment, processes and buildings. To promote seamless and uninterrupted functioning of these assets, it is very important to continuously measure, understand and act on any power quality issues that could affect uninterrupted operation.

**Problem to Solve**
The Facility Manager needs to:
- Understand which power quality events could adversely affect their processes or operations
- Be able to monitor persistent power quality disturbances
- Analyze and determine actions needed to correct issues

**Purpose of Power Quality Monitoring Application**
Monitor persistent steady state and event based disturbances
- Harmonics, current unbalance, flicker and over/under voltage conditions, transients, interruptions, etc.

Better understand power quality disturbances
- Trends and reports to understand potential issues that could affect operations
- Capture and study event details such as waveforms
- Patented Disturbance Direction Detection to locate the directionality of events

Deep-dive analysis of power quality issues
- Advanced dashboards and reports
- Analytics-based advisory services to improve performance across the system

**Outputs of the Application**
Events and alarms
- Onboard events and alarms with timestamps
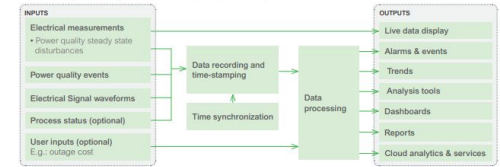Dashboards
- Power Quality Status Panel diagrams

### > Power Quality Monitoring
**Functional Breakdown of the Application**

**Data Flow**
Power Quality Monitoring application can be broken down as follows:

**INPUTS**
- Electrical measurements
  - Power quality steady state disturbances
- Power quality events
- Electrical Signal waveforms
- Process status (optional)
- User inputs (optional)
  - E.g.: outage cost

Data recording and time-stamping → Data processing
Time synchronization

**OUTPUTS**
- Live data display
- Alarms & events
- Trends
- Analysis tools
- Dashboards
- Reports
- Cloud analytics & services

**Data Flow in Detail**
**Inputs**
The following data are required:
**Electrical Measurements**
- Voltage, current and power measurements need to be captured with accuracy and high sample-rate.

**Power Quality Steady State Disturbances**
- Voltage and Current Harmonics
- Voltage and Current Imbalance
- Voltage Fluctuations (Flicker)
- Frequency Variations

**Power Quality Events**
- Transients
- Interruptions
- Voltage sags & swells
- Overvoltage and undervoltage

**Electrical Signal Waveforms**
- High sample rate sinusoidal waveform data for all phases of voltage and current

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# Designing PME - Device Support

Supported Protocols

PME supports the following protocols to communicate to devices and gateways:

- Modbus™ TCP

- Modbus RTU (via Ethernet gateway)

- ION™

- OPC DA

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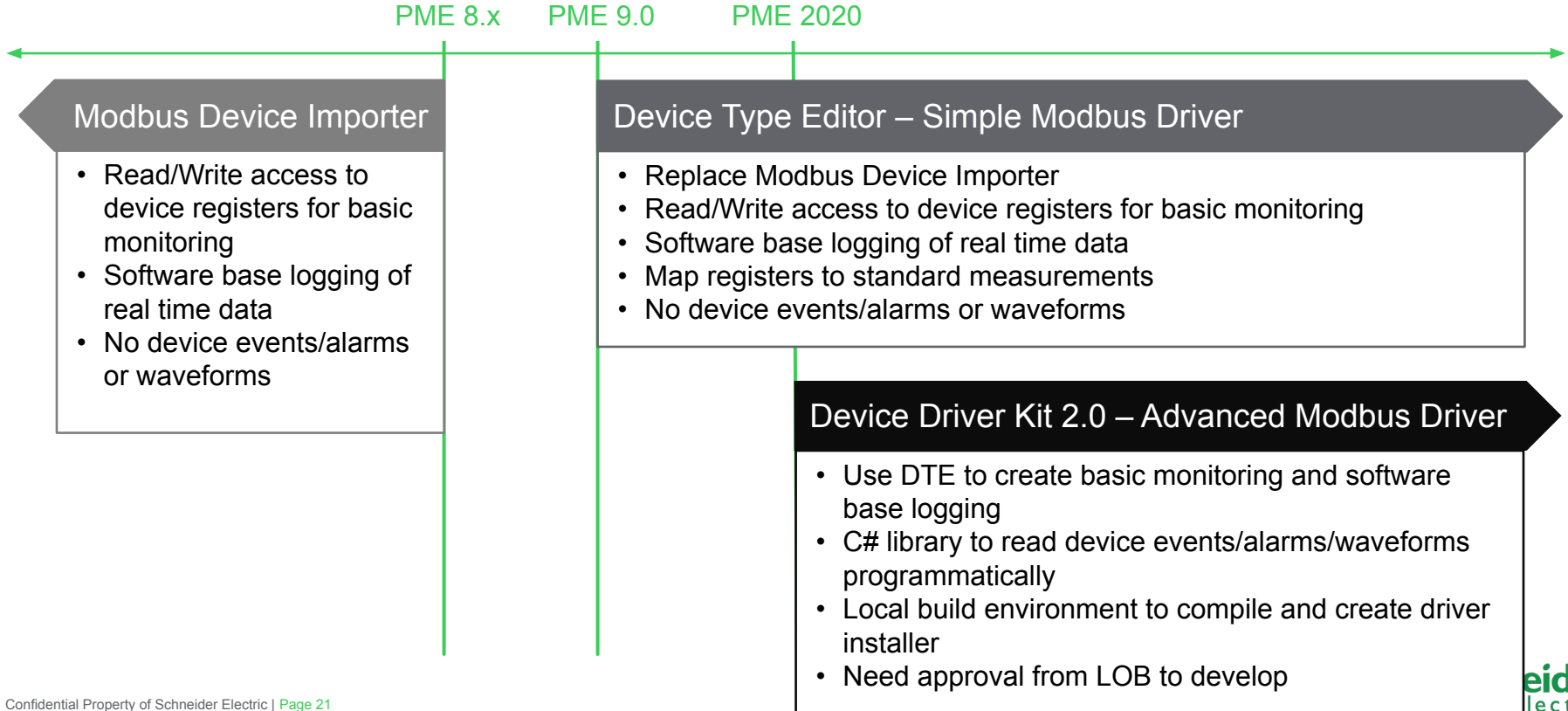# Designing PME - Device Support

## Native Device Drivers

| Device Type | PME License | Real-time Data | Onboard Alarms (Logs and Timestamps) | Onboard Historical Logs | Waveforms | Breaker Control | PME 9.0 | PME 8.2 | PME 7.2.2 | SPM 7.0.1 | ION:E 6.0 SP1 | Additional Info |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9410 | M | ✔ | ✔ | ✔ | ✔ | NA | Native | Native | Installer | Installer | | |
| 9810 | S | ✔ | ✔ | ✔ | ✔ | NA | Native | | | | | |
| 3300 ACM | E | ✔ | NA | NA | NA | NA | Native | Native | Native | Native | Native | |
| 37xx ACM | S | ✔ | ✔ | ✔ | ✔ | NA | Native | Native | Native | Native | Native | |
| 3800 RTU | M | ✔ | NA | ✔ | NA | NA | Native | Native | Native | Native | Native | |
| Accusine PCS | M | ✔ | NA | NA | NA | NA | Native | Native | Installer | | | |
| Accusine PCS+ | M | ✔ | NA | NA | ✖ | NA | Native | Native | Installer | | | |
| Accusine PFV+ | M | ✔ | NA | NA | ✖ | NA | Native | Native | Installer | | | |
| Acti 9 Smartlink | E | ✔ | NA | NA | NA | ✔ | Native | Installer | Installer | Native | Installer | |
| Acti 9 Smartlink Ethernet/SI B | E | ✔ | NA | NA | NA | ✔ | Native | Installer | Installer | | | |
| Altivar 61 | E | ✔ | NA | NA | NA | NA | Native | Native | Installer | | | |
| BCPM | 0.5 M | ✔ | NA | NA | NA | NA | Native | Native | Native | Native | Native | |
| BCPM Flex Cct | 0.5 M | ✔ | NA | ✔ | NA | NA | Native | Installer | Installer | | | Consumes 1 M license for 42 channels in PME 7.2.2 |
| CM100-200 | E | ✔ | NA | NA | NA | NA | Native | Native | LE Driver | LE Driver | LE Driver | |
| CM2000 series | M | ✔ | ✔ | ✔ | ✔ | NA | Native | Native | Native | Native | Installer | |
| CM3000 series | M | ✔ | ✔ | ✔ | ✔ | NA | Native | Native | Native | Native | Native | |
| CM4000 series | S | ✔ | ✔ | ✔ | ✔ | NA | Native | Native | Native | Native | Native | |

[PME Driver Matrix](#)

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# Designing PME - Device Support

Creating 3rd Party Modbus Device Driver

PME 8.x  PME 9.0  PME 2020

**Modbus Device Importer**

- Read/Write access to device registers for basic monitoring
- Software base logging of real time data
- No device events/alarms or waveforms

**Device Type Editor – Simple Modbus Driver**

- Replace Modbus Device Importer
- Read/Write access to device registers for basic monitoring
- Software base logging of real time data
- Map registers to standard measurements
- No device events/alarms or waveforms

**Device Driver Kit 2.0 – Advanced Modbus Driver**

- Use DTE to create basic monitoring and software base logging
- C# library to read device events/alarms/waveforms programmatically
- Local build environment to compile and create driver installer
- Need approval from LOB to develop

# Designing PME – Device Support

ION over Modbus

- With Power Monitoring Expert (8.2 and above) and ION Setup, "it just works" when you add a **PM8000\*** or an **ION7400\*** to a Modbus Ethernet gateway

- **_ALL_** ION functionality is accessible through this mechanism

  - Data Recorders

  - Onboard events

  - Waveforms

  - Time Synchronization

  - Firmware Upgrade / Framework download

\*Requires latest firmware

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# Designing PME – Communicate Design

**PME**



Direct Ethernet     Ethernet Gateway     OPC Server

Power Meters | Protective Relays | RTUs, PLCs | Breakers, Trip Units, Gateways | FD Breakers, Sensors, Gateways | Variable Speed Drives | UPSs | PQ Correction | Water, Air, Gas, Steam
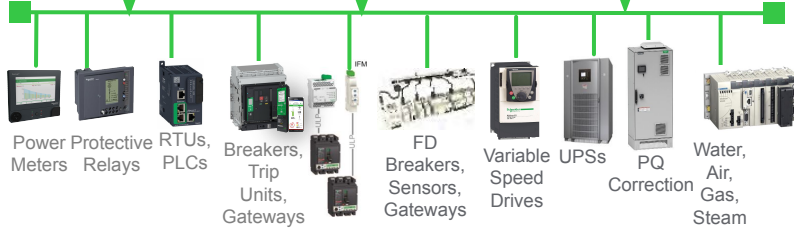
|  | **Direct Ethernet** | **Ethernet Gateway** | **OPC Server** |
|---|---|---|---|
| Configuration | Simplest | More Effort | More Effort |
| Performance | Best | Better | Good |
| Cost | High | Lower | Lower |

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# Designing PME – Communicate Design

| | Direct Ethernet | Ethernet Gateway | OPC Server |
|---|---|---|---|
| Configuration | • Each device has IP and connects to PME directly<br>• Can easily set up comm loss alarms on all devices<br>• Each device type requires device driver | • Gateway passes data through<br>• Devices are daisy chained<br>• Need to know unit ID for each device<br>• Each device type requires device driver | • Have to create OPC device types<br>• OPC comm issues are difficult to troubleshoot<br>• PME as OPC client |
| Performance | • PME pulls from devices quickly and simultaneously<br>• Large bandwidth to transmit data | • Daisy chain can be the bottleneck of the overall performance<br>• Use Daisy Chain Calculator to estimate how many devices on daisy chain | • Install OPC Server on the same PME Server to avoid DCOM issues or OPC tunneller highly recommended<br>• OPC site for every 5 OPC devices<br>• Each OPC device can have around 100 OPC tags<br>• No software based logging |
| Cost | • Each device has to have communication module<br>• Some devices require purchase comm module separately | • Devices have serial ports and don't need comm module<br>• Have to buy number of gateways accordingly | • Requires purchase of OPC tunneller |

# Designing PME – Communication Design

Communication and performance example

- Push the limitations of each component in the network to minimize the cost.

- In a MV switchgear assembly there is typically a PQ meter (i.e. ION 7650) and a protection relay (i.e. SEPAM).
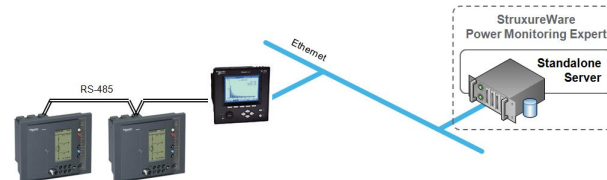
For higher performance:

- Higher performance since the Sepam have dedicated ACE850 modules.

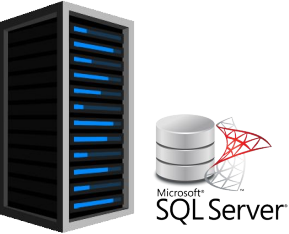- Higher cost due to ACE850s, additional wiring and possibly a switch.

For lower cost:

- Lower performance since the ION 7650 isn't dedicated as a gateway

- Lower cost due to no additional equipment.

# Designing PME – System Architecture

**Server:**
Application + Database

**Thick Clients:**
Engineering Tools
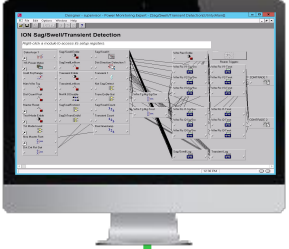
**Thin Clients:**
Main User Interface (Web based)



IP Backbone

Modbus and ION Protocols

Power Meters

Protection Relays

Breakers, Trip Units, Gateways

UPSs

PQ Correction Equipment

Variable Speed Drives

IFM

Final Distribution Breakers, Sensors, Gateways

RTUs, PLCs

Water, Air, Gas, Steam

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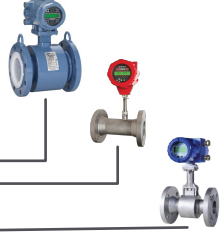
# Designing PME – System Architecture

| Standalone | Distributed |
|---|---|
| PME software and MS SQL Server all installed on one PME server | PME software installed on Application Server and PME databases hosted on separate MS SQL Server |
| • Most common<br>• Simple to commission | • Less common but required due to IT policy or customer having dedicated database server<br>• No installation required on the database server<br>• Database managed by IT |

**New!**

Configuration Manager Tool 2020 can be used to change PME architecture from Standalone to Distributed and from Distributed to Standalone.

Configuration Manager Tool 2020 is released with PME 2020

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# Designing PME – System Architecture

Client Types

| Engineering Client | Web Client |
| --- | --- |
| Administrator interface that is used to manage, build, maintain, and customize the PME system | Primary user interface that accesses the PME Web Applications |
| • Management Console<br>• Vista<br>• Design<br>• Configuration Tools | • Dashboards<br>• Trends<br>• Alarms<br>• Reports<br>• Diagrams |
| Additional Engineering Clients can be installed on other computers | Doesn't require any installation |

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# Designing PME – IT

## Supported Environment and Software

**Windows Operation Systems**

- Windows 10 Professional/Enterprise
- Windows Server 2012 Standard
- Windows Server 2012 R2 Standard/Enterprise
- Windows Server 2016 Standard
- Windows Server 2019 Standard    **New!**

**SQL Server Versions**

- SQL Server 2012 Express/Standard/Enterprise/Business Intel.,SP2
- SQL Server 2014 Express/Standard/Enterprise/Business Intel.
- SQL Server 2016 Express/Standard/Enterprise/Business Intel.
- SQL Server 2017 Express/Standard/Enterprise/Business Intel.

**Browsers**

- Firefox, Chrome, Safari, Opera

**Office**

- Excel 2013, 2016 and 365

**New!**


Windows® 7

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# Designing PME – IT

Basic System vs Advanced System

A **Basic** system has out-of-the box functionality and will meet most customer needs.

- Factory default device logging

- No high-speed (that is, faster than 15 minutes) logging

- No custom applications

They use the following devices:

- 70% Entry/Basic Meters

- 20% Intermediate Meters/Trip Units/Relays

- 10% Advanced/Utility Meters

- **Do not** include large numbers of BCPM or EM4800

An **Advanced** system might include one or more of the following:

- Power Quality Advisor module

- Custom applications in the VIP

- Non-default logging (shorter than 15 minute intervals)

- High concurrent system usage with report generation

- OPC server with thousands of tags

- High number of concurrent users accessing the system

- Mixture of different device types, including advanced PQ meters

The majority of Power Monitoring Expert systems are basic systems with out-of-the box functionality that meets most customer needs.

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# Designing PME – IT

## Recommended spec - Server

### Basic System

| Small | ≤ 100 | ≤ 5 | Desktop<br>Intel Core i5 (2 core)<br>8 GB (RAM) |
|-------|-------|-----|--------------------------------------------------|
| Medium | ≤ 250 | ≤ 10 | Workstation<br>Intel Xeon W-21xx (4 core)<br>16 GB (RAM) |
| | ≤ 600 | ≤ 10 | Server<br>Intel Xeon E3-12xx (6 core)<br>24 GB (RAM) |
| Large | ≤ 2500 | ≤ 10 | Server<br>Intel Xeon E3-12xx (10 core)<br>32 GB (RAM) |

### Advanced System

| System Size | Devices | Users | OPC Tags | HW |
|-------------|---------|-------|----------|-----|
| Small | ≤ 100 | ≤ 15 | 5000 | Workstation<br>Intel Xeon W-21xx (4 core)<br>16 GB (RAM) |
| Medium | ≤ 250 | ≤ 20 | 10000 | Server<br>Intel Xeon E- 12xx (6 core)<br>24 GB (RAM) |
| | ≤ 600 | ≤ 35 | 30000 | Server<br>Intel Xeon E3-12xx (10 core)<br>32 GB (RAM) |
| Large | ≤ 2500 | ≤ 50 | 50000 | Server<br>Intel Xeon Scalable Silver (12 core)<br>64 GB (RAM) |

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# Designing PME – IT

Recommended spec – Client Machines

## Engineering Client

The Engineering Client workstation should meet or exceed the following specification:

**CPU**: Intel Core i3 (2 core), or better

**RAM**: 4+ GB
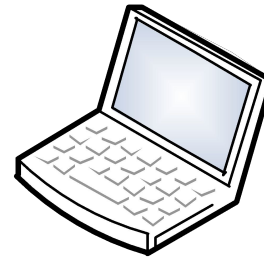
**HDD Space**: 2GB for software installation
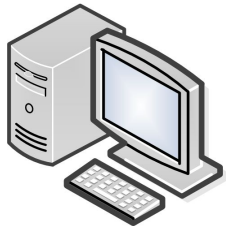
## Web Client

The Web Client computer should meet or exceed the following specification:

**CPU**: 2 GHz Dual Core, or better

**RAM**: 4+ GB

**Resolution**: 1280 x 960, or higher

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# Designing PME - IT

Which is More Important: CPU or RAM?

They are both important for different reasons.

- **CPU** plays a critical role for executing Power Monitoring Expert operations.
  - It is especially important when using a large number of translated devices.

- **RAM** is **very important** for SQL Server.
  - SQL Server is a memory intensive program which requires more RAM for running reports, logging a large number of measurements, and other database-intensive operations.
  - During deployment, it is important to cap SQL memory because the SQL Server can use all available RAM, which may impact the performance of other operations.

**NOTE**: Undersized computer hardware is a common source of performance issues with PME systems.

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# Designing PME - IT

## Hard Drive Space for Software Components

- The following summarizes the approximate hard drive space required for each component.
  - All remaining hard drive space will be reserved for the ION_Data database and its backups, and the SQL Server tempDB.

| Component | Hard Drive Space Required |
|---|---|
| Windows OS | 80 – 100 GB |
| Power Monitoring Expert | 5 GB |
| Power Monitoring Expert databases* | 5 GB |
| SQL Server | 2 GB |
| Free hard drive space | 10% - 30% of the total hard drive space |

**TOTAL     ~ 100 GB + 30% of Total Hard Drive Space**

*Excluding ION_Data

**Four databases store the system configuration and logged data**

- **ApplicationModules**: configuration data for the Dashboards and Tables.

- **ION_Data**: logged historical data, events and waveforms from devices.

- **ION_Network**: device communication information and general Power Monitoring Expert settings.

- **ION_SystemLog**: Power Monitoring Expert events that occur during the operation of the software.

Hard Drive Space for Software Components

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# Designing PME – IT

## HDD Groups

- For a small basic system, a single hard drive is sufficient for the:

  - **Operating system** and pagefile

  - **Power Monitoring Expert** software and it's **databases**

  - **SQL Server** and other applications

- For **improved** hard drive and **system performance**, it's recommended (if possible) to separate major components onto different hard drive groups (physical).

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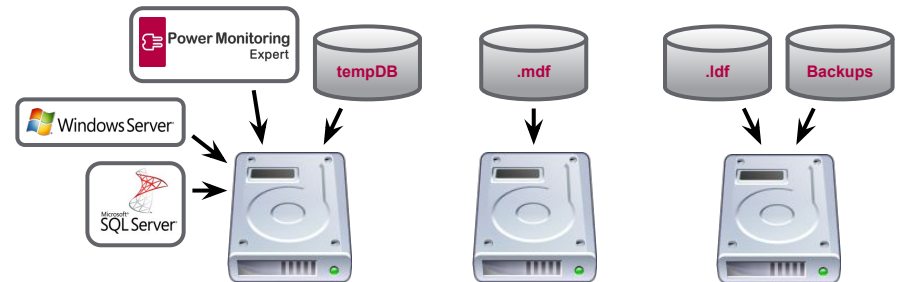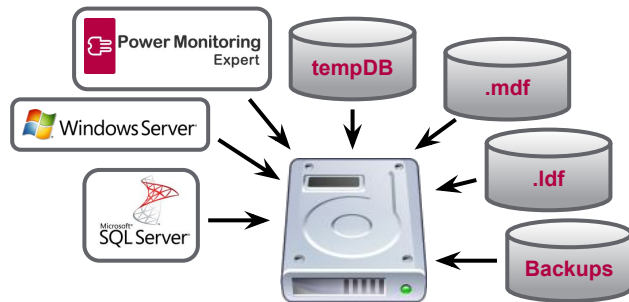
# Designing PME – IT

## Recommended RAID1 Configurations

### Small System

**2x HDD**

| Component | Group 0 |
|---|---|
| | HDD1 + HDD2 |
| OS | ✓ |
| tempDB | ✓ |
| MDF | ✓ |
| LDF | ✓ |
| Backups | ✓ |

**4x HDD**

| Component | Group 0 | Group 1 |
|---|---|---|
| | HDD1 + HDD2 | HDD3 + HDD4 |
| OS | ✓ | |
| tempDB | | ✓ |
| MDF | ✓ | |
| LDF | | ✓ |
| Backups | | ✓ |

### Medium System

**6x HDD**

| Component | Group 0 | Group 1 | Group 2 |
|---|---|---|---|
| | HDD1 + HDD2 | HDD3 + HDD4 | HDD5 + HDD6 |
| OS | ✓ | | |
| tempDB | ✓ | | |
| MDF | | ✓ | |
| LDF | | | ✓ |
| Backups | | | ✓ |

| Component | Group 0 | Group 1 | Group 2 | Group 3 |
|---|---|---|---|---|
| | HDD1 + HDD2 | HDD3 | HDD4 + HDD5 | HDD6 |
| OS | ✓ | | | |
| tempDB | | ✓ | | |
| MDF | | | ✓ | |
| LDF | | | | ✓ |
| Backups | | | | ✓ |

### Large System

**8x HDD**

| Component | Group 0 | Group 1 | Group 2 | Group 3 |
|---|---|---|---|---|
| | HDD1 + HDD2 | HDD3 + HDD4 | HDD5 + HDD6 | HDD7 + HDD8 |
| OS | ✓ | | | |
| tempDB | | ✓ | | |
| MDF | | | ✓ | |
| LDF | | | | ✓ |
| Backups | | | | ✓ |

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# Designing PME – IT

## Database Growth Calculator



**Power Monitoring Expert** — **Power Monitoring Expert 9**

[PME][Calculator]Database Growth Calculator

| | |
|---|---|
| **Annual Database Growth (GB)** | 0.00 GB |
| **Years of Data in the Database** | 0.0 Years |

**Instructions**

1. Add the numbers of device types in the following table. Green cells are configurable.

2. Devices with events, waveforms and burst data will typically contribute approximately 20% - additional growth to the total size of the database, depending on the frequency of power qualit events and device features/configuration.

| | |
|---|---|
| **Events / Waveform / Burst Contribution (%)** | 50% |

3. During normal operation the database will grow by 10% when more room is needed and should accounted for in estimations. It can be modified or disabled in SQL Server Management Studio.

| | |
|---|---|
| **Database Growth (%)** | 10% |

4. Adjust the maximum database size (if desired) that can fit on the hard drive to see how many years of data can be held in the database.

| | |
|---|---|
| **Maximum Database Size (GB)** | 50 |

| Device Range | Device Type | Daily Growth Rate (kB) | Has Waveforms | Number of Devices | Total Daily Growth (kB) |
|---|---|---|---|---|---|
| **Utility Meter** | ION8800A | 560 | Yes | 0 | 0 |
| | ION8800A (with IEC 61000-4-30) | 745 | Yes | 0 | 0 |
| | ION8800B | 560 | No | 0 | 0 |
| | ION8800B (with IEC 61000-4-30) | 680 | No | 0 | 0 |
| | ION8800C | 30 | No | 0 | 0 |
| | ION8650A | 525 | Yes | 0 | 0 |
| | ION8650A (with IEC 61000-4-30) | 710 | Yes | 0 | 0 |
| | ION8650B | 525 | Yes | 0 | 0 |
| | ION8650B (with IEC 61000-4-30) | 645 | Yes | 0 | 0 |

It uses only default logging profiles, so if there are is a change in what a device is logging (Onboard or Software based) that will need to be factored into the calculation.

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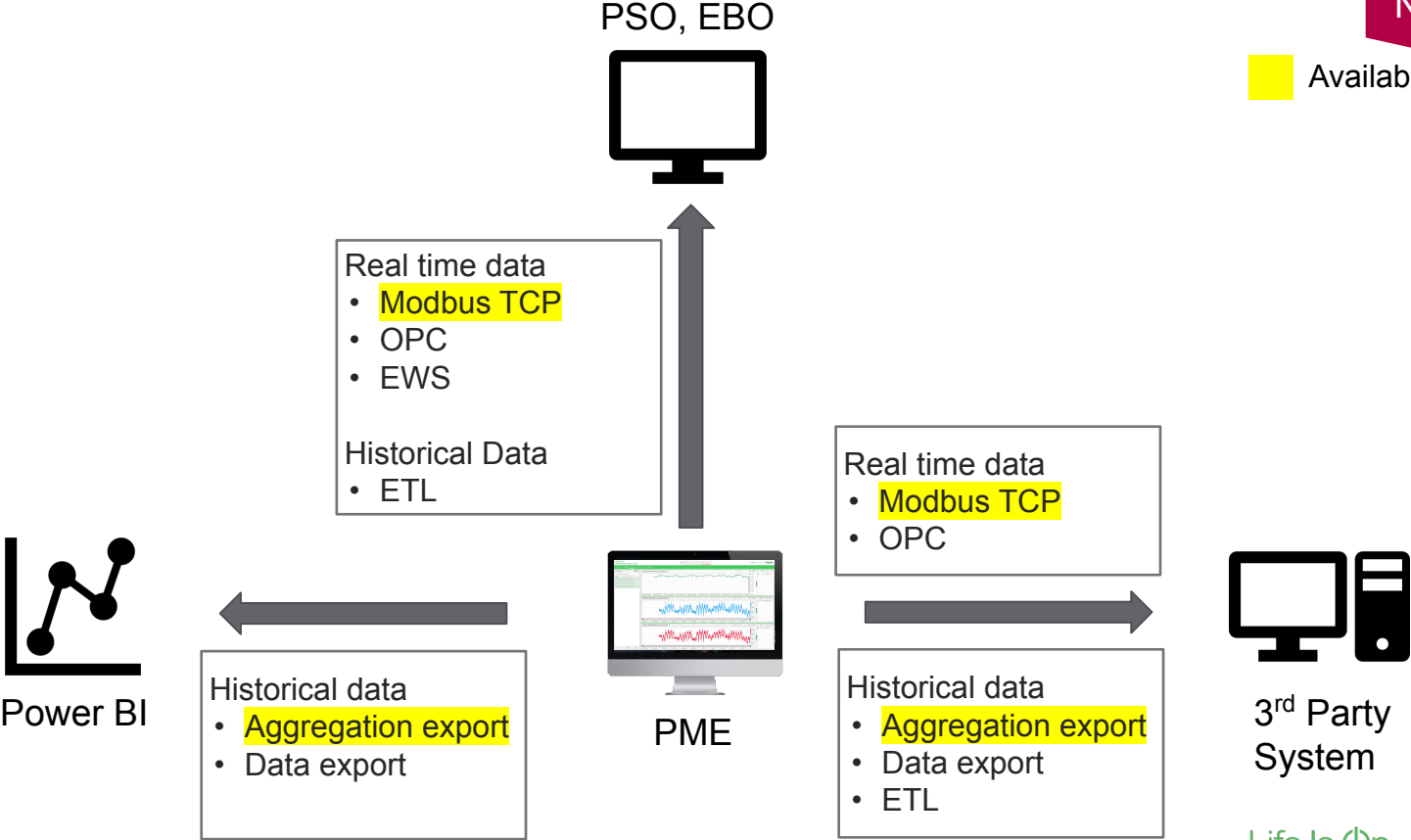
# Designing PME - IT

Cybersecurity

The PME System Guide includes a dedicated Cybersecurity section. When discussing opportunities with customers be prepared to ask or answer questions about:

- Network infrastructure (firewalls, port numbers, users, folder permissions, etc)

  - **Note:** PME is designed for an intranet environment within a secured network infrastructure. PME is NOT designed for direct Internet connection

- User Management

- Data encryption

- IT Questionnaires - Support

- HTTPS Certificates. Self-signed vs CA

# Designing PME – Integration with other systems

PSO, EBO

New!

☐ Available in PME 2020

**Real time data**
- Modbus TCP
- OPC
- EWS

**Historical Data**
- ETL

**Real time data**
- Modbus TCP
- OPC

Power BI

**Historical data**
- Aggregation export
- Data export

PME

**Historical data**
- Aggregation export
- Data export
- ETL

3rd Party System

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# Designing PME - Other

Multi-Site Systems

Single PME System to server multiple distributed facilities

- **Number of Users/Groups**: PME Groups and users created can be in the hundreds. However, We have tested for 50 Concurrent Users.

- **Number of Sites/meters:** No changes. Total devices as per PME design guidelines.

- **Network considerations:** Same as any other PME system. For distributed sites a corporate network, VPN or similar might be required. **No** open internet connections.

- **System and applications Design:**

  - Energy Billing and Energy Analysis Dashboards and Reports support multi-site

  - PQ Performance does not support a multi-site architecture.

  - The rest of the modules will require special attention on the configuration of reports and Diagrams

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# Quoting PME

# Quoting PME

Things to consider

- Offer Structure

- Licensing

- Commissioning Time

- Standard Scope of Work

- Upgrade Paths

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# Quoting PME - Offer Structure

PME Commercial structure is value based. Software licence increases based on the value customers get by:

- Increasing the number (and type) of devices connected to the system

- Increasing the number of people using or accessing the data from the system

- Expanding the functionality with optional software modules and optional services

System Size

$$$

$

$$$ Functionality and Digital services

$$$

Users of the System
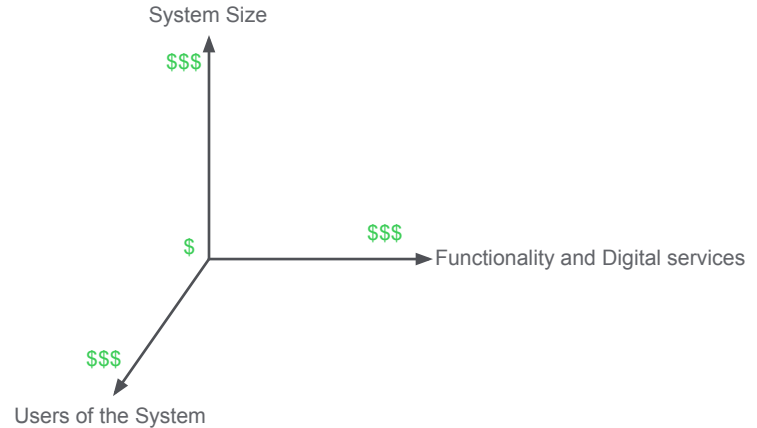
| #1<br>Choose your Offer | #2<br>Scale by Connected Devices | #3<br>Scale Your Users | #4<br>Select Software Modules | #5<br>Connect to services and analytics |
|---|---|---|---|---|
| Power Monitoring Expert | • License devices connected to the system | • License users accessing and using the system | • Extend the functionality beyond the standard feature set and enable advanced applications | • Add Power Advisor and software Assurance |

# Quoting PME - Licensing

Full Commercial and Licensing Policies [HERE](#)



PME Base Licence

Client Access Licences
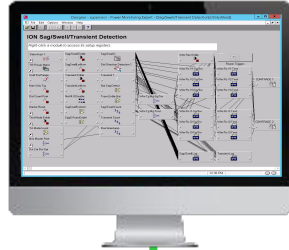
New!

Other "Optional" Licences

- Optional Software Modules
- Power Advisor
- Software Assurance
- SQL Server Std Edition

Microsoft SQL Server

IP Backbone

Device Licences

Power Meters

Protection Relays

Breakers, Trip Units, Gateways

UPSs

PQ Correction Equipment

Variable Speed Drives

IFM

Final Distribution Breakers, Sensors, Gateways

RTUs, PLCs

Water, Air, Gas, Steam

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# Quoting PME - Licensing

Software Module, each of which has its own part number

## Efficiency and Compliance

**Energy Analysis Reports Module:**

- Improve Operational Efficiency, Energy Performance and help achieve ISO50001 compliance

**Energy Analysis Dashboards Module:**

- Advance analysis and visualization gadgets. Sankey, heatmap/carpet, pareto and ranking.

**Energy Billing Module:**

- Flexible rate engine and reports for cost allocation, bill verification and tenant billing.

## Reliability and Safety

**Power Quality Performance Module:**

- Simple, global overview of the impact of power quality on your facility's operations

**Capacity Management Module:**

- Monitor the capacity loading of electrical equipment (UPS, Generators, multi-circuits)

**Insulation Monitoring Module:**

- Monitor insulation levels for power Isolated panels (IEC and ANSI)

**Event Notification Module:**

- Receive text or email notifications when power system events occur.

## Asset Compliance and Reliability

**Breaker Performance Module:**

- Breaker status diagrams and reports including electrical ageing and mechanical wear, for proactive maintenance

**Backup Power Module:**

- Monitor the parameters of your generator, ATSs and UPSs. Automated results for emergency power supply systems

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# Quoting PME - Licensing

PME 2020 Licensing Updates

New!

- Engineering Client and Web Client are merged to new Client Access License

  - When upgrade, existing engineering client and web client licenses will be automatically upgraded to access client licenses

- Device License Requirement Updates

  - PM8000 requires DL-S

  - Accusine PCS+, PFV+ and PCSn requires DL-S

  - EnerSure (BCPM 2.0, iBCPM Enkapsis, Enkapsis) requires DL-S

    - BCPM xD and iBCPM xD remain as DL-M

  - When upgrade, existing device license for above devices will be upgraded accordingly. For example, if you have 10 DL-M for PM8000 in PME 9, the 10 DL-M will be upgraded to 10 DL-S when PME 9 is upgraded to PME 2020

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# Quoting PME – Commissioning Time

## Commissioning Time Calculator

### Provide estimates on commissioning different components in PME

- Software Configuration

- Web Client Application Configuration

- PLCs and WAGES

- Hierarchies

- Device Communication

- Custom Reports

- Bill Module

- Applications in VIP

- Power Quality

- PME TVDs



**[PME][Calculator]Commissioning Time Calculator**
**Power Monitoring Expert 9**

| | Commissioning Time | | | |
|---|---|---|---|---|
| | Hours | Days | Cost / Day | Total Cost |
| | 0.0 | 0.0 | $ 1,500.00 | $ - |
| | Workday (hrs) | 7 | | |

| Quantity (QTY) | Component | Unit Time (Minutes) |
|---|---|---|
| | **Additional project time** | |
| 0 | Additional buffer time (in hours) required for project | 60 |
| | **Software Configuration** | |
| 0 | Install operating system | 240 |
| 0 | Update operating system with latest service packs and hotfixes | 240 |
| 0 | Configure operating system in preparation for PME v9 | 15 |
| 0 | PME v9 software installation (with or without SQL Express) | 120 |
| 0 | SQL Server Standard/Enterprise installation | 90 |
| 0 | Software backup at end of project | 30 |
| 0 | x1 device added to Management Console | 5 |
| 0 | x1 create logical device type (5 tags) | 15 |
| 0 | x1 user account added to system | 3 |
| | **Web Client Application Configuration** | |
| 0 | x1 Dashboard with x2 gadgets | 5 |
| 0 | x1 Diagram (from template) | 60 |
| 0 | x1 Diagram (from nothing; requires design, layout, creation) | 240 |
| 0 | x1 Trend | 5 |
| 0 | x1 Report | 5 |
| 0 | Change report pack logo | 5 |
| 0 | Change colour scheme of a single report | 5 |

> Estimates that give you a guideline. Work with local Ops teams to come up with more accurate numbers over time

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# Quoting PME – Standard Scope of Work (SSOW)

ESXP Digital Applications

Each SSOW package contains three documents: Technical Proposal, Estimate and Deployment Guide that are designed to help quote and deploy a specific ESXP Digital Application

| Technical Proposal | Estimate | Deployment Guide |

| | Step | Summary | Basic Rate Estimate (hours) | Complex Rate Estimate (hours) |
|---|---|---|---|---|
| ☐ | Licensing Configuration | Confirm activation or activate Energy Billing Module license on the PME server computer. | 0.25 | 0.25 |
| ☐ | Hierarchy Configuration | Configure the hierarchy to include all shadow meters and optional logical devices. | 0.25 | 0.25 |
| ☐ | Rate File Configuration | Configure the rate file based on the utility tariff structure and the utility bill. | 3 | 6 |
| ☐ | Time of Use Configuration | Configure the Time of Use (TOU) schedules based on the utility tariff structure and the utility bill. | 2 | 2 |
| ☐ | Reports Configuration | Configure and save the shadow bill and configure subscriptions. | 0.5 | 0.5 |
| ☐ | Verify Shadow Bill | Confirm that the line-item data and costs in the shadow bill match the data and costs in the utility bill. | 1 | 2 |
| ☐ | User Orientation | Review the application with the end user, including shadow bill reports, Rate Editor, and Time of Use Editor. | 1 | 2 |
| | | Total: | 8 hours | 13 hours |

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# Quoting PME – Standard Scope of Work (SSOW)

ESXP Digital Applications

Available SSOWs

📄 Utility Bill Verification

📄 Thermal Monitoring for MV Substation

📄 Thermal Monitoring for LV Busway

📄 Power Quality Monitoring ◄ New!

📄 Power Quality Compliance ◄ New!

# Quoting PME – Upgrade Paths

**New!**

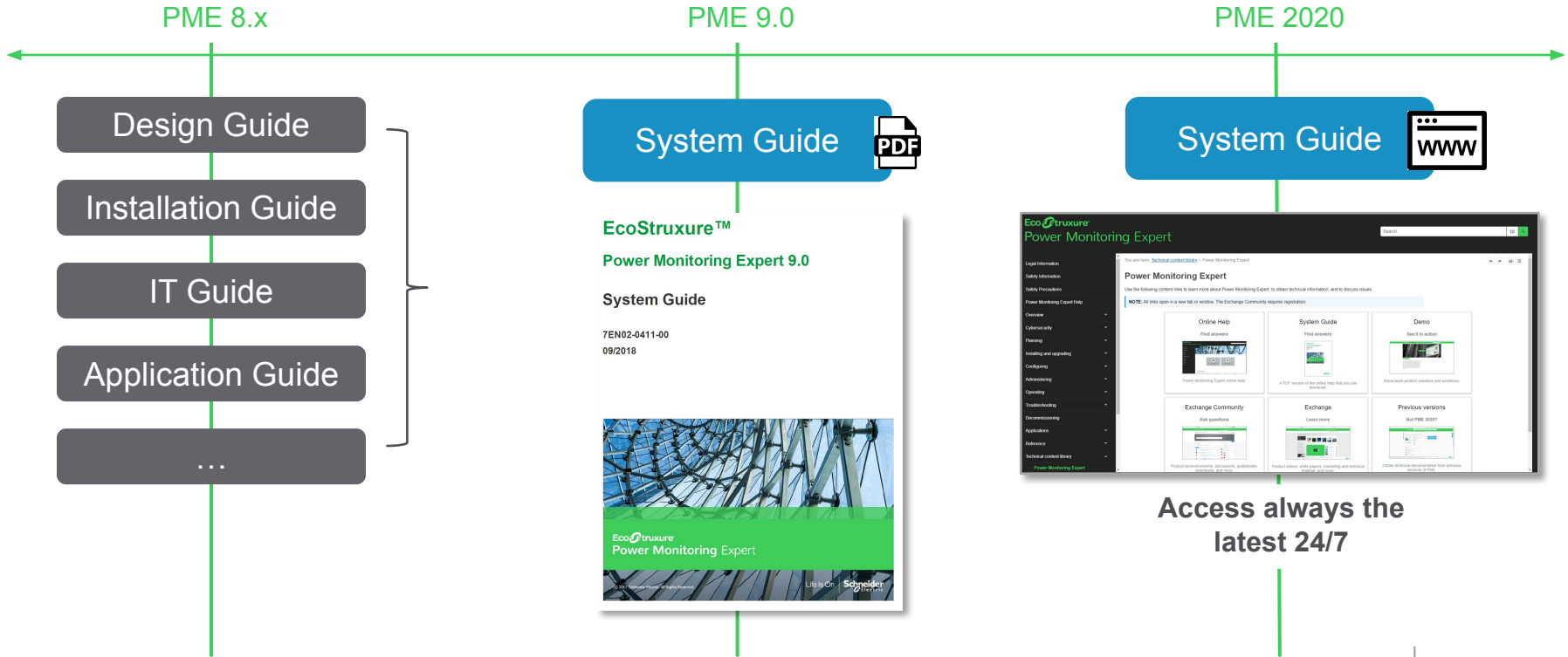## Indirect Upgrade Paths

- PME 7.2
- PME 7.2.1
- SPM 7.0.1
- IONE 6.0.1

In-place Upgrade via PME 7.2.2 DVD

Side-by-Side Upgrade to PME 8.2 via CM Tool 2.1

## Direct Upgrade Paths

- PME 7.2.2 *
- PME 8.x
- PME 9

In-place Upgrade via PME 2020 DVD

Or

Side-by-Side Upgrade via CM Tool 2020

**PME 2020**

**40%** faster when in-place upgrade from previous version to PME 2020 compared to PME 9.0
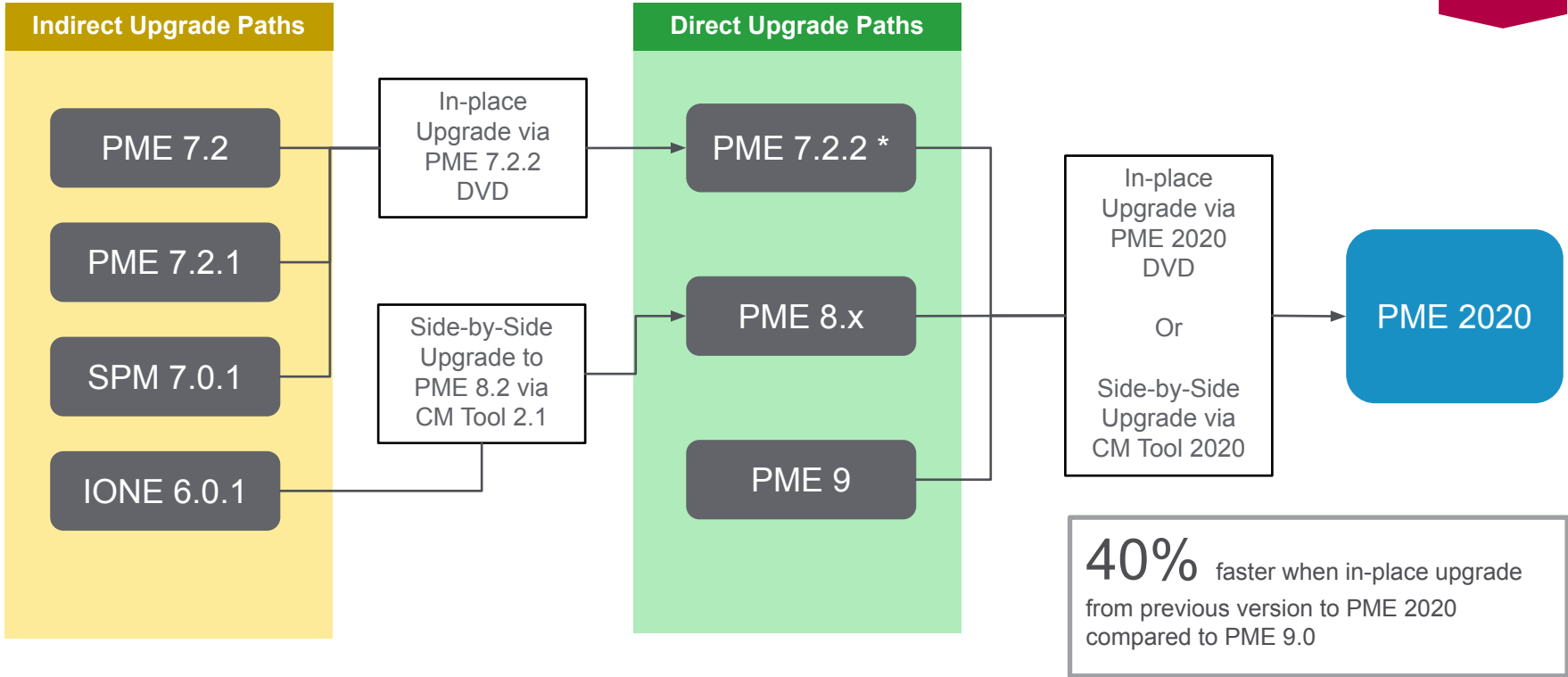
Always check if existing Windows OS and SQL versions are supported by PME 2020 before upgrading.

* PME 7.2.2 In-place upgrade from DVD requires manual steps.  See PME 2020 System Guide for details.

Confidential

Schneider Electric

# Where to get more info?

# PME System Guide

**PME 8.x**

**PME 9.0**

**PME 2020**

Design Guide

Installation Guide

IT Guide

Application Guide

...

System Guide 📄PDF

System Guide ▨WWW

**EcoStruxure™**

**Power Monitoring Expert 9.0**

**System Guide**

7EN02-0411-00
09/2018

EcoStruxure
Power Monitoring Expert

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**Power Monitoring Expert**

Use the following content links to learn more about Power Monitoring Expert, to obtain technical information, and to discuss issues.

NOTE: All links open in a new tab or window. This Exchange Community requires registration.

| Online Help | System Guide | Demo |
| Find answers | Find answers | See it in action |

| Exchange Community | Exchange | Previous versions |
| Ask questions | Learn more | Not PME 2020? |

**Access always the latest 24/7**

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# Exchange Extranet

## Access Design and Quote Assets

Easy access to content, searchable and intuitive. Content includes:

- Presentations, brochures, videos

- Whitepapers and case studies

- Links to demos and launch content

- Links to licensing portal

- Guides and Manuals

Direct downloads and easy sharing.

Exchange Extranet Link

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# Exchange Community

## Access to Knowledge and Experts

The place to ask questions, discuss with peers around the world and share best practices. Access:

- Download installers, drivers, service packs and hotfixes

- Post your files and share content

- Knowledge sharing

- Labs and Beta programs

- How to videos

- Global training Content

Exchange Community Link

# Sales Portal 2.0

Coming soon

| License Portal | → | Sales Portal 2.0 **New!** |
|---|---|---|

- Better customer tracking
- Improved work flow
- Simpler look up on existing system
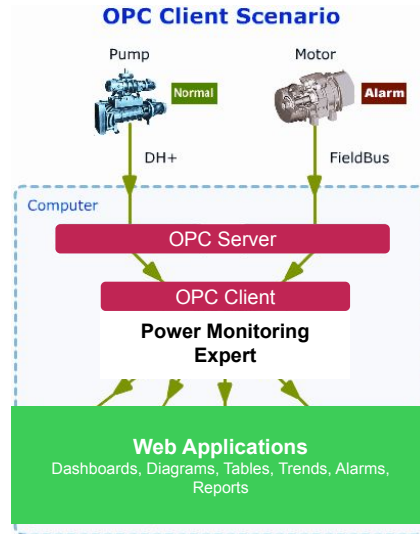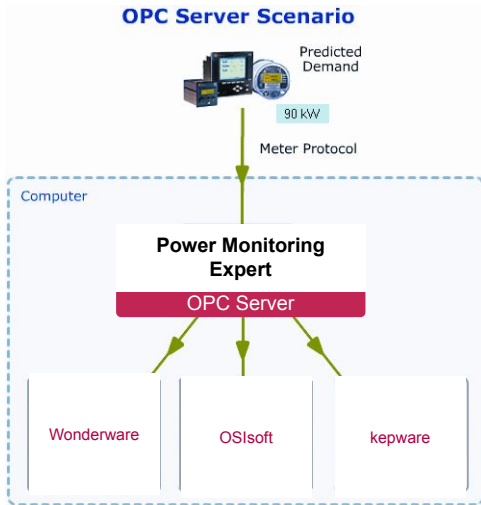- And more …
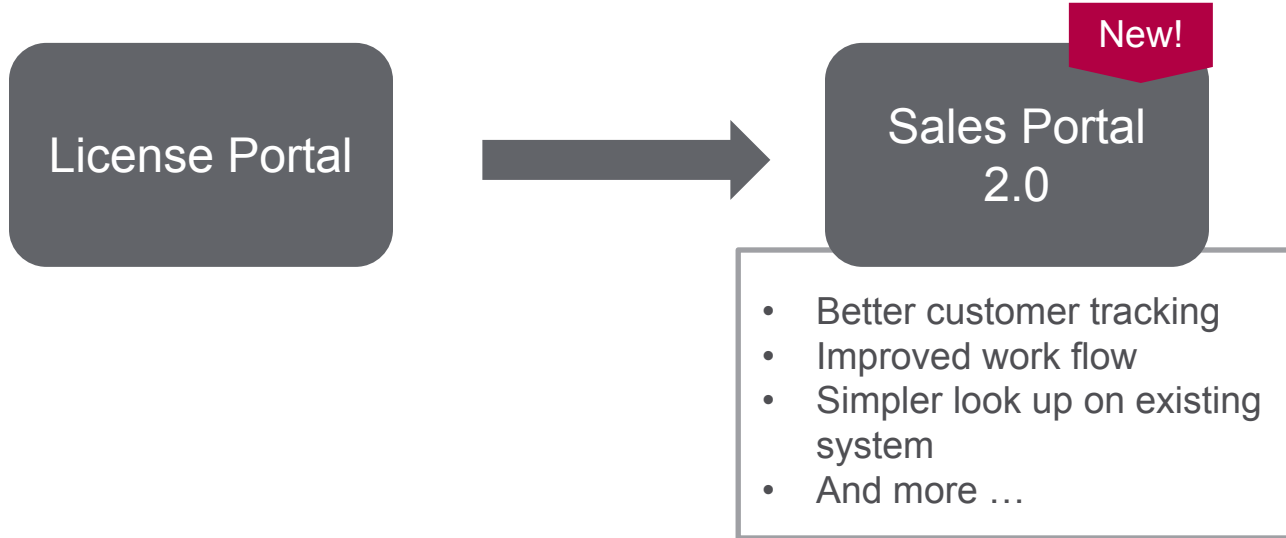
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# Appendix

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# OPC

- Power Monitoring Expert has an OPC Server and OPC Client

- Enables interaction between other Schneider Electric and 3rd party systems

- Industry-standard real-time data interface (OPC DA 2.05a)

# OPC Server

- Once enabled, the OPC server will publish basic power and energy measurements from the power meters.

- Additional configuration will allow an administrator to publish any real-time measurements from the system.
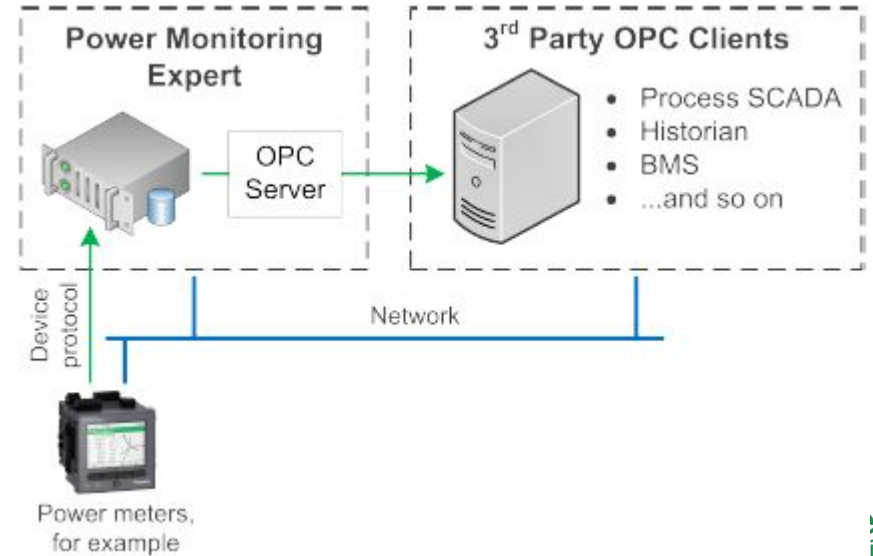


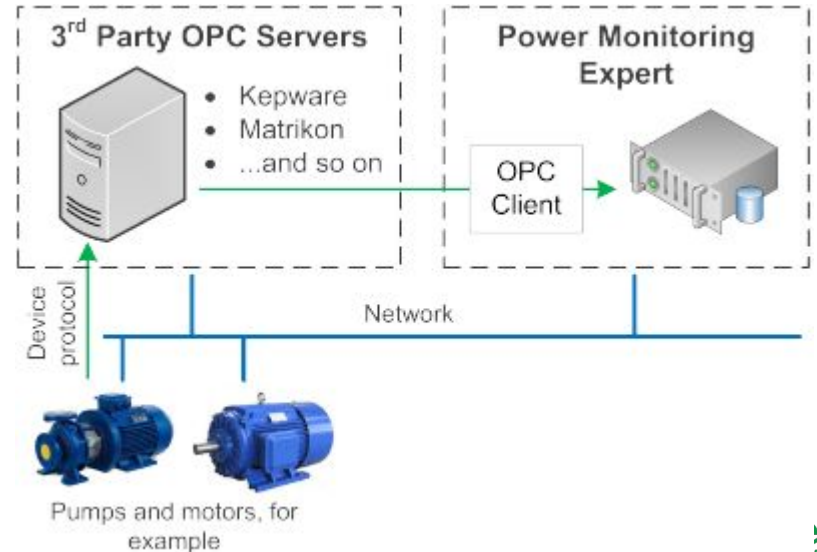**NOTE**: The OPC Server license is required for server functionality.

# OPC Client

- The OPC client mapping must be manually defined by the engineer using the Modbus Device Importer and other tools.

- Once configured, the OPC client will read tags from other OPC servers in the system.

Industry:

- Lots of PLCs

- Wonderware

- Profibus

- …

Buildings:

NOTE: Device licenses and custom engineering is required for OPC Client functionality.

- Lonworks



3rd Party OPC Servers
- Kepware
- Matrikon
- …and so on

Power Monitoring Expert

OPC Client

Device protocol

Network

Pumps and motors, for example

# Other supported standards

Power Monitoring Expert also supports the following:

## ODBC

- Open DataBase Connectivity - is a standard C programming language interface that is used to access any type of database, independent of specific database systems or operating systems.

## PQDIF

- The Power Quality Data Interchange Format allows for the exchange of power quality data between devices and software from different vendors using a non-proprietary standard developed under the guidelines of IEEE P1159.3.
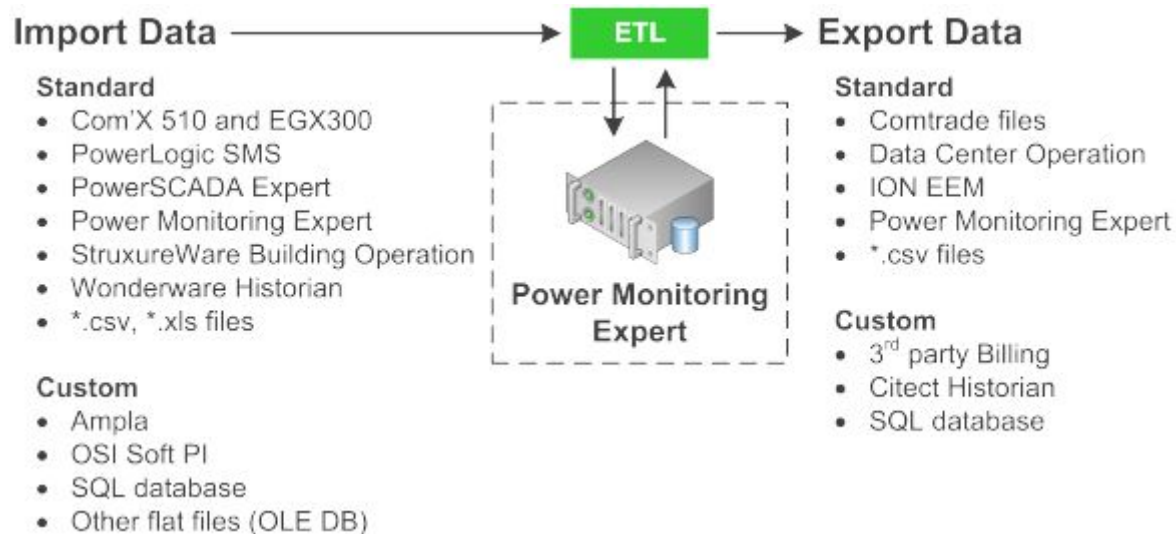
## XML

- Extensible Markup Language - is a set of rules for encoding documents in a file format that is readable by both humans and computers.

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# Extract Transform Load (ETL) Tool

Tools and Utilities

- **Import** data from external sources into the Power Monitoring Expert database, or to **export** data from the Power Monitoring Expert database to external destinations.

  - The tool supports many products and data stores.

## Import Data → ETL → Export Data

**Import Data**

Standard
- Com'X 510 and EGX300
- PowerLogic SMS
- PowerSCADA Expert
- Power Monitoring Expert
- StruxureWare Building Operation
- Wonderware Historian
- *.csv, *.xls files

Custom
- Ampla
- OSI Soft PI
- SQL database
- Other flat files (OLE DB)

**Power Monitoring Expert**

**Export Data**

Standard
- Comtrade files
- Data Center Operation
- ION EEM
- Power Monitoring Expert
- *.csv files

Custom
- 3rd party Billing
- Citect Historian
- SQL database

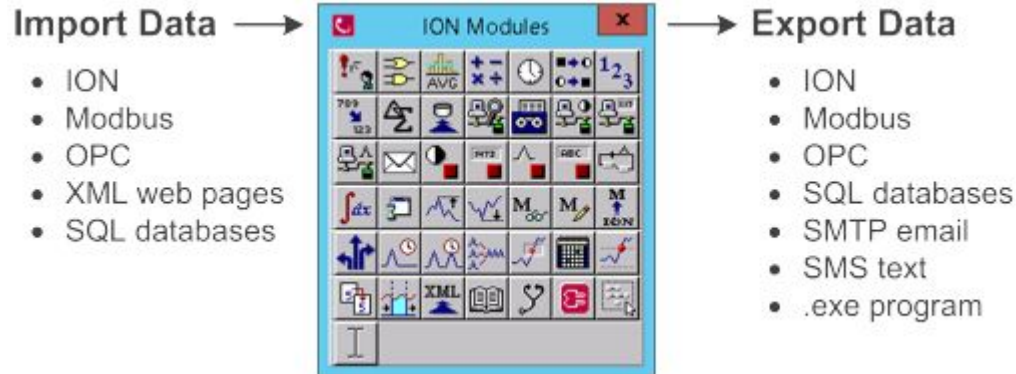
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# Virtual Processor (VIP)

Tools and Utilities

The Virtual Processor is a Windows-based service that operates on the Power Monitoring Expert server.

- It provides coordinated data collection, data processing, and control functions using a variety of protocols and standards.

- Distributed operations, customized solutions, and data exporting for a variety of industrial, commercial, and power utility needs are possible.



**Import Data** →
- ION
- Modbus
- OPC
- XML web pages
- SQL databases

**Export Data** →
- ION
- Modbus
- OPC
- SQL databases
- SMTP email
- SMS text
- .exe program

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# Virtual Environments

To be updated

Power Monitoring Expert can be installed in supported virtual environments that have equivalent performance to a recommended physical computer.

- The **FLEXnet License Administrator** software, which is used to manage Power Monitoring Expert licenses, supports virtual machine licensing for the following hypervisors:
  - VMWare Workstation 10
  - VMWare ESX1 6.0
  - Oracle Virtual Box 5.0.4
  - Microsoft Hyper-V from Windows 10, Windows Server 2016
  - Citrix XenServer 6.2
  - Parallels Desktop 10
  - QEMU-KVM

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# Special Case

ION meter in a Modbus serial network

- Primary use = **retrofit applications**

  - where a Modbus meter such as the PowerLogic™ PM800 meter is being replaced by an ION meter such as the PM8000.

- Network topology supported = Modbus Ethernet gateway network

  - i.e. Modbus slave devices daisy-chained to the serial RS-485 port of a Modbus Ethernet gateway device