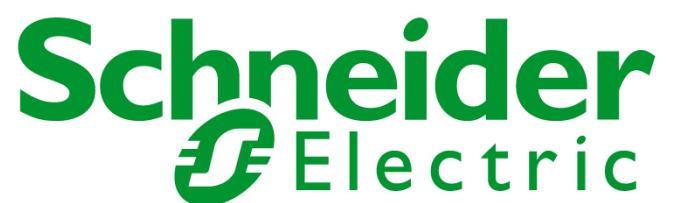Schneider Electric – ION EEM 5.0 (and cumulative updates)

ION EEM 5.0 System Specification Guide

v3.0

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Schneider Electric

Overview

This guide contains the software and hardware specifications needed for a successful EEM installation. These specifications are designed to help EEM perform adequately.

If any of the prerequisites are not met and cannot be easily corrected, it is usually best to contact a Schneider Electric representative before proceeding. If your hardware does not meet the specifications provided in this document, you should not proceed with the deployment.

> **Note:** Many commissioning and operation issues are the direct result of missing or incorrectly configured prerequisites or under-sized server hardware. We strongly recommend against deploying ION EEM on systems with only the mimimum specifications as this will, invariably, lead to poor performance, user dissatisfaction and additional expense post-deployment.

Client System Requirements

The client system is the end-user workstation that will be used to access the EEM system

> **Note:** ION EEM 4.0 R2 systems that meet the listed requirements are supported by Schneider Electric's various support centers. ION EEM 4.0 R2 systems that do not meet the listed requirements are *not supported* except where specifically noted.

		Requirements
Operating System		Windows XP SP3 or later (32-bit) Windows Vista (Business, Ultimate, Enterprise) SP2 or later (32-bit) Windows 7 (Professional, Ultimate) SP1 or later (32 or 64-bit)
Language / Regional Settings		English / United States (en-US)
Installed Software	**Standard EEM Web Application User**	**Web Browsers:** Internet Explorer 7, 8, 9, 10 and 11(with CU2 and later)
		Microsoft Silverlight 4.0 or later **Note: Microsoft Silverlight can only be installed by an Administrator user on the operating system.**
	Administration Tool User	Microsoft .NET Framework 3.5 SP1 Microsoft .NET Framework 4.0 **Note: This is only required for clients running the remote Administration Tool and not for clients accessing the Web Application. In the case of the remote Administration Tool, both versions of .NET are required and this will require a reboot of the workstation.**
		ASP.NET 4.0 **Note: This is only required for clients running the remote Administration Tool and not for clients accessing the Web Application.**

Server System Requirements

The server system is the back-end system that ION EEM is deployed on. The server system can be broken down into 2 core components: Application Server and Database Server.

Software Requirements

In a distributed environment these are two separate systems and should each meet all of the software requirements for their server type. In a standalone environment, where both the Application Server and Database Server are on the same system, then this system must meet the software requirements laid out for both Servers.

Note: An important change has been made to the supported server Operating System and SQL Server versions. These changes are necessary because some of the key performance enhancements to 4.0 R2 use features that are not available in older versions of either Windows or SQL Server.

	Server	Requirements
Virtual Machine Host	Application, Database	VMWare ESXi 3.5 Update 5 or ESXi 4.1 Microsoft Hyper-V 2008R2 or 2012 **Note: Performance and stress testing has been performed on this type of Virtual Environment. Other Virtual Environments may function, but are not supported.**
Operating System		Windows 2008 R2 Server (Standard, Enterprise) SP1 or later (64-bit)
Language / Regional Settings		English / United States (en-US)
Installed Software	Application	Internet Information Services 7.5 or later
		ASP.NET 4.0
		Microsoft .NET Framework 3.5 SP1 (Installed by ION EEM 4.0 R2 Installer) Microsoft .NET Framework 4.0 (Installed by ION EEM 4.0 R2 Installer) **Note: Both versions are required and a reboot of the server is required after the installation is complete.**
		Microsoft Silverlight 4.0 or later **Note: Microsoft Silverlight can only be installed by an Administrator user on the operating system.**
		Microsoft Message Queuing (MSMQ) 5.0 (Installed by ION EEM 4.0 R2 Installer) Latest SQL Server Backwards Compatibility Pack
	Database	SQL Server 2008 R2 / SQL Server 2012 (Standard, Enterprise) with Mixed Mode Authentication (64-bit only)

Server Fundamentals

These are the minimum required component specifications that should be found in all servers targeted for an ION EEM installation, regardless of server type or expected EEM system size.

Requirements	
Virtual Machine	All resources (CPUs, Memory, *etc.*) allocated to a VM must be **dedicated**, *not* shared. **Note: Dedicated resources ensure application stability, performance and data availability. If the resources in the Virtual Machine are shared with other software systems, then there is no reasonable guarantee on EEM's stability, performance or data availability.**
Core Clock Speed	3.0 GHz (2,000 MHz) **Note: The hardware specifications below are based on 3.0 GHz CPU clock speeds. For cores running between 2.0 and 3.0 GHz please see the Other Considerations section to correctly account for a slower clock speed. Cores below 2.0 GHz are not supported.**
Memory Speed (FSB)	1.6 GHz (1,600 MHz)
Network	Gigabit Ethernet NIC
Disk RPM	15,000 **Note: Solid State Drives (SSD) have an effective RPM rating far higher than 15,000 and are considered to meet this specification.**
Disk IOPS	265 or greater **Note: This level of I/O can be achieved using multiple physical disks in a RAID array. The exact configuration is up to the person in charge of specifying the server purchase, but the total IOPS nees to meet or exceed 265 IOPS.**
Disk Configuration	RAID 1 or RAID 10
Disk Size	**Application Server:** 30 GB of dedicated space available for ION EEM **Database Server:** Please review the ION EEM Deployment Guide, section "Appendix B: Hard Disk Sizing Considerations". **Note: It is important that the allocated hard disk on the Database Server will have at least 20%-30% free space available for SQL Server to function correctly as per the Microsoft SQL Server recommendations.**

Hardware Specifications

The following table provides a method for identifying the minimum and recommended hardware configurations required for an ION EEM installation to effectively operate.

Before any reasonable hardware specification can be recommended, it is imperative that the corresponding target **User Load** and **Data Load** are accurately calculated. The corresponding information and calculations can be found in the following sections *Calculating Estimated User Load* and ** See the Appendix* for a sample calculation

- **Total User Accounts** – This value represents the total number of user accounts that are active in the EEM deployment. For existing systems it is often more appropriate to use the number of *active* user accounts. This can be determined by examining the users' last logon date and querying the system for the number of unique users logged on in the last 6 to 8 weeks.
  - o   Note: If multiple users are going to be sharing a single EEM User account, please ensure each individual user is included in this value

- **Number of Kiosks** – This value represents the total number of simultaneously active Kiosk locations that will be enabled for the system
  - o   Note: These user accounts should also be included in the *Total User Accounts*

- **Number of Modeling Users** – The number of user accounts that will be working with the Modeling module
  - o   Note: These user accounts should also be included in the *Total User Accounts*

Calculating .   A sample set of calculations can be found in the Appendix.

During all calculations, it is important to provide values that cover reasonable expectations of growth for the next few years (or the lifetime of the hardware) to ensure that performance does not degrade with growth.

The hardware specifications should be based off of the greater of either the estimated **User Load** *or* **Data Load**.

Important

Based on the analysis of both performance and stress testing results, it has been found that a Standalone ION EEM system performs *faster* in both data loading and page response time when compared to a Distributed ION EEM system of *equivalent* hardware configuration. These findings matched with the fact that a distributed system has double the hardware requirements it should be noted that *Standalone is always the preferred hardware configuration* for either a minimum or recommended configuration.

Minimum and Recommended Specifications

A **minimum** hardware configuration will provide a slower but usable user response time from the Application server. Data import should be scheduled once per day during an off-business hours period to avoid a negative impact on the user experience during import operations.

A **recommended** hardware configuration will provide an optimal user response time from the Application server. Data import may be scheduled during business hours without significantly impacting the user experience. Import operations may be scheduled as frequently as once every two hours.

Hardware Specification Grid

Category	User Load[1]	Data Load[1]	Minimum[2]				Recommended[3]			
			Standalone		Distributed[4]		Standalone		Distributed[4]	
			Cores	Memory (GB)	Cores	Memory (GB)	Cores	Memory (GB)	Cores	Memory (GB)
A	1 – 4	1 – 1,000	1	4	1	4	2	4	2	4
B	5 – 9	1 – 15,000	1	8	1	8	2	8	2	8
C	10 – 14	1 – 40,000	2	8	2	8	4	8	4	8
D	15 – 19	1 – 60,000	2	16	2	16	4	16	4	16
E	20 – 29	1 – 75,000	4	16	4	16	8	16	8	16
F[5]	30 – 49	1 – 150,000	8	16	8	16	8	32	8	32[†]
F[5]							16	16	16	16
G	50+	1 – 200,000+	8	32	8	32	16	32	16	32[†]

[1] The recommended system configuration is reflected <u>by the greater of either the target User Load *or* Data Load</u>.

[2] A **minimum** hardware configuration will provide a slower but usable user response time from the Application server. Data import should be scheduled once per day during an off-business hours period to avoid a negative impact on the user experience during import operations.

[3] A **recommended** hardware configuration will provide an optimal user response time from the Application server. Data import may be scheduled during business hours without significantly impacting the user experience. Import operations may be scheduled as frequently as once every two hours.

[4] A distributed system consists of two distinct sets of hardware with identical hardware requirements. The value stated must be met by <u>both</u> the Application Server and Database Server, unless modified by an additional footnote

[5] If a system is 30-49 User Load or 1-150,000 Data Load, then either of the recommended systems are comparable (8 Cores/32 GB RAM or 16 Cores/16GB RAM) and customer preference or price point can drive this decision

[†] The value stated is intended for the Database Server only. The Application Server requires only 16 GB of memory

Calculating Estimated User Load

The User Load is a value that represents the amount of *simultaneous user load* on the system.

- **User Load** – This is the result of the *User Load Formula* described below. This is the value that should be used to look up and identify the required hardware configuration for the system

User Load Formula

The **User Load** can be derived with the following formula:

$$\text{User Load} = \left(\frac{\text{Total User Accounts}}{5} \right) + (\textbf{Number of Kiosks}) + (1.5 \times \textbf{Number of Modeling Users})$$

* See the Appendix for a sample calculation

- **Total User Accounts** – This value represents the total number of user accounts that are active in the EEM deployment. For existing systems it is often more appropriate to use the number of *active* user accounts.

This can be determined by examining the users' last logon date and querying the system for the number of unique users logged on in the last 6 to 8 weeks.

- o Note: If multiple users are going to be sharing a single EEM User account, please ensure each individual user is included in this value

- **Number of Kiosks** – This value represents the total number of simultaneously active Kiosk locations that will be enabled for the system
  - o Note: These user accounts should also be included in the *Total User Accounts*

- **Number of Modeling Users** – The number of user accounts that will be working with the Modeling module
  - o Note: These user accounts should also be included in the *Total User Accounts*

Calculating Estimated Data Load

The Data Load is a value that represents the amount of *service load* on the system.

- **Data Load** – This value is the result of the *Data Load Formula* described below. This is the value that will be used to look up and identify the required hardware configuration for the system

Data Load Formula

The **Data Load** can be derived with the following formula:

$$\textbf{Data Load} = (1 + \textbf{Data Load Modifier}) \times [\ \textbf{SMPs} + \textbf{ETLSMPs} + (\textbf{VSMPs} \times \textbf{VSD})\ ]$$

* See the Appendix for a sample calculation

- **Data Load Modifier** – This value is another abstraction that represents the impact of a number of peripheral ION EEM services and components. It is based on the result of the *Data Load Modifier Formula* described below. This Modifier also takes into account any adjustments necessary for servers with CPU clockspeeds between 2.0 and 3.0 GHz.

- **SMPs** – This value represents the total number of enabled Source Measurement Pairs that are configured to be imported by the ION Database Loader

- **ETLSMPs** – This value represents the total number of Source Measurement Pairs that are configured to be imported or exported by the ETL Engine

- **VSMPs** – This value represents the total number of enabled Virtual Source Measurement Pairs

- **VSD** – This value represents the maximum depth of the deepest Virtual Source hierarchy.
  - o This value should be derived from the worst case Virtual Source hierarchy, which is defined as the number of levels in the deepest Virtual Source hierarchy in the system. A Hierarchy of *meter(physical) > building(virtual) > region > corporate* has a value of 3 (count the virtual sources only).
  - o For specifying systems as part of the pre-sales process, this number must be estimated. It's strongly recommended that a conservative (high) value be picked in order to prevent under-specifying the hardware. One useful rule of thumb is to

count the levels within a customer's corporate hierarchy and add 2 (representing the site and building levels). Basic corporate hierarchy info should be accessible through the customer's purchasing group.

o   Based on previous experience the VSD should rarely be less than 4.

Data Load Modifier Formula

The **Data Load Modifier** can be derived with the following formula:

Data Load Modifier =
$(0.15 \times$ **PQ Enabled**$) +$
$(0.10 \times$ **DM Enabled**$) +$
$(0.05 \times$ **DQ Enabled**$) +$
$(0.01 \times$ **Custom TDs**$) +$
$(0.02 \times$ **Many Time zones**$) +$
Slow Core Modifier $+$
After Market Features Modifier

* See the Appendix for a sample calculation

- **PQ Enabled** – Set to 1 if system will be importing Power Quality Events or Waveforms, else 0

- **DM Enabled** – Set to 1 if system will be running Data Management jobs, else 0

- **DQ Enabled** – Set to 1 if system will be running Data Quality jobs, else 0

- **Custom TDs** – Set to the number of <u>custom</u> time dimensions that are enabled
  - o Note: Default primitive dimensions should not be counted towards this value

- **Many Time zones** – Set this to 1 if more than 8 Time zones will be enabled, else 0

- **Slow Core Modifier -** The **Slow Core Modifier** can be derived with the following formula:

$$\text{Slow Core Modifier} = \left(1 - \frac{\text{Clock Speed in GHz}}{3.0} \right)$$

  - o The slow core modifier for a processor with "turbo boost" or similar capabilities should be calculated using the processor's base (lowest listed) speed.

- **After Market Features Modifier** – Please set this value to the percentage of the overall system resources that is required to run any additional features, after-market configurations or third-party components that may impact performance.
  - o Example: If a Third party component needs 10% of system resources, then the value is 0.10

Appendix – Sample Calculations

This section will describe a sample system and the process used to generate both the **User Load** and **Data Load** values. These values will then be evaluated to look up the recommended hardware settings.

User Load Calculation

The first step is to calculate the **User Load** value of the projected system:

$$\textbf{User Load} = \left(\frac{\textbf{Total User Accounts}}{5}\right) + (\textbf{Number of Kiosks}) + (1.5 \times \textbf{Number of Modeling Users})$$

Sample Values:

- Total User Accounts = 30
- Number of Kiosks = 4
- Number of Modeling Users = 2

$$\textbf{User Load} = \left(\frac{30}{5}\right) + (4) + (1.5 \times 2)$$

$$\textbf{User Load} = (6) + (4) + (3)$$

$$\textbf{User Load} = 13$$

Slow Core Modifier

The next step is to calculate the first modifier for the Data Load calculation, the **Slow Core Modifier**:

$$\textbf{Slow Core Modifier} = \left(1 - \frac{\textbf{Clock Speed in GHz}}{3.0}\right)$$

Note: The Slow Core Modifier value must be set to 0 if the clock speed is greater or equal to 3.0 GHz

Sample Values:

- Clock speed in GHz = 2.23

$$\textbf{Slow Core Modifier} = \left(1 - \frac{2.23}{3.0}\right)$$

$$\textbf{Slow Core Modifier} = 0.2567$$

Data Load Modifier Calculation

Once the Slow Core Modifier has been calculated, then the **Data Load Modifier** is calculated to project the basic use case of the EEM system:

Data Load Modifier =

$$(0.15 \times \textbf{PQ Enabled}) + (0.10 \times \textbf{DM Enabled}) + (0.05 \times \textbf{DQ Enabled}) + (0.01 \times \textbf{Custom TDs})$$
$$+ (0.02 \times \textbf{Many Time zones}) + \textbf{Slow Core Modifier} + \textbf{After Market Features Modifier}$$

Sample Values:

- PQ Enabled   = 1
- DM Enabled   = 1
- DQ Enabled   = 0
- Custom TDs   = 3
- Many Time zones = 0
- Slow Core Modifier   = 0.2567 (*from Slow Core Modifier sample)
- After Market Features   = 0

Data Load Modifier = $(0.15 \times \textbf{1}) + (0.10 \times \textbf{1}) + (0.05 \times \textbf{0}) + (0.01 \times \textbf{4}) + (0.01 \times \textbf{0}) + (\textbf{0.2567}) + \textbf{0}$

Data Load Modifier = $(0.\textbf{15}) + (0.\textbf{10}) + (0.\textbf{04}) + (0.\textbf{2567}) + \textbf{0}$

Data Load Modifier = **0.5467**

Data Load Calculation

Once the Data Load Modifier has been calculated, then the **Data Load** value can be generated:

Data Load = $(1 + \textbf{Data Load Modifier}) \times [\textbf{SMPs} + \textbf{ETLSMPs} + (\textbf{VSMPs} \times \textbf{VSD})]$

Sample Values:

- SMPs   = 25,000
- ETLSMPs   = 5,400
- VSMPs   = 1,350
- VSD   = 4   (*Assuming a tree depth of 4)
- Data Load Modifier   = 0.5467   (*from Data Load Modifier sample)

Data Load = $(1 + 0.5467) \times [25,000 + 5,400 + (1,350 \times 4)]$

Data Load = $(1.5467) \times [25,000 + 5,400 + (5400)]$

Data Load = $(1.5467) \times [25,000 + 5,400 + (5400)]$

Data Load = $(1.5467) \times [35,800]$

Data Load = $(1.5467) \times [35,800]$

Data Load = **55,371.86**

Evaluating the Results

Once all 4 calculations have been completed, the **User Load** and **Data Load** values can be used to look up the recommended hardware configuration. The recommended hardware will correspond to either the **User Load** or **Data Load** value that suggests the more powerful system.

The samples above generated the following values:

- **User Load** = **13**
- **Data Load** = **55,371.86**

Using these values, we can see that:

- The **User Load** value corresponds to a Stand Alone system with 4 cores and 8 GB of RAM
- The **Data Load** value corresponds to a Stand Alone system with 4 cores and 16 GB of RAM

The recommended system would thus use the Data Load value and be: **4 cores and 16 GB of RAM**