

# TRELLIS™ QUICK START ENERGY MANAGEMENT SOLUTION



## Guide Specifications

### 1.0 General

#### 1.1 Overview

This document includes the specifications and features of the *Trellis™* Quick Start Energy Management package.

These include:

1. Capabilities for *Trellis* Quick Start Energy Management solution
2. Requirements for network and server hardware

### 2.0 Software Overview

#### 2.1 *Trellis* Quick Start Energy Management Solution:

The *Trellis* Energy Management Solution provides software, hardware, and services for monitoring in a complete package that provides visibility into the energy consumption and operating efficiency of the data center. IT managers are able to use the gathered information to determine system peak performance, maximize energy usage, minimize energy waste and reduce utility costs. With this offering, managers can view current and historical efficiency metrics, as well as calculate both consumption and costs for data centers that are not yet properly instrumented for measuring facility and IT load.

This solution may also be integrated with other *Trellis* modules to create a full-featured data center infrastructure management (DCIM) solution.

With the *Trellis* Energy Management Solution, you are able to:

- Correctly manage power and cooling to resolve energy issues in your critical environment

- Receive a comprehensive view of the power resources and utilization, for easier management of the complete data center power system – from utility to the rack power distribution
- Determine which devices are dependent on a device using configured connections, allowing you to plan for power changes and maintenance, and perform risk assessments
- Adjust operation loads on equipment based on actual information, to maintain service level agreements and improve efficiency – without worrying about availability
- Respond quickly to critical power issues 24/7/365
- Automate PUE, DCIE, and energy reporting
- Lower energy cost with power management of critical infrastructure
- Reduce total cost of ownership
- Increase productivity and power resource utilization
- Standardize PUE reporting to save time and increase

#### *Trellis* Quick Start Energy Management Solution (15 FMDs)

<i>Trellis</i> Bundle SKU	TR-OF-TEMS
<i>Trellis</i> License Bundle • <i>Trellis</i> Site Manager • <i>Trellis</i> Power System Manager	YES
Licensed Racks/FMDs	15
Maintenance	1-Year Silver
<i>Trellis</i> Host Server	Customer provided based on meeting Avocent® requirement specifications
Professional Services	Fixed Cost, T&E included, 4 days onsite, 6 days offsite
Training	Virtual – Instructor Led

### 2.2 Monitoring Software

The *Trellis* Quick Start Energy Management Solution provides the following capabilities:

- Identify real time power consumption
- Comply with industry-approved efficiency metrics (PUE and DCIE)
- View operating efficiency losses and recognize areas for performance improvements
- View all power system capacity utilization using a dynamic one-line diagram
- Be aware of the active power path and status of each device in the power chain
- Access reports showing system capacity and utilization

#### 2.2.1 Monitor And Respond To Critical Devices Intelligently

- See device status (Normal, In Alarm, Maintenance Mode, Not Responding) on a graphical floor plan and in real time
- Configure data points for collection and assign data collection intervals
- Categorize and visualize data via Configure, Control, Support and Specification tabs
- Use Accelerated Polling to monitor trends during power outage and when running on battery power for maintenance; compare load with run time to provide additional measurement of load percentage versus available battery run time
- Control and command other devices to perform actions using an alarm as a trigger, minimizing need for personnel intervention (i.e., high temperature); gather data from any device in the system once alarm is triggered

- Get notifications via SNMP, SMS or email and based on working hours of facilities personnel so alarms are addressed by the right person promptly; determine delivery based on notification states (Success, Failed or Pending)
- Provide alarm attributes, filters, transitions, views (active and audit/calendar) as well as actions (acknowledgment, escalation, accelerations, etc.); assign alarms and notification rules according to user role
- Use logical operators (AND, OR, NOT) to create logic between alarms so notifications are sent only after conditions of related alarm are met; no notification sent if action is no longer needed
- Suppress alarms so users won't need to spend time receiving and checking notifications from devices that send erroneous, intermittent alarms
- Use Summary View to see what alarm merits immediate attention and Timeline View to see alarms side-by-side to understand their context, cause and relationship, if any

## 2.2.2 Track Consumption in Real Time For Better Efficiency

- Use the unified dashboard to see real-time data, energy usage and operating efficiency together; key information helps determine system peak performance, maximize energy usage and minimize energy waste
- Customize dashboards so users can enter data manually if the data center is not properly instrumented for measuring total facility or IT load
- Gauge efficiency and comply with current and historical industry- approved efficiency metrics (Compute real-time power consumption (kW/hour) for a device or a group of devices and determine ways to balance capacity and demand within the data center

- Eliminate readings from one or more devices when making PUE and DCiE calculations in a mixed-use (office space + data center) data center facility
- Understand capacity usage to ensure business-critical services are always running while lowering operating costs; roll out measures to improve peak performance

## 2.2.3 Dynamic Electrical One-Line Diagram

- Receive a comprehensive view of power resource and utilization for easier management of the complete data center power system—from utility entrance down to the rack power distribution
- Gain complete awareness of the active power path and the status of all devices in that power chain using a dynamic, maintainable one-line diagram
- Understand the dependencies within the power system, aiding maintenance activity planning
- Use current and historical trends to make more accurate capacity forecasts and deployment plans
- Improve business continuity through documentation of the power system and connections
- Create comprehensive downtime reports of cascading power failures by reviewing the historical operation of equipment

## 2.2.4 Comply with Industry Approved Efficiency Metrics (PUE & DCiE)

- Ensure business-critical continuity with comprehensive event management and alarm notifications
- Accurately understand real-time energy consumption (kW/ hours) and cost of operating subsystems; even exempt certain parts in calculating for a mixed-use facility

- Improve performance efficiency and reduce risk of unplanned downtime by knowing the current and future energy needs of the data center based on historical data
- View PUE and DCiE to ensure compliance with efficiency metrics by The Green Grid and the like
- Promote efficient and effective use of support personnel, including site engineers and technicians, by sending them in— only when necessary
- Reduce time spent sorting through inbox messages with an intelligent summary of priority issues
- Highlight issues that need immediate attention and provide real-time, meaningful information that addresses the needs of senior management

## 2.2.5 Monitor and Compute Energy Costs

- Collect and analyze real-time data for monitoring business-critical infrastructure, environmental conditions and power consumption
- Use the unified dashboard to see real-time data, energy usage and operating efficiency together; key information helps determine system peak performance, maximize energy usage and minimize energy waste
- Configure source and currency details that facilitate utility cost calculations at the system and unit levels... so you can determine actual costs, not just consumption
- Comply with industry-approved efficiency metrics (PUE and DCiE)
- Calculate utility cost—not just consumption—at the system and unit levels
- Determine current and future energy needs based on historical data
- Compute real-time power consumption (kW/hour) for a device and determine ways to balance capacity and demand within the data center

## 2.3 Maintenance

- One year Silver Support maintenance included

Technical Contacts*	3
Response Time <sup>2</sup>	Based on Severity level: 1, 2 = 4 hours 3, 4 = 12 hours
Follow Up Time <sup>2</sup>	Based on Severity level: 1 = Every 8 hours 2 = Every 2 days 3, 4 = Every 5 days
Phone Support	8 hours, 5 days a week (Monday- Friday) <sup>3</sup> Support available in English, French, Japanese, German and Mandarin

<sup>1</sup> Start date is date of purchase

<sup>2</sup> Communication is via email or phone. Response times are based on initial phone contact.

<sup>3</sup> Local operations center time (Local support centers: Philippines and China in APAC, Romania in EMEA and Florida in North America).

## 2.4 Installation and Service

Avocent® Professional Services uses a building block approach to build and quote Statements of Work. The following information provides detailed descriptions of the service components outlined in the “Services Scope” the SOW.

### Service Components

#### 2.4.1 Trellis™ Platform Installation

##### 2.4.1.1 Trellis Platform Base Installation – Energy Management Solution

###### A. Project Kickoff

Avocent will conduct a Project Kickoff, which is a meeting to review the Statement of Work scope, the team involved and the overall objectives of the customer.

###### B. Pre-Installation Software Workshops

Avocent will conduct a pre-installation software workshop with the appropriate Customer personnel to ensure that the Customer has all the necessary hardware and non- *Trellis* platform software installed and configured in advance of Avocent installing the *Trellis* platform software application.

###### C. Software Installation and Standard Setup

Avocent will install the *Trellis* platform into the Customer’s environment and perform standard setup tasks for both the *Trellis* platform application and each of the associated modules. Avocent will perform the following:

###### D. Software installation

Avocent will perform the following software installation tasks:

- Execute a Pre-Installation Checklist to ensure that Customer has properly prepared the servers for *Trellis* platform installation prior to installing the *Trellis* platform.
- Install the *Trellis* platform in Customer’s environment.
- Execute a Post-Installation Checklist to ensure that the *Trellis* platform was properly installed.

##### 2.4.1.2 Trellis Platform Application Setup

Avocent will perform the following *Trellis* platform application setup tasks:

- Configure email or SMS, up to three (3) users.
- Setup user accounts, up to three (3) users.
- Create User Groups, and Roles, up to three (3) groups and three (3) roles.

- Spend up to one hour providing knowledge transfer covering:
  - Adding users and assigning roles.
  - Requesting and downloading symbols/element libraries.

###### A. Project Close Out

- Avocent will perform a set of activities to bring closure to the project. It includes introducing the Customer to Avocent’s Support department for post-implementation support, and gaining concurrence with the Customer that all the tasks defined within the Statement of Work have been performed.

###### B. Support Handoff

Avocent will perform the following Support Handoff tasks:

- Facilitate a call between Avocent Support and Customer.
- Request that Support review with Customer the Support organizational structure, methods of contacting support, report logging system, and SLAs.
- Request that Avocent Support create a Support Login for Customer (if one does not currently exist.)
- Review with Customer the process for requesting Element Libraries.

###### C. Project Close Out

Avocent will perform the following Project Close Out tasks:

- Review with Customer each of the tasks defined within the Statement of Work and the work that was completed by Avocent.
- Discuss any further work that Customer may wish to consider.

## 2.4.1.3 Floor Plan Import – Energy Management Solution

Avocent® will import and set up an existing data center floor plan drawing in the *Trellis*™ platform for all Customer environments within the scope of this Statement of Work. A floor plan is defined as a single level within a single building location. A single floor plan can contain multiple rooms as long as they are all on the same level. A data center containing multiple levels will require a floor plan component for each level. The standard file types (.VSD, .DWG, or .DXF) are supported, as are up to two revisions of the floor plan. Avocent assumes all drawings and data provided by the Customer are accurate and complete. This includes Data Center floor plan drawings, which Avocent assumes to be to scale and architecturally (walls, columns, grid, etc...) correct. Customer is responsible for the accuracy and relational integrity of all data provided to Avocent.

## 2.4.2 Trellis Site Manager Installation

### 2.4.2.1 Trellis Site Manager Base Configuration – Energy Management Solution

#### A. Trellis Site Manager workshop

Avocent will conduct the *Trellis* Site Manager workshop, which is a meeting (or series of meetings) covering the following:

- *Trellis* Site Manager and *Trellis* Energy Insight Scope
- Review Site Scope Document to validate that all devices that are to be monitored are ready for monitoring.
- Review devices to be monitored and protocols to be used
- Determine protocol settings for each monitored device
- Determine monitoring intervals and thresholds

- Determine roles and access rights
- Review PUE/DCiE level (1 or 2), sampling frequency, and averaging period
- Determine devices included in Total Facility Load and Total IT Load groups
- For each device, determine if load is manually entered or monitored

**NOTE:** This assumes monitored devices are set up as part of *Trellis* Site Manager.

#### B. Pre-installation hardware workshop

Avocent will conduct a pre-installation hardware workshop with the appropriate Customer personnel to ensure that the Customer has performed the necessary tasks to ensure that the Customer's network and target devices are configured in advance of Avocent installing Avocent hardware.

#### C. Trellis Energy Insight Configuration

Avocent will perform the following *Trellis* Energy Insight implementation tasks:

- If possible, configure settings for PUE level, sampling frequency, and averaging period.
- If possible, add devices to the Total Facility Load and Total IT Load groups.

#### D. Trellis Site Manager Configuration

Avocent will complete initial configuration of the *Trellis* Site Manager module with native *Trellis* monitoring capabilities.

- Avocent will spend up to five hours covering the following *Trellis* Site Manager tasks:
- Locating up to fifteen (15) pre-identified Devices in Inventory
- View and Edit Device Properties
- Place up to fifteen pre-identified Devices in Maintenance Mode

- Define /modify monitoring intervals and thresholds
- Modifying setting for PUE level, sampling frequency, and averaging period
- Adding/Removing devices to the Total Facility Load and Total IT Load groups

#### E. Trellis Site Manager assumptions

- Each of the fifteen (15) monitored devices will be identified by manufacturer, model and serial number prior to implementation.
- The devices to be monitored must be in a monitorable state and support one of the following protocols: BACnet/IP, Modbus/ IP, SNMP, or Velocity. Any devices that are not in a monitorable state will be excluded from the implementation. This solution does not include devices that are monitored through an intermediate system such as a BMS or SiteScan.
- Any hardware, upgrades, or networking required for connectivity to monitored devices must be in-place prior to *Trellis* Site Manager implementation. For any devices requiring monitoring which are not ready in their current state, Avocent can provide products and services to ensure monitoring readiness at an additional cost and require a signed Change Order.
- Any changes made to the monitored devices between the time of the site survey and the implementation need to be communicated to the Avocent implementation team.
- Any changes made to the monitored devices that affect the ability of the *Trellis* platform to receive monitored data either during or after implementation are the responsibility of the Customer.

- Any devices that have not been identified as part of this monitoring implementation will be addressed using a Change Order and may result in additional costs to the Customer.

**NOTE:** Monitorable state is defined as the device being powered, functional, physically connected to network or monitoring gateway, locally configured (e.g. IP address and unit settings set) and pingable from the network hosting the *Trellis™* platform monitoring engine.

### 2.4.2.3 Configuration – Energy Management Solution

Avocent® will install the *Trellis* platform Avocent® Intelligence Engine into the Customer's environment(s). This service does not include configuring monitored devices.

Avocent will perform the following hardware installation tasks:

- Deploy Intelligence Engine to Customer provided environment
- Add engines to the associated *Trellis* platform modules
- Spend up to two hours providing informal knowledge transfer to both demonstrate as well as allow the Customer to access the Avocent Intelligence Engine (content will be based on user experience).

### A. Avocent Intelligence Engine Deployment and Configuration

Avocent will install the *Trellis* platform Avocent Intelligence Engine into the Customer's environment(s). This service does not include configuring monitored devices.

Avocent will perform the following hardware installation tasks:

- Deploy Intelligence Engine to Customer provided environment
- Add engines to the associated *Trellis* platform modules

- Spend up to two hours providing informal knowledge transfer to both demonstrate as well as allow the Customer to access the Avocent Intelligence Engine (content will be based on user experience).

### 2.4.2.4 Monitored Devices – Energy Management Solution

Avocent will configure up to fifteen (15) monitored devices for critical power infrastructure in the *Trellis* platform, test the EL to ensure they are collecting the proper data, and validate that the collected data matches readings on the device.

### 2.4.2.5 *Trellis* Power Systems Manager – Planning and Design

Avocent will configure up to fifteen (15) monitored devices for critical power infrastructure in the *Trellis* platform, test the EL to ensure they are collecting the proper data, and validate that the collected data matches readings on the device.

### 2.4.3 *Trellis* Power Systems Manager Node Configuration – 15

Avocent will configure the Customer one line diagram according to the output in the *Trellis* Power System Manager Workshop:

- Add up to fifteen (15) defined nodes to the diagram
- Connect nodes
- Review output with Customer
- Revise layout to Customer Preference

### 2.4.4 Value Training Services

#### 2.4.4.1 Value Training Services – Energy Management Solution

Avocent will provide Value Training Services to include eight (8) hours of a senior consulting engineer's time and one (1) hour of project management. During this time standard *Trellis* Platform reports for Site Manager specific to Energy Management will be overviewed.

### 2.5 Floor Mounted Device (FMD) License and Scope

- The *Trellis* Quick Start Monitoring solution is licensed by the number of Floor Mounted Devices. FMDs include racks or any devices that occupy floor space, like cooling units and UPS units.
- This package includes support for up to 15 FMDs which can be any combination of racks, cooling & power units.
- Devices are components or equipment that fit inside the FMD, like IT servers or rack PDUs. These devices are not included in the FMD count.
- The professional service scope is limited to monitoring 15 devices. The *Trellis* Quick Start Monitoring package license includes an unlimited number of devices but service will only setup and configure up to 15 devices.
- Additional FMD licenses can be added at any time.

### 3.0 Hardware Specifications

#### 3.1 Server Specifications

Trellis™ Quick Start Data Center Monitoring solution can be operated on a virtual or physical server platform.

The specifications to the right are for the current server specifications requirements.

#### 3.2 Operating Systems

The Trellis platform supports the following operating systems and software. One of the following operating systems must be installed on both the front and back machines:

- Microsoft® Windows® 2008, R2 SP1 Enterprise, 64-bit (full installation)
- Red Hat® Enterprise Linux® version 6.4, 6.5 or 6.6, 64-bit

DATA SIZE GUIDELINES	SMALL	MEDIUM	LARGE	ENTERPRISE
Concurrent users	10	20	50	100
Devices	2,000	20,000	100,000	200,000
Power Connections	1,000	10,000	60,000	100,000
Data Connections	2,000	10,000	60,000	100,000
Monitored Datapoints	1,000	10,000	40,000	140,000
FRONT MACHINE	SMALL	MEDIUM	LARGE	ENTERPRISE
CPU manufacturer	Intel®	Intel®	Intel®	Intel®
CPU model	Xeon®	Xeon®	Xeon®	Xeon®
CPU speed (GHz) 8 M L3 cache	2.6	2.6	2.6	2.6
CPU count	1	2	2	2
CPU cores	4	4	4	8
Memory (GB) DDR3 1333 MHz	32	32	40	44
Disk throughput	> 500 MB/s (sequential) [uncached]			
Storage	300 GB Enterprise class			
Ethernet	> 80 MB/s			
BACK MACHINE	SMALL	MEDIUM	LARGE	ENTERPRISE
CPU manufacturer	Intel®	Intel®	Intel®	Intel®
CPU model	Xeon®	Xeon®	Xeon®	Xeon®
CPU speed (GHz) 8 M L3 cache	2.6	2.6	2.6	2.6
CPU count	1	2	2	2
CPU cores	4	4	4	8
Memory (GB) DDR3 1333 MHz	24	32	32	32
Disk throughput	> 500 MB/s (sequential) [uncached]			
Storage	*300 GB Enterprise class for base installation			
Ethernet	> 80 MB/s			
TOTALS	SMALL	MEDIUM	LARGE	ENTERPRISE
Total CPUs	2	4	4	4
Total cores	8	16	16	32

\*Hardware sizing varies depending on usage requirements and is performed by Professional Services.