Server Technology, Inc.   Technical Note

Sentry Power Manager (SPM) Hub and Node Feature: Part Numbers SPM-Hub and SPM-Node

Purpose

This technical note provides functional information about Server Technology's SPM Hub and Node feature. The feature allows the connection of multiple SPMs together and uses one of those SPMs (hub) to collect and display PDU device information from the other SPMs (one or more nodes).

As the hub monitors key information for each node in the connection, each node continues to perform on its own as a fully functional and complete SPM system

Note: Hub and Node was not intended for redundancy or for a type of fail-over mode for multiple SPM systems.

Overview

Hub and Node is a separate SPM license-key feature for the SPM administrative user account, available with SPM version 5.4 or later. The feature allows multiple SPM systems to be connected to each other for monitoring, configuring, and reporting operational data for PDUs within the hub and node connection.

In the Hub and Node connection, a hub can have multiple nodes but a node can only have one hub, as illustrated:
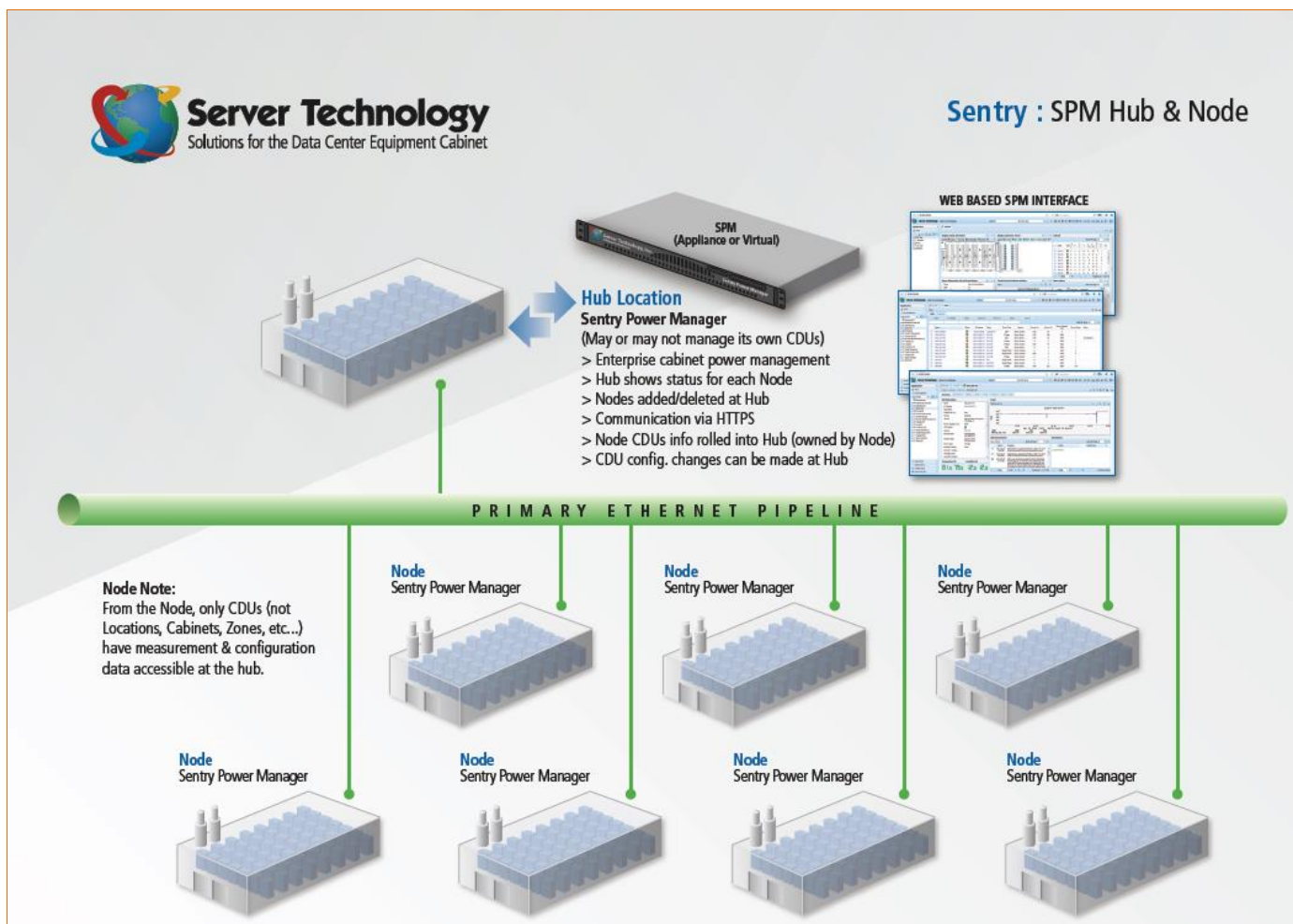
Terms and Definitions

- **Hub:** An SPM system that can manage other SPM systems (nodes).
- **Node:** An SPM system that can be managed by another SPM system (hub).
- **Partial Sync:** The limited hub operation that only collects frequently updated PDU values from the node; these values can include alarms, power, load, and energy.
- **Standalone:** An SPM system that cannot be used as a hub or a node, or cannot be managed by a hub. To allow a standalone system to become a hub (or a node), a separate license key must be applied to the standalone SPM.
- **Sync/Full Sync:** The hub operation that collects PDU information from the node.
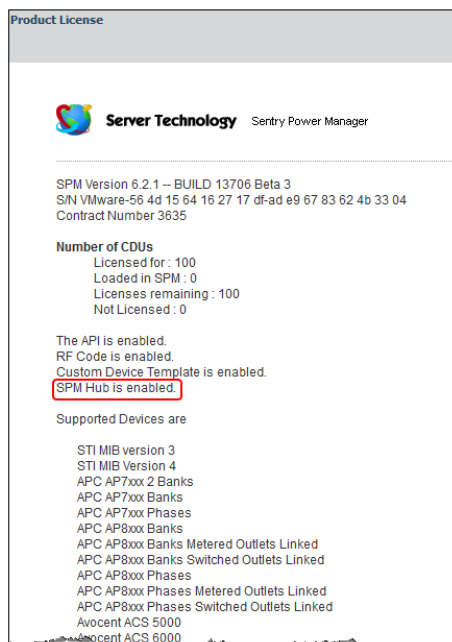
Getting the SPM License Key

The SPM product ships as a standalone unit and only becomes a hub SPM or a node SPM when the Hub and Node feature is activated by a license key from Server Technology.

Note: One key is required for the hub (SPM-Hub) and one key is required for the node (SPM-Node).

For information about getting the license key(s) and how to use it to activate Hub and Node, contact your Server Technology representative at: 1-800-835-1515 (domestic), ++0(1)775-284-2000 (international), or email sales@servertech.com
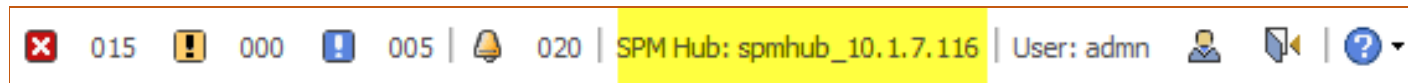
How the Hub and Node License Key Works

- The license key has the option to enable either hub capability or node capability. If both keys are enabled, the SPM will be a hub.
- An SPM becomes a hub when a hub key (SPM-Hub) is applied to it.
- An SPM becomes a node when a node key is applied to it (SPM-Node), assuming the SPM is not already a hub.
- When a node license key is issued to a standalone SPM, a prompt requests changing the default node password ("spmnode").
- Node PDUs that are rolled up to the hub are not counted out of the hub's license nodes. They are only counted out of the node's license nodes, since the device is only managed by SNMP on the node.
- When Hub and Node is operational, and depending on the type of license key, the SPM Product License page displays the enabled status for "SPM Hub" or "SPM Node", as highlighted in the following example.

Product License

Server Technology   Sentry Power Manager

SPM Version 6.2.1 -- BUILD 13706 Beta 3
S/N VMware-56 4d 15 64 16 27 17 df-ad e9 67 83 62 4b 33 04
Contract Number 3635

Number of CDUs
    Licensed for : 100
    Loaded in SPM : 0
    Licenses remaining : 100
    Not Licensed : 0

The API is enabled.
RF Code is enabled.
Custom Device Template is enabled.
SPM Hub is enabled.

Supported Devices are

    STI MIB version 3
    STI MIB Version 4
    APC AP7xxx 2 Banks
    APC AP7xxx Banks
    APC AP7xxx Phases
    APC AP8xxx Banks
    APC AP8xxx Banks Metered Outlets Linked
    APC AP8xxx Banks Switched Outlets Linked
    APC AP8xxx Phases
    APC AP8xxx Phases Metered Outlets Linked
    APC AP8xxx Phases Switched Outlets Linked
    Avocent ACS 5000
    Avocent ACS 6000

How to Identify the System

When the Hub and Node feature is activated, the type of system (SPM Hub or SPM Node), along with the system name, are displayed in the header at the top of the SPM page, highlighted in this example:

Setting Up Hub and Node

Key issues to note before setting up the Hub and Node feature:

- Only SPM administrator users can set up and use the Hub and Node feature.

- License keys must be assigned to the hub and node to enable the Hub and Node feature.

- The hub and **all nodes** must be on the same version of SPM, for example SPM 5.4.3. Only the first three numbers of the SPM version are required to be the same.

- The default node password is **spmnode**.

- Optional, but recommended: The node should be given a private password. The new password is entered at the New SPM Node window. To avoid a sync error with the hub, the hub needs to enter the correct node password.

How the Setup Works

Step 1. The Hub Initializes

From the SPM Nodes page at SPM > SPM Setup > SPM Nodes, the administrator adds a node with a name, IP address, https port, and password.

SPM adds the node to the system with the status "initializing". The hub reaches out to the node, attempting to establish a hub-node relationship.

The hub is then added to the new node's SPM Nodes list.

If the hub fails to initialize, it will retry periodically. User intervention may be required if the hub failed due to an unreachable address, the wrong password, a missing license key, or an attempt to have two hubs.

Step 2. The Hub Syncs with the Node

After the initialization process is successful, the hub syncs with the node. The first sync runs longer than future syncs, especially if the node has a large amount of energy history.

About Hub and Node Communication

SPMs communicate on https. The SPMs authenticate the communication using secure keys that were exchanged during the initialization stage. If an SPM changes IP address or port, the changed SPM attempts to notify other SPMs.

Start Using Hub and Node

Best Practice: Server Technology recommends that devices are managed on the node, not on the hub. Managing devices on the hub, especially for larger systems, may slow down the system.

The following example shows how to apply the license key to build the Hub and Node framework:

1. Start with two standalone SPM systems, for this example, named SPM1 and SPM2. If you look at System Setup for either SPM1 or SPM2, you will notice there is no SPM Nodes option or page because the two starting SPMs are standalone.

2. Obtain your license key for the Hub feature as described above, and apply it to SPM1. The SPM1 system is now the hub and you will see "SPM Hub: Enabled" in the Product License page. Also, at System Setup, you will then see the SPM Nodes options and page, and SPM1 will be displayed in the SPM Nodes list as the hub.

3. Obtain a node license key and apply it to SPM2, which will then become a node. You will have to change the default node password (you can do this on the SPM Nodes page with the Configure SPM Node option). The SPM2 system is now a node and you will see "SPM Node: Enabled" in the Product License page. At System Setup, you will then see the SPM Nodes page, and SPM2 will be displayed in the SPM Nodes list as a node.

4. Log in to SPM1 as an administrator user and go to SPM Setup > SPM Nodes > New SPM Node and provide a new node name, host (the node's IP address), the port (the node's HTTPS port, default "443"), and the password (default password is "spmnode").

5. The SPM1 system (hub) will add SPM2 as its node. SPM1 will see SPM2 in the SPM Nodes page, and SPM2 will see SPM1 in the SPM Nodes page. This means the hub and node are visible to each other through the SPM Nodes page and will have two-way communication. The node status starts with "initializing" and then syncs with the hub to display normal status in the SPM Nodes list.

6. You can add more nodes to SPM1 (the hub) by repeating steps 3-5.

Hub and Node with SPM System Objects

This section covers how Hub and Node manages device, performs a partial/full sync, handles SPM system objects, and does a remote discovery/add.

Device Management

Hubs manage their own PDUs and also units from other SPMs. Hubs fully manage each PDU with all changes to the unit pushed to the SPM that owns the PDU. Other system objects owned by a node – cabinets, circuits, clusters, groups, lines, locations, reports, schedules, and zones – are not synchronized or managed by the hub. These system objects can be maintained separately on each server, if desired.

Each SPM manages the devices it owns through SNMP. Although a hub can have its own devices and can manage them through the usual SNMP network process, doing so will affect the performance of the hub as it manages its nodes. Therefore, even though the node PDUs are rolled up to the hub, the node PDUs are still owned by the node, not the hub.

On the hub, GUI configuration changes for node devices are forwarded to the node as if the configuration was done from the node. These changes include names, thresholds, notes, SNAP, outlet control, maintenance, and other device settings.

Adding a New Device

For the hub, the following SPM Node field is available in the New Device Discovery window.

What's the Partial Sync and Full Sync?

The hub periodically does a **partial sync** with the node to get updated data values. The partial sync frequency is controlled by the configuration setting in SPM Setup > Server Settings > the Node Manager Sleep field (milliseconds between each poll; the default is 30,000 ms).

A full sync is initiated on the hub when SPM service starts, when a sync error occurs (for example, due to an unreachable node), or when you click the Sync Now icon:

The **Sync Now** icon allows a hub-based operation that collects PDU information from the node.

Other (Non-PDU) System Objects

Node objects such as locations, cabinets, zones, circuits, outlet groups, and outlet clusters – any SPM object other than a PDU – will not be rolled up into the hub.

Outlet Groups

With the Hub and Node feature, an outlet group can have outlets from only one SPM. This means the hub cannot create an outlet group with outlets across multiple SPMs.

Cabinets

A cabinet can contain PDUs from only one SPM.

Hub and Node with SPM Functions

Add/Discovery

Using a remote add/discovery, parameters for the add/discovery are entered on the hub and are pushed down to the node. The add/discovery function is done on the node, and discovery status is passed back from the node to the hub. The parent location and SNAP template specified in a remote add/discovery are assigned to the new devices on the hub when the devices are rolled up to the hub. Parent location is not affected on the node.

API

The SPM API current only supports local devices. Viewing or configuring node devices from the hub API is not supported.

Cabinets

PDUs from more than one hub and node SPM cannot be in the same cabinet.

Email

If email alerts are configured on the hub, then emails will be sent for all alarms, including node PDU alarms.

Node Status

The hub shows status for each node. If a node is unreachable, the node PDUs on the hub will be set to Unreachable status.

SPM Node Column

Various SPM pages and user reports show the SPM Node column to indicate the SPM that owns the system object.

Trending

Trend data for each device is saved on the SPM that owns the device, requested and used only as needed. The hub can show trends for node devices by requesting the trend image from the node, but the hub cannot show a trend image that contains objects from multiple SPMs.

Reports

Hub and Node user reports are generated locally. The energy data for node devices is saved on both the hub and the node. The PDUs that are managed by more than one SPM are shown in the Duplicate Inventory report.

Working with Hub and Node

The SPM Nodes List
Once the license key is activated, access the Hub and Node feature at **SPM > SPM Setup > SPM Nodes**

Hub and Node Icons and Options
The following icons in the toolbar of the SPM Nodes list are the same options in the right-click menu on the list.

Icon	Name	Description
	Configure	Displays the dialog box with the current node parameters for editing.
	Delete	Deletes the selected node. Displays when any item in the list other than "Local" Node Type is selected. **Note:** A node delete action cannot be undone.
	Add Notes	Provides a place to provide and save free-form notes about the SPM.
	Sync Now	Initiates an immediate sync. A sync is the hub operation that collects PDU information from the node. Displays when the hub (or any item in the list other than "Local" Node Type) is selected.
	New SPM Node	Only shows when the hub is selected. Displays the dialog box for entering parameters for adding (and connecting to) a new node. Nodes can only be added to the hub one at a time.

How a Hub Is Created

The Hub and Node feature is enabled with a license key from Server Technology. The license key allows for either hub capability or node capability. If both keys are enabled, the SPM will be a hub.

A standalone SPM becomes a hub when a hub key (SPM-Hub) is applied to the SPM. A standalone SPM becomes a node when a node key (SPM-Node) is applied to the SPM.

Once the Hub and Node feature is enabled for a hub, the hub displays (along with any nodes that were added to the hub) in the SPM Nodes list, shown below.

Adding a Node to the Hub

The Add function adds a single node (one at a time) to the hub displayed in the SPM Nodes list.

Important: A new node can only be added to the hub from the hub itself. You must log in to the SPM Hub to add a node. The option for New SPM Node is not available in an SPM system configured as a Node system.
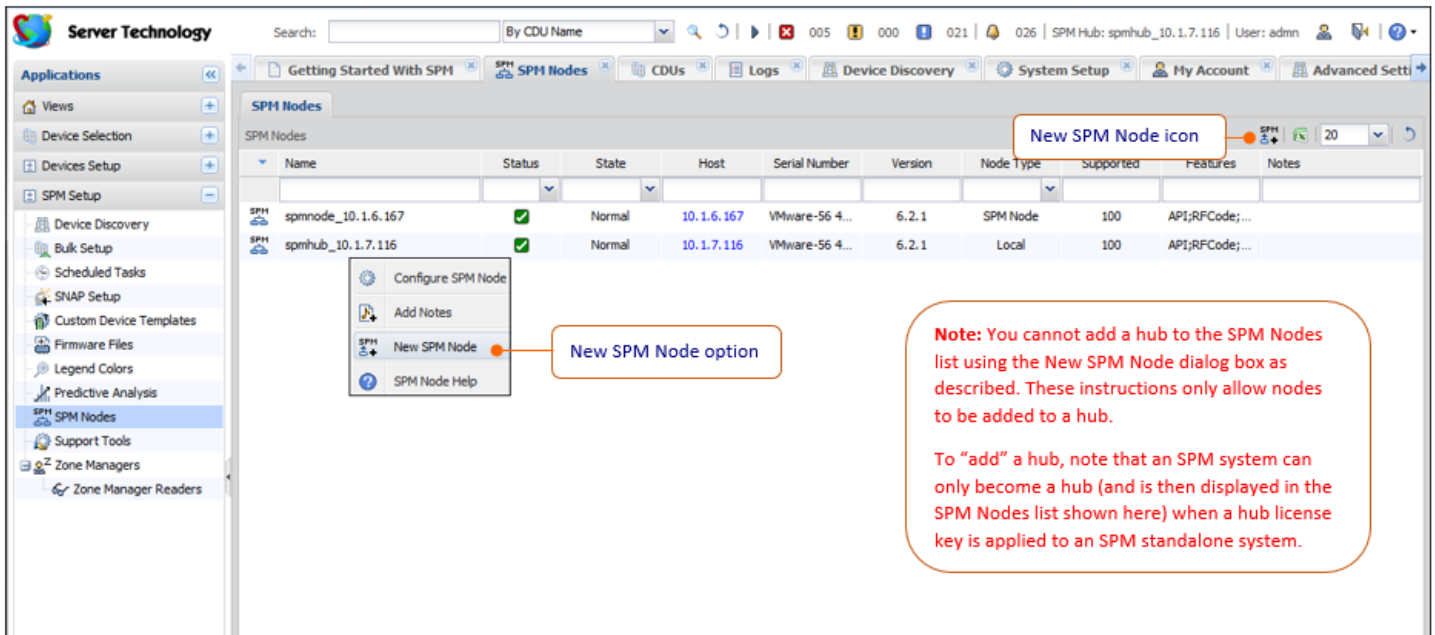
To Add a Node:

Step 1. Select the New SPM Node icon in the toolbar (alternatively, you can right-click an item in the list and from the menu, select the New SPM Node option).

The New SPM Node dialog box displays:

Step 2. Provide the following:

- A name for the new node.

- The host (IP address of the node).

- Port number for the HTTPS secure communications port (or accept the default "443").

- Password that was configured on the node; required by the server to allow access. Default is "spmnode".

**Step 3.** Click **OK**. The new node is then listed in the SPM nodes list.

About Remote Discovery/Add

The hub can instruct the node to perform a device discovery/add. The parameters for the function are entered on the hub and pushed down to the node, but the device discovery/add is done at the node. A scheduled remote discovery can also be done.

The parent location and the specified SNAP template are assigned to the new devices on the hub when the devices are rolled up, but this does not affect the parent location on the node.

Configuring a Hub or Node

The Configure SPM Node function edits settings for a hub or a node (one at a time) as displayed in the SPM Nodes list.
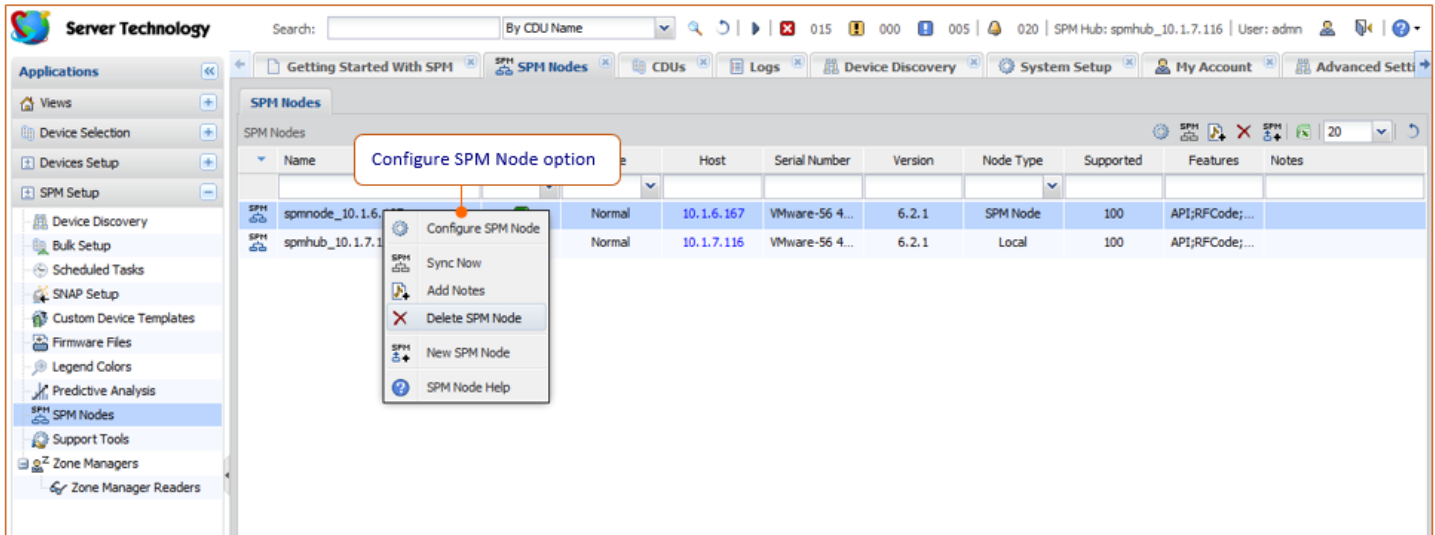
Configuration Options

The Configure SPM Node function allows four different configuration options, depending on the role (hub or node) of the selected SPM in the SPM Nodes list:

- Hub Configures a Node: The hub can edit the name, host, port, or password of a node. The new node name will be used on both the hub and the node. Changing the host, port, or password does not apply the changes to the node – it only affects the way the hub attempts to communicate with the node. The password must match the password configured on the node.

- Hub Configures Itself: (This is the "Local" item in the SPM Nodes list.) The hub can change its own name or its preferred host. Nodes will be notified to use the new name and host.

- Node Configures a Hub: Read-only. The node can see the name and host of the hub but cannot change them.

- Node Configures Itself: (This is the "Local" item in the SPM Nodes list.) The node can change its own name, its preferred communication host, or its password. Connected hubs will be notified to use the new name and host. The hub will need the password when communicating with the node.
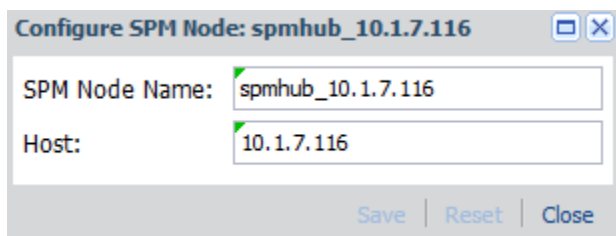
To Configure a Hub or a Node:

Step 1. Select the Configure SPM Node icon in the toolbar (alternatively, you can right-click an item in the list and from the menu, select the New SPM Node option).

The Configure SPM Node dialog box displays. The settings vary for a hub or a node.

Step 2. Configure the settings as described:

- <u>For the Hub:</u> Edit the name and host settings. The hub does not have a port or password for editing because the hub only communicates to nodes.
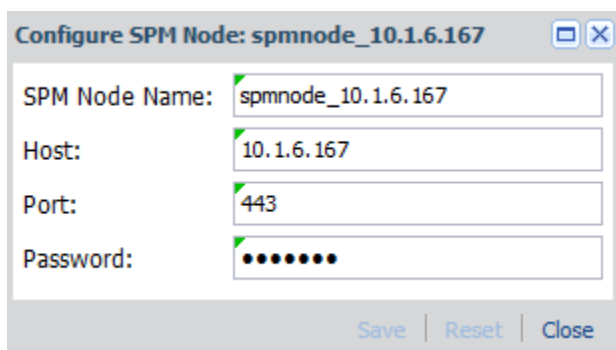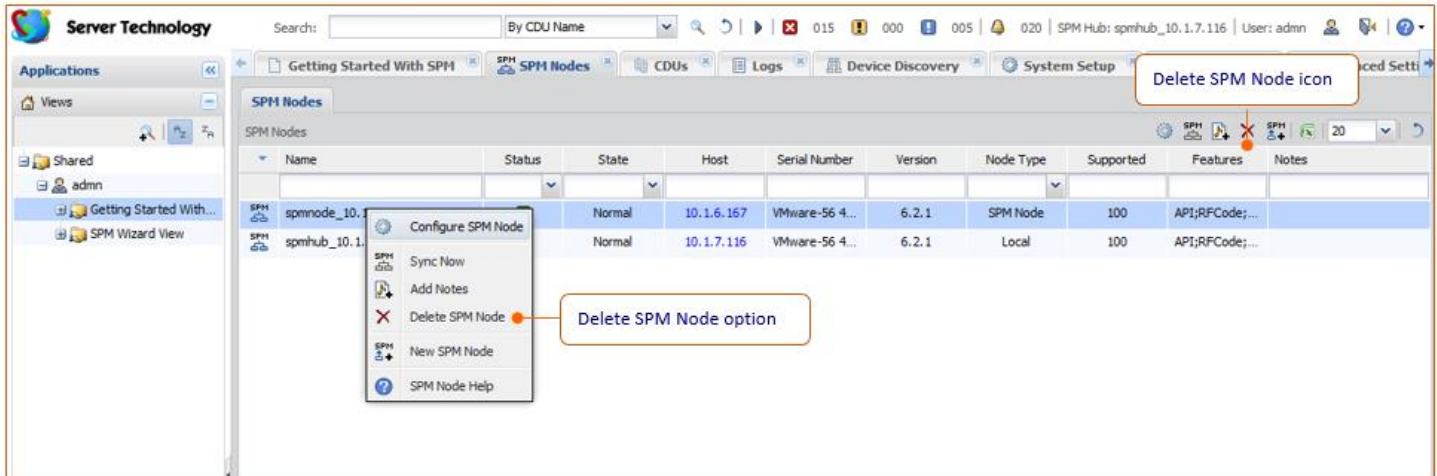

- <u>For a Node:</u> Edit Name, Host, Port, and Password.

Step 3. Click **Save**. The edited settings for the hub or node are updated in the SPM Nodes list.

Deleting a Hub or Node

The Delete SPM Node action does not delete the node SPM. The delete action only removes the hub-node connection between the local SPM and the deleted node SPM.

How the Delete Action Works

SPM provides four ways for deleting the hub and node connection:

Preferred Method: The preferred method for stopping a connection between a hub and a node is to delete the node from the hub by: (1) logging into the hub, (2) selecting the node, and (3) deleting the node. The hub will then stop managing the node, and the two SPMs (hub and node) will operate independently of each other.

Alternative Method: In case the user does not have access to the hub, an alternative method is to: (1) log into the node and (2) delete the hub. This alternative delete action removes the hub's permission to access the node. The node will continue to operate as usual but disconnected from the hub.

Status and History: When a node is deleted on the hub, all node devices and energy history are deleted with the node. The node status changes to "deleting" as the hub cleans up node objects from the hub and removes the hub from the node. Then the node is removed from the SPM Nodes list. When a hub is deleted on the node, the node remains on the hub but the node will be unreachable.

Re-establish Connection: To re-establish communication between the hub and the node: (1) log into the hub and (2) add the node again.

To Delete a Hub or a Node Connection:

Step 1. Select the Delete SPM Node icon in the toolbar (alternatively, you can right-click an item in the list and from the menu, select the Delete SPM Node option).

Step 2. You will be prompted to confirm the delete action.

Note: A hub or node delete action cannot be undone.

Contact Technical Support

be supported.

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