

## Sentry Power Manager (SPM) Integration with Starline® Busway Power Distribution System

### Purpose

This technical note introduces the integration of Server Technology's Sentry Power Manager (SPM), version 6.1 and later, with the Starline® busway overhead electrical power distribution system. This joint-effort solution for power management is designed for maximum energy management and efficiency in the data center.

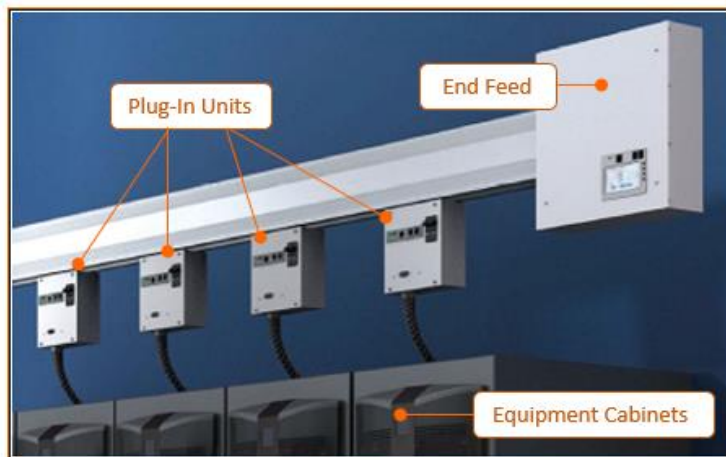
### Benefits of Using the Busway Solution

When the busway distribution system is combined with SPM's enterprise management, benefits include:

- A flexible and reliable design that is easy to customize.
- Elimination of point-to-point wiring and distribution panels.
- Use of branch circuit taps.
- Enhanced ability to monitor and manage power consumption.

### Busway Design

The following illustration of the busway architecture (connected to a row of Server Technology equipment cabinets in this example), shows the two main busway components: **end feed** and **plug-in unit**.



- **End Feed:** (Has its own IP address). The end feed typically provides power to an entire row of cabinets. The end feed displays summary and infeed power data in SPM but does not show information about the plug-in unit.
- **Plug-In Unit:** (Has its own IP address). The plug-in unit has 1-4 outlets (or 1-6 outlets) of different plug types that go into the equipment cabinets. The plug-in unit provides summary, infeed data, and outlet data in SPM. Although multiple plug-in units can be part of a busway system, the plug-in unit has no information about the end feed. Note that some outlets, drop cords, or other items in the plug-in unit are not considered "real outlets", and are often referred to as Starline busway receptacles; however, the type of receptacle is not an issue for SPM.

Working with Busways in SPM

This section shows where busway information appears in the SPM graphical user interface.

CDUs List

The following example shows how busways are displayed together with power distribution units (PDUs) in the SPM CDUs list. You will also find busways listed in a similar way on the Infeeds list, Outlets list, and Enclosures list.

If SPM has at least one busway, these data lists will show the column, Device Type, with the searchable options “PDU” or “Busway”, as illustrated:

Name	Sta...	State	IP Address	Parent	Power Type	Version	Power Status	Total Power (W)	Current (A)	Power Capacity (VA)	Notes	Manufa...	Device Type
10.1.2.199	✓	Managed	10.1.2.199		3 Phase	Sentry Smart CDU Ver...						Server ...	PDU
10.4.11.95	✓	Managed	10.4.11.95		Single Pha...	Version 8.0f						Server ...	Busway
10.4.11.99	✓	Managed	10.4.11.99		Single Pha...	Sentry Switched CDU						Server ...	PDU
10.4.11.100	✓	Managed	10.4.11.100		208V	Sentry Smart CDU Ver...						Server ...	PDU
10.4.11.101	✓	Managed	10.4.11.101		Single Pha...	Sentry Switched CDU Versi...	Normal	2170	12.33	0		Server ...	PDU
10.4.11.102	✓	Managed	10.4.11.102		208V	Sentry Smart CDU Version 7.0k	Normal	0	0.00	0		Server ...	PDU
10.4.11.103	✗	Managed	10.4.11.103		Single Pha...	Sentry Version 5.3q	Normal	0	0.00	0		Server ...	PDU
10.4.11.104	✓	Managed	10.4.11.104		3 Phase	Sentry Switched CDU Versi...	Normal	26	0.25	0		Server ...	PDU
10.4.11.106	✓	Managed	10.4.11.106		Single Pha...	Sentry Smart CDU Version 7.0k	Normal	6003	26.10	0		Server ...	PDU
10.4.11.107	✓	Managed	10.4.11.107		3 Phase	Sentry Smart CDU Version 7.0v	Normal	0	0.00	5760		Server ...	PDU
10.4.8.1	✓	Managed	10.4.8.1		3 Phase	Version 8.0f	Normal	0	0.00	43228		Server ...	PDU
10.1.2.53	✗	Managed	10.1.2.53	Reno	DC	Switched -48 VDC PDU Versi...	Normal	0	0.00	0		Server ...	PDU
10.1.2.160:32...	✓	Managed	10.1.2.160	Reno	Single Pha...	1.9.0 Aug 4, 2006	Normal	264	2.20	0		Avocent	PDU
10.1.2.159:7.1	✓	Managed	10.1.2.159	Reno	Single Pha...	1.9.0 Aug 4, 2006	Normal	0	0.00	0		Avocent	PDU
10.1.2.160:32...	✓	Managed	10.1.2.160	Reno	Single Pha...	1.9.0 Aug 4, 2006	Normal	0	0.00	0		Avocent	PDU
10.1.2.160:48...	✓	Managed	10.1.2.160	Reno	Single Pha...	1.9.1 May 2, 2007	Normal	0	0.00	0		Avocent	PDU
Schleifen Test	✓	Managed	10.1.7.55	Reno	Single Pha...	150	Normal						
031.32-H02-P...	✓	Managed	10.1.7.55	Reno	3 Phase	150	Normal						
hPDU	✓	Managed	10.1.7.55	Reno	Single Pha...	210	Normal						
10.4.6.5	✗	Managed	10.4.6.5		3 Phase	Sentry Switched CDU Versi...	Normal	553	2.95	10800		Server ...	PDU
50.254.204.18	✓	Managed	50.254.204...		3 Phase	M22276-116 v3.42	Normal	40	0.38	0		Starline	Busway
10.4.11.98	✓	Managed	10.4.11.98		3 Phase	M22276-116 v3.11	Normal	240	2.05	0		Starline	Busway

Zoom-in of busway entries in the CDUs list:

150	Normal	8	0.04	0	Schleife...	PDU
150	Normal	4	0.02	0	Schleife...	PDU
210	Normal	0	0.00	0		
Sentry Switched CDU Version...	Normal	574	2.92	10800	Server ...	PDU
M22276-116 v3.42	Normal	41	0.38	0	Starline	Busway
M22276-116 v3.11	Normal	243	2.07	0	Starline	Busway
Sentry Switched CDU Version...	Normal	469	7.20	4800	Server ...	PDU

### Is the Busway an End Feed or a Plug-in Unit?

SPM’s Summary of CDU Information provides busway identification and operational information, the same way a PDU’s information is summarized:

The screenshot shows the SPM interface for a CDU. At the top, it says 'CDU: 10.4.11.98'. Below that are tabs for 'Summary', 'Setup', 'Trends', 'Predictive', and 'Enclosure'. The 'Summary' tab is active, showing 'CDU Information'.

Name	10.4.11.98
State	Managed
Status	✓
IP Address	10.4.11.98
Description	Test Unit
Total Power (W)	0
Enterprise Name	Starline CPM Busway Plug-In 4 Outlets
Device Type	Busway
Version	M22276-116 v3.11
Power Capacity (VA)	0
Capacity Used (%)	0.00
Serial Number	
Model Number	CBT5E92-520D-C14-4-M59S-SAMPLE
Power Type	3 Phase
Power Status	Normal
Notes	
Manufacturer	Starline

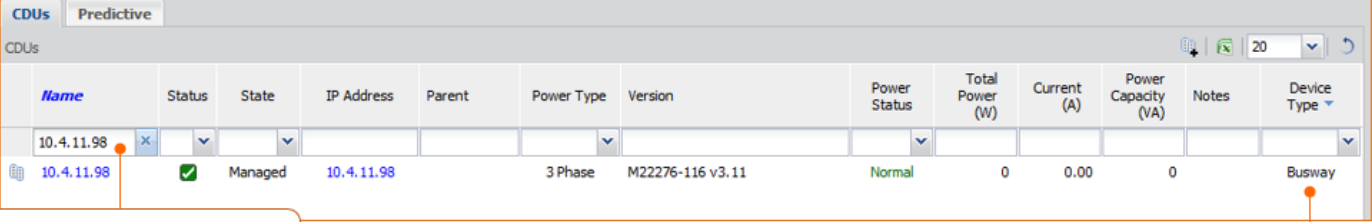
Two callout boxes are present:

- A box pointing to the 'Enterprise Name' field: 'Identifies the Starline busway as an end feed or a plug-in unit (4 or 6 outlets). This example shows the Busway Plug-In 4 Outlets.'
- A box pointing to the 'Manufacturer' field: 'Busways in SPM are identified by the Starline manufacturer.'

## Searching for Busways in Lists

Busways can be searched in SPM lists (CDUs list, Infeeds list, Outlets list, and Enclosures list) like other SPM objects by using the search fields at the top.

The following example shows the CDUs list filtered by a busway's name (IP address in this example).



Name	Status	State	IP Address	Parent	Power Type	Version	Power Status	Total Power (W)	Current (A)	Power Capacity (VA)	Notes	Device Type
10.4.11.98	✓	Managed	10.4.11.98		3 Phase	M22276-116 v3.11	Normal	0	0.00	0		Busway

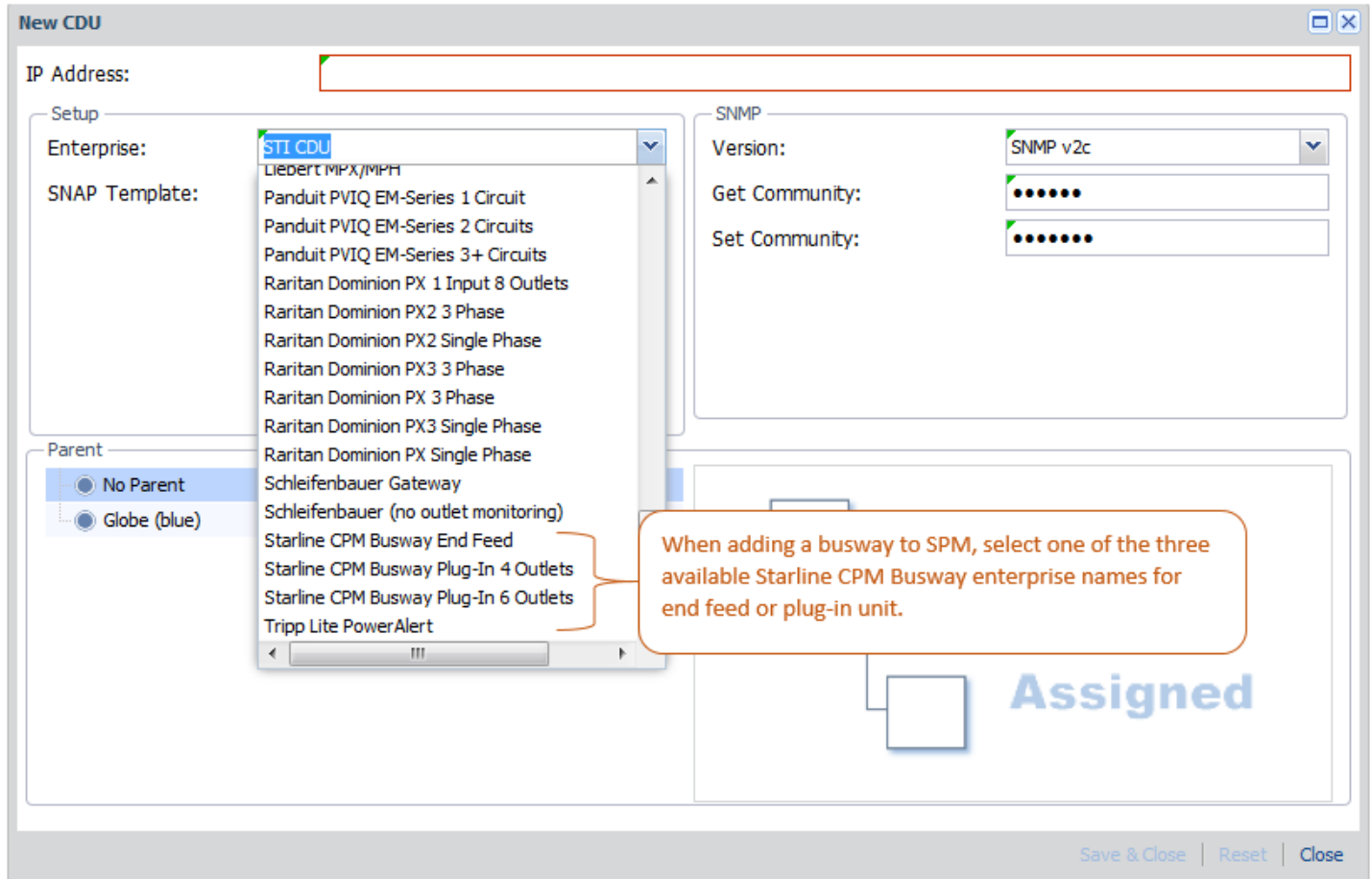
Busway searched by CDU Name displays in a filtered CDUs list.

Busway searched by CDU Name displays in a filtered CDUs list.

## New CDU Window

A busway (end feed or plug-in unit) can be added to SPM the same way a competitive PDU is added to SPM, using the New CDU window, shown below.

The three Enterprise names available for Starline busways in SPM are “Starline CPM Busway End Feed”, “Starline CPM Busway Plug-In 4 Outlets”, and “Busway Plug-In 6 Outlets”, called out in this example:

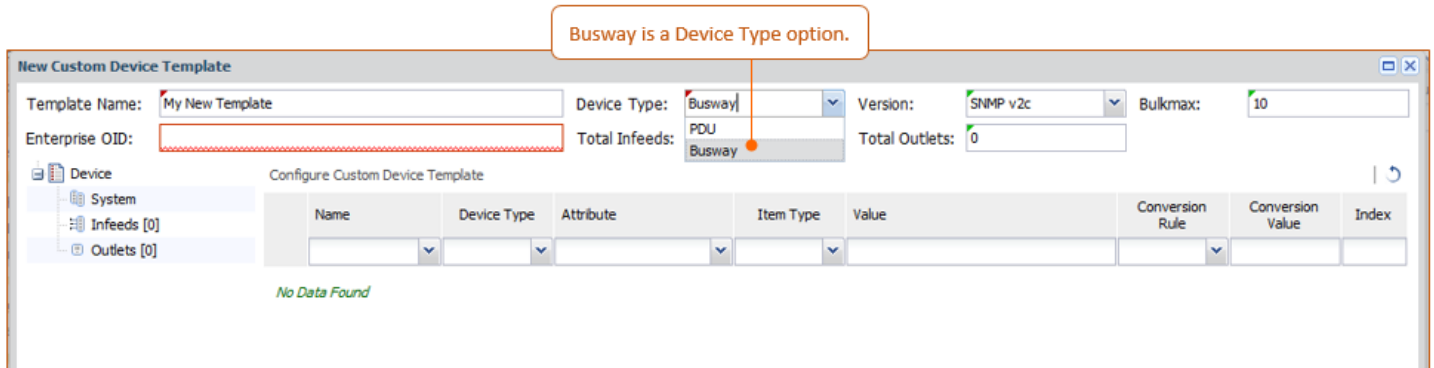


**Note:** To ensure that busway power is not aggregated with a PDU, and possibly causing twice the actual power busways cannot be added to cabinets, locations, or zones. Therefore, when adding a device using the New CDU window as shown above, if you select a busway Enterprise name, the Parent section of the window will be disabled.

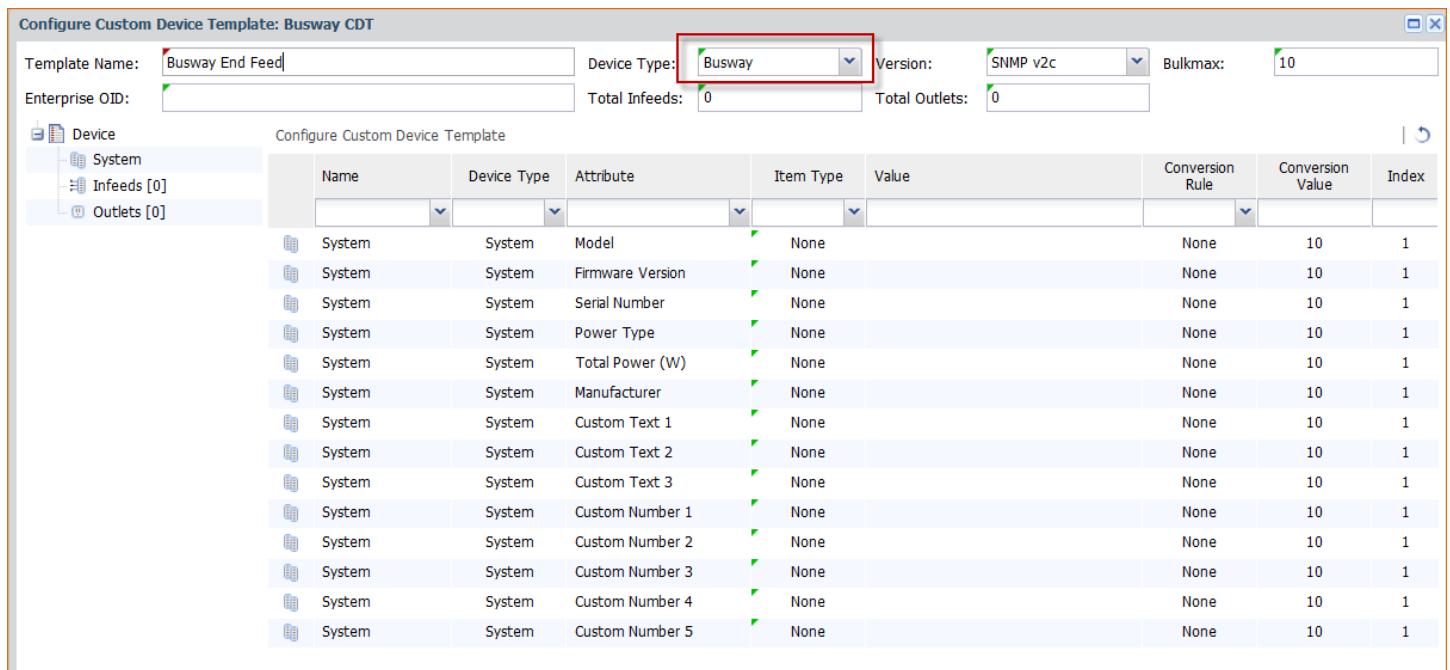
Custom Device Templates

If the Custom Device Template (CDT) feature of SPM is key-activated within SPM, a busway (either an end feed or a plug-in unit) can be tracked using CDT like any other non-PDU custom device.

When creating a new template using the New Custom Device Template window, from the Device Type drop-down, select the Busway option, as shown:

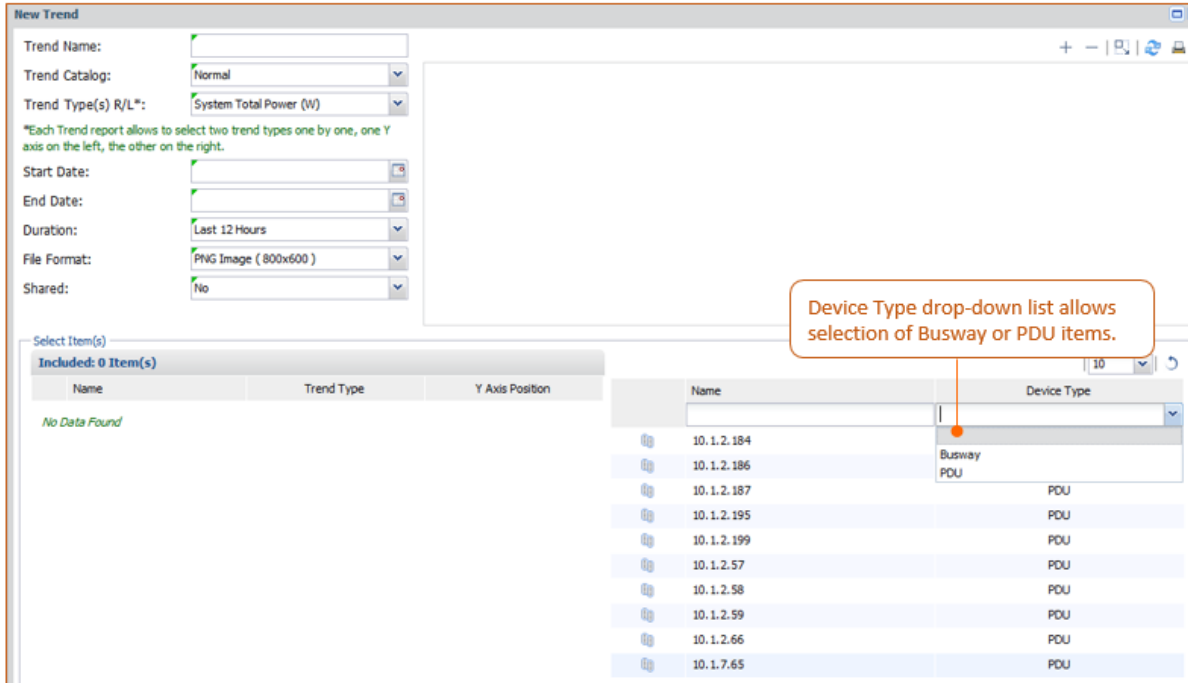


When saved, the configuration window displays the template fields for configuring the busway’s custom device template.

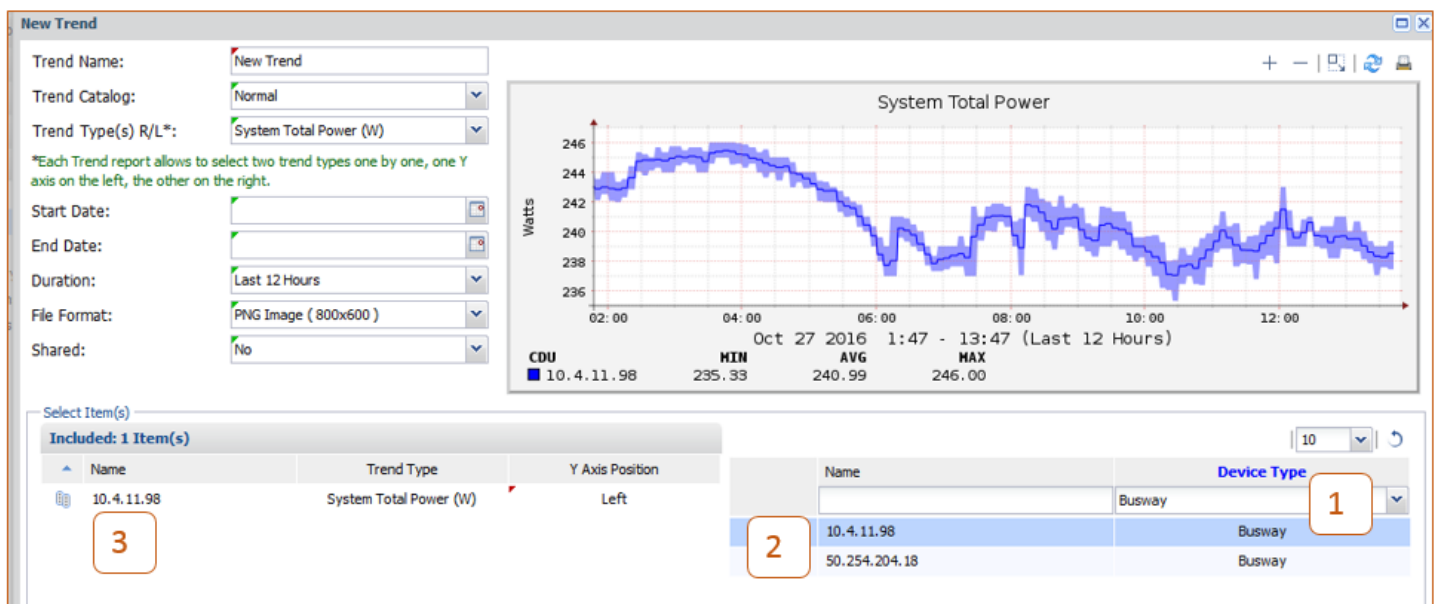


## Trending

When selecting items to include in a new trend report, if SPM has at least one busway, the item selection list in the lower right area of the New Trend window will show the filterable column, Device Type, with options for Busway or PDU items.

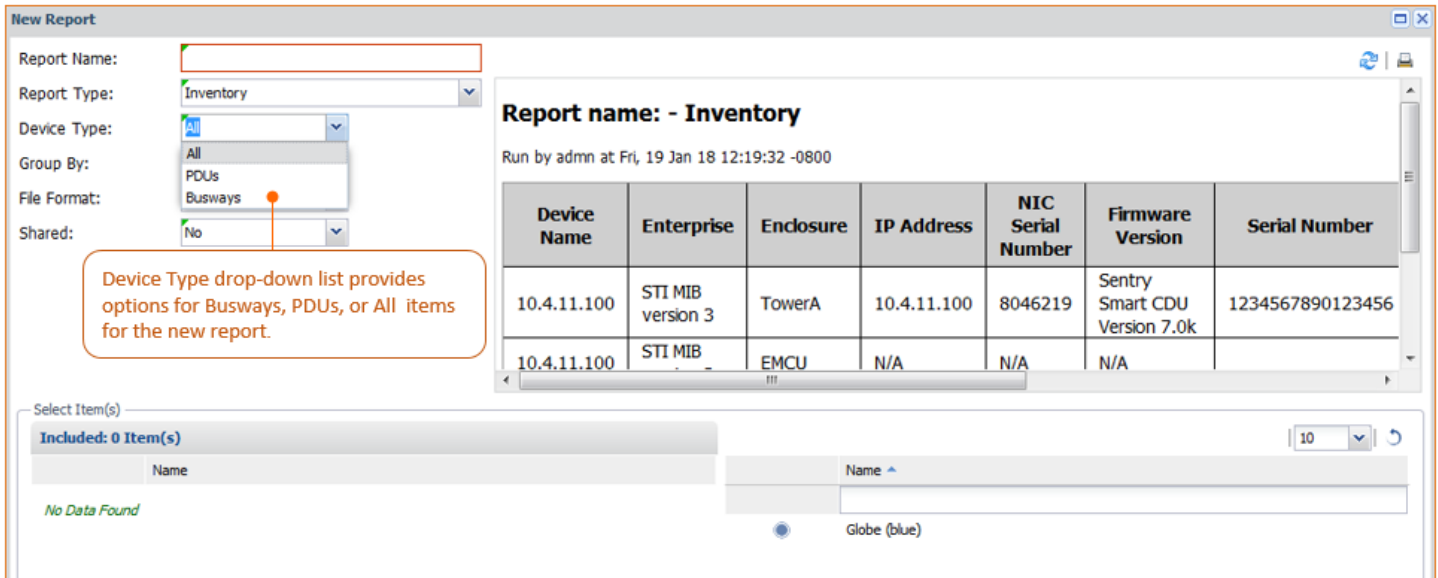


The following example shows: (1) the Device Type “Busway” option selected, (2) the two busway items in SPM displayed in the filtered item selection list, and (3) one of the items (10.4.11.98) dragged and dropped to the lower left to be included in the new System Total Power trend report:



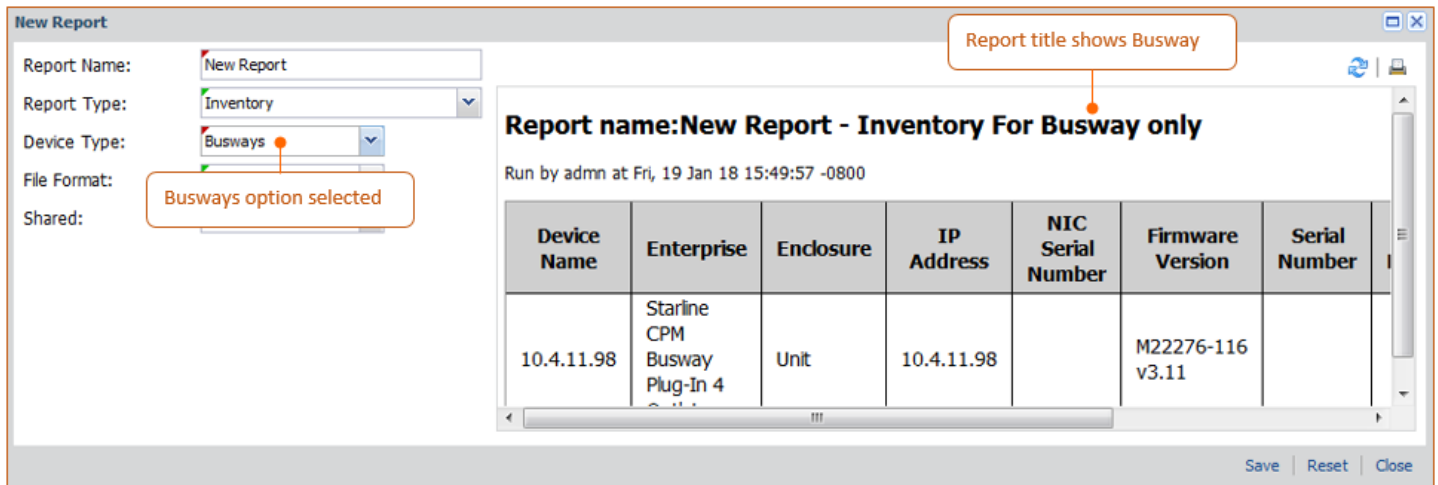
Generating Busway Reports

If SPM has at least one busway, the New Report window allows the selection busways to be reported on, for both end feeds and plug-in units.



Device Type drop-down list provides options for Busways, PDUs, or All items for the new report.

Example of the SPM Inventory report for the Busways option. Note that "Busway" appears in the generated report title:





## Report Samples

The following examples show the SPM reports that allow busway information to be reported on, either end feeds or plug-in units. Each report sample below was generated with the "Busways" option as the device type.

### System: Inventory

**Report name: Busway Inventory - Inventory For Busway only**  
Run by admn at Fri, 19 Jan 18 15:57:46 -0800

Device Name	Enterprise	Enclosure	IP Address	NIC Serial Number	Firmware Version	Serial Number	Model Number	Power Type	Max Capacity (VA)
10.4.11.98	Starline CPM Busway Plug-In 4 Outlets	Unit	10.4.11.98		M22276-116 v3.11			3 Phase	0

### System: Total Power (W)

**Report name: Busway Total Power - Total Power For Busway only**  
Run by admn at Fri, 19 Jan 18 16:00:54 -0800

Device Name	Total Power (W)
10.4.11.98	98

### System: IP Address

**Report name: IP Address - IP Address For Busway only**  
Run by admn at Fri, 19 Jan 18 16:08:14 -0800

Device Name	Address Type	IP Address	Network Mode	DHCP Enabled
10.4.11.98	IP Managed	10.4.11.98		

### General: Input Power (W)

**Report name: Busway Input Power - Input Power For Busway only**  
Run by admn at Tue, 17 Jan 17 14:44:02 -0800

CDU	Enclosure	Infeed/Phase Power 1 (W)	Infeed/Phase Power 2 (W)	Infeed/Phase Power 3 (W)	Total Power (W)
10.4.11.98	Unit	243	0	0	243
50.254.204.18	Unit	0	21	20	41

### General: Input Voltage (V)

**Report name: Busway Input Voltage - Input Voltage For Busway only**  
Run by admn at Tue, 17 Jan 17 14:49:49 -0800

CDU	Enclosure	Infeed/Phase 1 (V)	Infeed/Phase 2 (V)	Infeed/Phase 3 (V)
10.4.11.98	Unit	0.0	0.0	0.0
50.254.204.18	Unit	208.2	206.8	209.0

## General with Subtotals: Subtotal Input Power (W)

Report name: Busway Subtotal Input Power - Input Power with Subtotals For Busway only

Run by admn at Tue, 17 Jan 17 14:58:31 -0800

CDU	Enclosure	Infeed/Phase 1 Power (W)	Infeed/Phase 2 Power (W)	Infeed/Phase 3 Power (W)	Total Power (W)
10.4.11.98	Unit	244	0	0	244
50.254.204.18	Unit	0	21	20	41

## Power Summary: Complete Outlet Power (W)

Report name: Busway Complete Outlet Power - Complete Outlet Power For Busway only

Run by admn at Tue, 17 Jan 17 15:00:50 -0800

CDU	Enclosure	Input Cord	Outlet	Capacity (A)	Voltage (V)	Current (A)	Active Power (W)	Apparent Power (VA)	Power Factor
10.4.11.98	Unit		Outlet_1	.0	N/A	N/A	124	127	.00
10.4.11.98	Unit		Outlet2	.0	N/A	N/A	119	121	.00
10.4.11.98	Unit		Disabled	.0	N/A	N/A	0	0	.00
10.4.11.98	Unit		Disabled	.0	N/A	N/A	0	0	.00

## Power Summary: Complete Infeed Power (W)

Report name: Busway Complete Infeed Power - Complete Infeed Power For Busway only

Run by admn at Tue, 17 Jan 17 15:02:47 -0800

CDU	Enclosure	Infeed/Phase	Voltage (V)	Current (A)	Active Power (W)	Apparent Power (VA)	Crest Factor	Power Factor
10.4.11.98	Unit	Feed 2	0.0	0.00	0	0		0.00
10.4.11.98	Unit	Feed 3	0.0	0.00	0	0		0.00
10.4.11.98	Unit	Feed 1	0.0	2.07	243	249		0.98
50.254.204.18	Unit	Feed 2	208.1	0.19	21	23		0.91
50.254.204.18	Unit	Feed 1	210.0	0.00	0	0		1.00
50.254.204.18	Unit	Feed 3	210.3	0.19	20	23		

## Power Summary: Complete Power Summary (W)

Report name: Busway Complete Power Summary - Complete Power Summary For Busway only

Run by admn at Tue, 17 Jan 17 15:18:59 -0800

CDU	Enclosure	Type	Phase 1 Voltage (V)	Phase 2 Voltage (V)	Phase 3 Voltage (V)	Phase 1 Current (A)	Phase 2 Current (A)	Phase 3 Current (A)	Total Current (A)	Phase 1 Power (W)	Phase 2 Power (W)	Phase 3 Power (W)	Total Power (W)
10.4.11.98	Unit	3 Phase							2.07				244
50.254.204.18	Unit	3 Phase							0.38				41

**Note:** Busways are not included in the SPM energy reports.

## View Panels

If SPM has at least one busway, the busway displays in device list panels in the Views application, as well as other information areas that contain a busway, such as a report or trend.

Busways display in Views if the information panel selected for the view has a busway.

Busways are mixed with PDUs in device lists, such as the CDUs list (above) and the Infeeds list (below) in this example.

Phase 1 Current (A)	Phase 2 Current (A)	Phase 3 Current (A)	Total Current (A)	Phase 1 Power (W)
			2.05	
			0.38	

## What You Cannot Do with Busways

Busways are not available in some areas of SPM.

*You cannot do the following ...*

- Add a busway to an outlet group. This means busways cannot be part of an outlet cluster.
- Add a busway to a cabinet, location, or zone. This is done to ensure busway power is not aggregated with PDU power to possibly skew the actual power reading.
- Create a cabinet device for a busway. Note that SPM will not automatically create a cabinet device for a busway.
- Generate an energy report for busways.

## Contact Technical Support



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