Storage Power Measurement

Patrick Stanko

SNIA Emerald™ Training

SNIA Emerald Power Efficiency Measurement Specification, for use in EPA ENERGY STAR®

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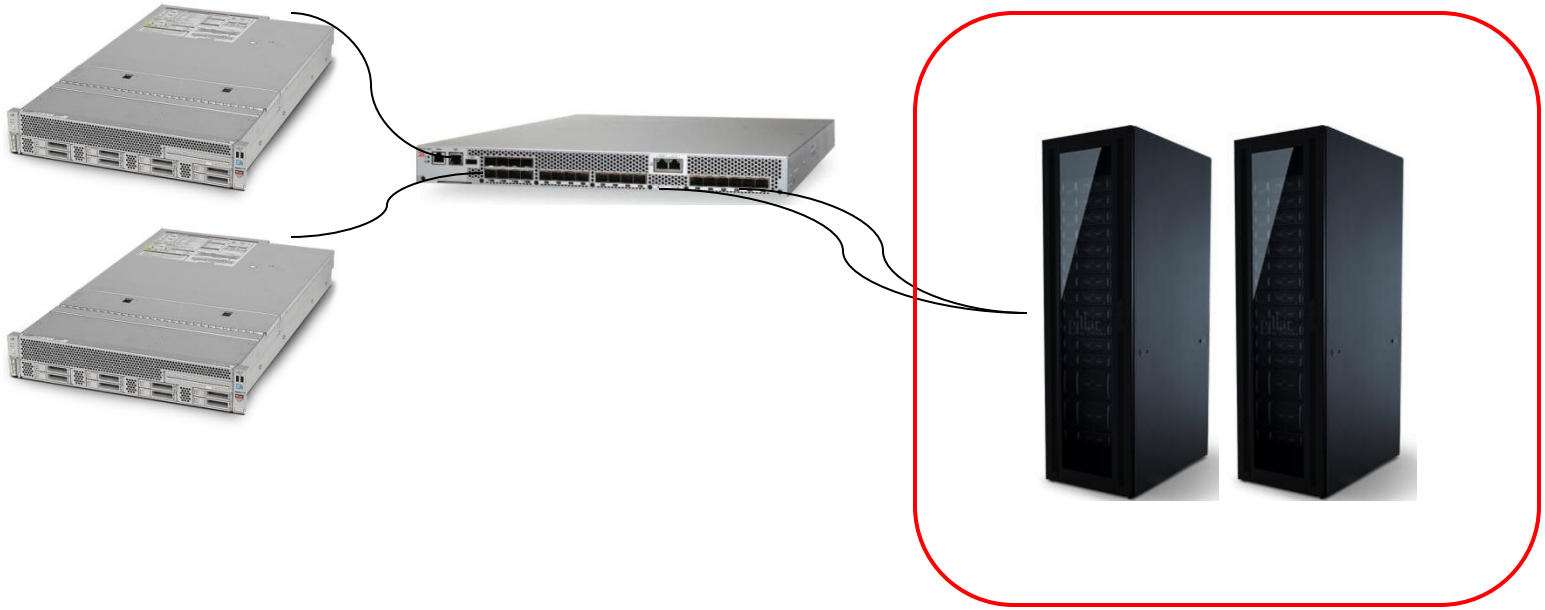
SNIA™ Green Storage Initiative

SNIA Emerald™

Black box boundary

- Clearly define the system which requires power measurement



Black box boundary continued

- I/O generator server may be in the same rack
  - Rack level fans, rack level controller, switch
  - What is the real system under test

Redundancy in power supplies

- Measure both power feeds
- Both power supplies operational

Systems get large

- Multiple racks of equipment to measure
- Use a clamp on the main line feed

Double check

- Power should be close to what is expected
- Verify power factor
- Three phase setup
- Syncing clocks between power meter and Vdbench

Input power requirements

Input power requirements

NOMINAL INPUT VOLTAGE RANGE	Phases	AC INPUT FREQUENCY RANGE
100-120 VAC RMS	1	47 – 63 Hz
200 – 240 VAC RMS	1	47 – 63 Hz
200 - 480 VAC RMS	3	47 – 63 Hz

Power meter requirements

- Power Meter accuracy

Power Consumption (p)	Minimum Accuracy
p ≤ 10 W	± 0.01 W
10 < p ≤ 100 W	± 0.1 W
p > 100 W	± 1.0 W

- Sampling period of 5 second or less
- Sampling rate of 0.2 samples/second or greater

Environmental monitoring

- Monitor temperature during the test
  - Measure in degrees Celsius
  - Measured in 0.1 degree resolution
  - Sample in a period not grater than 1 minute
  - Measured at primary air inlet
    - Center of the storage configuration

Difference between Emerald and ENERGY STAR

- ENERGY STAR has tighter input voltage requirements
  - For systems Equal to or less than 1500W
    - Standard input voltages with ±1.0%
    - Total Harmonic Distortion (THD) of 2.0%
  - For systems greater than 1500W
    - Standard input voltage ±5.0%
    - Total Harmonic Distortion (THD) of 5.0%
- With tight THD requirements need to get the power meter as close to the System Under Test
- Temperature sensor
  - Overall accuracy of ±0.5C or better
  - 50 mm in front of the main airflow inlet