CSCI PSU Proposal for ENERGY STAR Tier 2 Server Specification

EPA Energy Star for Server Tier 2 Development Workshop

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• **Power Supply Requirements:** EPA intends to explore a *Net Power Loss* approach for Computer Server power supplies under Tier 2 of this specification. This approach would aim to specify a maximum allowed power loss through the power supply at actual operating conditions of the Computer Server (e.g., Idle and full load power).

• If a Net Power Loss approach is not developed, EPA plans to reevaluate both Multi-Output and Single-Output power supply efficiency and power factor levels.
ENERGY STAR Motivation for NPL Approach

• ENERGY STAR Goals for Tier 2 PSU requirements
  • Maximize and promote operational efficiency
  • Encourage right sizing and address impact of redundancy
  • Continue to recognize PSU as possible energy bottleneck AND ALSO opportunity for savings regardless of hardware configuration, work load, or application
  • Maintain momentum toward more efficient supplies as mainstream
ENERGY STAR NPL Method

• ENERGY STAR has indicated that NPL is a possible approach for measuring system efficiency rather than current PSU efficiency and PF approach
  • Measures AC Power\textsubscript{in} – DC Power\textsubscript{out} at Idle and Max vs current method DC Power\textsubscript{out} / AC Power\textsubscript{in} at designated rated loads
• Address actual wattage losses at real operating conditions instead of efficiency at arbitrary load conditions
  • Directly correlates to wasted wattage / real-world conditions
  • Eliminate current arbitrary load points of 10%, 20%, 50% and 100% loading
  • Includes effects of redundancy and PSU sizing
• Industry opposes
  • No accepted protocol
  • Industry aligned behind current methods
Gold PSU Losses vs Losses

- Max Gold PSU Losses
  - 500W PSU
  - 1200W PSU
  - Gold Eff

Output Power

4 proc system operating range

dual proc system operating range

% Load
Gold PSU Losses

Which net loss requirement do we use?

- Option #1
- Option #2

4 proc system operating range

dual proc system operating range

Max Gold PSU Losses

Output Power

500W PSU
1200W PSU
Gold Eff

Efficiency

Gold PSU Losses

0 20 40 60 80 100 120 140 160 180

0 0.2 0.4 0.6 0.8 1

0 200 400 600 800 1000 1200 1400

0 78% 80% 82% 84% 86% 88% 90% 92%

climatesavers computing
Gold PSU Losses

4 proc system operating range

Dual proc system operating range

% Load

Output Power

Max Gold PSU Losses

Efficiency

#1 not as good for low power PSUs

#1 not as good for high power PSUs

Option #1

Option #2

500W PSU

1200W PSU

Gold Eff

Efficiency:

- 78%
- 80%
- 82%
- 84%
- 86%
- 88%
- 90%
- 92%
- 94%

Power:

- 0 20 40 60 80 100 120 140 160 180
- 0 100 200 300 400 500 600 700 800 900

Low power PSUs

High power PSUs
Gold PSU Losses

Dual Proc System Operating Range

Output Power

4 Proc System Operating Range

Max Gold PSU Losses

500W PSU
1200W PSU
Gold Eff

Option #1

Option #2

#2 not capable using low power PSUs

#2 not capable using high power PSUs
Curve Fitting with NPL

Single O/P Gold PSUs (best in rating)
Proposed PSU Requirements for Tier 2 Server Spec

- Follow same PSU efficiency and PF approach as adopted in Tier 1 Server spec
  - Maintains alignment with CSCI and 80+ requirements
  - Establishes consistent roadmap for PSU suppliers
  - Eliminate unique Tier 1 single O/P PSU requirements for PSU <500W
- Maintain PSU consistency for all specifications
  - Follow similar approach for Tier 1 Storage PSU spec requirements
  - Maintain alignment with ENERGY STAR Client Spec
    - Both specs contain requirement for multi O/P PSUs
    - Creates confusion as there is overlap in low end/pedestal servers and desktop PSUs
Proposed PSU Requirements (cont)

- Withdraw consideration of system level PSU requirement
  - Idle power specification encourage right sizing
  - Use adders to address redundant power supplies
- Focus on system level requirements rather than additional PSU requirements
  - CSCI supports industry efforts to develop server performance/efficiency metric
    - Metric should be applied to blade servers as system PSU requirements for blades becomes quite complicated
Proposed Accuracy Requirements for Tier 2

- In general, CSCI does not understand motivation of including a power monitoring feature in an energy efficiency specification.
  - Market feature, not energy feature
- Accuracy requirement of ±5% accuracy with a maximum error of ±10W per PSU
  - Tier 1 → ±5% with a maximum error of ±5W per PSU
  - As the load decreases the ability to accurately measure the power becomes increasingly difficult → maintain max error of ±10W
- Requirement should be per PSU
  - Fixed maximum system error becomes increasingly difficult for systems with redundant and additional PSUs
- Eliminate specialized power metering solutions
  - Sacrifices additional power losses to accurately measure input power
  - Unnecessarily drive up PSU costs
- Power reporting requirements should be applicable to rack mounted server products only
  - Power reporting requirements should not be required for pedestal servers
Other questions:
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