ETSI: Server Efficiency Metric

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V1.0

Contributors:

Consultant

Henry M Wong the Chief Technologist at E^{3}HS IT Consulting, enabling and evangelizing a holistic approach to resource efficiency of and by data centres and data centre equipment. Mr. Wong has over 32years of IT industry experience in computer system development, manufacturing, and deployment, including technical standards, best practices, and policies. Mr. Wong's experience ranges from leading edge product development, e.g. low power server processors, to enabling data centre level technologies, e.g. modular data centres and 380VDC, Mr. Wong's product development experience includes over 22years in digital and mixed signal processor systems development. Products include Intel's first mobile Chipset (Intel's 360SL), the first mobile Pentium® Processor (Intel's P54LM/P55C), and the first integrated fax/data modem (Sierra Semiconductor 11192). Mr. Wong has led technology development and enablement of high-efficiency and high-reliability power-conversion techniques, component thermal solutions, and system clocking networks for the Intel® Itanium® and Intel® Xeon® processor platforms. Mr. Wong has also authored and enabled key technologies such as Adaptive Voltage Positioning, Modular Direct Power Connect, Server Component High Impingement Mode Cooling, and Programmable Geared Differential Clocking for Multi-Time Domain Architectures. For the past 10+ years, Mr. Wong has led and supported many of the enterprise industry energy-efficiency initiatives, technologies, and policies with organizations such as the US EPA, US DOE, Lawrence Berkley National Labs, and The Green Grid. Mr. Wong has represented IT industry's technical positions to policy organizations such as the US DOE, Japan METI, California's Energy Commission, Korea's KEMCO, and China's standardization bodies. Mr. Wong has also coordinated technical assessment and policy positions between industry organizations such as IT Industry Council, the Green Grid, Storage and Networking Industry Association (SNIA), and SPEC. Mr. Wong is a 1984 graduate of Yale University with a degree in semiconductor physics.

Working with the industry on Data Center and Server Efficiency….

the green grid

ISO JTC1 IEC Information Technology Standards

ITI Information Technology Industry Council Leading Policy for the Innovation Economy

BERKELEY LAB LAWRENCE BERKELEY NATIONAL LABORATORY

energy ENERGY STAR

ecma INTERNATIONAL

DIGITALEUROPE

Best Practice Green IT Promotion Council

DatacenterDynamics Knowledge & Networking

Objectives

Metric which is:

- Independently repeatable
- Consistent with data centre operation
- Vendor and supplier agnostic
- Incentivizes energy effectiveness at a data centre level
- Consistent with historic and emerging technology directions
- Accessible to small and medium businesses (of and by data centres)

Challenges:

- Existing paradigms on “efficiency”; power, performance, individual vs. aggregate
- Marketing vs. practical, proven techniques
- Regulatory requirements and consistency with actual operations
- Adaptation to more energy effective technologies and trends
- Multiple per system metrics being developed by differing organizations

Server efficiency metrics development in progress

- Alignment with other organizations:
  - The Green Grid
  - Lot 9 and consultants
  - ENERGY STAR for Computer Servers, Enterprise Data Storage, and Large Networking Equipment
  - China National Institute on Standards (CNIS)
  - ISO/IEC JTC 1 SC39 (Resource Efficiency of and by Data Centres)

- Technical Characteristics and Program Consistency
  - Metric validation and applicability
  - Product scope and categories
  - Power Supply efficiency
  - Idle and Active Mode Efficiency
  - Test conditions
  - New technology adaptation

Logistics and plans

- Parallel tracks
  - Lot 9 – Resolution to industry (Digital Europe) and Consultant's recommendation (Q4'2016)
  - Energy Star for Computer Servers revision 3, 2nd draft 2016 eoy (2018 Effectivity target)
  - CNIS server standard development next meeting Q4'2016 with SPECPower
  - Remaining programs are expected to follow
- Trends
  - Establish common metric evaluation- Deployed Power
  - Product scope and categories- Volume servers and product family
  - Power Supply efficiency – Single output targeting Platinum for premium
  - Idle and Active Mode Efficiency – Separate, integrated, or single method is under debate
  - Test conditions – consistency with SNIA/Storage. Application range vs. regulatory target
  - New technology adaptation – Addressing 40/100+Gbe, integrated APA, and FPGA's

ETSI Server Metric Planning

- Initial Draft – Dec'2016
  - Feedback cycle and key stakeholders
  - Technical review and team recommendations

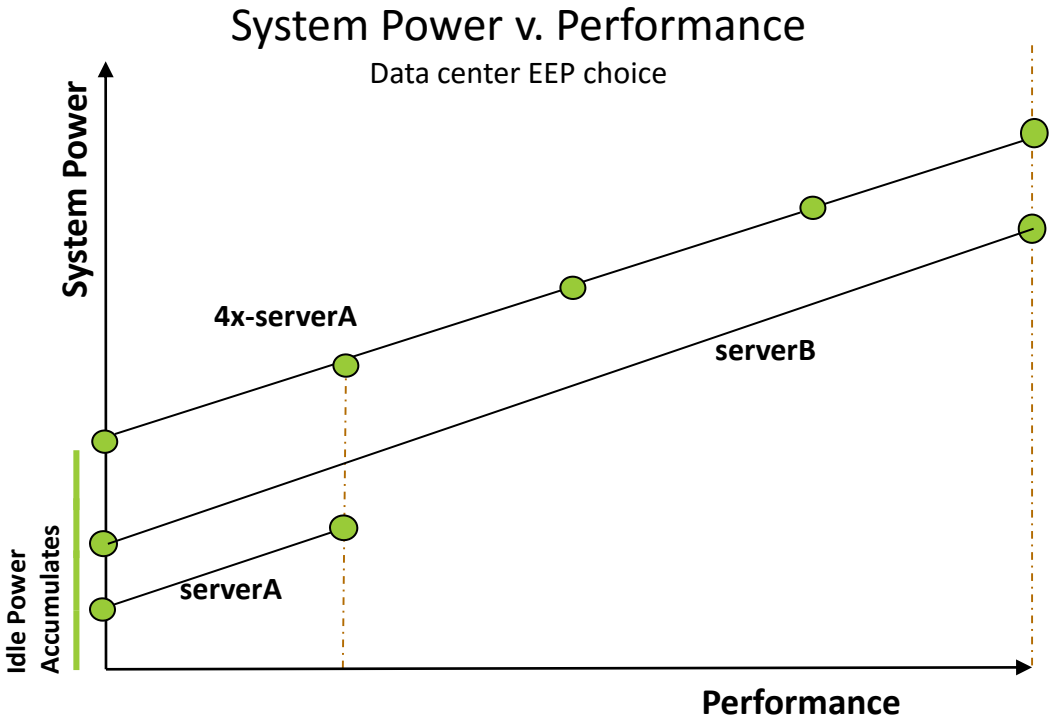
- 2nd Draft – Q1'2017
  - Team considerations addressed
  - Alignment considerations highlighted and addressed
  - ETSI review level plans
  - Review with liaisons and key stakeholders

- FCD/DIS considerations– TBD
  - Update plans based on Q1'2017 feedback

Backup

Energy Efficient Performance (EEP) Metric Challenge

So which one is better. Assuming a data center that needs to support more than 2x server A capacity?



Server A has a better Perf/Watt score.
But… the better efficiency choice for the data center is serverB.

Deployed Power[1] Analysis

- Constructed as a sample deployment of IT equipment at data centre level, assuming the targeted performance metric is consistent with data centre workload
- Assessment determines the resulting energy consumption (power impact) of the deployed systems at 0, 25%, 50% and 100% utilization levels.
- Methodology:
  - Use agreed upon performance metric
  - Determine 100x maximum performance of the group for targeted performance
  - Calculate the number of individual systems of a particular type would be needed to meet the aforementioned target
  - Calculate the resulting aggregate power level in the deployment based on number of that particular system and the 0%, 25%, 50%, and 100% performance load levels.
  - Rank order the results of a the proposed efficiency metric vs. the “deployed power”

1 Deployed Power Analysis Workload Descriptions, Digital Europe, 05 August 2016