Dec 5, 2007

United States Environmental Protection Agency
Office of Air and Radiation
Energy Star® Program
Washington DC 20460

Dear Energy Star Program,

Intel appreciates the opportunity to comment on the Energy Star Computer
Program Discussion Guide: Version 4.0, Tier 2.0 dated November 9, 2007. We look
forward to an ongoing dialogue on the subject. In summary, our comments are
aligned to the specific topical elements outlined by the Discussion Guide.

(1)   Energy Efficient Performance Assessment (EEPA) Approach
(2)   Product Categories
(3)   Program Scope and Requirement Categories
(4)   Power Supplies and Components
(5)   Power Management and Network Requirements
(6)   Testing Procedure and Reporting Requirements

Energy Efficient Performance Assessment (EEPA) Approach

- *What challenges does platform dependence introduce to the EStar Computer Program?* **Intel Feedback:** The primary challenge will be in the disparate nature of Client platform refreshes (annual cadence) vs benchmark software refreshes which necessarily must occur on 2-4yr cadence cycles.
- *How can performance under different EEPA workloads best be integrated into Energy Star?* **Intel Feedback:** There are three primary metrics for performance that could result from an EEPA approach: Energy Consumption, Time to complete workload(s), and explicit performance. Each has pro's and con's but Intel would advocate for either Energy Consumption (over the duration of the workload(s)) or Time to complete workload as the preferred metric.
- *Do stakeholders believe that when paired with a calculated annual energy use value, an EEPA tool like EECoMark™ will be a reasonable means of comparing energy use of desktops? notebooks?* **Intel Feedback:** Yes for both desktops and notebooks; A single, standardized methodology which allows for scaling is always preferred but should be limited to devices of a similar class. For example, fringe class devices (slates/tablets, MID, UMPC's,

*Other brands and names may be claimed as the property of others

etc..) are not primarily AC mode devices and should not be considered under the same EEPA methodology that governs desktops and notebooks.

- *Should EEPA take into account different usage patterns for businesses compared to home users in arriving at a consensus usage scenario?* **Intel Feedback:** If Energy Star is intended to be primarily relevant to governments and large corporate environments then focus on a "business" usage scenario is sufficient. If Energy Star intends to reach into consumer and small/medium business space then usage scenarios for these markets would also need to be developed. It seems unrealistic to presume a single "consensus" usage model that applies to Gov't, Lg Biz, SMB, and Consumer spaces could be developed.

- *Should the EEPA reflect typical usage patterns of computers in all Energy Star countries in arriving as a consensus usage model?* **Intel Feedback:** Again, to presume a single "consensus" usage model that applies to multiple user types across multiple geographies seems an impractical expansion of the data collection scope. Intel recommends the data collection be limited to US and EU markets where the necessary customer education and industry resourcing may already exist to complete the minimum necessary data collection for EEPA.

- *How does the proposed EEPA approach mesh with the Climate Savers Computing Initiative, which bases qualification largely on the efficiency of internal power supplies and motherboards?* **Intel Feedback:** CSCI focuses on power management education (synergy w/ EStar), PSU efficiency (synergy w/ EStar), and VR power train efficiency (reduced VR losses in both active and inactive modes = synergy w/ EStar); CSCI PSU efficient targets are graduated over time – may create disconnect with Energy Star but ultimately delivers on goals of Energy Star (reduced consumption) which could be viewed as synergistic with Energy Star.

Product Categories

- *What sleep levels are appropriate for Desktop-Derived Servers covered it the Computers Specification?* **Intel Feedback:** Intel advocates for no inclusion of Sleep targets for DDS products. Traditional sleep definitions may still not capture the usage model. Recommend using SpecPower which covers the range of activity levels consistent with a single unit server.

- *Should EPA use the same approach used in Tier 1 for Workstations or should they be handled differently?* **Intel Feedback:** Intel recommends changing the specification, as implied in our Tier1 discussions. Intel recommendation is to utilize the HPC benchmark-Linpack; and graphics routine SpecAPC, and capture the energy consumption to complete 2 cycles encompassing inactive power levels.

- *Should thin-clients be evaluated alongside other computer categories in the Energy Star Computers specification?* **Intel Feedback:** Intel recommends not including thin-clients as their market presence does not justify this to date. Additionally, the thin-client usage model does not demonstrate clear macro-energy advantages.

*Other brands and names may be claimed as the property of others

- *Are there additional products that should be considered for inclusion in this Tier2 specification?* **Intel Feedback:** Intel recommends separating All-in-one system products into their own category with distinct requirements.

Program Scope and Requirement Categories
- *Will an EEPA approach lessen the dependence on categorization of systems, as was done for Idle state requirements in Tier1?* **Intel Feedback:** The only way to account for the broad diversity in PC system configurations is to either categorize (ala Tier 1) OR move to a capability ladder systems (ala print/imaging spec).

Power Supplies and Components
- *Are the Tier1 component-level requirements for internal/external power supplies appropriate when used in conjunction with an EEPA tool such as EECoMark? Alternatively, should internal/external power supply specs be made more stringent?* **Intel Feedback:** Yes – power supply efficiency and predictability are foundational to next generation product planning and architectures as well as data measurement reliability and consistency. Intel recommends adding 5VSB efficiency requirements to DT PSU's. Additionally, Intel recommends adding 5% and 10% load efficiency targets to NB and DT PSU's.
- *Energy Star's existing Tier 1 framework requires measurement of desktop computers and workstations with mouse/keyboard attached. Consistent with these measures to create a realistic testing situation, should any commonly used peripherals be included in Tier2 test procedure to accurately reflect real-world usage?* **Intel Feedback:** On one hand, EStar is a self certifying program by system manufacturers; certifying "as-shipped" is the only reasonable expectation gov't could have under this premise; On the other hand, efforts to collect "real-world" usage data and run "workload" energy consumption is an effort to understand energy consumption in an "as-used" context for which sys-mfg's cannot be held accountable. Intel recommends that Tier2 test methodology include the addition of commonly deployed system peripherals (internal/integrated devices to either DT or NB systems) either by some volume estimate or per whatever the final "categorization" of systems dictates. Intel also recommends Tier2 test methodology allow for any natively featured power management features (ala HDD spindown) per the OEM factory configured settings.
- *What new energy saving technologies becoming prevalent on the market are worth special consideration in Tier2?* **Intel Feedback:** Intel's vPRO™ technology (http://www.intel.com/products/vpro/?iid=search), low-power USB, Energy Efficient Ethernet, LED backlights, NVRAM (SSD's, HDD caching etc…), Quad-Core CPU's, Gfx integration in CPU, etc….

Power Management and Network Requirements

*Other brands and names may be claimed as the property of others

- *Are any allowances for additional management tools that aid in the adoption of computer power management (such as service processors in Sleep and Standby) worth consideration?* **Intel Feedback:** Yes – Intel agrees with principle that providing adders for technologies that improve the "macro" power of story in enterprise environments is appropriate. If such a feature is included, Intel recommends the test procedure for Tier2 be revised to include some test which confirms the system under test can actually respond to a network request from an Sx operating mode and then return the system to the originating Sx mode.
- *How should the Tier1 network provisions (reduction of the speed of active Ethernet networks when transitioning to Sleep or Standby/Off, maintaining full network presence in Sleep, and Wake-on-LAN) be evaluated under the EEPA approach?* **Intel Feedback:** Ensuring the LAN is connected to a network switch/hub which supports multiple link-speeds will provide the opportunity for LAN technology solutions to innovate with various power management features under the EEPA approach.

Testing Procedure and Reporting Requirements

- *Should EPA investigate power levels of notebook and integrated computers that incorporate the energy use of displays?* **Intel Feedback:** Yes – Intel believes that for Active mode testing, NB/AIO displays should remain powered while for inactive mode testing displays should keep the Tier 1 provision of display blanking. Intel believes that many power management technologies can improve active display in AIO/NB. Obviously with the wide variety of display options and technologies available keeping displays active for testing will increase test complexity (follow EuP Lot3 proposal for normalization?).
- *What data collection is necessary to support the EEPA tool development? To support meaningful Energy Star requirement levels?* **Intel Feedback:**
  A) Usage mode studies must be completed in both US and Europe covering at a minimum government and Lg Biz environments; Intel has released a Microsoft® Windows® based utility "UTrack" to the ECMA TC38-TG2 to support such studies.
  B) Device characterization studies to support a categorization or capability adder model. Devices = storage devices, memory, Gfx, CPU, other add-in cards, etc..
  C) Revised data collection worksheet (vs Tier1 precedent) should be used and some thought given to a uniform test/measurement equipment set may be necessary.
- *When a final list of qualifying Tier2 computers is eventually posted to the Energy Star website, the program intends to post annual energy consumption figures and performance information to better inform consumers. Posting this information is also being proposed for televisions. EPA invites feedback on this plan.* **Intel Feedback:** Yes – Intel agrees with this plan (current Tier1 submissions provide Sx state power but not idle with submission)

*Other brands and names may be claimed as the property of others

Other Generalized Feedback for Consideration

- *If an inactive mode categorization system is employed, consideration should be given to change from the current Tier1 precedent (If not configuration C and not configuration B, then configuration A → where configuration A gets the most stringent targets); The preferred method would be "If Not Config A or Config B then test to Target C" which creates a catch-all bucket where Target C is the greatest allowance for inactive power consumption.*
- *Intel is concerned with the test hardware cost increment that moving to an EEPA approach requires (increased power meter cost). This could create a financial burden issue for smaller system manufacturers effectively prohibiting them from participating in Energy Star. Intel suggests that a limit be established by EPA or ECMA on the "reasonable" compliance test cost to be employed by system manufacturers. Perhaps a ceiling of no more than $1000 for complete setup (host system + meter + network switch/hub, etc…).*

We would be happy to further discuss our rationale for these positions at your request. In addition, we will provide a "track changes" version of the Draft 1 Version 4.0 Energy Star specification for computers with our detailed comments included.

Thank you for your consideration of these comments.

*Other brands and names may be claimed as the property of others