4E EDNA Task Updates

Steven Beletich
EDNA Operating Agent
About EDNA

- Established in 2014 by IEA-4E TCP
- Focused on connected devices
  - Energy costs
  - Energy opportunities
- 12 member countries
- Tasks lead by countries
Energy Aware Devices Report – Policy Opportunities

- Devices self-reporting own energy
- Opportunity for efficient building operation
- Low cost to implement
- Low cost M&V + field data (policy)
- Actions required
  - Standardise device behaviour
  - Develop (application layer) protocols
  - Develop “receiving entities” to harvest data
  - Develop people/systems to analyse & act on data
Energy Aware Devices (2)

- Potential other next step - policy makers’ toolkit
  - Benefits & costs
  - Status of technology
  - Examples in other policies

- EDNA considering

- Report on website + CofE
Connected Audio (IoT)

- Potential for high network standby power
- Estimated worldwide stock of 300 million connected audio products by 2018
- Report on website + CofE
2.3 Analysis of Power Modes

The power consumption of an NCAP depends on use: an NCAP is expected to use more power while playing music than while waiting for user input. The analysis of datasheets, owner's manuals, and technical specifications has shown that in general, we can distinguish four different power modes (five, if off mode is also considered).

The power modes are described in the following subsections using the example of a speaker. Note that very few products offer all of these power modes.

2.3.1 Active Mode

When a speaker is playing music, all subsystems are active. The communication interface receives an audio stream and relays it to the processor where it is decoded and then converted to an analog audio signal. The analog signal is amplified and then replayed by the speakers (see Figure 9).

The power consumption in active mode is fluctuating and depends on the output power of the audio power amplifiers: the louder the audio content is replayed, the more power is consumed.

In active mode, the power supply unit operates in the upper part of its nominal load range, where efficiency rates of 90% and higher can be achieved. This means that less than 10% of system power consumption is lost by the power supply unit.

2.3.2 Idle Mode

In this study, idle mode is defined as the mode, where the speaker is not playing audio content, but is able to respond immediately to user input. This means that the Digital to Analog Converter, the audio power amplifier, and loudspeaker are not used and thus turned off (see Figure 10).
Results – Standby Power of Networked Audio

<table>
<thead>
<tr>
<th></th>
<th>Speakers (63)</th>
<th>Amplifiers (5)</th>
<th>Adapters (9)</th>
<th>Overall (77)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>17.6</td>
<td>7.3</td>
<td>5.6</td>
<td>17.6</td>
</tr>
<tr>
<td>Min</td>
<td>1.3</td>
<td>4.5</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Mean</td>
<td>4.3</td>
<td>5.9</td>
<td>3.7</td>
<td>4.3</td>
</tr>
</tbody>
</table>
Intelligent Efficiency – Policy Report

- High level introduction
- Policy opportunities to encourage
- Lie of land
  - Few policies mention IE
  - 6 categories
    - Information, education, awareness
    - Labelling
    - Technology research
    - Development
    - Demonstration
Intelligent Efficiency (2)

- High level barriers
  - Privacy
  - Consumer awareness
  - Workforce readiness
  - Inter-operability
    - Govt-lead collaborations to develop open source software
  - Silo effects
  - Lack of understanding by governments & energy users
Intelligent Efficiency (3)
Intelligent Efficiency (4)

- Potential Government Action
  - Support R&D + demonstration
  - Performance labels & standards
  - Encourage software platforms & protocols
  - Harmonize across jurisdictions
  - Coordinate agencies

- Report on website + CofE
"Always-On" & "Through-Powered" Devices

- Always-on devices
  - Switches, IP phones, etc.
- Through-power devices
  - Data/power on same cable
  - PoE
  - USB
    - Power management modes
    - Power delivery specification
  - HDMI
  - MHEG (cable TV)

- Report mid 2018
Energy Harvesting

- Investigate potential for use in IoT
- Study existing & emerging technologies
- Investigate technology
  - Status
  - Future direction
  - Hurdles
- Estimate energy demand of IoT
- Final report in late 2017
Addendum – Completed Tasks

- Smart metering and energy monitoring systems
- Energy efficiency of the internet of things

http://edna.iea-4e.org
http://cda.iea-4e.org