

Investigation and Exploration of Network Power Consumption in Set Top Boxes, VOIP Telephones and Game Consoles

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| <p>Focus of Report</p> | <p>The report investigates the power scaling and control opportunities and the potential for power consumption savings and benchmarking for three product groups: Complex set Top Boxes (STBs), Voice over Internet Protocol (VOIP) phones and game consoles.</p> |
| <p>Description of Research</p> | <p>For this research ADT</p> <ul style="list-style-type: none"> ➤ Selected and purchased game consoles, complex STBs (for pay TV), and VOIP phones, with a range of energy efficiency levels. ➤ In consultation with experts, determined the various functional modes for each product that could provide distinct power measurements and conducted these measurements for (a) typical, (b) highly efficient and (c) highly inefficient product performance. ➤ Conducted tear-down analysis (deconstructing the products and identifying components and their power consumption where possible) and thermal imaging to measure the power consumption for the various functions and to observe differences in product design, power conversion approaches and device programming. ➤ Assessed the capability of these products to be identified on a network via a unique electronic signature. Evaluated the extent of power scaling and power consumption savings opportunities for the products. |
| <p>Key Findings</p> | <p>Power consumption testing</p> <p><i>Complex STBs</i></p> <ul style="list-style-type: none"> ➤ Factors governing power consumption of STBs are the type of chip set, the power supply, the number of tuners and the maintenance of conditional access keys. ➤ Without HDD (hard disk recorder) connected decrease in power consumption of 2.8 watts for Austar and 3.8 watts for Foxtel. ➤ No difference in power consumption while on in a variety of modes including: play, recording, play back or pause for Foxtel. However, with Austar there was a difference of up to 2.5 watts; ➤ Telstra T-Box showed considerably lower consumption across all modes compared to other two – e.g. standard movie play of 11.8W T-box, 26.01W Austar and 22.5W Foxtel. ADT point out however that the Telstra T-Box has only two tuners compared to 4 each for the other STBs and is powered by an external power supply (EPS). ➤ After 4 hours Telstra T-box powered down via internal timer from 12watts to standby mode of < 1 watt. Foxtel from a standby active high mode of 29 watts to standby active low mode of around 23 watts after 4 hours of inactivity from the user. Austar did not power down and always operates in active standby mode (24 hour standby mode average of 24 watts), to be available to receive updates from the broadcast network. |

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| | <p><i>VOIP phones</i></p> <ul style="list-style-type: none"> ➤ Overall power consumption of handset IP phones is relatively low compared to router type IP phones; ➤ The Cisco model has the lowest power consumption and suggests that savings can be made on standby, ringing, calling and talking modes. ➤ For router/modem type IP phones ADT found that there is some potential for power consumption savings when in standby waiting mode. <p><i>Game consoles</i></p> <ul style="list-style-type: none"> ➤ Higher power consumption for the consoles with higher graphics capabilities i.e. the Xbox 360 and PlayStation 3. ➤ PlayStation had an “auto off” function after one hour; Xbox after 6 hours. <p>Power scaling and control opportunities</p> <p><i>Complex STBs</i> – none of the STBs tested have power scaling functionality. There is opportunity for power scaling by power managing when multiple tuners exist. Those with HDD component could also be power scaled by managing the spinning functionality of the HDD - HDD could be “spun down” when not recording rather than constantly on.</p> <p><i>VOIP phones</i> – moderate power scaling (between 1-2watts) is evident between the operating modes of ‘waiting for a call’ and ‘ringing, calling and talking’.</p> <p><i>Game consoles</i> – no power scaling evident for the three consoles tested.</p> <p>Potential for power consumption savings and benchmarking</p> <p><i>Complex STBs</i> - Both the Foxtel and Austar products would achieve significant power savings if they were placed into standby mode and switched to higher active standby when required to update conditional access keys and maintain electronic program guides – as occurs with the Telstra T-Box.</p> <p><i>VOIP phones</i></p> <ul style="list-style-type: none"> ➤ Custom built multi-voltage switching power supplies could be used to avoid unnecessary power loss. (ADT note that this is probably an expensive option for manufacturers). ➤ As one of the router/modems uses between 1w-3w less than the other two there is scope for improvements in design, focussing on energy consumption and performance. ➤ For Router IP phones a difference of 3w exists between best and worst performing models again suggesting improvements could be made here. <p><i>Game consoles</i> – The main opportunity for power consumption saving is to develop more sophisticated auto power down modes when not in use.</p> |
| <p>Conclusions</p> | <p>STBs - Opportunity exists for power scaling in complex STBs.</p> <p>VOIP phones - Scope exists for reducing power consumption, particularly through the use of multi-voltage switching power supply.</p> <p>Game Consoles – Improvements in power consumption could be achieved through better management of auto power down and standby modes.</p> |
| <p>Standby power policy Implications</p> | <p>Opportunities exist for the reduction in energy consumption of complex STB’s, VOIP phones and game consoles through the use of design focussing on energy consumption and performance such as power scaling and multi- voltage switching power supplies.</p> |