

List of technical standards for equipment connected to energy-using networks

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<p>Focus of Report</p>	<p>This report is a non-exhaustive review of technical standards from 2010 relevant for network connected equipment. It reviews the standards perceived by the authors as the most relevant that could potentially form the basis of a consistent international standard, covering: pure technical standards, power measurement specifications or test methods, and mandatory or voluntary environmental performance standards.</p>
<p>Description of Research</p>	<p>56 standards are reviewed and classified according to the type – technical, performance or measurement; if they include power management or energy saving features; and their geographic scope (global, regional or APP member). Analysis of the level of implementation of the standard and future possibilities is provided. The review for each standard is presented in separate factsheets summarising key information on technical, performance and measurement aspects; the scale of implementation, future development and the responsible organisation involved.</p> <p>Three promising standards of particular interest to policy makers are identified: IEEE 802.3 (specifically IEEE 802.3az Energy Efficient Ethernet); IEEE 1901: High-speed power line communications; and IETF Energy Management Working Group. Areas of concern with standards particularly those lacking energy-saving features are highlighted.</p>
<p>Key Findings</p>	<p>General Characteristics of Standards</p> <p>The research identified three general characteristics that standards should hold, being:</p> <ul style="list-style-type: none"> ○ Open (i.e. non-proprietary); ○ Extensible (i.e. designed to accommodate future developments); and ○ Foundational (i.e. provide the basis for further development of specific implementation). <p>E.g. the standards developed by the Institute of Electrical and Electronics Engineers (IEEE) and the work of the Internet Engineering Task Force (IETF).</p> <p>Areas of concern</p> <p>The research highlighted a number of areas of concern due to their lack of energy saving features that require the attention of policy makers:</p> <ul style="list-style-type: none"> ➤ Improving standards for WAN/LAN network equipment <p>A number of standards lack energy saving features specifically in industrial, commercial, and domestic equipment requiring Wide and Local Area Networks (WAN and LAN). Examples cited; IEEE 802.11 Wireless LAN – base stations and access points lacking energy-saving features, IEEE802.16 Wireless Broadband</p>

	<p>– less efficient base stations; and ITU J.222 DOCSIS – lack of any active energy-saving features.</p> <ul style="list-style-type: none"> ➤ Improving consumer electronics standards The absence of harmonisation of standards, the proliferation of propriety standards and the lack of energy saving features across all standards in consumer electronics. For example the High-Definition Multimedia Interface (HDMI) standard, popular due to its ability to transmit high-definition audio and video signals over a single cable, is a proprietary standard, which currently lacks any energy-saving features. While it could be a convenient means to manage energy use across the entire entertainment system. ➤ Harmonising smart grid standards The potential of smart grid technologies in management of electricity peak loads is widely recognised. With the diverse range of appliances needing to be connected to make the smart grid effective, harmonisation of standards is particularly important. ➤ Improving performance standards Performance standards are an important tool of policy makers in promoting energy savings. To strengthen these standards power management features need to be explicitly required within the scope of the standard or duty-cycle requirements need to be established that are sufficiently stringent so as to effectively require active power management. ➤ Improving measurement standards Measurement standards could also be enhanced by focussing on the duty-cycle measuring the energy consumption over the entire duty cycle including low-power and active modes.
<p>Conclusions</p>	<p>The authors conclude that all standards should be open, extensible and foundational. The report highlight three protocols warranting the most focus from policy makers: IEEE 802.3 (specifically IEEE 802.3az Energy Efficient Ethernet); IEEE 1901: High-speed power line communications; and IETF Energy Management Working Group. In the factsheets provided for each of the standards reviewed, the section on future development offers recommendations on how each could be enhanced e.g. by incorporating energy management features.</p>
<p>Standby power policy Implications</p>	<p>This report provides a valuable review and analysis of current technical standards relevant to measuring and establishing performance requirements for network connected equipment. The key characteristics of standards identified and the three protocols of particular interest are beneficial. The provision of the 56 factsheets provides readable, accessible summaries of the standards with the sections on implementation and future development being particularly beneficial to standby power policy makers.</p>