



Lab Testing Summary Report

June 2010

Report 100305B

Product Category:

Power Efficient Switches

Vendor Tested:



Products Tested:

HP A5120-48G SI Gigabit Ethernet Switch



Key findings and conclusions:

- HP A5120-48G SI with 52 ports consumed 28% less power than the Industry Average consumption for comparable products
- Energy efficient architecture uses 65nm silicon technology to lower power consumption
- Effective management GUI allows administration of power saving options for all ports, by schedules or usage
- IMC Platform supports management and network monitoring including power consumption statistics

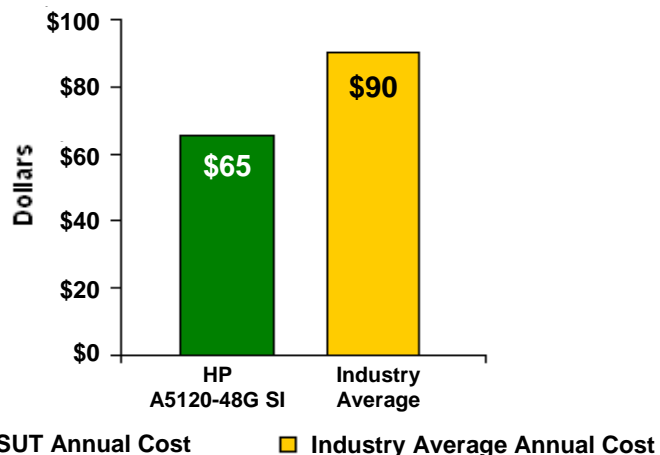
Hewlett-Packard* A5120-48G SI Gigabit Ethernet Switch was evaluated by Miercom under the Certified Green Program for power consumption and energy efficiency. We analyzed the business enabling green benefits that the A5120-48G SI offers to its ecologically aware customers.

In hands-on testing and analysis of the HP A5120-48G SI with 48 10/100/1000 Mbps auto sensing and four 1Gb SFP ports, the switch proved to afford customers a highly economical, manageable and energy efficient Layer 2 switching solution. Utilizing the latest silicon technology and energy efficient design, the A5120-48G SI leverages its green features to promote environmentally sound network practices.

The A5120-48G SI is operational with default settings and can also be configured using a web browser GUI. The GUI has an Energy Saving option which enables port scheduling to work at variable speeds during specific times of a day as needed by the business. In addition, the switch will power down the idle ports not running any traffic resulting in additional power savings. As shown in [Figure 1](#), HP A5120-48G SI has an annual running cost (*continued on page 3*)

Figure 1: HP A5120-48G SI Annual Energy Cost

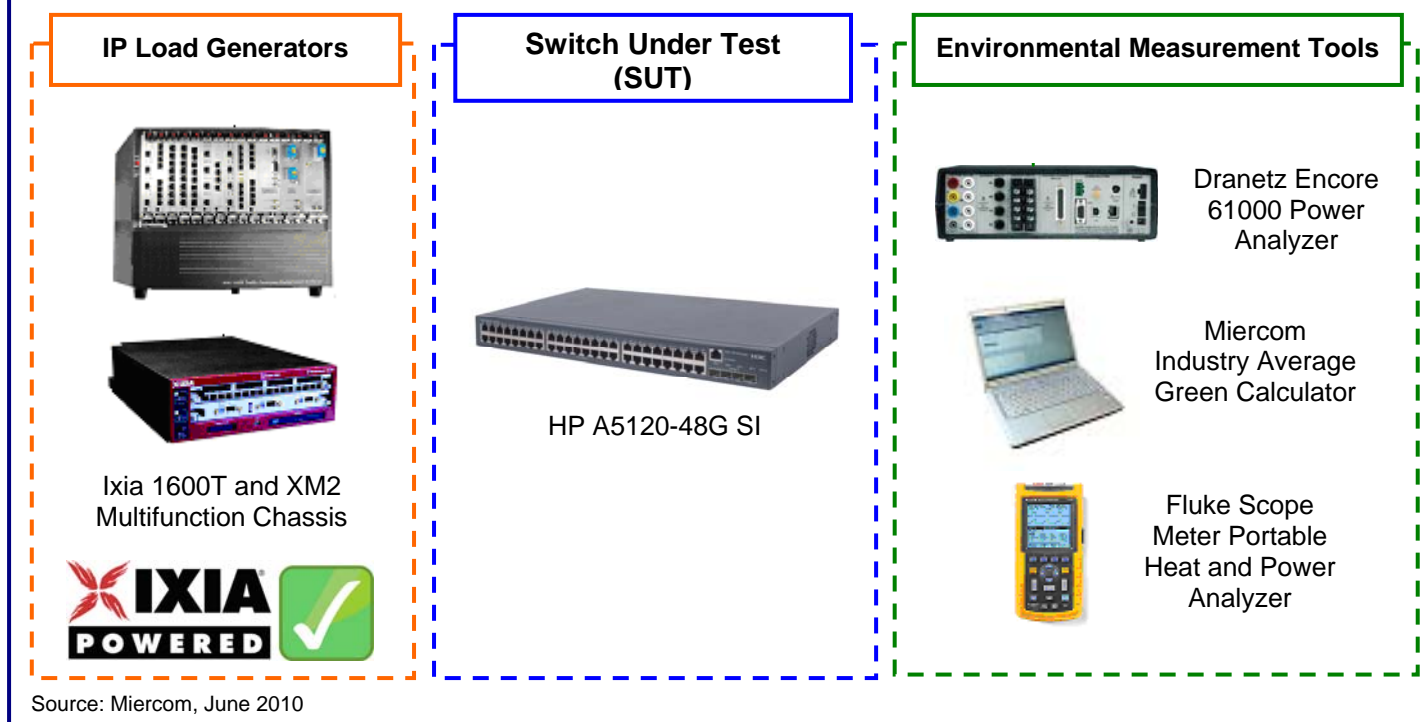
All Ports Loaded, Annual Use Estimate



Source: Miercom, June 2010

Annual cost for the HP A5120-48G SI was calculated to be \$65 for 52 ports as compared to the Industry Average of \$90. This is a 28% cost savings for power consumption alone. See the Business Case section on page 5 for additional details and calculations.

Test Bed Diagram



How We Did It

The HP A5120-48G SI was evaluated for environmental impact by looking at the individual components as well as its special features and capabilities. Testing focused on the power consumption and efficiency of the product. A full audit was conducted to analyze the overall product specific environmental impact.

Lab testing was conducted for power consumption under load. Measurements and audit results were verified with site survey assessments. The HP A5120-48G SI was configured and tested using 48 10/100/1000 Base-T ports and 4 SFP 1GbE ports. We measured power consumption changes by scheduling the independent ports for power down and configuring them for rate changes via GUI. In addition, we measured the power consumption at idle with no traffic, no links, partial load and full load.

Measuring Power Consumption: The power consumption of the HP A5120-48G SI was measured with varying network and link loads that a switch would typically experience in a real-world deployment. Power consumption was measured using a Dranetz Encore 61000 Power Analyzer from Dranetz-BMI (www.dranetz-bmi.com). The SUT was loaded with traffic at various rates and packet sizes in accordance with RFC 2544 Benchmarking Methodology for Network Interconnect Development.

Power consumption measurements were taken during system boot-up, idle, and with 70% and 100% load. Power consumption was measured, while running Layer 2 traffic from the XM2 and 1600T traffic generators from Ixia (www.ixiacom.com). Traffic was applied to each of the 1 GbE ports while stressing the product with the features it supports. All power measurements were taken at 110 volts and 60 Hz frequency. Frequency was also regulated at 50Hz and 60Hz to test actual power provided in other countries. In addition, power measurements were also taken for varying frame size from small to jumbo size to analyze any change in power consumption.

Miercom recognizes Ixia as an industry leader in energy efficiency testing of networking equipment. Ixia's unique approach utilizes coordination of energy measurements with network traffic load – allowing energy consumption to be graphed against network traffic volume. Real-world traffic is generated by Ixia's test platform and test applications, principally IxNetwork for layer 2-3 routing and switching traffic and IxLoad for layer 4-7 application traffic.

Environmental Analysis: Miercom's environmental review of the HP A5120-48G SI also entailed an examination of the Hewlett-Packard company-wide and product-specific environmental impact reduction efforts. Analysis includes comparisons to industry averages for competitive products that were also tested.

(continued from page 1) of \$65 under the Business Case described on page 5. This reflects a 28% savings when comparing costs for switches that are configured with 52 1GbE ports. The cost analysis is described under “Business Case” on page 5.

Power Efficiency

Power measurements were taken with different Layer 2 frame sizes and traffic loads. The effect of the various traffic sizes on the power consumption was measured. The HP A5120-48G SI was loaded with 70% and 100% traffic. As shown in [Figure 2](#), the power consumption at idle state with all links up registered 59.27 watts. With 70% 512 byte load, the watts used increased to 59.94. At 100% load there was an increase of 1.03 watts for a total 60.3 watts.

We took additional measurements for power consumption using different frame sizes and found that when using Jumbo frames (9216 bytes), the power consumption was 59.88 watts, an increase of only 0.61 from idle without traffic. We noted that an increase in the frame size caused the power consumption to decrease as shown in [Figure 2](#).

A Web based management GUI provides access to dynamic port speed throttling for the A5120-48G SI. This feature can reduce the load on the processor; for example, a schedule can be created to change the load to a lower rate on all 52 ports in order to reduce the power consumption. [See Figure 3 for more details](#).

The HP A5120-48G SI used 30% less power than the Industry Average (IA) of similar 52 port GbE

switches. At 100% load with 512-byte packets, the IA was 85.2 watts, while the A5120-48G SI consumed 60.3 watts. At 70% load, 59.9 watts was used. [See Figure 5 on page 5](#).

The total annual power consumption by the A5120-48G SI was calculated to be 519.67 watts compared to the Industry Average of 719 watts. A5120-48G SI used 1.15 watts power per port as compared to the Industry Average of 1.64 watts per port at full load. The Business Case described on page 5 shows that deploying the HP A5120-48G SI in a network can reduce energy bills by 28%.

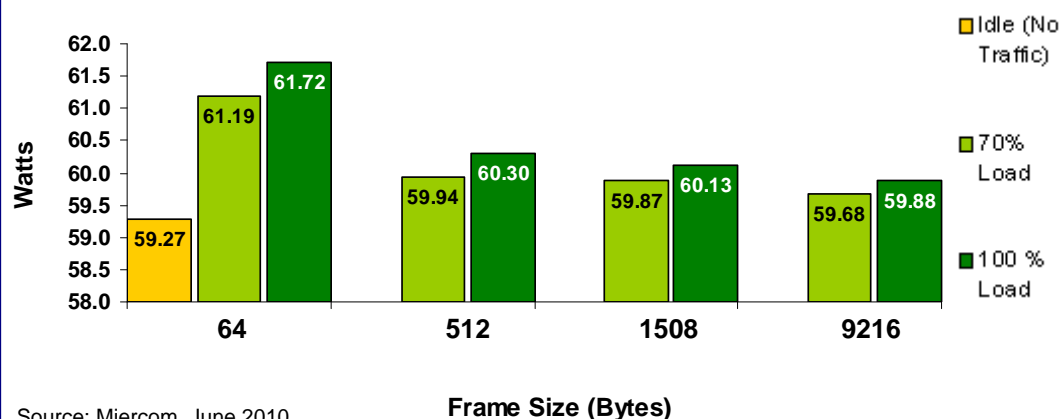
Product Efficiency

The HP A5120-48G SI with 48 1GbE ports and 4 SFP fiber uplinks can provide greater media flexibility for data transport and achieve greater distance connectivity.

The A5120-48G SI is easily manageable via a web browser interface for configuration, monitoring and administration. Features include LACP (Link Aggregation Control Protocol) for automated device grouping, which helps to prevent traffic bottlenecks. Integration with Intelligent Management Center (IMC) Platform provides all basic tools needed to manage and monitor a network, including the power consumption at each node. IMC delivers a full Fault-management, Configuration, Accounting, Performance and Security FCAPS solution and can be used to map the network topology, with indicators for connected devices and port locations.

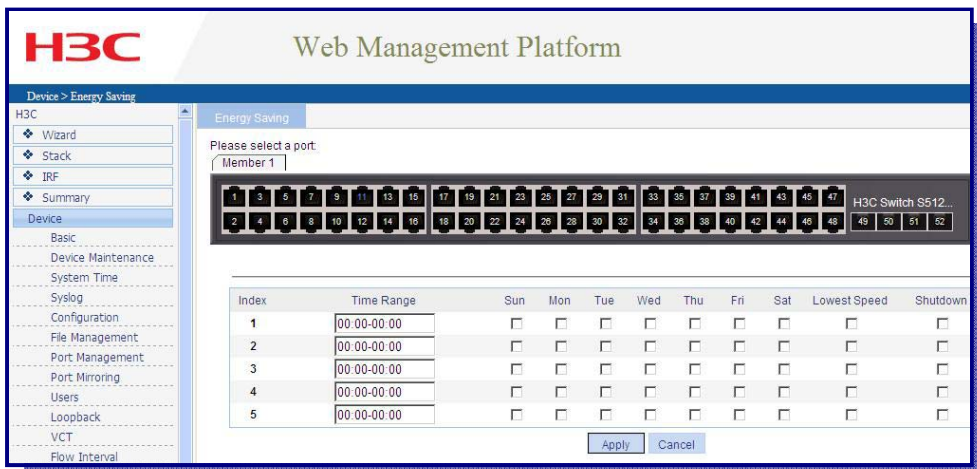
Figure 2: HP A5120-48G SI Power Profile

48 1Gbps ports, at specified frame size and load



The Power Profile shows the energy consumed while using different frame sizes and traffic loads. Power with all links up and without traffic was 59.27 watts. This was gradually increased as Layer 2 traffic was added to the switch. With an increase in frame size and throughput, the power consumed decreased.

Figure 3: Management Interface with Energy Savings Settings



Using the intuitive built-in web interface, an administrator can use the Energy Saving option to modify the ports for low bit-rate or shutdown by time-of-day. Ports can easily be set to low speed or shutdown at pre-scheduled times.

The HP A5120-48G SI uses 65nm silicon to improve the green capabilities of the switch with lower power consumption. The A5120-48G SI has an auto-idle power down mode which can also decrease energy consumption.

New security features are supported including SSL to encrypt all HTTP traffic for secure access to browser based management. The switches also include automatic DoS protection.

Quality of Service offerings allow traffic prioritization and classification of real time traffic into eight priority levels mapped to eight queues.

The web interface GUI, as shown in [Figure 3](#), has all the ports listed to allow an administrator to schedule ports to work at low bit-rate or even power off when not in use. This is another energy saving capability in the network.

The HP A5120-48G SI offers a switching capacity of 104 Gbps loading the same with 100% traffic. We measured the power consumed for jumbo frame size and found it uses 25.3% less Watts/Gbps than the Industry Average as shown in [Figure 4](#).

Business Processes

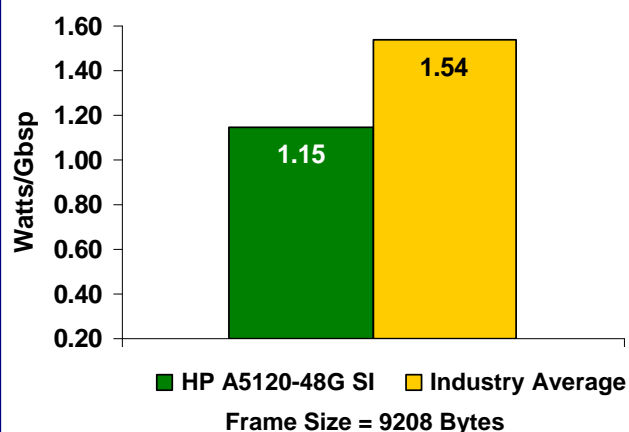
Hewlett-Packard strives to reduce landfill waste, by reducing the physical size of their products and simplified packaging. Paperless documentation is now available online, further reducing materials used and facilitating recycling activities.

Hewlett-Packard demonstrates their commitment to the environment when planning and designing facilities and operations. Hewlett-Packard

implements recycling and waste reduction programs, energy management systems for controlling light and heat, a global print-on-demand system for marketing and sales materials; all part of eliminating and reducing landfill waste.

Employing technologies that enable employees to work remotely, Hewlett-Packard reduces travel and damaging emissions. IMC controls multiple devices from a central remote location and allows the administration of all devices on the network. Remote backup, mass configuration changes and

Figure 4: HP A5120- 48G SI Power Efficiency



Source: Miercom, June 2010

A comparison of the power consumption relative to performance throughput for the switch under test compared to the Industry Average (IA). The HP A5120-48G SI uses 25% less watts than the IA.

other similar functions can all be performed without traveling to various locations. Carbon foot print is again being reduced.

Green Innovation

All Hewlett-Packard products are designed with the latest silicon technology. The HP A5120-48G SI uses 65nm technology, providing enhanced performance without increasing power usage. This has led to 31% savings from the previous generation 90nm silicon.

In addition to reducing power consumption, heat generation and cooling requirements, the built-in dual speed cooling fans run at a lower speed and reduce the amount of energy that fans require.

Hewlett-Packard also uses texture mapping rather than printing, electroplating or bronzing to reduce materials used in product manufacturing. Recyclable materials are used whenever possible in component manufacturing.

Shipping by sea rather than air is the Hewlett-Packard preferred choice for global distribution of products, reducing overall impact on the environment.

Affiliations and Standards

As an active member of Energy Efficient Ethernet, Hewlett-Packard helps drive the standards for more energy efficient design and development.

Hewlett-Packard is the founding sponsor and member of Green Grid. HP is a strong proponent of standards based design, utilizing standards based Link Layer Discovery Protocol (LLDP), supporting dynamic power allocation, resulting in increased energy efficiency.

Products from HP are compliant with RoHS and exceed the international standards. The affiliations mentioned help Hewlett-Packard to innovate based on “standards based design” and point to the credibility Hewlett-Packard products and solutions have in the industry.

Business Case

Figure 1 shows an annual savings of \$25 for the HP A5120-48G SI switch compared to the IA. The annual costs were compared to a typical switch being used with varying traffic from idle to the maximum line rate.

The Annual Use Estimate (AUE) is based on a duty cycle of 12 hours per work day each week. During those 60 hours approximately 10 hours will be running at 100% load while the remaining 50 hours will run at 70% load. Weekends and the remaining 12 hours per day are considered as idle/ready for a total of 108 hours per week.

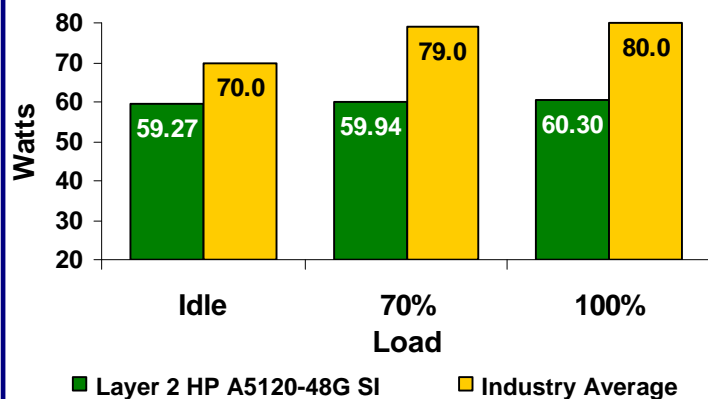
To calculate the annual cost, multiply the kilowatts by total yearly hours; and multiply this result by the cost factor of 12.5 cents per kWh.

Certified Green

Miercom conducts environmental analysis on products using holistic view, considering power efficiency, manufacturing, and other factors which are part of the product and its lifecycle. Power consumption and power efficiency are very important metrics for comparing products and are typically all that are discussed in other organizations' green reports. We believe a more comprehensive approach, which reveals true business case savings to customers for the other environmental benefits a vendor's product may afford, is a better approach.

Competitive indexing with industry average is achieved by comparing measured results from products in a given class. This comparison allows a single view of the annual cost for power consumption of a product, and comparison information that will help the user understand if the evaluated product affords an overall advantage for power efficiency.

Figure 5: HP A5120-48G SI Power Consumption
48 port switch, 512-byte frame size,
at specified load



Source: Miercom, June 2010

Power consumption was measured at idle, 70% and 100% throughput. Hewlett-Packard results are compared to the Industry Average (IA).

Miercom Certified Green

The energy-saving attributes of the HP A5120-48G SI were evaluated by Miercom in accordance with the Certified Green Testing Methodology. The product met the required criteria to achieve the Miercom Certified Green Award.

Based on our hands-on testing and the verified representations made by Hewlett-Packard, Miercom confirms that the HP A5120-48G SI is designed to provide effective and environmentally sound networking solutions.

The A5120-48G SI gives customers a highly economical, manageable and energy efficient Layer 2 switching solution. Utilizing the latest silicon technology and energy efficient design, the A5120-48G SI leverages its green features to promote environmentally sound network practices.



HP A5120-48G SI



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Miercom has hundreds of product-comparison analyses published over the years in leading network trade periodicals including Network World, Business Communications Review - NoJitter, Communications News, xchange, Internet Telephony and other leading publications. Miercom's reputation as the leading, independent product test center is unquestioned.

Miercom's private test services include competitive product analyses, as well as individual product evaluations. Miercom features comprehensive certification and test programs including: [Certified Interoperable](#), [Certified Reliable](#), [Certified Secure](#) and [Certified Green](#). Products may also be evaluated under the [NetWORKS As Advertised](#) program, the industry's most thorough and trusted assessment for product usability and performance.



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