

Sentinel Energy and Cost Savings Calculations

Introduction

The most prevalent methodology for accessing multiple classified networks within the U.S. and abroad is to utilize separate computers for each classification level in order to maintain the required security. In some instances as many as eight computers are separately accessed by users that switch their (K)eyboard, (V)ideo Monitor, and (M)ouse between each computer using a KVM Switch. This methodology is a tremendous power burden since each computer is a separate Security Domain that must be powered on for access. Other solutions such as Virtualization are more sophisticated and utilize servers that allow each security level to be maintained with a separate virtual security domain that is accessed via a Thin Client or “Dumb” Terminal. This technology is very sophisticated and expensive since it requires a new infrastructure with high speed powerful servers and expensive and sophisticated software. Users and administrators also require special training and some existing software may no longer be compatible. In addition, although it reduces power use at the desktop, the power required to maintain multiple simultaneous domains is intensive and provides no real savings since the power load is merely transferred to the Server. There is no free lunch with respect to energy requirements for data processing regardless of where it is implemented. The SPI Sentinel uses a true power saving and cost saving technology that relies on high speed switching between multiple domains so that only one domain need be active and powered at any time. A calculation of the savings is provided below for a facility that averages 4 Security Domains per seat.

Energy Savings

The average modern Desktop PC will utilize approximately 200 watts per hour for 2080 hours per year during normal data processing and network operations. Heavy duty data processing activity, of the type often used within DoD and other Federal Agencies, could push this power load even higher. This equates to at least $200 \times 2080 = 416,000$ watts per year. This assumes the computer is only used 8 hours per day for 5 work days and is turned off when not being used. If kept powered all the time the power use in idle mode would be about 80 watts for an additional 6680 hours at $80 \times 6680 = 534,400$ additional watts per year. This brings the total power usage to $416,000 + 534,400 = 950,400$ watts per year or 950.4 Kilowatt Hours (Kwhrs) per year.

Assuming an average of 4 computers per Multi-domain seat, the power use is a minimum of $4 \times 416,000 = 1,664,000$ watts per year (1664 Kwhrs per year) if the computers are turned off when not used. If the computers are always powered on the power usage would be $4 \times 950,400 = 3,801,600$ watts per year (3,801.6 Kwhrs per year). With the Sentinel installed, power use is reduced to 416,000 watts per year for each 4 domain Multi-domain seat since it is based on a single computer that can only remain on if it is being used. The Sentinel forces the user to power off the computer when not in use as a security function that also enforces energy conservation.

Based on the above, power savings per seat is a minimum of $1,644,000 - 416,000 = 1,248,000$ watts per year and a maximum of $3,801,600 - 416,000 = 3,385,600$ watts per year if the computers are allowed to remain on all the time. For a facility of 5,000 Multi-Domain seats the savings in power could be as much as $5000 \times 3,385,600 = 1,692,800,000$ watts or almost 1.7 Gigawatts or approximately 1.7 Million Kwhrs per year. This does not include the additional savings if the Sentinels were equipped with Solid State Drives (SSDs) which use about half the power of equivalent electromechanical drives. The use of SSDs could reduce the power usage by as much as an additional 50%, which could increase savings to approximately $1.5 \times 3,385,600 = 5,078,400$ watts per year. This equates to a maximum of **5,078 Kwhrs saved per year for each seat**. It is estimated that there are approximately 1,000,000 Multi-Domain seats within the United States Federal Agencies and Federal Contractors. It is, therefore, conceivable that the use of the Sentinel could ultimately provide an **overall energy savings of trillions of Kwhrs per year**.

Overall Cost Savings

The Sentinel has an average cost depending on configuration that is somewhat less than a single Desktop Tower PC with a display and all required software. For a Multi-domain seat using four computers the cost savings would equal the three computers it is eliminating plus their maintenance and energy costs. The Sentinel itself uses negligible power in the 100 milliwatt range since it is completely solid state and uses low power solid state circuitry that is only utilized during the domain login process which takes less than a minute. The savings in acquisition and maintenance costs would be the cost of the three computers and KVM Switch being replaced minus the acquisition and maintenance costs of the Sentinel. The cost of a Sentinel varies by quantity and configuration but is less than a typical Desktop used by DoD such as a Dell T3500 which, with minimum options sells for about \$1500. If Maintenance at about 15% per year is added the acquisition and maintenance cost savings is the cost and maintenance of two \$1500 computers and \$300 Secure KVM over a three year life cycle. This is equal to $1.15 \times (1500 + 1500 + 300) = 3795$. Over a longer period the savings are much greater since the Sentinel life cycle is 10 years as identified in the NIAP Validation. This allows the system to be reinstalled as necessary, during new computer upgrades over its life cycle.

Energy savings per year would be based on the cost of electricity per Kilowatt Hour, which averages between .1 to .2 dollars within the United States. If an average of .15 is used, the maximum savings of 4,400 Kilowatt hours per year for each seat identified above would equate to an **annual energy cost savings per seat of $.15 \times 4400 = \$850$** . This savings along with the above acquisition and maintenance cost savings would well exceed the costs of each Sentinel in its first year of use. Over a three year period the cost savings for each 4 domain seat would be the total of the acquisition, maintenance, and energy cost savings which is $\$3795 + (3 \times \$850) = \$6,345$. Over a three year computer life cycle the **annual overall cost savings from the Sentinel would average \$2115 per seat**. Other energy and cost savings based on reductions in required facility cooling are tangible but are facility dependent and too difficult to calculate.