

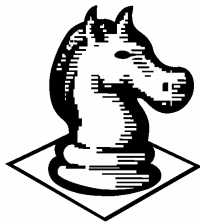
# MIMIC<sup>®</sup> *Simulator... for a greener world*

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*by Uwe Zimmermann*

**Make your organization **GREENer** with  
MIMIC Simulator**



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### **Gambit Communications, Inc.**

Founded in 1995, Gambit Communications is a leader in network simulation tools that enhance the productivity of management software developers and enterprise users while lowering their costs. MIMIC Simulator is a modular family of simulators used by leading networking vendors for use in applications from development and testing to operator training and disaster simulations. Gambit Communications' portfolio of many customers includes: IBM, CA, Hewlett Packard, MCI, Cisco, Nortel, Alcatel-Lucent, Marconi, Intel, Motorola, BMC, InfoVista, and Ericsson. For more information on Gambit and MIMIC, please visit [www.gambitcommunications.com](http://www.gambitcommunications.com).



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**E**nergy costs are increasing worldwide. Growing economies have resulted in unprecedented energy consumption. With mounting energy costs, diminishing power and space capacity, increased regulatory attention, and higher customer demand, “going green” is not only socially responsible but also vital for the bottom line.

Every test lab requires IT assets and power. Large organizations fill huge rooms with computing equipment and cooling systems. Expanding this lab capacity leads to power scarcity, over-consumption of non-renewable resources, and increased pollution. There is a definite need for IT solutions that go well beyond the traditional facilities focus. Simulation software plays a leading role in this new paradigm.

This paper explores the need for drastic energy savings and demonstrates benefits being achieved with Gambit Communications’ solutions. Gambit’s powerful software suite, **MIMIC Simulator**, provides a clear energy efficient, environmentally friendly alternative. Utilization of these capabilities can help organizations meet the increasing challenges of energy efficiency, cost containment and compliance.

### Going Green

- ✓ *How to reduce energy use by 90% per year*
- ✓ *How to drastically decrease physical space*
- ✓ *How to decrease the CO2 Emissions produced by the IT infrastructure*
- ✓ *How to save money while saving the planet*

Scientists attest that Global Warming is real, our water supply is rapidly dwindling due to contamination and our air quality is contributing to asthma, allergies and even deaths from lung and respiratory diseases. Medical researchers acknowledge that many cancers and other diseases are directly related to the use of synthetic petrochemicals. Organizations can make significant improvements in these situations by making changes to their practices when it comes to building, power consumption and energy management.

Going green is what we do in an effort to save our planet. The only way to prevent irreversible destruction to our earth is to change the way we treat our environment. We all need to learn to protect and preserve the Earth. It's not just recycling or using "smart" devices anymore. It's conserving energy and space, reducing carbon emission where possible, anything that we can do at home and work and in our daily lives to make our planet better.

There is also a growing social responsibility. Organizations are realizing that being green is good for business, positively affecting brand image and fast becoming a competitive differentiator for customers, partners and suppliers. The fact that going green can reduce costs and thus improve the bottom line simply increases the level of interest in going green. But how do organizations go green? Currently there is a focus on deploying more efficient systems and tracking energy consumption. Projects with the primary focus of increasing greenness are also exploring optimization of business process along with infrastructure improvements. As the energy stakes rise, a more pervasive approach is essential. Software is the key component in helping organizations go green from the inside out.

With energy costs continuing to escalate, along with ever increasing reliance on IP-based networks to power a myriad of new applications, data centers are coming under unprecedented operational scrutiny. IT managers, faced with the challenge of squeezing more performance out of existing data center budgets, need to limit the capital expense of additional equipment, simplify network operations and ensure maximum efficiencies that contribute to 'green' energy reduction efforts.

### The Need

- ✓ *Global Warming is real.*
- ✓ *Going green is what we do in an effort to save our planet.*
- ✓ *We need to conserve energy and space.*
- ✓ *Being green is good for the business image.*
- ✓ *Software is a key component in going green from inside out.*

## ***Energy consumption***

A 2007 report from the U.S. Environmental Protection Agency\* estimated data centers consume 1.5 percent of the country's total electricity. That total doubled from 2001 to 2006 and is expected to almost double again by 2011, going up about \$7.4 billion annually in energy costs.

Most data centers were built before 2001, when traditional capacity models and technology limitations forced system architects to expand capacity by attaching new devices—one server per workload, with every device requiring dedicated floor space, power, and cooling.

These types of infrastructures are inherently inefficient, leading to device underutilization, greater hardware expenditure, and higher total energy consumption. All of these, cost, performance and environmental concerns, brings simulation software into prominence. It brings thousands of networking equipment together to harness the resources of many separate elements to perform as one.

### **Consumption**

- ✓ ***Data centers consume 1.5% of the total US electricity.***
- ✓ ***Every test lab requires IT assets and power.***
- ✓ ***Virtualization helps in reducing the cost, space, energy and maintenance headaches.***

## ***MIMIC to the rescue***

Gambit's MIMIC Simulator can help do more with less physical equipment, reducing the energy demands of your infrastructure while expanding capacity and enabling greater flexibility.

MIMIC can create a virtual lab consisting of thousands of devices in one workstation. It replaces the test labs which are used for evaluation before purchase, testing, configuration and training before deployment. Virtualizing the lab helps in going green along with saving costs:

- ✓ Replaces thousands of devices and reduces the capital expenditure.
- ✓ Decreases the electricity requirements by 90%.
- ✓ Reduces the need for huge space.
- ✓ Trims down the cost of future purchases
- ✓ Removes the worry of recycling old electronic products or properly disposing of electronic waste such as lead and mercury

An average personal computer consumes 200W [1], a typical networking device consumes 100W. Simulating those networking devices in MIMIC gives organizations some serious energy savings. The following table computes electricity consumption based on lab size:

<b>Networking Devices</b>	<b>Real Lab</b>	<b>Virtual Lab with MIMIC</b>
<b>100</b>	<b>10kW</b>	<b>0.2kW</b>
<b>250</b>	<b>25kW</b>	<b>0.2kW</b>
<b>500</b>	<b>50kW</b>	<b>0.2kW</b>
<b>1,000</b>	<b>100kW</b>	<b>0.2kW</b>
<b>2,000</b>	<b>200kW</b>	<b>0.2kW</b>
<b>5,000</b>	<b>500kW</b>	<b>0.2kW</b>
<b>10,000</b>	<b>1000kW</b>	<b>0.2kW</b>

The power consumption of a simulator is equal to the power consumption of a single PC, which remains constant for 1 or thousands of simulated devices. As the table shows, simulating 10,000 devices gives you 5,000 times the power reduction.

It is easy to calculate the daily costs based on the Average Retail Price of Electricity (From [2]) for different states, e.g. for NH (current electricity costs for the State of NH):

<b>Networking Devices</b>	<b>Real Lab</b>	<b>Virtual Lab with MIMIC</b>
<b>100</b>	<b>\$31.94</b>	<b>\$0.64</b>
<b>250</b>	<b>\$79.85</b>	<b>\$0.64</b>
<b>500</b>	<b>\$159.70</b>	<b>\$0.64</b>
<b>1,000</b>	<b>\$310.94</b>	<b>\$0.64</b>
<b>2,000</b>	<b>\$621.88</b>	<b>\$0.64</b>
<b>5,000</b>	<b>\$1554.70</b>	<b>\$0.64</b>
<b>10,000</b>	<b>\$3100.94</b>	<b>\$0.64</b>

Again, the cost of electricity remains constant with MIMIC Simulator while for the real lab, it increases linearly by the number of devices. Thus **MIMIC yields a cost saving of 4,500 to 5,000 times in electricity consumption alone**. These numbers ignore cooling, lighting, networking and other sub-linear cost increases. In addition to the energy savings, there are major costs savings related to device purchase, maintenance and repair.

## CONCLUSION

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Using simulations can significantly reduce the actual number of IT equipment needed to support a lab or a data center.

One can see that from an energy cost savings standpoint alone; MIMIC Simulator pays for itself within a very short period of time. In addition to that, it reduces the need for most of the equipment, space requirements and maintenance headaches.

The idea of going green not only makes an organization socially responsible by saving energy, but it also yields real impact on the bottom line.

### **MIMIC Simulator**

- 1. Replaces thousands of devices and reduces the capital expenditure.*
- 2. Decreases the electricity requirements by 90%.*
- 3. Reduces the need for huge space.*
- 4. Trims down the cost of future purchases*
- 5. Removes the worry of recycling old electronic products or properly disposing of electronic waste such as lead and mercury*

### **References**

- [1] [http://www.aeanet.org/Forums/AeAEnergyPaperJune2001\\_forum+.pdf](http://www.aeanet.org/Forums/AeAEnergyPaperJune2001_forum+.pdf)  
[2] [http://www.eia.doe.gov/cneaf/electricity/epm/table5\\_6\\_b.html](http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_b.html)

## THE MIMIC PRODUCT SUITE

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The three components of the MIMIC product suite work together to provide a complete SNMP-based network simulation capability on a single computer.

### *MIMIC Simulator*

The MIMIC Simulator allows for the simulation of an entire enterprise network on one Intel®-based PC or Sun® Microsystems Sparc™. With support for any SNMP-based device, a variety of device configurations can be performed with a management application.

Configurations are completely run-time customizable, both on an individual and collective basis. Since MIMIC responds to SNMP v1, v2c and v3 queries on any of its configured IPv4 and IPv6 addresses, it looks to the Network Management Application as if it is talking to actual devices.

### *MIMIC Compiler*

The MIMIC Compiler allows users to import any SMI-compliant MIB and extend the set of defined devices to support proprietary or unique equipment. Vendors use the Compiler to import definitions of new devices in the prototype development phase.

With an intuitive graphical interface or a powerful, flexible scripting language, users can further customize any device in the MIMIC library to simulate unique network behavior.

### *MIMIC Recorder*

The MIMIC Recorder enables users to automatically simulate the behavior of actual devices on a network by capturing a “snapshot” of the device MIB in actual operation. The snapshot can then be easily replayed by the Simulator to simulate an entire network with minimal user effort.

Any number of target devices can be recorded in parallel. Any subset of the device MIB objects can be recorded. For example, if a problem investigation focuses on a small part of the MIB, snapshots can be taken of the relevant MIB subtrees. The recording can be saved in a format for future editing, annotation. Recordings can be exchanged via e-mail and source code-controlled.

### *MIMIC Device Library*

MIMIC ships with a large library of simulated devices, networks and pre-compiled MIBs from the leading networking companies.

MIMIC standard package includes the following:

#### *Tools*

- **MIMICView** - User-friendly GUI to manipulate the simulations
- **MIMIC Shell** - Command-line interface

### *Wizards*

MIMIC Wizards give a user-friendly way to compile, record and simulate huge networks.

- **Discovery Wizard** - Records large networks
- **Topology Wizard** - Customizes different network topologies
- **MIB Wizard** - Allows importing new MIBs
- **Simulation Wizard** - Helps creating simulations for devices under development

### *Libraries*

- **Device Library**
- **Networks Library**
- **MIB Library**
- **Scripts Library**

### *Platforms*

MIMIC supports Windows®, Solaris™ and Linux™ operating environments.