

ShoreTel, Inc.

Unified Communications System

Evaluation of Power Consumption vs. Cisco Unified Communication Manager



Test Summary

Premise: Enterprises of all sizes are becoming increasingly conscious of the energy consumption of their business tools, including communications systems. Not only does lower energy consumption decrease the total cost of ownership, it has a net positive impact on CO2 emissions. Buyers are advised to factor in the “green” footprint, as well as the features and functionality, of a unified communications system.

ShoreTel, Inc. commissioned The Tolly Group to evaluate its Unified Communications (UC) System for its power consumption when running critical IP Telephony components in campus headquarters, regional office and branch-office locations.

The Tolly Group measured the power consumed (total watts) by a variety of ShoreGear® IP voice switches and ShorePhone® IP phones. Engineers then computed the energy requirements to support three enterprise-class scenarios — a large-scale network with headquarters, a medium network with a central HQ and 19 remote offices, and a self-contained single site small office. The computations considered all ShoreGear voice switches, phones and associated servers and the power required to support them.

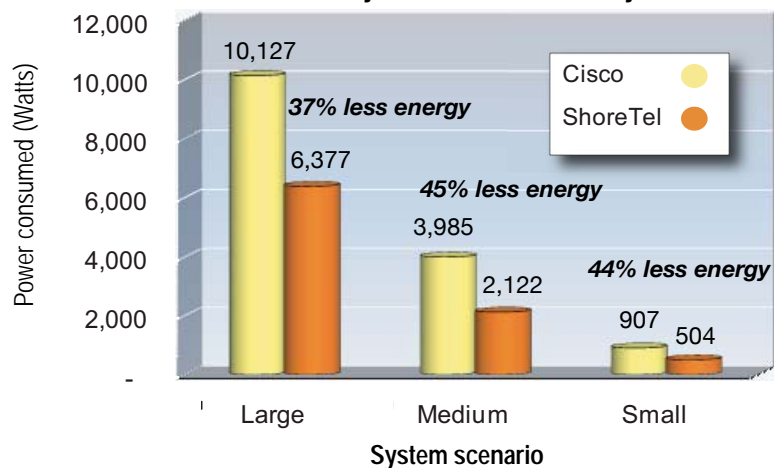
The Tolly Group compared the ShoreTel Unified Communications System’s energy consumption to a Cisco Systems, Inc. solution used for a comparable deployment. A representative sample of Cisco equipment was tested for power consumption and those results were used to extrapolate the data for the three enterprise scenarios.

Tests were conducted in July 2008.

Test Highlights

- ▶ Uses 37% less power — 6,377 watts versus 10,127 watts versus a Cisco solution in a large enterprise scenario
- ▶ Uses 45% less power — 2,122 watts versus 3,985 watts versus a Cisco solution in a medium-sized multi-site deployment
- ▶ Uses 44% less power — 504 watts versus 907 watts versus a Cisco solution in a small office deployment
- ▶ ShoreTel’s monochromatic GbE IP phone consumes almost 60% less power than a Cisco equivalent in idle state

Energy Consumption of ShoreTel and Cisco Unified Communication Systems in a Large System As Measured by Extech Power Analyzer



Note: Large system was comprised of 1,500 users across a main headquarters site, a remote office (200 users) and a satellite office (50 users). Medium scenario included 350 users across 20 sites. Small scenario included 65 users at a single site.

Source: The Tolly Group, July 2008

Figure 1

Executive Summary

ShoreTel's Unified Communications System and its ShoreGear voice switches and Shore-Phone telephones used up to 45% less energy across three enterprise-class deployment scenarios than a solution based upon Cisco Unified Communication Manager.

These tests show that ShoreTel's Unified Communications System, which is comprised of the company's ShoreGear IP voice switches and IP phones, uses up to 45% less energy, on average, than Cisco Systems, Inc.'s comparable Cisco Unified Communication Manager.

The Tolly Group measured key components and calculated the energy consumption of the solutions under test for three enterprise-class scenarios — a large multi-site business with 1,500 users, a medium-sized multi-site distributed business with 350 users, and a small office with 65 users. In every case, the ShoreTel Unified Communications System required less energy to power VoIP communications than the Cisco solution.

RESULTS

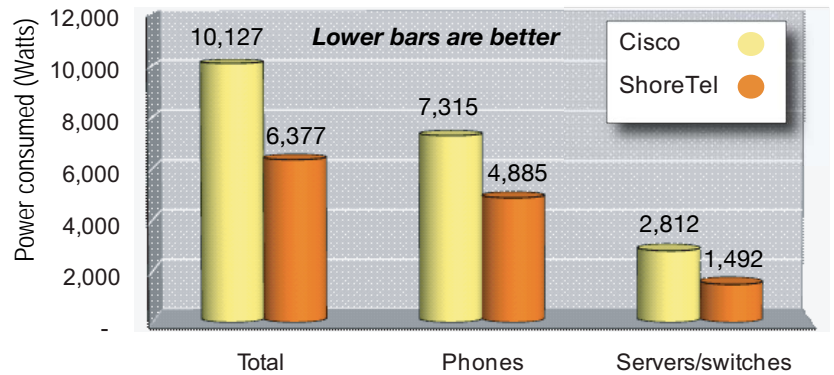
ENERGY CONSUMPTION: LARGE SYSTEM

The Tolly Group tested a representative sample of voice switches and IP phones, and then used those measurements to generate a projection of energy consumption across a large-scale deployment of 1,500 users — 1,250 stationed at a central headquarters location with two equipment rooms, 200 users at a remote

office location and 50 users at a branch office. The system was fully UC-enabled with voice, voice messaging, IM and converged conferencing. It also had a contact center. Redundancy was assumed for call control, voicemail and for the contact center.

Test results show that a single ShoreGear-90 voice switch (SG-90) used 10.9 watts during the 40-second test in both idle state, and active state with traffic flowing across ports (voicemails recorded, voice connections made, etc). An IBM System x3250 server, used by ShoreTel for

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As Measured by Extech Power Analyzer

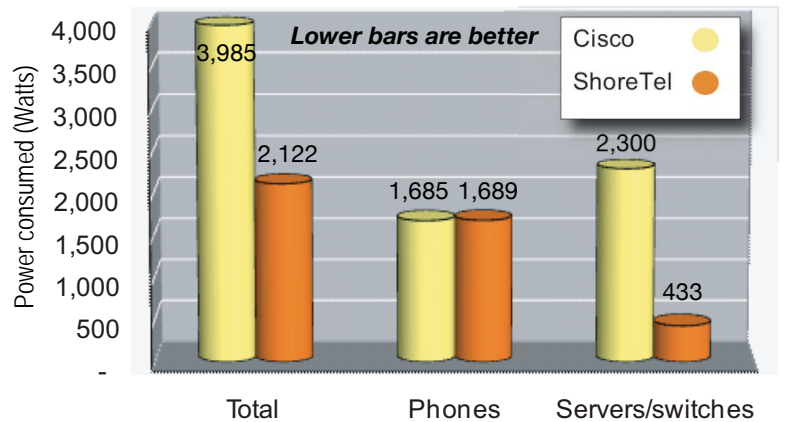


Note: Large system was comprised of 1,500 users across a main headquarters site, a remote office (200 users) and a satellite office (50 users). Results based on extrapolated data derived from tested devices.

Source: The Tolly Group, July 2008

Figure 2

Energy Usage of ShoreTel and Cisco Unified Communications Systems in a Medium System
As Measured by Extech Power Analyzer



Note: Medium system supported 350 users across 20 sites. Results based on extrapolated data derived from tested devices.

Source: The Tolly Group, July 2008

Figure 3

system management and voicemail applications, required 85 watts of energy.

The Cisco MCS 7828-H3 appliance, on the other hand, consumed 105 watts during the same test, which translates into about 8% more watts consumed.

On the IP phone front, Tolly Group engineers tested four models each from ShoreTel and from Cisco. (See *Test Methodology section*.)

The ShoreTel phones used 6.05 watts each during idle state (just the phone powered, no traffic) while the Cisco IP phones required 6.3 watts. During active state (with an open voice connection), the ShoreTel phones used 6.8 watts each, on average, while the Cisco phones required 7.05 watts each, on average.

Users who deploy Gigabit Ethernet to the desktop should note that ShoreTel's 10/100/1000 IP560g phone used 59% less power than its Cisco counterpart in idle state, and 33% less power in active mode during a voice call.

Using those results, Tolly Group engineers then computed the energy costs for a large-scale configuration that covered 1,500 IP phones, 62 ShoreGear voice switches, seven IBM servers a conference bridge and a third-party speech engine.

For the Cisco configuration, engineers factored in four Cisco Unified Communication Manager appliances, a Unified Operations Manager and Provisioning Manager, six Cisco 2821 Integrated Services Routers (three at each HQ site), plus a Cisco 2821 ISR at the remote office and a Cisco 3825 ISR at the branch office.

Test results show that the ShoreTel UC solution would use 6,377 watts versus 10,127 watts for the Cisco solution. (See Figure 2.)

ENERGY CONSUMPTION: MEDIUM SYSTEM

Tolly Group engineers also projected the energy costs to support a medium-sized business configuration supporting 350 users across 20 sites. The scenario consisted of a single headquarters site with 65 users supported by three SG-50 voice switches providing N+1 redundancy, a VoIP application server, conference bridge and an SG-T1 to support PRI trunks.

Each of 19 branch offices were supported by an SG-30 voice switch and 15 users with IP phones.

ShoreTel's ShoreGear voice switches and IP phones would require 2,122 watts to support the HQ and 19 branch office sites. The Cisco solution would require 3,985 watts, meaning users would need 45% more energy to power the Cisco VoIP solution. (See Figure 3.)

ENERGY CONSUMPTION: SMALL SYSTEM

This test scenario involved a small self-contained office with 65 users.

The single site would use three SG-50 voice switches for N+1 redundancy for call control, 65 IP phones and an SG-T1 for PRI trunking.

The small office Cisco configuration would consist of a Cisco Call Manager with redundancy, Unity voice-mail server, a Cisco 2821 WAN gateway with T1 access, and 65 IP phones. The ShoreTel UC solution would need 504 watts to power the equipment. The Cisco solution would require 907 watts. See Figure 4.)

SETUP & METHODOLOGY

Engineers tested the ShoreTel ShoreGear-90 (SG-90) voice switch connected to an IBM System x3250 rack-mount server loaded with Windows 2003 Server Edition and ShoreTel 8 Software.

For Cisco, engineers measured the power consumption of the Cisco MCS 7828-H3 Unified Communication Manager Appliance equipped with a pre-installed Linux operating

ShoreTel Inc.

Unified Communications System

Efficient Energy Consumption for Enterprise VoIP Networks



system and Unified Communications Manager Business Edition 6.1 software suite.

Engineers also tested eight IP phones with a mix of display and connection types connected to a GbE switch via a PowerDsine 3100G single-port PoE injector:

- ☛ ShorePhone IP 230 and Cisco IP 7940G (no PoE capability, tested with AC adaptor), monochrome display and Fast Ethernet connection;
- ☛ ShorePhone IP 560G and Cisco IP 7961G-GE, monochrome display and GbE connection;
- ☛ ShorePhone IP 265 and Cisco IP 7970G, color display and Fast Ethernet connection;
- ☛ ShorePhone IP 565G and Cisco IP 7975G, color display and GbE connection.

The ShoreTel Call Manager was connected to an SG-90 voice switch, which provided ShoreTel IP phones with connection across the GbE network, and the Cisco MCS 7828-H3 Unified Communication Manager connected to Cisco Unified IP phones in the same manner.

Before measuring the amount of power drawn by the IP phones, engineers measured the power drawn by the PowerDsine 3100G PoE injector (1.6 watts) as a baseline. Engineers then subtracted the baseline from the overall power consumption of each IP phone to derive the power consumed purely by the IP phone alone.

Tolly Group engineers measured the power consumption of the various VoIP components and extrapolated the measured data into the small, medium and large system configurations. The key VoIP components included voice switches, VoIP servers and IP phones. Engineers used an Extech

Power Analyzer to measure the watts consumed by the devices.

The extrapolated data was calculated using a calibration factor which is the difference between the measured power consumption of each device

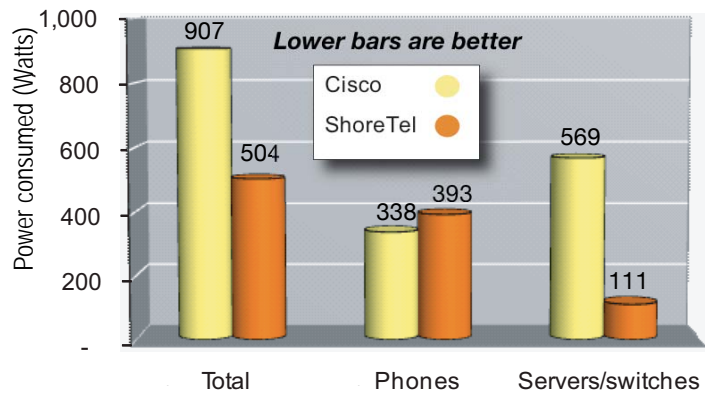
and the official published power consumption found in each vendor's Web site official data sheet for each component. The calibration factor enabled engineers to derive an effective value, representing the maximum power consumed by the tested device. Engi-

neers used the effective values of power consumption for the devices to calculate an effective value for power consumed across the entire test scenario.

Given this approach, Tolly Group engineers could extrapolate a close estimate to the total power consumed from all unmeasured devices for the final results. After applying the calibration factor an effective value or maximum power consumed by the devices was derived. Using the effective values for power consumption of the various components tested, Tolly Group engineers estimated the total power consumption from all devices in the three network scenarios. ShoreTel used the IBM servers as application hosts for voicemail and administrative functions.

Cisco, on the other hand, integrated server functionality into its MCS 7828-H3 Unified Communication Manager appliance along with core voice switching functions. ShoreTel used the IBM servers as application hosts for voicemail and administrative functions. Cisco, on the other hand, integrated server functionality into its MCS 7828-H3 Unified Communication Manager appliance along with core voice switching functions.

Energy Usage of ShoreTel and Cisco Unified Communications Systems in a Small System As Measured by Extech Power Analyzer



Note: Small system supported a single site with 65 users. Results based on extrapolated data derived from tested devices.

Source: The Tolly Group, July 2008

Figure 4

Test Equipment Summary

Vendor	Product	Web URL:
Extech Instruments	Extech Power Analyzer	http://www.extech.info

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