

Avaya 9600 Series Voice over IP Phones: Energy Consumption Evaluation versus Cisco Unified IP Phone 7900 Series

EXECUTIVE SUMMARY

Deployment of IP-based telephony solutions have become commonplace. The next step toward utilizing IP-based communications for business unification is to design an open and extensible environment that expands upon the basic capabilities of VoIP for unified communications. System architects are now accomplishing this with Session Initiation Protocol (SIP). This step delivers a number of operational efficiencies, such as service consolidation, centralization, and reduced management overhead.

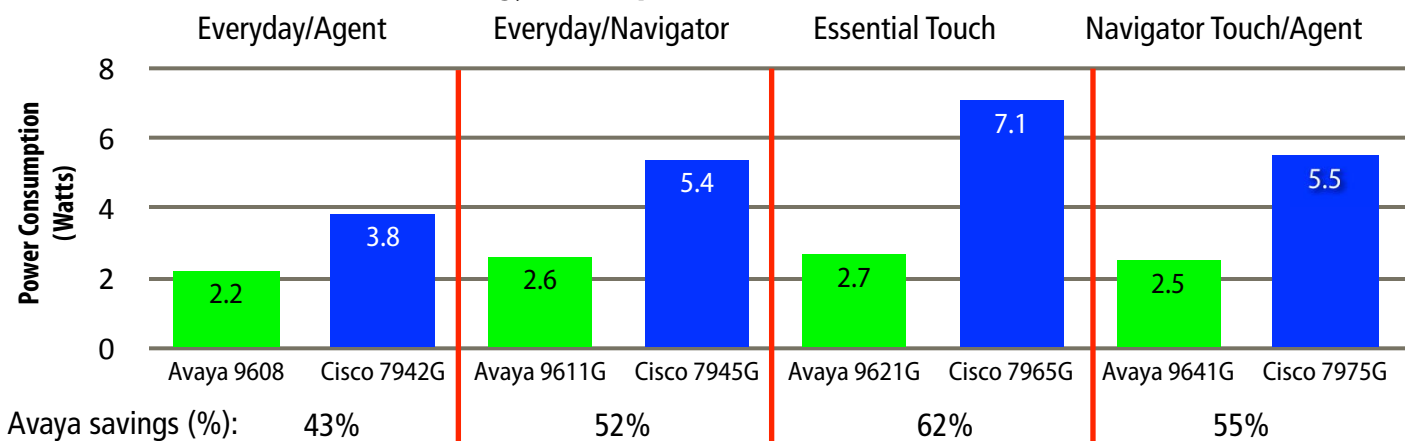
SIP-enabled IP Phones can help reduce overall system energy consumption, especially in large installations, where relatively small differences in the power consumption of VoIP phones can have a significant overall impact due to the sheer volume of powered devices.

Especially with larger installations, VoIP phones constitute the largest number of devices and consume the biggest share of energy in a VoIP system for both Avaya and Cisco installations. Independent measurement conducted by Tolly and energy consumption models developed by Avaya and validated by Tolly engineers reveal three facts about VoIP phones and systems, they are Tolly's "Bottom Line".

THE BOTTOM LINE

- 1 In every scenario tested by Tolly, the Avaya 9600 phones consumed 40% to 60% less energy than the comparable Cisco offering
- 2 Over 80% of the overall energy consumption of VoIP systems can be attributed to the VoIP phones
- 3 Avaya VoIP solutions (gateways, servers, IP Phones) were validated by Tolly to use 45% less energy, produce 45% less CO₂ and lower the electrical expense by 45% vs Cisco

VoIP Phone Energy Consumption: On Hook, PC Switch Port Inactive



Note: Percentage of power consumption savings by using Avaya listed for each pair of phones compared.

Source: Tolly, July 2010

Figure 1



Introduction

In June 2010, Tolly was commissioned by Avaya to verify energy efficiency performance. Customer queries, RFP's and requirements for programs like Energy Star® from the US EPA (see side bar later in this document) demonstrate that Avaya's government and enterprise customers are looking for products and services which, when implemented, reduce the amount of energy required, the cost associates with it and its carbon emission.

The project objectives included: 1) obtaining energy consumption data for the Avaya 9600 series VoIP phones data, in all 5 common usage scenarios, 2) obtaining energy consumption data for the new Cisco Unified IP Phone 7900 series models in the same scenarios and compare between similar models from both companies 3) To validate & endorse the solution energy model developed by Avaya. To substantiate Avaya's new energy efficient IP Phone design and achieving the above objectives, Tolly monitored and verified product testing conducted at Avaya's Energy Efficiency facility in Billerica, MA.

IT organizations that focus on the purchase of equipment that lowers energy consumption and that are establishing plans to intelligently manage IT installations can model their VoIP environment utilizing Avaya's energy calculator. Developed exclusively for this test and validated by Tolly engineers, individual IP Phone and VoIP solution designs can be projected in dollars, KWh and CO₂ emissions with the calculator. (A sample of the calculator output can be found later in this document and the calculator is available through Avaya representatives.)

Test Scenario Overview


VoIP phones were tested in a variety of states of activity in order to provide more granular data points for energy consumption modeling. Test scenarios were also designed to take advantage of the phones integral switch-ports that allow the connection of a computer (referenced herein as "PC"),

The following scenarios were tested:

- Minimum: No PC connected, display manually adjusted to its lowest (dimkest) setting.
- Normal Off Hook: No PC connected, default display setting, phone in use.

**Avaya
9600 Series
VoIP Phones**

**Energy
Consumption vs
Cisco Unified IP
Phone 7900
Series**



*Tested
July
2010*

- Normal On Hook: No PC connected, default display setting, phone not in use.
- Energy Saver On: This test scenario differed by vendor. For Avaya, the energy saver

Average VoIP Phone Energy Consumption (Watts) Avaya 9600 Series IP Phones vs Cisco 7900 Unified IP Phone Series

Scenario	Avaya 9600	Cisco 7900	Savings with Avaya
Minimum (No PC, display off)	2.1	4.8	56.7%
Normal Off Hook (No PC)	2.6	5.3	51.8%
Normal On Hook (No PC)	2.5	5.3	52.5%
Energy Saver On (No PC)	2.3	4.8	52.9%
Maximum (PC Traffic, speaker phone)	3.1	5.9	47.3%
Average (All Scenarios)	2.5	5.2	52.0%

Note: Measurements accurate to .1Watts.
For Cisco, "Energy Saver" mode and "Minimum" settings were the same.
Source: Tolly, July 2010

Table 1



VoIP Phone Energy Consumption (Watts)

Scenario	Minimum (No PC, display off)	Normal Off Hook (No PC)	Normal On Hook (No PC)	Energy Saver On (No PC)	Maximum (PC Traffic, speaker phone)	Average (All Scenarios)
Avaya 9608	2.2	2.3	2.2	2.2	2.4	2.3
Cisco 7942G	3.9	3.9	3.8	3.9	4.3	4.0
Savings with Avaya	43.1%	41.0%	42.6%	36.9%	43.9%	41.5%
Avaya 9611G	2.0	2.6	2.6	2.2	3.2	2.5
Cisco 7945G	4.8	5.4	5.4	4.8	5.6	5.2
Savings with Avaya	57.6%	51.6%	51.6%	54.9%	42.9%	51.7%
Avaya 9621G	2.1	2.7	2.7	2.4	3.6	2.7
Cisco 7965G	6.3	7.0	7.1	6.3	7.9	6.9
Savings with Avaya	66.7%	61.6%	62.3%	61.4%	55.1%	61.4%
Avaya 9641G	2.0	2.6	2.5	2.3	3.3	2.6
Cisco 7975G	4.6	5.5	5.5	4.6	6.3	5.3
Savings with Avaya	56.1%	52.7%	54.6%	51.1%	46.8%	52.3%

Source: Tolly, July 2010

Note: Measurements accurate to .1Watts.
For Cisco, "Energy Saver" mode and "Minimum" settings were the same.

Table 2



feature in its LAN switch port was set to run “off hours” at only 10Mbps. This allowed the VoIP phone to be available if needed but reduced switch power.

Cisco has a power saver mode in which the switch port is actually turned off during non-business hours, but this makes the phone unusable. Instead, testers minimized power draw at the phone by dimming the display but verifying that it was still visible.

- Maximum: PC connected transmitting traffic, phone in use with speakerphone on.

Test Results

Four VoIP phones from each vendor were tested. In every scenario, the Avaya 9600 phones consumed less energy than the comparable Cisco offering. The average energy savings from using Avaya VoIP phones ranges

from 41.5% to to 61.4% when compared head-to-head with comparable Cisco models. See Table 1 for the combined average of all models across the different tests.

Avaya 9608

The Avaya 9608 is a monochrome phone with Fast Ethernet (100Mbps) network connectivity. Testing compared this phone to Cisco’s Unified IP Phone models 7942G. On average across all 5 test scenarios, the Avaya 9608 was 41.5% more energy-efficient than the Cisco 7942G. See Table 2.

Avaya 9611G

The Avaya 9611G is a color phone with Gigabit Ethernet network as well as USB connectivity. Testing compared this phone to Cisco’s Unified IP Phone model 7945G.

On average across all 5 test scenarios, the Avaya 9611G was 51.7% better than the Cisco 7945G. See Table 2.

Avaya 9621G

The Avaya 9621G is a touch screen color phone with Gigabit Ethernet network connectivity. Testing compared this phone to Cisco’s Unified IP Phone models 7965G.

On average across all 5 test scenarios, the Avaya 9621G was 61.4% more energy-efficient than the Cisco 7965G.. See Table 2.

Avaya 9641G

The Avaya 9641G is a touch screen color phone with Gigabit Ethernet network as well as USB connectivity. Testing compared this phone to Cisco’s Unified IP Phone model 7975G.

On average across all 5 test scenarios, the Avaya 9641G was 52.3% more energy-efficient than the Cisco 7975G.. See Table 2.

Avaya & EPA Energy Star Guiding Principles

Avaya is committed to reducing the carbon footprint of IT products. We are in dialog with regulatory agencies like the US EPA which administers the Energy Star® certification program. As of August 2010 the Energy Star® program does not cover any Avaya products however we have volunteered to adopt the program guiding rules and implemented them in our products’ design:

- * Qualified products must deliver the features and performance demanded by consumers, in addition to increased energy efficiency.
- * If the qualified product costs more than a conventional, less-efficient counterpart, purchasers will recover their investment in increased energy efficiency through utility bill savings, within a reasonable period of time.
- * Energy efficiency can be achieved through broadly available, non-proprietary technologies offered by more than one manufacturer.
- * Product energy consumption and performance can be measured and verified with testing.

Avaya and its 17,000 employees understand that design matters. We are committed to designing future-friendly, energy efficient products.

Source: Avaya, August 2010

Figure 2



Test Setup & Methodology

The purpose of this evaluation was to compare the relative energy consumption of various VoIP phones, therefore the relevant test environment

included only the VoIP phone under test and the LAN switch to which it was connected. Each vendor's VoIP solution was paired with its same-branded LAN switch. This is important since the

switch is typically an important element of each vendor's power management strategy. See Table 3 for a listing of the individual IP phones and LAN Switches included in the test.

Savings with Avaya - Energy Model

Design Matters. Avaya VoIP design can provide substantial savings.

SIP enabled IP Phones make up 98% of all devices the consume power in a VoIP design – therefore IP energy efficiency design matters. SIP enabled IP Phones can consume 80% of all the electricity in the design
The average SIP enabled IP Phone savings by Avaya is 52%; the average VoIP solutions savings is over 45%.

Avaya can model annual energy use, cost and CO₂ consumption relevant to a business, government or healthcare decision-maker, the table below illustrates office configurations of 400, 1500, 4000 and 10,000 IP Phones and the required call servers, gateways and routers. The Avaya model calculates the energy savings when implementing Avaya rather than Cisco VoIP solution in kilowatts and the carbon savings in pounds per year using the May 2010 US average kWh rate of 10.19 cents.

Avaya-enabled Annual Solutions Savings (Scenario: IP Phone on hook, no PC connected)				
Office User Configuration	Power (kWh)	US Dollars	CO ₂ /Pounds	Avaya Saves:
400	16,027	\$1,633	25,376	49.6%
1,500	49,040	\$4,997	77,646	45.5%
4,000	127,669	\$13,010	202,139	45.6%
10,000	318,009	\$32,405	503,305	45.5%

Tolly engineers validated these scenarios and Avaya's modeling tool.

If you're planning to expand contact center agents, or introduce next generation color touch screen SIP enabled IP Phones for heavy navigators, Avaya's measured value proposition is lower cost and less carbon by using fewer kilowatts. Contact your Avaya representative for specific analysis to your situation.

Avaya Energy Saver feature was also tested and produced an additional 9% energy savings while still maintaining voice and PC connectivity through the switch port. Cisco EnergyWise did not have similar capability to test. EnergyWise only allows power termination to IP Phones ending services and requiring re-registration based on IOS version 12.2.52.

Source: Avaya, July 2010

Figure 3



For each test, the IP phone under test was connected to a PoE port of a LAN switch from the same company. Power draw data was obtained using the Power Plan CAT5/6 DVM from Byte Brothers, Inc. (<http://bytebrothers.com>).

The power draw of each IP phone was measured in the various states described at the beginning of this document.

To measure idle power consumption of the DUTs, engineers connected the power supply to the test tool, and powered on the device. Once the DUT had reached an idle state, records were taken and averaged over a span of two minutes.

Energy Saver Test

As Avaya and Cisco implement energy saver mode differently, this study was designed to ensure the collection of valid comparative energy consumption data.

Avaya's energy saver mode on its switch reduces the port speed to 10Mbps. This allows the IP phone and any system connected to the IP phone's integrated LAN switch to communicate across the LAN but the lower LAN link speed reduces the power draw. Avaya notes that this mode can be set on a port-by-port basis and can be activated manually or automatically via a scheduler built in to the LAN switch. In addition, energy saver mode can be coupled with Avaya's PoE power saver feature to designate which devices, such as certain wireless access points, can be powered off completely at the end of the work day.

For Cisco, the relevant EnergyWise policy would shut off the power to the switch port to which the IP phone was

Devices Under Test

Device	Model
Avaya 9600 Series & LAN Switch	
48 port PoE Switch	ERS 4548GT-PWR
10/100 IP Phone	9608
10/100/1000 IP Phone	9611G
10/100/1000 IP Phone	9621G
10/100/1000 IP Phone	9641G
Cisco Unified IP Phones & LAN Switch	
24 port PoE Switch	WS-C3750G-24PS-S
10/100/1000 IP Phone	Unified IP Phone 7942G
10/100 IP Phone	Unified IP Phone 7945G
10/100/1000 IP Phone	Unified IP Phone 7965G
10/100/1000 IP Phone	Unified IP Phone 7975G

Cisco phones were tested with SIP firmware release 8.5(2). Avaya phones were tested using Avaya One-X H323 R3.11 as Avaya SIP firmware was not available in the test window. Avaya internal benchmarks show that the power consumption of the SIP version is equal to or lower than the Avaya H.323 software documented in this report

Source: Tolly, July 2010

Table 3

connected. In this state, no communication would be possible. Alternatively, Cisco allows a policy which instead turns off the display, moderately reducing power consumption, while maintaining a functioning phone. Thus to provide a relevant comparison between functional phones, the energy saver scenario for Cisco was the same as the scenario labeled minimum in which there was no PC connected to the integrated switch of the phone and the screen was dimmed completely.



About Tolly...

The Tolly Group companies have been delivering world-class IT services for 20 years. Tolly is a leading global provider of third-party validation services for vendors of IT products, components and services.

You can reach the company by email at sales@tolly.com, or by telephone at +1 561.391.5610.

Visit Tolly on the Internet at:
<http://www.tolly.com>

Interaction with Competitors

In accordance with Tolly's Fair Testing Charter, Tolly personnel invited representatives from Cisco Systems, Inc. to review the testing but received no response. All products were configured to use default settings except as noted.



For more information on the Tolly Fair Testing Charter, visit:
<http://www.tolly.com/FTC.aspx>

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