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## **The Total Economic Impact™ Of Cisco Unified Wireless Network Migration**

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## Executive Summary

In February 2008, Cisco Systems commissioned Forrester Consulting to examine the total economic impact and potential return on investment (ROI) that enterprises may realize by migrating to a Cisco Unified Wireless Network. A Cisco Unified Wireless Network allows organizations to standardize and centrally manage all of the various elements within their wireless network. This study illustrates the financial impact of migrating to a controller-based, or centrally managed, wireless architecture for an organization that previously deployed and managed autonomous wireless solutions.

Forrester conducted in-depth interviews with four existing Cisco customers that had recently migrated from autonomous wireless solutions to a centrally managed, wireless architecture. The purpose of the interviews was to understand the key drivers for migration and to quantify the IT and business benefits. Forrester found that as a result of the migration, the organizations achieved operational cost savings including: improved network security, reduced on-going administration costs, improved end-user productivity, and improved third-party guest access.

### Purpose

The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Cisco Unified Wireless Network on their organizations. Forrester's aim is to clearly show all calculations and assumptions used in the analysis. Readers should use this study to better understand and communicate a business case for investing in Cisco's Unified Wireless Network.

### Methodology

Cisco selected Forrester for this project because of its industry expertise in wireless networking technology and Forrester's Total Economic Impact™ (TEI) methodology. TEI not only measures costs and cost reduction (areas that are typically accounted for within IT) but also weighs the enabling value of a technology in increasing the effectiveness of overall business processes.

For this study, Forrester employed four fundamental elements of TEI in modeling controller-based, or centrally managed, wireless network infrastructure solutions:

1. Costs and cost reduction.
2. Benefits to the entire organization.
3. Risk.
4. Flexibility.

Given the increasing sophistication that enterprises have regarding cost analyses related to IT investments, Forrester's TEI methodology serves an extremely useful purpose by providing a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

### Approach

Forrester used a five-step approach for this study:

1. Forrester gathered data from existing Forrester research relative to mobility services and the wireless LAN market, in general.

2. Forrester interviewed Cisco marketing and technical sales teams to fully understand the potential (or intended) value proposition of Cisco Unified Wireless Network.
3. Forrester conducted a series of in-depth interviews with four organizations currently using Cisco Unified Wireless Network infrastructure.
4. Forrester constructed a financial model representative of the interviews. This model can be found in the TEI Framework section below.
5. Forrester created a composite organization based on the interviews and populated the framework using data from the interviews as applied to the composite organization.

### Key Findings

Forrester's study yielded several key findings:

- **ROI.** Based on the interviews with four existing customers, Forrester constructed a TEI framework for a composite organization and the associated ROI analysis illustrating the financial impact areas. As seen in Table 1, the risk-adjusted ROI for our composite company is 92% with a breakeven point (payback period) after deployment of 15 months.
- **Benefits.** The organizations that we interviewed migrated to the centrally managed, wireless architecture where access points are connected to a central controller for ease of management and consistency of performance to reduce the operational cost of managing their wireless implementations previously based on standalone or autonomous access points. By standardizing and centrally managing the wireless network, they have reduced on-going administrative costs, reduced site monitoring costs associated with RF monitoring and rogue detection, improved end-user productivity, and reduced the IT effort to assign and monitor guest access. The present value (PV) of the risk-adjusted total benefits is equal to \$647,529.
- **Costs.** The cost to migrate from autonomous wireless solutions to a centrally managed, wireless architecture includes: the incremental cost to upgrade non-software upgradeable access points, the cost to implement controllers to centrally manage access points, the software license fees to implement wireless control system (WCS), and initial and on-going administrative costs. The PV of the risk-adjusted total costs equates to **\$337,086**. The reader should note that the Cisco product costs are list prices and do not include any discounts.

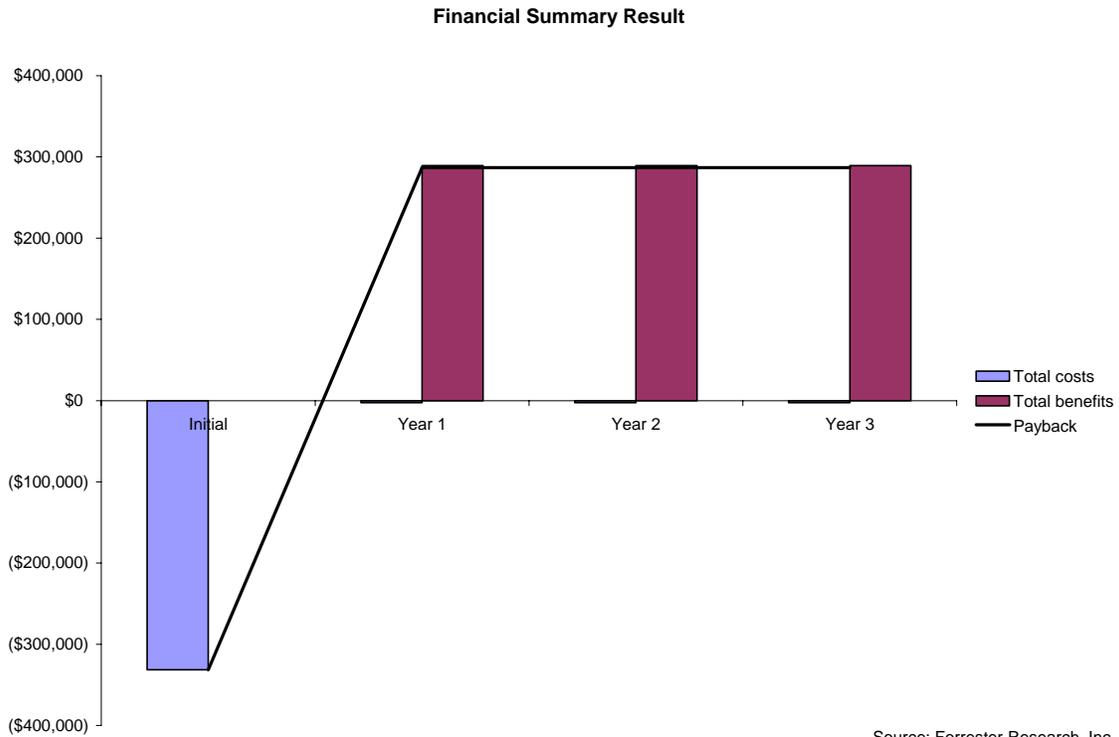
Table 1 illustrates the risk-adjusted cash flow for the composite organization, based on data and characteristics obtained during the interview process. Forrester risk-adjusts these values to take into account the potential uncertainty that exists in estimating the costs and benefits of a technology investment. The risk-adjusted value is meant to provide a conservative estimation, incorporating any potential risk factors that may later impact the original cost and benefit estimates. For a more in-depth explanation of risk and risk adjustments used in this study, please see the Risk section. (Note: numbers have been rounded throughout this document.)

**Table 1: Financial Summary Result, Composite Company ROI, Risk-Adjusted**

Summary financial results	Original estimate	Risk-adjusted
ROI	113%	92%
Payback period (months)	14	15
Total costs (PV)	(\$337,888)	(\$337,086)
Total benefits (PV)	\$719,475	\$647,529
Total (NPV)	\$381,587	\$310,443

Source: Forrester Research, Inc.

**Figure 1: Financial Summary Result**



## **Disclosures**

The reader should be aware of the following:

- The study is commissioned by Cisco Systems and delivered by the Forrester Consulting group.
- Cisco reviewed and provided feedback to Forrester, but Forrester maintained editorial control over the study and its findings and did not accept changes to the study that contradicted Forrester's findings or obscured the meaning of the study.
- The customer names for the interviews were provided by Cisco.
- Forrester makes no assumptions as to the potential return on investment that other organizations will receive. Forrester strongly advises that readers should use their own estimates within the framework provided in the report to determine the appropriateness of an investment in Unified Wireless Network.
- This study is not meant to be used as a competitive product analysis.

## Unified Wireless Network: Overview

According to Cisco, Unified Wireless Network infrastructure delivers cost-effective, secure wireless access for business-critical mobility anytime, anywhere. The solution uses Cisco Aironet lightweight access points in conjunction with a Cisco Wireless LAN Controller and the Cisco Wireless Control System (WCS) to provide secure, high-performance wireless LANs (WLANs).

Forrester's research revealed:<sup>1</sup>

“Cisco offers a comprehensive solution of standalone, centrally managed, and hybrid access points to complement its strategy with offerings scaling from small and medium-size business (SMB) to data-center-class. In addition, offering full suite of voice hardware and software and having developed the only location appliance of vendors considered, Cisco spans the full spectrum of WLAN components. The vendor's monolithic size and premium-priced offerings are ideal for large enterprises looking for a one-vendor solution and organizations with a considerable, existing Cisco investment looking for the opportunity to standardize and centrally manage all network elements both wired and wireless.”

The interviewed organizations migrating to Unified Wireless Network completed the following three components:

### **Migrate to Lightweight Access points**

Cisco offers free software to upgrade existing 802.11 a/b/g standalone access points to operate as 802.11 a/b/g lightweight access points. Aironet access points that cannot be migrated using free software upgrade offerings can be traded out for new Cisco Aironet 802.11a/b/g and 802.11n lightweight access points as part of a normal or accelerated access point refresh cycle. Cisco provides a variety of single- and dual-band lightweight access points for indoor office environments, challenging RF environments, and the outdoors. The customers interviewed have implemented a combination 1130 and 1240 Aironet access points throughout their campuses for Voice over WLAN (VoWLAN) wireless VoIP and WLAN-based location-based services.

### **Implement Wireless LAN Controllers**

Wireless LAN controllers provide systemwide services such as access point configuration, security policies, intrusion prevention, radio frequency (RF) management, and monitoring network quality of service (QoS). Controllers are most often deployed in an N+1 or N=n arrangement where N equals the base controller number and the corresponding “=” number indicates the number of redundant controllers for failover.

### **Implement Wireless Control System (WCS)**

Cisco WCS allows network managers to design, control, and monitor the wireless network from a centralized location. Cisco WCS includes a graphical user interface (GUI) that supports centralized RF prediction and corresponding access point placement, policy provisioning, troubleshooting, user tracking, security monitoring, and wireless LAN systems management. With a license upgrade, Cisco WCS also supports real-time spectrum intelligence to detect, classify, and locate devices that are causing RF interference. Quick detection of interfering devices improves network performance, coverage, and security.

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<sup>1</sup> “Cisco Systems Captures The Enterprise Market For WLAN Infrastructure” April 4, 2007 by Chris Silva <http://www.forrester.com/Research/Document/0.7211.41791.00.html>.

### Analysis

As stated in the Executive Summary, Forrester took a multistep approach to evaluate the impact that implementing Unified Wireless Network can have on an organization:

- Interviewing Cisco Systems' marketing and technical sales teams.
- Conducting in-depth interviews of four organizations currently using Unified Wireless Network infrastructure.
- Constructing a common financial framework to illustrate the costs and benefits associated with the migration.
- Constructing a composite organization based on characteristics of the interviewed organizations.

### Interview Highlights

A total of four interviews were conducted for this study, involving representatives from the following companies:

1. Fortune 500 automobile manufacturer.
2. Global medical devices manufacturer.
3. A not-for-profit foundation for medical education and research with approximately 2,500 physicians and scientists.
4. A regional not-for-profit healthcare provider operating more than 20 hospitals.

The four in-depth interviews revealed:

- By centrally managing the wireless network infrastructure components, interviewees reduced administrative costs associated with day-to-day wireless network management. Releasing service set identifier (SSID) updates and/or configuration from a central location allows network administrators to reduce travel time between offices and eliminate the troubleshooting effort required to detect human errors caused by the annual roll out of manual access point updates.
- Using the offered functionality, interviewees are proactively monitoring and detecting wireless issues, and in most instances, resolving them before end-users experience a failure. This reduces calls to the help desk.
- By using the "lobby ambassador" feature, organizations can specify a period that a guest account remains active and other guest access account parameters centrally while allowing administrative "front desk" staff to issue login credentials to guests. Interviewees indicated that this allows them to reduce IT staff time to track guest access. Interviewees also improved guest productivity for third-party visitors such as lawyers, auditors, consultants, and contractors by allowing them to have high speed wireless guest access as a replacement for expensive analog lines or carrier-based broadband connections to the desk.

- Mitigating security risk was another major catalyst for migrating to a centrally managed, wireless architecture. By allowing the system to detect and shut down rogue access points, organizations can proactively find and eliminate potential security or ad hoc interferences; which is critical in many organizations especially where compliance with data security standards is concerned. It also simplifies any investigation effort and reduces the costs associated with periodic site survey audits.

## **TEI Framework**

### *Introduction*

From the information provided in the in-depth interviews, Forrester has constructed a TEI framework for those organizations considering implementation of a Cisco Unified Wireless Network. The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that impact the investment decision.

### *Composite Organization*

Based on the interviews with the four existing customers provided by Cisco, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas impacted financially:

- The composite organization that Forrester synthesized from these results represents a US-based organization with 5,000 employees.
- Prior to migration, the total number of access points reached 750 distributed across four campuses: 500 access points in headquarters, and 100, 100, and 50 in each of three regional campuses. The organization expects to use WLAN-based voice and location services in the future.
- Two years ago, the organization's IT staff migrated its WLAN deployment from autonomous wireless solutions to a centrally managed, wireless architecture. By centrally managing the implementation, the organization gained operational efficiency within IT and its business units. To complete the migration, the organization used the free software to upgrade its existing 700 802.11a/b/g standalone access points to operate as 802.11a/b/g lightweight access points. The remaining 50 Aironet access points that could not be migrated using the free software upgrade were traded in for new Aironet 802.11 a/b/g lightweight access points.

### *Framework Assumptions*

Table 2 lists the discount rate used in the PV and NPV calculations and time horizon used for the financial modeling.

**Table 2: General Assumptions**

<b>General assumptions</b>	<b>Value</b>
Discount rate	10%
Length of analysis	Three years

Source: Forrester Research, Inc.

Organizations typically use financial discount rates (the interest rate used in cash flow analysis) between 8% and 16%, based on their current environment. Readers are urged to consult with the finance department to determine the most appropriate discount rate to use within their own organizations.

In addition to the financial assumptions used to construct the cash flow analysis, Table 3 provides salary assumptions used within this analysis.

**Table 3: Salary Assumptions**

Ref.	Metric	Calculation	Value
A1	Hours per week		40
A2	Weeks per year		52
A3	Hours per year (M-F, 9-5)		2,080
A4	Hours per year (24x7)		8,736
A5	Fully-loaded annual salary for network administrator		\$100,000
A6	Hourly	(A5/A3)	\$48

Source: Forrester Research, Inc.

## Costs

This section exhibits the overall investment in a Cisco Unified Wireless Network based on the characteristics of the composite organization. Costs include the investment to: 1) upgrade non-software-upgradeable Aironet access points to lightweight access points; 2) implement WLAN controllers; 3) deploy WCS; and 4) initial and on-going administrative costs.

### *Total Access Point Costs*

For organizations that are migrating to a Unified Wireless Network, Cisco offers free software to upgrade existing 802.11 a/b/g standalone access points to operate as 802.11 a/b/g lightweight access points. In some instances, an organization may have Aironet access points that cannot be migrated using the free software. At that time, the organization is required to purchase new Aironet 802.11 a/b/g or 802.11n access points to complete the migration. The list price for 1130 and 1240 models are \$699 and \$899, respectively. The list price for Aironet 1250s is \$1299.

Forrester assumes that the composite organization has a total of 750 existing access points. The composite organization has 50 Aironet access points that cannot be migrated using the free software. The organization trades these access points for lightweight Aironet 802.11 a/b/g models. To calculate the incremental cost required to replace non-software upgradeable access points, we applied an average cost of \$799  $(\$699 + \$899) / 2$  per access point. Table 4 shows the cost of \$39,950 (50 access points \* \$799 per access point).

**Table 4: Total Access Point Costs**

Ref.	Metric	Calculation	Initial
B1	New access points purchased		50
B2	Average cost per access point		\$799
Bt	Total costs of access points	$B1*B2$	\$39,950

Source: Forrester Research, Inc.

*Total Controller Costs*

Cisco Wireless LAN Controllers are another component of the Cisco Unified Wireless Network and deliver services simultaneously to all access points. To assess the costs of controller implementation, Forrester assumes that the composite organization distributes the following access point breakdown across its four campuses: 500, 100, 100, and 50. We assume that the composite organization uses two types of controllers: WiSM and 4400-100 series.

The WiSM and 4400-100 controller can manage up to 300, and 100 access points, respectively. With an average list price of \$45,995 for WiSM and \$34,995 for 4400-100 controllers, we applied the following controller distribution: two WiSMs to manage the 500 access point campus, three 4400-100 controllers for campuses with access points varying from 50 to 100, and one additional WiSM controller for backup (n+1 environment); allowing additional capacity to accommodate future access point expansion. Table 5 illustrates this calculation.

**Table 5: Total Controller Costs**

Ref.	Metric	Calculation	Per period
C1	Total WiSM controllers purchased		3
C2	Total 4400-100 controllers purchased		3
C3	Cost per controller (WiSM)		\$45,995
C4	Cost per controller (4400-100)		\$34,995
Ct	Total cost to implement controllers	$C1*C3+C2*C4$	\$242,970

Source: Forrester Research, Inc.

*WCS Licensing Costs*

Cisco WCS allows network managers to design, control, and monitor the wireless network from a centralized location. Cisco offers licenses for 100, 500, 1000, 2500, 10000, and 50000 access points. We chose the option to purchase one license for 1000 access point for the list price of \$46,950 to accommodate any future expansion. The 2500, 10000, and 50000 enterprise licenses also include WCS Navigator, a utility to manage multiple WCS management stations. Table 6 demonstrates this calculation.

**Table 6: WCS Licensing Costs**

Ref.	Metric	Calculation	Per period
D1	WCS license fees		\$46,950
D2	Number of licenses		1
Dt	WCS License Fees	D1*D2	\$46,950

Source: Forrester Research, Inc.

*Initial And On-Going Administrative Costs*

The final component of cost to migrate to the Cisco Unified Wireless Network solution is the administrative time associated with: 1) the initial set-up of controllers, WCS implementation, and replacement of any new access points, and 2) the on-going management of the wireless network.

We assume that the composite organization purchased six controllers; five will be used to manage existing access points within the four campuses, and one will be used as a failover controller deployed redundantly. We estimate that the network administrator is required to spend four hours to set up each controller and spends another eight hours replacing non-upgradeable access points and setting up the WCS. To estimate the on-going effort requirements after migration, we assume that the composite organization needs to perform three access point configuration updates annually. The interviewees revealed that the network administrators spent an hour per week on network monitoring, and 30 minutes on each access point configuration update annually. By eliminating the manual access point updates, the organizations that we interviewed were able to significantly reduce the time required to troubleshoot wireless network issues resulting from human error. We estimate benefits gained in the next section. Here, we calculate the cost associated with initial and on-going administrative effort to set-up and manage the controller-based, wireless architecture. Table 7 presents this calculation.

**Table 7: Initial And On-Going Administrative Costs**

Ref.	Metric	Calculation	Initial	Year 1	Year 2	Year 3
E1	Number of network admin.		1	1	1	1
E2	Fully loaded hourly rate		\$48	\$48	\$48	\$48
E3	Number of hours		34	52	52	52
E4	Annual number of update and/or configuration per access point		0	3	3	3
E5	Average time to set up the controller for each update (hour)		0	0.50	0.50	0.50
Et	Initial and on-going administrative cost	$E2*(E1*E3+E4*E5)$	\$1,632	\$2,568	\$2,568	\$2,568

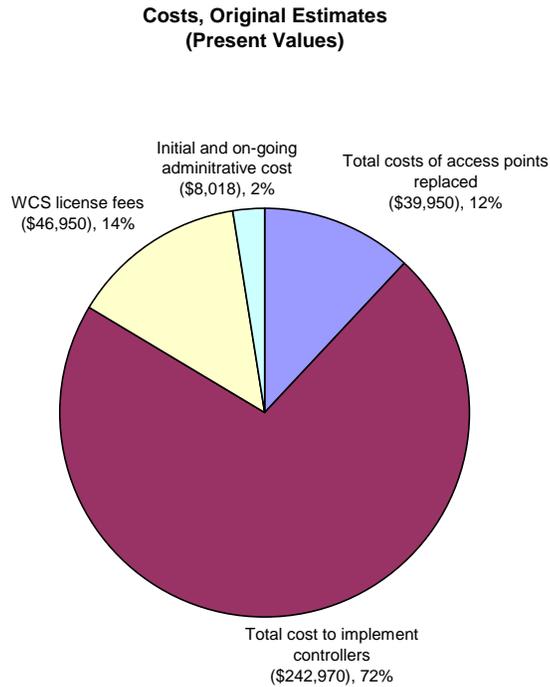
Source: Forrester Research, Inc.

## Total Economic Impact Study of Unified Wireless Network

### Total Costs

Table 8 illustrates the total costs for the composite organization to migrate to the Cisco Unified Wireless Network solution.

**Figure 2: Total Costs – Non-Risk-Adjusted**



Source: Forrester Research, Inc.

**Table 8: Total Costs, Non-Risk-Adjusted**

Costs	Initial	Year 1	Year 2	Year 3	Total	Present value
Total costs of access points replaced	(\$39,950)	0	0	0	(\$39,950)	(\$39,950)
Total cost to implement controllers	(\$242,970)	0	0	0	(\$242,970)	(\$242,970)
WCS license fees	(\$46,950)	0	0	0	(\$46,950)	(\$46,950)
Initial and on-going administrative cost	(\$1,632)	(\$2,568)	(\$2,568)	(\$2,568)	(\$9,336)	(\$8,018)
<b>Total costs</b>	<b>(\$331,502)</b>	<b>(\$2,568)</b>	<b>(\$2,568)</b>	<b>(\$2,568)</b>	<b>(\$339,206)</b>	<b>(\$337,888)</b>

Source: Forrester Research, Inc.

## Benefits

The next component of this analysis examines the potential benefits of migrating to a controller-based, wireless architecture. Interviewed customers identified the following benefits associated with the Cisco Unified Wireless Network: 1) reduction in on-going administrative costs; 2) reduction in site monitoring costs associated with RF monitoring and rogue detection; 3) improvement in end-user productivity; and 4) reduction in guest access costs. This section illustrates the possible ways to quantify the impact of these benefits based on the characteristics of the composite organization.

### *Operational Cost Savings*

The organizations that we interviewed migrated to a centrally managed, wireless architecture to reduce the operational and administrative costs of managing a wireless network. For these organizations, the wireless network is a business critical application. Customers interviewed either used voice and/or location services or were seriously considering an investment in one or both.

As the interviewees grew their autonomous wireless footprint, they realized that to proactively maintain their network, they needed to increase the number of network administrators. With IT operating budgets tightening, the migration to a centrally managed, wireless architecture provided the opportunity to maintain and grow wireless network without incurring the cost to hire additional staff.

To calculate this benefit, we assume that the composite organization implemented 750 access points across four campuses. Based on the interviewees, we estimate that the network administrators were required to annually perform three access point configurations manually. Each access point update would require 15 minutes to complete and log. In addition to these updates, the network administrators also spent on average eight hours per week troubleshooting and completing wireless audits per location. With an average fully loaded hourly salary of \$48 (\$100,000/2080) for network administrators, we estimate a cost savings of \$106,872 annually ( $\$48 * (750 * 3 * .25 + 8 * 4 * 52)$ ). Table 9 illustrates this calculation.

**Table 9: On-Going Administrative Cost Savings**

Ref.	Metric	Calculation	Per period
F1	Total number of access points		750
F2	Annual number access point updates or configurations		3
F3	Average time required to update each access point (hour)		0.25
F4	IT staff fully loaded hourly rate		\$48
F5	Number of hours per week to troubleshoot and complete wireless audits per location prior to migration		8
F6	Number of locations		4
F7	Weeks per year		52
Ft	Reduction in on-going administrative cost	$F4 * (F1 * F2 * F3 + F5 * F6 * F7)$	\$106,872

Source: Forrester Research, Inc.

## Total Economic Impact Study of Unified Wireless Network

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The offering's security enhancement feature enabled interviewees to monitor, detect, and shut down rogue access points. The system adjusts coverage using access point transmission control automatically and provides consistent availability. Based on the interviews, we estimate that the composite organization will perform two site surveys annually at each of its four locations at a cost of \$10,000 per survey. After migration, the organization reduced the number of surveys per location by 50%. Table 10 presents the annual cost savings of \$40,000 ( $4 \times 2 \times 50\% \times \$10,000$ ).

**Table 10: Reduction In Site Survey Costs To Mitigate Security Risk**

Ref.	Metric	Calculation	Per period
G1	Total number of sites surveyed		4
G2	Number of scheduled site surveys		2
G3	Reduction in site surveys		50%
G4	Site survey costs		\$10,000
Gt	Reduction in on-going RF monitoring and rogue access point detection	$G1 \times G2 \times G3 \times G4$	\$40,000

Source: Forrester Research, Inc.

The controller's ability to centrally manage access points reduced: 1) the administrative time to troubleshoot and perform frequently scheduled wireless audit rotations, and 2) the effort to perform site surveys to detect and eliminate rogue access point and mitigate security threats. As a result, it also enabled interviewees to significantly reduce their help desk support costs within their organizations. In the environment prior to the migration, these interviewed customers received as many as 20 calls per day related to the wireless network, but after the migration, the numbers dropped to approximately five calls per month. This shift impacted Tier 1 support as well as Tier 2 and Tier 3 support. Today, the majority of the calls are being managed by Tier 1 support or help desk staff, and organizations have significantly reduced, and in some cases, eliminated the effort previously required by Tier 2 and Tier 3 support.

To calculate this benefit, Forrester estimates that the composite organization responded to 1000 incidents annually prior to the migration and that it required 2 hours to rectify each incident. We assume that prior to the migration 40% of incidents were managed by help desk and 60% by Tier 2 and Tier 3 support. After the migration, the support requests dropped; help desk saw a 40% reduction in requests, and Tier 2 and Tier 3 support experienced an 85% reduction in support requests. Table 11 demonstrates the annual cost savings of \$88,000 for this category ( $1000 \times 2 \times (40\% \times 40\% \times 48 + 60\% \times 85\% \times \$72)$ ).

**Table 11: Reduction In Help Desk Support Costs**

Ref.	Metric	Calculation	Per period
H1	Annual number of wireless incidents prior to migration		1000
H2	Average time to evaluate and address an incident		2
H3	Percent incidents handled by help desk		40%
H4	Percent incidents handled by Tier 2 and Tier 3 support		60%
H5	Reduction in help desk support		40%
H6	Reduction in Tier 2 and Tier 3 support		85%
H7	Average hourly rate for help desk support		\$48
H8	Average hourly rate for Tier 2 and Tier 3 support		\$72
Ht	Reduction in help desk support costs	$H1*H2*(H3*H5*H7 + H4*H6*H8)$	\$88,800

Source: Forrester Research, Inc.

### *End-user Productivity Gain*

In addition to IT cost savings, organizations that we interviewed sited end-user productivity gains resulting from reduction in wireless outages. As wireless networks evolve and become a business critical application, the importance of this benefit will continue to increase.

For this study, we estimate that the composite organization has 5000 employees. Based on the access point distribution for the composite organization, in the autonomous environment each access point outage affects approximately 15% of employees. To remain conservative, we estimate that by reducing each outage, we can capture productivity gain of 25%. Table 12 illustrates this calculation (5000\*2\*15%\*25%\*\$48).

**Table 12: End-User Productivity Gain**

Ref.	Metric	Calculation	Per period
I1	Total number of workers		5,000
I2	Average time per wireless incident		2
I3	Total number of access points		750
I4	Percent affected by wireless incident	I3/I1	15%
I5	Percent of productivity captured		25%
I6	Hourly rate per worker		\$48
I <sub>t</sub>	Improvement in end-user productivity	I1*I2*I4*I5*I6	\$18,000

Source: Forrester Research, Inc.

### *Guest Access Efficiencies*

This category describes the IT and business benefits of using “Lobby Ambassador” services. Prior to migration to Cisco Unified Wireless Network, the IT staff were responsible for setting up and eliminating guest access for visitors. We assume that the organization receives 360 visitors annually and prior to the migration, IT spent 30 minutes per visitor to log, set up, and eliminate guest access. With an average fully loaded hourly salary of \$48, we calculated a savings after the migration of \$8,640 annually (360\*0.50\*\$48). Table 13 illustrates this calculation.

**Table 13: Guest Access Set-Up And Monitor Cost Savings**

Ref.	Metric	Calculation	Per period
J1	Annual number of third-party vendors		360
J2	Time required to set up and monitor guess accesses (hours)		0.50
J3	Hourly rate per worker (IT)		\$48
J <sub>t</sub>	Reduction in effort to set up and monitor guest accesses	J1*J2*J3	\$8,640

Source: Forrester Research, Inc.

This category illustrates business benefits for visitors including lawyers, auditors, consultants, and contractors who bill the organization for the hours of service provided. Prior to migration, these individuals would spend an hour waiting to receive guest access. With an average hourly rate of \$150, we calculate the productivity gain of \$27,000 (360\*0.5\*\$150). Table 14 presents the calculation.

**Table 14: Visitors' Productivity Improvement**

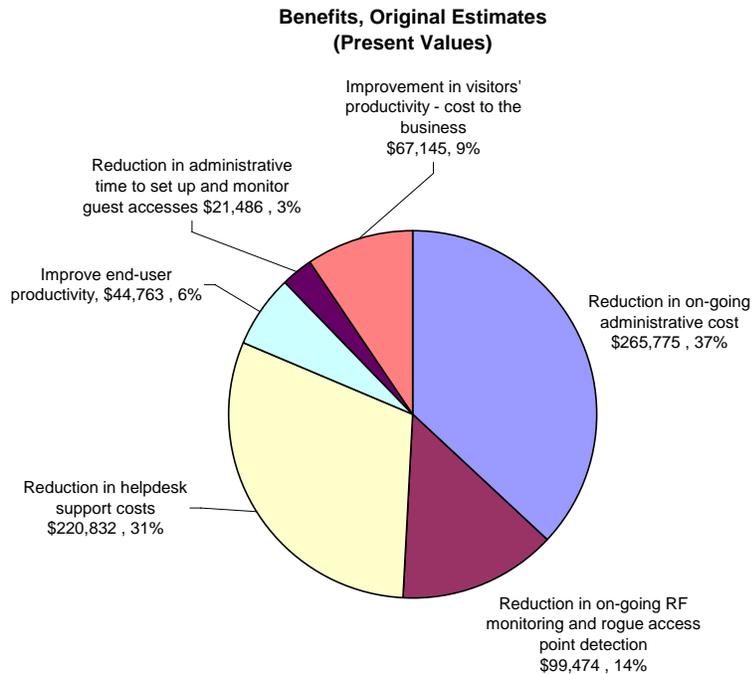
Ref.	Metric	Calculation	Per period
K1	Annual number of visitors		360
K2	Average time saving		0.50
K3	Average hourly rate per worker		\$150
Kt	Improvement in visitors' productivity - cost to the business	$K1 * K2 * K3$	\$27,000

Source: Forrester Research, Inc.

**Total Benefits**

Table 15 illustrates the total benefits for the composite organization to migrate to Cisco Unified Wireless Network.

**Figure 3: Total Benefits, Non-Risk-Adjusted**



Source: Forrester Research, Inc.

**Table 15: Total Benefits, Non-Risk-Adjusted**

Benefits	Year 1	Year 2	Year 3	Total	Present value
Reduction in on-going administrative cost	\$106,872	\$106,872	\$106,872	\$320,616	\$265,775
Reduction in on-going RF monitoring and rogue access point detection	\$40,000	\$40,000	\$40,000	\$120,000	\$99,474
Reduction in help desk support costs	\$88,800	\$88,800	\$88,800	\$266,400	\$220,832
Improvement in end-user productivity	\$18,000	\$18,000	\$18,000	\$54,000	\$44,763
Reduction in administrative time to set up and monitor guest accesses	\$8,640	\$8,640	\$8,640	\$25,920	\$21,486
Improvement in visitors' productivity — cost to the business	\$27,000	\$27,000	\$27,000	\$81,000	\$67,145
<b>Total</b>	<b>\$289,312</b>	<b>\$289,312</b>	<b>\$289,312</b>	<b>\$867,936</b>	<b>\$719,475</b>

Source: Forrester Research, Inc.

## Risk

Risk is the third component within the TEI model; it is used as a filter to capture the uncertainty surrounding different cost and benefit estimates. If a risk-adjusted ROI still demonstrates a compelling business case, it raises confidence that the investment is likely to succeed because the risks that threaten the project have been taken into consideration and quantified. The risk-adjusted numbers should be taken as “realistic” expectations, since they represent the expected values considering risk. In general, risks affect costs by raising the original estimates, and they affect benefits by reducing the original estimates.

For the purpose of this analysis, Forrester risk-adjusts cost and benefit estimates to better reflect the level of uncertainty that exists for each estimate. The TEI model uses a triangular distribution method to calculate risk-adjusted values. To construct the distribution, it is necessary to first estimate the low, most likely, and high values that could occur within the current environment. The risk-adjusted value is the mean of the distribution of those points.

Forrester defines two types of investment risk associated with this analysis: implementation and impact risk. **Implementation risk** is the risk that a proposed technology investment may deviate from the original resource requirements needed to implement and integrate the investment, resulting in higher costs than anticipated. **Impact risk** refers to the risk that the business or technology needs of the organization may not be met by the technology investment, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for cost and benefit estimates. Quantitatively capturing investment risk by directly adjusting the financial estimates results in a more meaningful way and offers a more accurate projection of the return on investment.

The following *general* management and process risks were considered in this study:

## Total Economic Impact Study of Unified Wireless Network

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- Planning, installation, and testing could demand more time than originally anticipated.
- Forrester did not evaluate the cost and benefits associated with any next generation equipment. However interviewees are considering the future cost of next generation upgrades to their equipment, and they are concerned that the acquisition costs of next generation equipment may exceed their benefits.

The following risk specific to Cisco's Unified Wireless Network was considered in this study:

- End-user productivity gains may vary from originally anticipated estimates due to the specific characteristics of an organization's wireless deployment and usage prior to migration.

The following tables show the values used to adjust for uncertainty in cost and benefit estimates. Based on the comments from the interviewed customer, we applied risk to the benefit categories to adjust for any uncertainty but did not apply any risk to the cost categories. Forrester uses list prices for all software licensing, maintenance fees, and hardware costs. The professional services costs typically pose the greatest uncertainty, and in this case, they were very minimal.

**Table 16: Total Costs, Risk-Adjusted**

Costs	Initial	Year 1	Year 2	Year 3	Total	Present value
Total costs of access points	(\$39,950)				(\$39,950)	(\$39,950)
Total cost to implement controllers	(\$242,970)				(\$242,970)	(\$242,970)
WCS license fees	(\$46,950)				(\$46,950)	(\$46,950)
Initial and on-going administrative cost	(\$1,469)	(\$2,311)	(\$2,311)	(\$2,311)	(\$8,402)	(\$7,216)
<b>Total costs</b>	<b>(\$331,339)</b>	<b>(\$2,311)</b>	<b>(\$2,311)</b>	<b>(\$2,311)</b>	<b>(\$338,272)</b>	<b>(\$337,086)</b>

Source: Forrester Research, Inc.

**Table 17: Total Benefits, Risk-Adjusted**

Benefits	Year 1	Year 2	Year 3	Total	Present value
Reduction in on-going administrative cost	\$96,185	\$96,185	\$96,185	\$288,554	\$239,197
Reduction in on-going RF monitoring and rogue access point detection	\$36,000	\$36,000	\$36,000	\$108,000	\$89,527
Reduction in help desk support costs	\$79,920	\$79,920	\$79,920	\$239,760	\$198,749
Improvement in end-user productivity	\$16,200	\$16,200	\$16,200	\$48,600	\$40,287
Reduction in administrative time to set up and monitor guest accesses	\$7,776	\$7,776	\$7,776	\$23,328	\$19,338
Improvement in visitors' productivity — cost to the business	\$24,300	\$24,300	\$24,300	\$72,900	\$60,431
<b>Total benefits</b>	<b>\$260,381</b>	<b>\$260,381</b>	<b>\$260,381</b>	<b>\$781,142</b>	<b>\$647,529</b>

Source: Forrester Research, Inc.

## Flexibility

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for some future additional investment. Flexibility benefits typically increase with the scalability of the technology investment. This provides an organization with the “right” or ability to engage in future initiatives but not the obligation to do so. In the case of this investment, a customer might choose to purchase additional services including location tracking with the intention of future scalability.

One of the interviewed organizations — a medical device manufacturer — has implemented location tracking services to support quality assurance processes when it activated RFID within its manufacturing facility. Every unit and/or package is read and marked electronically before being shipped to doctors and hospitals and after it is received by the organization from doctors or hospitals. The quality assurance unit monitors and identifies units completed and shipped with 100% certainty. This has resulted not only in reduction in loss of items but also reduced time and effort to track and monitor each product within each package. Knowing that the units are shipped correctly with 100% certainty provides information required to recover a loss. Flexibility could also be quantified if evaluated as part of a specific project (described in more detail in Appendix A).

## TEI Framework: Summary

Considering the financial framework constructed above, the results of the costs, benefits, risk, and flexibility sections using the representative numbers can be used to determine a return on investment, net present value, and payback period.

Table 18 and 19 present the risk-adjusted values after applying the risk-adjusted method indicated in the Risk section.

It is important to note that values used throughout the TEI Framework are based on in-depth interviews with four organizations and the resulting composite organization built by Forrester. Forrester makes no assumptions as to the potential return that other organizations will receive within their own environment. Forrester strongly advises that readers use their own estimates within the framework provided in this study to determine the expected financial impact of migrating to Unified Wireless Network.

**Table 18: Summary Financial Non-Risk-Adjusted Cash Flow**

Category	Initial	Year 1	Year 2	Year 3	Total	Present value
Total costs	(\$331,502)	(\$2,568)	(\$2,568)	(\$2,568)	(\$339,206)	(\$337,888)
Total benefits		\$289,312	\$289,312	\$289,312	\$867,936	\$719,475
Total (non-risk-adjusted)	(\$331,502)	\$286,744	\$286,744	\$286,744	\$528,730	\$381,587
Return on investment	113%					
Payback period (months)	14					

Source: Forrester Research, Inc.

**Table 19: Summary Financial Risk-Adjusted Cash Flow**

Category	Initial	Year 1	Year 2	Year 3	Total	Present value
Total costs	(\$331,339)	(\$2,311)	(\$2,311)	(\$2,311)	(\$338,272)	(\$337,086)
Total benefits		\$260,381	\$260,381	\$260,381	\$781,142	\$647,529
Total (non-risk-adjusted)	(\$331,339)	\$258,070	\$258,070	\$258,070	\$442,870	\$310,443
Return on investment	92%					
Payback period (months)	15					

Source: Forrester Research, Inc.

## Study Conclusions

Forrester's in-depth interviews with Cisco's Unified Wireless Network customers yielded several important observations:

Based on information collected in interviews with current Unified Wireless Network customers, Forrester found that by standardizing and centrally managing the wireless network, these organizations have: 1) improved network security; 2) reduced on-going administrative effort; 3) improved end-user productivity and 4) improved third-party guest access.

The financial analysis provided in this study illustrates the potential way an organization can evaluate the value proposition of Cisco's product. Based on information collected in four in-depth customer interviews, Forrester calculated a three-year risk-adjusted ROI of 92% for the composite organization with a payback period of 15 months. All final estimates are risk-adjusted to incorporate potential uncertainty in the calculation of costs and benefits.

Based on these findings, companies looking to migrate to Cisco's Unified Wireless Network can expect productivity benefits and cost savings. Using the TEI framework, many companies may find the potential for a compelling business case to make such an investment.

## Appendix A: Total Economic Impact™ Overview

Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

The TEI methodology consists of four components to evaluate investment value: benefits, costs, risks, and flexibility. For the purpose of this analysis, the impact of flexibility was not quantified.

### Benefits

Benefits represent the value delivered to the user organization — IT and/or business units — by the proposed product or project. Often product or project justification exercises focus just on IT cost and cost reduction, leaving little room to analyze the effect of the technology on the entire organization. The TEI methodology and the resulting financial model place equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization. Calculation of benefit estimates involves a clear dialogue with the user organization to understand the specific value that is created. In addition, Forrester also requires that there be a clear line of accountability established between the measurement and justification of benefit estimates after the project has been completed. This ensures that benefit estimates tie back directly to the bottom line.

### Costs

Costs represent the investment necessary to capture the value, or benefits, of the proposed project. IT or the business units may incur costs in the forms of fully burdened labor, subcontractors, or materials. Costs consider all the investments and expenses necessary to deliver the proposed value. In addition, the cost category within TEI captures any incremental costs over the existing environment for ongoing costs associated with the solution. All costs must be tied to the benefits that are created.

### Risk

Risk measures the uncertainty of benefit and cost estimates contained within the investment. Uncertainty is measured in two ways: the likelihood that the cost and benefit estimates will meet the original projections and the likelihood that the estimates will be measured and tracked over time. TEI applies a probability density function known as "triangular distribution" to the values entered. At a minimum, three values are calculated to estimate the underlying range around each cost and benefit.

### Flexibility

Within the TEI methodology, direct benefits represent one part of the investment value. While direct benefits can typically be the primary way to justify a project, Forrester believes that organizations should be able to measure the strategic value of an investment. Flexibility represents the value that can be obtained for some future additional investment building on top of the initial investment already made. For instance, an investment in an enterprisewide upgrade of an office productivity suite can potentially increase standardization (to increase efficiency) and reduce licensing costs. However, an embedded collaboration feature may translate to greater worker productivity if activated. The collaboration can only be used with additional investment in training at some future point in time. However, having the ability to capture that benefit has a present value that can be estimated. The flexibility component of TEI captures that value.

## Appendix B: Glossary

**Discount rate:** The interest rate used in cash flow analysis to take into account the time value of money. Although the Federal Reserve Bank sets a discount rate, companies often set a discount rate based on their business and investment environment. Forrester assumes a yearly discount rate of 10% for this analysis. Organizations typically use discount rates between 8% and 16% based on their current environment. Readers are urged to consult their organization to determine the most appropriate discount rate to use in their own environment.

**Net present value (NPV):** The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). A positive project NPV normally indicates that the investment should be made, unless other projects have higher NPVs.

**Present value (PV):** The present or current value of (discounted) cost and benefit estimates given an interest rate (the discount rate). The PV of costs and benefits feed into the total net present value of cash flows.

**Payback period:** The breakeven point for an investment, or the point in time at which net benefits (benefits minus costs) equal initial investment or cost.

**Return on investment (ROI):** A measure of a project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits minus costs) by costs.

### *A Note On Cash Flow Tables*

The following is a note on the cash flow tables used in this study (see the Example Table below). The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1. Those costs are not discounted. All other cash flows in Years 1 through 3 are discounted using the discount rate shown in Table 2 at the end of the year. Present value (PV) calculations are calculated for each total cost and benefit estimate. Net present value (NPV) calculations are not calculated until the summary tables and are the sum of the initial investment and the discounted cash flows in each year.

### **Example Table**

Ref.	Category	Calculation	Initial cost	Year 1	Year 2	Year 3	Total

Source: Forrester Research, Inc.