

Network Technology Integration Drives Business Success

Only Cisco's tightly integrated networks deliver an inherently resilient, performance-optimized, and automated communications foundation to cost-conscious midsize organizations.

Business and Technical Challenges

Computer networks have come a long way in improving business processes. To deliver these benefits, the networks themselves have actually grown quite complex – at least, behind the scenes. They connect all the components of an IT infrastructure, supporting any number of dissimilar applications, protocols, and services, while providing employees with access to the resources that keep business processes running. Today's Internet-based economy often demands 24-by-7 customer service, so a business's network must now be available nearly 100 percent of the time. It must also be smart enough to automatically fend off unexpected security incidents and adjust to changing traffic loads to maintain consistent application performance.

Because networks have so many multidimensional jobs to perform, it is no longer practical or economically feasible to construct them by stringing together a large number of standalone components that are managed separately and have little or no awareness of one another. Rather, today's networks require a significant level of technology and management integration to function optimally and securely. To ensure that networks remain manageable and secure as they grow, as well as to help minimize total cost of ownership (TCO), Cisco® has achieved levels of network technology integration that its competitors have not. The result is a simpler, systems-centric approach to networking that automates operations and lowers overall costs for midsize organizations.

Cisco network components are designed to work together. Security, quality of service (QoS), and high availability are built in from the ground up. Cisco has combined routing, switching, security, voice, and wireless technologies into unified network components, alleviating the need for midsize customers to bolt separate devices onto the network that must be managed and secured individually. Separate deployment, security, and management require additional staff resources that many midsize companies do not have available; in addition, scaling networks built from nonintegrated components is much more complex and difficult. Cisco integration efforts ensure that a business's network can be deployed, managed, and secured as a cohesive entity.

All Cisco network components operate under a common management system, so that IT staff do not have to be trained to use several dissimilar systems. This unified management allows for the correlation of network events among various connected devices, giving technology managers a more meaningful analytical picture of the network than if they had to view multiple management screens. This big-picture view allows them to troubleshoot network issues faster and keep operations available a larger percentage of the time.

This paper discusses the various dimensions of Cisco technology integration and its business benefits, including lowered TCO and future proofing. It demonstrates how IT operations personnel can do more with less while becoming better aligned with their company's vision.

Cisco Integrated Solutions

Core networking technologies can be divided into three primary categories: switching and routing, voice signaling and call processing, and wireless network transmission. Historically, these capabilities have been developed and deployed on separate products and, in some cases, on separate networks. As a single provider of all these network elements, and because of its substantial industry leadership, Cisco is in a unique position to integrate these core capabilities in a way that creates a resilient and automated underlying network foundation for cost-conscious midsize companies.

In addition to combining the core technology areas just mentioned into unified products, another level of integration involves embedding key higher-layer networking services into unified products. Let's take a brief look at these two types of integration and their benefits.

The Switching and Routing Foundation

Switching and routing enables the basic transfer of networked application traffic. Attributes such as throughput, number and types of interfaces, and number of ports remain important considerations when evaluating routers and switches, though they are reaching commodity levels as the networking market matures. Most devices perform both Layer 2 fast switching and the intelligent Layer 3 function of routing, or best-path determination and forwarding. In addition to the basic speeds and feeds of these devices, the following attributes are mandatory for any business-class converged network:

- Multilevel network security
- Traffic management, including QoS capabilities
- Redundant components and failover capabilities for continued uptime of the voice, data, and video riding the unified network

This is where Cisco's systems approach to integrated technologies comes in:

Built-in, Multi-level Security

Cisco integrated services routers (ISRs) have firewall and access control capabilities embedded in them. These capabilities automatically permit or deny individual user access to network resources according to company policies. The router/switch products also support intrusion prevention functions that detect malware, such as worms, Trojan horses, and other infectious code. These functions block malware from the network to circumvent denial of service (DoS) attacks. The routers also inherently support data encryption – while maintaining wire-speed network performance – to protect the privacy of networked traffic while it is in transit.

Integrated Traffic Management and QoS

Traffic management and QoS capabilities are designed into Cisco networks from the ground up to optimize application performance. Traffic management involves monitoring, identifying, and classifying application traffic so that specific QoS policy actions, such as packet prioritization and per-flow bandwidth guarantees and rate limiting, can be assigned and applied to each class of traffic. Today's converged networks need these QoS capabilities to control the various voice, data, and video application traffic flows, all of which have different bandwidth requirements and delay sensitivities. Integrated QoS ensures that each traffic type consistently gets the network resources it needs to perform properly and prevents one application from monopolizing resources and degrading the performance of others.

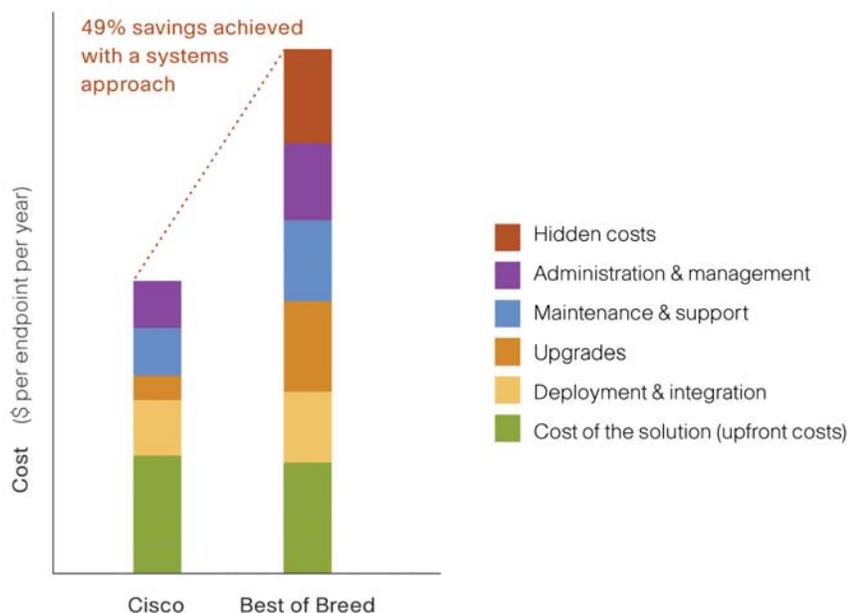
Inherent Redundancy for High Availability

Cisco Catalyst® switches and ISRs contain options for redundant network circuits and automatic failover protocols, such as the Cisco Hot Standby Router Protocol (HSRP) and the industry-standard Virtual Router Redundancy Protocol (VRRP), so that a backup device can transparently take on the work of a primary device if it should fail. These capabilities help ensure the near 100 percent availability required in today's 24-by-7 business environment.

Overall Savings

From a TCO perspective, according to research by Frost & Sullivan, integrating routing, switching, security, QoS, and wireless technologies saves organizations up to 49 percent compared to the cost of purchasing and operating separate “best of breed” products for each function (see Figure 1).

Figure 1. Comparative TCO analysis: Integrated solutions vs. separate “best of breed” products



Source: Frost & Sullivan, 2006

VoIP and Cisco Unified Communications

The integration of voice, data, and video onto a single, integrated IP network platform provides several business advantages in terms of both cost savings and efficiency. In addition to the cost advantages realized by merging multiple networks into one, such integration provides entirely new collaboration and communications capabilities through the use of applications that mix network-based data with voice calls, and through unified messaging systems that save time and promote faster decision making.

Cost Savings of Integration

Combining multiple networks into one converged infrastructure greatly reduces capital expenditures, cabling costs, and the operational expenses associated with managing separate network infrastructures. The industry has had several years of enterprise experience in integrating voice over IP (VoIP) into traditional packet data networks now – enough to comfortably estimate that organizations save 30 to 40 percent on long-distance, circuit, equipment, and network administrative costs by running a single architecture instead of having separate networks for different applications.

Improved Efficiency with Unified Applications

Cisco Unified Communications applications – those that combine VoIP with data, video, messaging, and other functions – provide new ways for employees, customers, and suppliers to communicate and collaborate in call centers and elsewhere over the network. This integration enhances productivity, enabling better and faster communications and decision making throughout the organization.

The integration of an organization's customer database with its IP call center telephony system enables a call center service representative to know the identity of a customer before picking up the phone. It also allows call center and other personnel throughout the organization to access up-to-date customer histories. This access to current customer information – combined with chat and instant messaging for quick consultations with colleagues and experts – enables employees to improve the overall customer experience.

A single, secure electronic mailbox that collects messages from multiple phones, e-mail systems, and fax machines streamlines the time and effort spent checking and managing multiple messaging systems. These unified mailboxes enhance efficiency by making individuals more responsive, as well as by reducing the potential for overlooked messages and delayed replies, which can have costly business consequences. According to a 2005 study by the Radicati Group, Inc., unified messaging alone can add up to 40 minutes of productive time per worker per day. And Sage Research, which conducted a study in 2005 for Cisco involving interviews with more than 200 organizations, reports that workers with access to full-featured Cisco Unified Communications systems gain an average of 55 minutes per day in productivity.

Security and QoS are integrated into the voice-networking components of the network foundation, just as they are in the routing and switching components. In addition, integration with third-party applications, such as human resource management, enterprise resources planning (ERP), and customer relationship management (CRM) software, enhances business processes and improves customer service.

Integrated Security: Conversation Privacy, Message Confidentiality, and Authentication

Voice conversations are more secure in a unified network environment than in traditional telephone systems. The reason is that Cisco IP-based systems allow voice conversations to be encrypted. Encryption takes place from phone to phone, so that the conversation remains secured from end to end. If an eavesdropper were somehow able to tap into an encrypted phone conversation, the discussion would be unintelligible.

Cisco integrated voicemail systems also allow for enhanced privacy. Businesses can set rules for particular phone extensions regarding what can and cannot be done. A business, for example, can opt to configure its voicemail system to allow certain messages to be forwarded but to disallow forwarding of messages marked "private." Similarly, the phone system can be configured to give

certain individuals the ability to receive voice messages from third parties via e-mail while restricting other employees from doing so.

Authenticating and verifying users, devices, and traffic on a unified network is essential. An unsecured voice system might be used as an access point for an attack on an organization's data network, in which malicious data is made to look like voice traffic. Cisco Unified Communications systems, however, defend against these attacks. They examine all of the traffic on the network, separate voice from data traffic, and then verify that what appears to be voice traffic is, indeed, voice.

Integrated QoS

To ensure high-quality VoIP conversations, Cisco Unified Communications systems give VoIP packets top priority, because these packets represent real-time conversations that cannot tolerate much latency in transmission. VoIP traffic is placed in a special virtual LAN (VLAN) that is logically segmented from data traffic. VoIP VLANs are first in line for delivery through router and switch transmission queues to ensure high-quality voice calls.

High Availability

In addition to the resiliency built into the foundational data network through redundant components, connections, and failover protocols, the Cisco Unified Communications platform supports special provisions for keeping voice connections live. The Cisco Unified Survivable Remote Site Telephony (SRST) service builds in failover call-processing capabilities that take over in the event that a wide-area connection to a centralized call server is lost.

Wireless and Mobility Capability

Wireless LAN (Wi-Fi) controller capability is integrated directly into the Cisco ISRs, which are built for midsize businesses and branch offices. This integration lowers the TCO of networking in these locations. Cisco Wi-Fi networks implement Layer 2 standards for security and QoS. The Layer 3 security, QoS, and management capabilities described earlier can also be applied to both wired and wireless network segments in a consistent manner, all from the same device, to streamline operations and free network managers for more strategic work that better supports business goals.

In addition to wireless LAN capabilities, a cellular routing module has been integrated into the Cisco ISR branch-office routers. With it, branches have the option to use 3G cellular networks as a primary or backup WAN connectivity link.

Common Security Across Both Wired and Wireless LANs

The Cisco Secure Wireless Solution applies wired security features, such as firewall filtering and Layer 4-7 intrusion prevention, to wireless LAN traffic without requiring users to log in separately to each network segment. Cisco wireless LAN controllers (standalone or integrated into switches/routers) automatically communicate with the various Cisco security appliances and functions on the wired network, so that all security checks, scans, and remediation done on the wired network segment also take place on wireless LAN traffic.

Unified Wi-Fi and Cellular Networks for Roaming

Dual-mode phones provide wireless VoIP to employees while they are at the office and traditional cellular service to them when they are out of range of the business wireless LAN. Regardless of the network they are on, users are reachable by a single phone number, using the Cisco Mobile Connect converged solution. This flexibility increases the productivity of employees and reduces cellular phone charges. In addition, the Cisco Unified Mobile Communicator extends all the

directory, dial plan, and application features available to business phones from their Cisco call server to users' cell phones for deeper integration and user flexibility.

Aligning Business and Technology

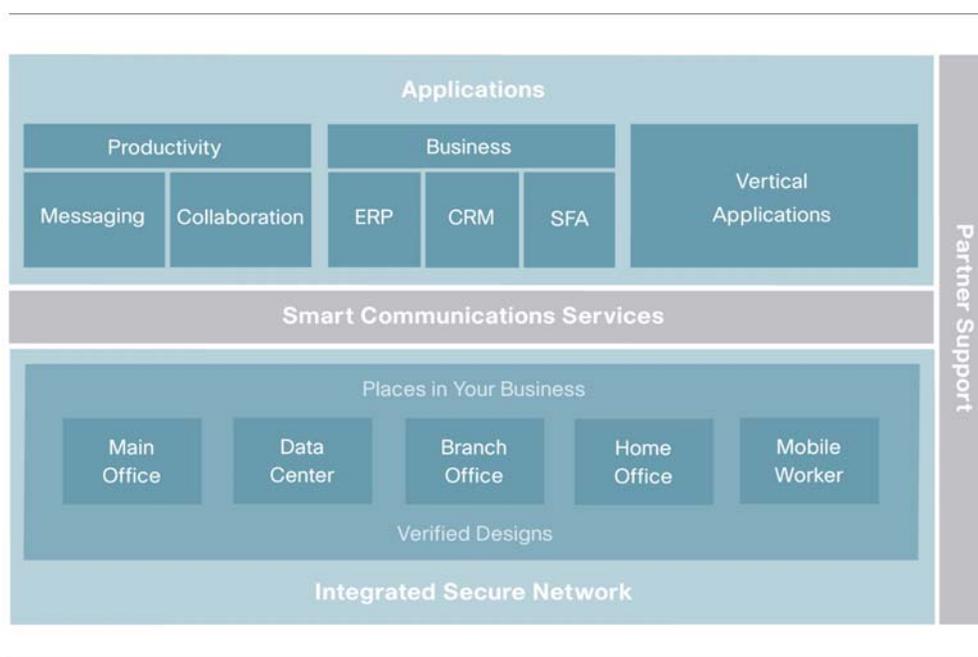
To assist chief information officers and IT managers in supporting business optimization and growth, Cisco has crafted an architecture, called the Cisco Smart Business Communications Architecture, that can be customized to meet an organization's immediate and future network and business needs. The architecture takes a holistic approach to networkwide technology and application integration that enables easy-to-scale network additions through the use of virtual technologies. Virtualization enables network resources to be shared across the entire organization, wherever they happen to be needed at the time. An adjunct to this architecture is the Cisco Smart Business Roadmap, a consultative process whereby customers and Cisco cooperatively build a custom roadmap for growing their network foundations in a way that is consistent with each customer's own business vision.

Cisco Smart Business Communications Architecture

The Cisco Smart Business Communications Architecture is a two-layer model that includes reference architectures, production-grade designs, and verified best practices for network implementation and management. Each component within the architecture corresponds to places in the business network – main office, data center, branch office, home office, and mobile worker – and contains its own designs that can be combined for a customized, proven solution.

This highly integrated process offers practical benefits, such as lower operational expenses, by enabling employees to communicate using a single, secure architecture for voice, data, mobility, and video.

Figure 2. Cisco Smart Business Communications Architecture



Foundational Layer

The foundation of the Cisco Smart Business Communications Architecture is the integrated secure network layer, described earlier, which integrates security with core routing, switching, voice, and wireless technologies. The architecture provides best-practice designs that describe how to optimize each networking function in individual areas of a business.

Embedded in the integrated secure network layer are Cisco Smart Communications Services – including the intelligent network services mentioned earlier, such as HSRP/VRRP, SRST, and QoS – that work with Cisco core technologies to enable the delivery of business applications to users in the appropriate format, wherever they happen to be. Another Cisco Smart Communications Service is load balancing, which enables the network to automatically adjust to unexpected or uneven traffic loads by directing user requests to the most available server.

Certified Cisco channel partners can optimize Cisco Smart Communications Services for each customer environment according to the specific business and technical requirements of that organization. This flexibility enables midsize companies to establish a smart, resilient foundation for network applications and services that can grow and evolve along with their businesses. As new business models are developed, application connectors already resident within the network efficiently link Cisco Smart Communications Services to end users' applications.

Applications Layer

Above the integrated secure network layer in the Cisco Smart Business Communications Architecture is the applications layer, which is divided into three categories: productivity, business, and vertical industry applications.

- Productivity applications include rich-media collaboration and messaging running on an integrated secure network. These solutions have been verified to ensure that, for example, Cisco integrated messaging, speech recognition, and automated attendant applications can serve users in multiple locations from a single centralized server. They have also been verified to provide enhanced capabilities such as secure private messaging across many different devices.
- Business applications include standard horizontal applications, such as CRM, ERP, and salesforce automation tools, from industry leaders such as Microsoft and Salesforce.com.
- Applications tailored to vertical markets address and support industry-specific standards. Cisco will continue to demonstrate how these applications can run more effectively on a Cisco integrated secure network – and how the performance and utilization of vertical applications can be improved.

Cisco Smart Business Roadmap

Cisco offers a roadmap service to help customers determine optimum solutions for today while ensuring future scalability to help grow the business. The Cisco Smart Business Roadmap process begins with the customer and Cisco together identifying business objectives and then mapping them to the technology solution that is needed today. Each recommended solution is designed to allow simple additions for future network investments while continuing to optimize the business based on the customer's vision. There are four common business challenges faced by midsize and large businesses for which the Smart Business Roadmap prescribes customizable solutions:

1. Operational efficiency

A flexible, reliable network with integrated technologies and management enhances communications with employees, partners, and customers; streamlines operations and simplifies network management; improves employee productivity and effectiveness; increases revenue; and lowers operational costs.

2. Customer responsiveness

Integrating communications systems with customer information enables the company to improve customer interactions, give service agents real-time access to customer data, provide customers with intuitive self-service options, and protect customer information.

3. Cost containment

A network with integrated voice, data, and video communications simplifies operations and management; reduces telecommunications expenses; avoids costs involving employee moves, adds, and changes; and eliminates redundant technology.

4. Security, including VPN encryption

Integrated security allows companies to safeguard their assets without diverting valuable resources. A Cisco secure integrated network helps protect company resources by securing customer information, identifying internal and external threats, stopping malware before it spreads, and adapting as new threats evolve.

The Cisco Smart Business Roadmap helps build the right solutions for each of these challenges, according to customers' priorities, and then determines how customers can evolve their business to an optimal level of performance. Figure 3 illustrates the stages in implementing technology solutions, as identified by the Cisco Smart Business Roadmap.

Figure 3. Business stages identified by the Cisco Smart Business Roadmap

Smart Business Roadmap: Business Stages



Summary

An integrated approach to technology is needed to survive and thrive in today's business climate, which relies on computer networks to securely enable nonstop business processes, improve efficiencies, and enhance customer responsiveness. A greater degree of network automation, based on each organization's internal policy, is necessary to ensure that networks remain manageable and secure as they grow and to lower TCO. With these requirements in mind, Cisco has achieved various levels of network-technology integration that are unique in the industry.

The Cisco systems-centric approach masks the back-end complexity of the multiple jobs networks now perform. Network components fall under a common management system, reducing training and operational burdens and allowing for the correlation of network events to decrease troubleshooting times and increase network availability.

In a Cisco network, core switching, routing, multilevel security, voice, and wireless capabilities have been combined into unified network components, rather than being bolted onto the network as separate devices that must be managed and secured individually. These components, together with Cisco Smart Communications Services, fall into the Cisco Smart Business Communications Architecture, a design guide and set of best practices that organizations can use as a template for selecting products that fit the architecture. The related Cisco Smart Business Roadmap brings customers and Cisco together to create a customized plan that details which solutions will best align product and technology choices with the business vision and anticipated requirements.

As a supplier of all core networking elements and intelligent services, and because of its industry leadership and world-class partnerships, only Cisco can provide the levels of technology and management integration required to deliver, in a holistic manner, capabilities and information that are greater than the sum of the network parts. As a result, businesses can take full advantage of Cisco integrated technologies to continually increase employee and IT staff efficiency, improve customer satisfaction and loyalty, and gain a competitive advantage.



Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Asia Pacific Headquarters

Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

Europe Headquarters

Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: +31 0 800 020 0791
Fax: +31 0 20 357 1100

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

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