

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 midsized 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 your network now must 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 each other. 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 midsized organizations.

Cisco network components are all designed to work together. Security, quality of service (QoS), and high availability are all built in from the ground up. Cisco has combined routing, switching, security, voice, and wireless technologies into unified network components, alleviating the need for midsized 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 midsized companies do not have available, and it is much more complex and difficult to scale networks built from non-integrated components. However, Cisco's integration efforts ensure that your network can be deployed, managed, and secured as a cohesive entity.

All Cisco network components fall under a common management system so that IT staff do not have to be trained to use several dissimilar systems. Unified management allows for the correlation of network events among various connected devices, and gives technology managers a more meaningful analytical network through one management console. This big-picture management view allows them to troubleshoot network issues faster and keep operations available for a larger percentage of the time.

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

Cisco Integrated Solutions

Core networking technologies can be broken into three primary categories: routing/switching, voice signaling and call processing, and wireless network transmission. Historically, these functions 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 mid-sized companies.

In addition to combining the core technology areas mentioned into unified products, another level of integration that facilitates a simplified, systems approach to networking involves embedding key higher-layer networking services into unified products. Let's take a brief look at these various kinds of integration and their benefits.

The Switching and Routing Foundation

Switching and routing are the network-foundation technologies that enable the basic transfer of networked application traffic. Attributes like throughput, number and types of interfaces, and numbers 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:

- Multi-level 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 functions 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. The functions block such malware from the network to circumvent denial of service (DoS) attacks. And they 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 in 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, which all 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 hogging resources and degrading the performance of others.

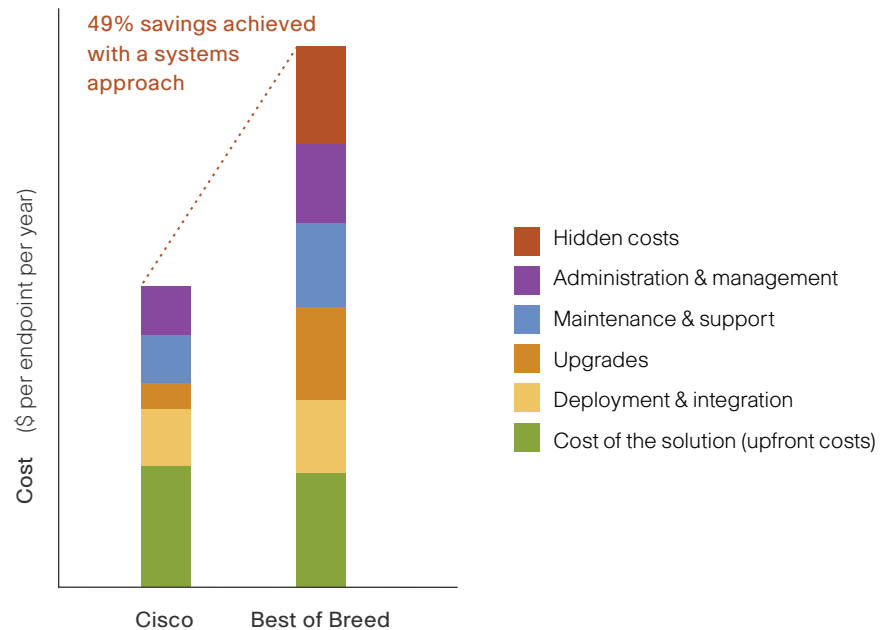
Inherent Redundancy for High Availability

Cisco Catalyst Switches and Integrated Services Routers contain options for redundant network circuits and automatic failover protocols, such as the Cisco Hot Standby Router Protocol (HSRP) and 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% 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% compared to the cost of purchasing and operating separate "best of breed" products for each function.

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 from both economic and efficiency perspectives. There are the bottom-line cost advantages of merging multiple networks into one. In addition, entirely new collaboration and communications capabilities are enabled by applications that mix network-based data with voice calls, and unified multiple messaging systems save time and promote faster decision-making.

Cost Savings of Integration

Collapsing multiple networks into one converged infrastructure greatly reduces capital expenditures, cabling costs, and the operational expenses associated with managing separate network infrastructures. There have been several years of enterprise experience with integrating voice over IP (VoIP) onto traditional packet data networks now—enough that the industry comfortably estimates that organizations save 30% to 40% on long-distance, circuit, equipment, and network administrative costs by running a single architecture instead of 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 is a productivity-enhancer, enabling better and faster communications and decision-making throughout the organization.

The ability to immediately know the identity of a customer before the call center service representative picks up the phone is furnished by the integration of an organization's customer database with its IP call center telephony system. Unifying telephony with customer data 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, secured electronic mailbox that collects messages from multiple phones, email systems, and fax machines streamlines the time and effort spent checking and managing multiple messaging systems. These unified mailboxes impact 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 levels of privacy. Businesses can set rules for particular phone extensions about 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 on messages marked "private." Similarly, the phone system can be configured to give certain individuals the ability to receive voice messages from third parties via email while restricting other employees from doing so.

Authenticating and verifying users, devices, and traffic on a unified network is essential, in that unsecured voice systems might be used as an access point for attacking an organization's data network and disrupting business processes. In such cases, individuals will try to disguise malicious data as voice traffic. Cisco Unified Communications systems, however, prevent this from happening. 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, VoIP packets are marked with top priority, because they represent real-time conversations that cannot tolerate much latency in transmission. The Cisco Unified Communications system places VoIP traffic in a special virtual LAN (VLAN) 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 foundational data network resiliency built in with 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 should be lost.

Wireless and Mobility

Wireless LAN (Wi-Fi) controller functionality is integrated directly into the Cisco ISRs mentioned, which have been purpose-built for midsized businesses and branch offices. This integration lowers the TCO of networking in these locations. Cisco 802.11-standard Wi-Fi networks have Layer 2 standards of their own for security (802.11i) and for QoS (802.11e), which are bundled in. 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 now 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 and routers) automatically communicate with the various Cisco security appliances and functions on the wired network so that all security checks, scans, and remediation that happen on the wired network segment take place on wireless LAN traffic, too.

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. Whichever network they are on, users are reachable by a single phone number using the Cisco MobileConnect converged solution. This flexibility increases the productivity of employees and simulta-

neously 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.

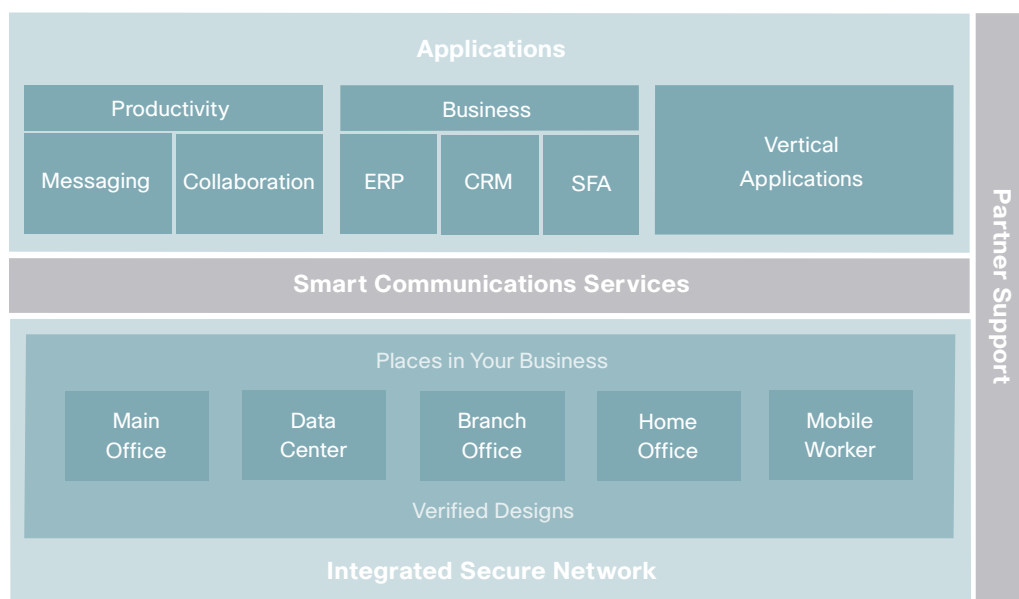
Aligning Business and Technology

To assist CIOs 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 according to an organization's immediate and future network and business needs. The architecture takes a holistic approach to network-wide 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

This framework 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 Framework



Foundational Layer

The foundation of the Smart Business Communications Architecture is the integrated secure network layer, generally described earlier, which integrates security with core routing, switching,

voice, and wireless technologies. Cisco has verified designs for these integrated products and all the places in the business they service. The architecture provides best-practice designs that describe how to optimize each networking function in each of these places in a business.

Embedded in the integrated secure network layer are Cisco Smart Communication Services—including the intelligent network services mentioned earlier, such as HSRP/VRRP, SRST and QoS—that work with Cisco core technologies to enable business application delivery to users in the appropriate format, wherever they might happen to be. Another Cisco Smart Communication 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 Business Communication services for each customer environment according to the specific business and technical requirements of that organization. This flexibility enables midsized 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 as part of the architecture efficiently link Smart Business 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 service 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 Customer Relationship Management (CRM), Enterprise Resource Planning (ERP), and sales force automation tools, from industry leaders such as Microsoft and Salesforce.com.
- Applications specific 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 vertical application performance and utilization 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 midsized 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 on employee moves, adds, and changes, and eliminates redundant technology.

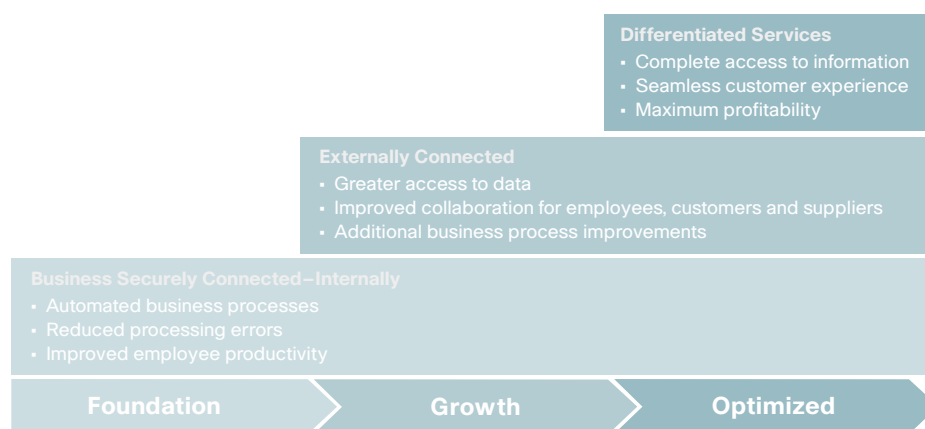
4) Security, including VPN encryption

Integrated security allows you to safeguard your 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, in priority order, and then determines how to evolve your business to an optimal level of performance.

Figure 3. Smart Business Roadmap: Business Stages

Smart Business Roadmap: Business Stages



Summary

An integrated technology approach is needed to survive and thrive in today's business climate, which relies on computer networks to securely enable non-stop 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 network 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.

Core switching, routing, multi-level 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, as well as Cisco Smart Communications Services, fall into the Cisco Smart Communications Business 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 Communications Business Roadmap brings customers and Cisco together to customize each business's plan for which solutions to plug into the architecture to best align products and technology choices with 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, in a holistic manner, to deliver capabilities and information that are greater than the sum of the network parts. As a result, businesses can leverage Cisco integrated technologies to continually increase employee and IT staff efficiency, improve customer satisfaction and loyalty, and gain competitive advantage to grow bottom-line results.



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