

# How Network Architecture Simplifies the Deployment of Unified Communications

Network architecture enhances implementation of IP voice, data, and video products in the Cisco network.

## Cisco IT Case Study / Enterprise Network Architecture / Cisco SONA and Cisco Unified

**Communications:** The Cisco Service-Oriented Network Architecture (SONA) is an architectural framework that helps organizations accelerate applications, improve business processes, and increase profitability. Cisco has been transitioning to the SONA framework for its own corporate network to reduce costs and increase flexibility for adopting new technologies. This case study describes how Cisco IT used SONA elements to enhance the implementation of Unified Communications products (IP voice, data, and video) on the Cisco network. It also describes the results Cisco has achieved for cost savings, increased productivity, improved customer service, and enhanced business processes. Customers can draw on Cisco IT's real-world experience in this area to help support similar enterprise needs.

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– Jawahar Sivasankaran, Cisco IT Program Manager

## BACKGROUND

Cisco® has developed an integrated network architecture—the Cisco Service-Oriented Network Architecture (SONA)—that provides the framework for Cisco IT decisions and technology deployments. As one example of this architecture's value, Cisco IT has taken advantage of the SONA converged infrastructure to deliver a smooth internal deployment of Cisco IP Unified Communications products.

## CHALLENGE

Cisco has long held the vision of information being shared and used effortlessly to facilitate faster, more flexible collaboration within the company. This information would be shared easily among different yet integrated applications, among diverse groups of employees, and between partners, customers, and various Cisco groups.

However, until recently, the tools to facilitate this information sharing did not exist. The underlying network and data center systems, as well as the software applications, were separated into different silos. There was little communication among these silos, which meant applications could not support easy collaboration or flexible information sharing. Cisco network designers realized these limitations had to be overcome at a network and services level.

The network needed to deliver a wide variety of reusable services to both users and applications. Examples include general services such as identity management, mobility, security, data storage, and data processing, as well as specific services such as voice call control, data encryption, message logging, and protocol translation. Using these network services, Cisco employees could develop companywide tools and business processes for supporting multimedia collaboration among users and applications in an easy, scalable way.

## SOLUTION

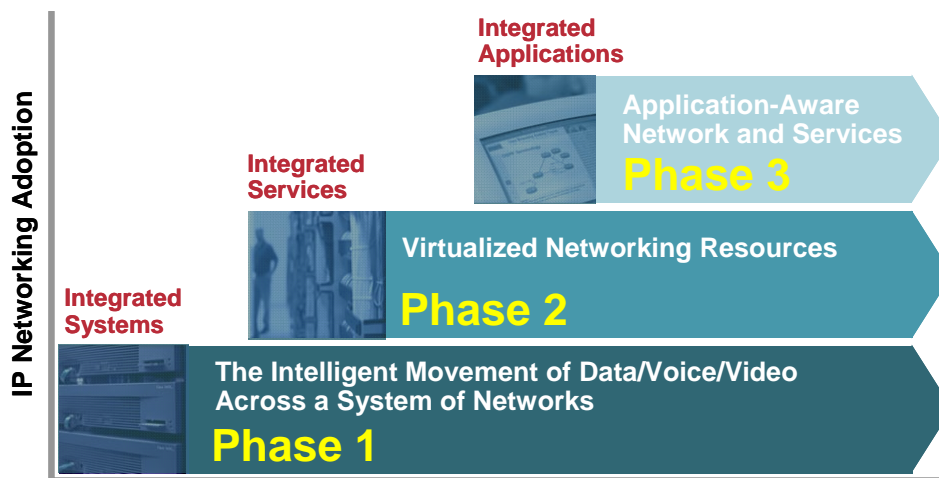
Before deploying the Cisco Unified Communications solutions, Cisco IT was evolving its corporate network in three implementation phases, to allow the network to support reusable, scalable services (Figure 1). The goal of this evolution is to support an Intelligent Information Network (IIN), which is Cisco’s vision for growing business value through increasing investment in the network over a period of three to five years. An IIN builds on an existing infrastructure foundation and turns the traditional IT “cost center” into a strategic tool that helps enable sophisticated IT functionality such as virtualization, telepresence, application integration, and optimization that streamlines IT processes.

**Phase 1** built integrated systems for intelligent movement of data, voice, and video traffic across the Cisco corporate network. Cisco IT also migrated all traffic and access types onto a consolidated IP network.

**Phase 2** delivered integrated services and virtualized network resources such as storage. Virtualization was enabled by the converged IP network and the Cisco intelligent network design.

**Phase 3** focused on integrating applications through an “application-aware network,,” an approach that delivers centralized communications services for all applications from the network.

**Figure 1.** Phases for transitioning to the Cisco Intelligent Information Network.

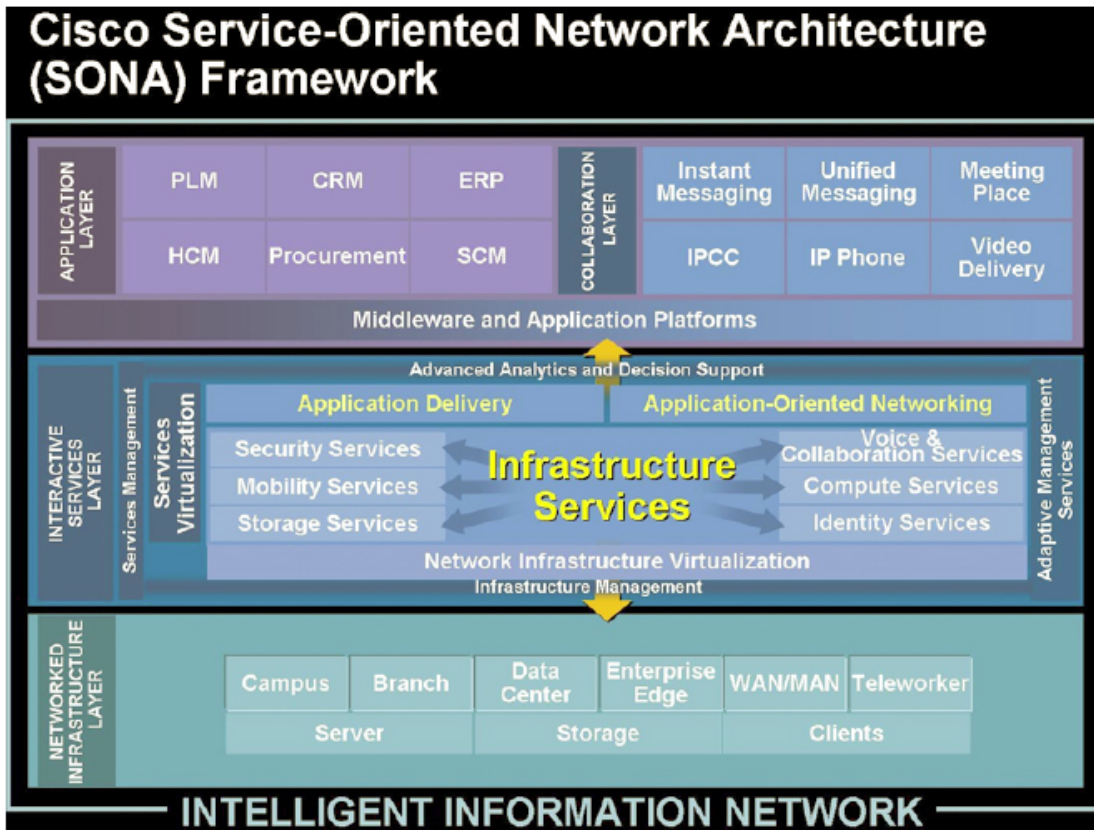


The evolution to an IIN required Cisco IT to change how it viewed the network, moving from a perspective based on specific technologies to Cisco SONA, which is based on a services perspective.

Cisco IT applied the principles of the Cisco SONA framework to the Cisco corporate network. Today, the Cisco global network uses the Cisco SONA framework to securely deliver services such as IP communications, content distribution, and storage (Figure 2).

“In the Cisco SONA framework, the network forms a single element that connects and enables all components of an IT infrastructure to accelerate applications, optimize processes, and maximize IT resources,” says Jawahar Sivasankaran, Cisco IT program manager. “The framework helps organizations increase revenue and opportunity, improve business resilience, strengthen customer relationships, and improve productivity while reducing costs.”

**Figure 2.** The Cisco SONA framework offers numerous services and architectural elements for integrating and simplifying new technology deployments across an enterprise network.



### Guiding the Deployment of Cisco Unified Communications Solutions

Beginning in 2000, Cisco IT used the SONA framework to deploy Unified Communications solutions incrementally, starting with basic telephony services, then adding advanced technologies and customized applications such as IP-based voice and video services to Cisco employees working in company offices, at home, or in contact centers (Table 1).

Three layers in the Cisco SONA framework are relevant to the Cisco Unified Communications deployment (Figure 2).

- **Network infrastructure layer:** Defines the single, converged IP network that provides intelligent connectivity for all services and applications—including voice—across the enterprise.
- **Interactive services layer:** Integrates the network and applications, and provides common infrastructure services such as computing, storage, security, mobility, voice, identity, and collaboration.
- **Application and collaboration layer:** Defines the distinct voice, data, video, and converged applications that are delivered over the network and use network services.

“The Cisco SONA framework simplified our deployment of Cisco Unified Communications solutions because we could do it in a layered fashion,” says Sivasankaran. “The framework assured that the underlying network layers were complete and supporting technologies were ready as we deployed each new solution. Deploying a new application was just a matter of pulling in the right services, which already existed in the network.”

**Table 1.** Cisco IT deployed Unified Communications solutions in phases, building incrementally on the network foundation defined in the Cisco SONA framework.

Timeframe	Cisco Solutions Deployed	Building Upon ...	Leading To ...
2000	Cisco Unified CallManager, Cisco Unified IP Phones, Cisco IP Communicator, network security, and QoS technologies	Cisco's converged IP network	Centralized call processing that supports new applications
2002	Cisco Unified Survivable Remote Site Telephony (SRST)	Centralized call processing by Cisco Unified CallManager in regional hubs worldwide	Common voice services delivered to employees in campus sites and branch offices
2002	Cisco Unified Contact Center	Cisco's converged network and centralized call processing	Global call routing capabilities and flexibility for adapting to dynamic business needs and contact center activity
2004	Cisco Unity®	Central call processing hubs	Future migration to Cisco Unity unified messaging
2004	Cisco Unified MeetingPlace®	Network services for voice, video, and data	Rich-media conferencing for employees and external participants
2005	Cisco Unified Video Advantage	Cisco Unified IP Phones and video support in the Cisco network	Near-transparent provisioning of video services for users
2006	Internal tools for services management	Cisco's converged, integrated, and intelligent network	Faster, automated deployment of services and applications

## Network Services

Drawing from the interactive services layer, the Cisco Unified Communications deployment uses network services for security, quality of service (QoS), and services management.

**Security.** Cisco security technologies help to maintain high levels of protection and threat mitigation for the Cisco Unified Communications deployment. These technologies include Cisco firewalls, Cisco Security Agent software on voice servers, protection against denial of service attacks, and third-party antivirus tools. Using virtual LANs to separate voice and data traffic is another important security measure that has been implemented by Cisco IT.

**QoS.** End-to-end Cisco technologies such as QoS are required for deploying Unified Communications solutions successfully and for delivering the voice, video and application quality that support employee productivity. With a converged network services compete for IP resources and they have different requirements for latency, jitter, and packet size, and different tolerances for packet loss. The Cisco SONA framework requires QoS implementation across the converged network, but with all services delivered on a single IP network, the implementation of a single set of QoS policies is greatly simplified.

**Services management.** Cisco remote operations services allow centralized management and provisioning of Unified Communications services. Network managers also use automated processes that define user entitlement for network access and services. Dialing plans, call detail records (CDRs), call admission control (CAC), and least-cost routing are additional techniques that Cisco IT has used to deliver efficient, cost-effective voice services.

## Cisco Unified Communications Solutions

Cisco's internal Unified Communications deployment encompasses numerous products and capabilities.

**Call processing and IP telephony.** For centralized call processing, Cisco IT deployed Cisco Unified CallManager clusters with a variety of clients, including Cisco Unified IP Phones and Cisco IP Communicator for software-based

telephony. Additional elements include Cisco gateways that communicate with public networks, Cisco gatekeepers that provide CAC, and audio-video bridges that support conferencing services. Together, these services provide the basic functions in an IP telephony system.

**Remote office communications.** In a centralized call processing model, remote offices must have an alternative network path for placing and receiving phone calls if the primary WAN link is unavailable. Cisco Unified Survivable Remote Site Telephony (SRST) software operates on remote office routers to provide communications failover, redundancy, and security for remote sites that have lost connectivity to a central Cisco Unified CallManager system.

**IP phones and applications.** Cisco IT has developed several custom applications, such as directory lookup, by using the XML integration features on Cisco Unified IP Phones. For remote and mobile employees, Cisco IP Communicator software is installed on a PC and provides voice services and productivity features comparable to those on office phones.

**Voicemail and unified messaging.** Cisco Unity servers provide networked voicemail services to Cisco employees worldwide. Because the underlying call control system (Cisco Unified CallManager) was already in place, Cisco IT only needed to ensure correct interoperability when the Cisco Unity voicemail system was implemented. In the interactive services layer, the integration of Cisco Unity with Active Directory and other computing resources ensured a smooth migration to an IP-based voicemail solution.

**Conferencing.** The internal audio, video, and Web conferencing solutions are based on Cisco Unified MeetingPlace and partner technologies.

**Video telephony.** More than 25,000 Cisco employees worldwide access video telephony services from their PCs by using the Cisco Unified Video Advantage camera and software. Because the Cisco network supports video telephony as a service, provisioning activity is nearly transparent to Cisco IT. Initiating a video call is as simple as dialing an employee's five-digit phone extension.

**Contact center.** Cisco Unified Contact Center solutions provide interactive voice response, call routing, and call distribution capabilities that allow Cisco to handle inbound sales and support calls with quality and cost efficiency.

## RESULTS

Deploying Cisco Unified Communications solutions using the Cisco SONA framework is yielding several benefits:

**Convergence, intelligence, security, and integration in all areas of the network infrastructure.** Cisco's converged network encompasses all IT technologies, including data, voice, video, and storage. The entire network now provides more intelligence for delivering all applications, including voice and video. Cisco employees are more productive because they can use a consistent set of Unified Communications tools from almost anywhere in the world.

**Cost savings.** Cisco has realized significant cost savings by carrying internal calls on the corporate network, reducing costs for network infrastructure and cabling, as well as eliminating the lease and maintenance costs of traditional PBX, voicemail, and call center systems. With the Cisco SONA framework, the network offers the power and flexibility to implement new voice applications easily, which reduces development and implementation costs. Common network services are used on an as-needed basis by voice, data, and video applications.

**Productivity improvements.** Collaboration services and product features enable employees to share multiple information types on a rich-media conference. For example, agents in Cisco contact centers can share a Web browser with a customer during a voice call to speed up problem resolution and increase customer knowledge. Collaboration has enabled contact center agents to reduce the average time spent on each call, yet receive higher customer satisfaction ratings.

**Faster deployment of new services and applications.** Cisco is better able to deploy services for interactive

communications through virtualization of storage and other network resources. Automated processes for provisioning, monitoring, managing, and upgrading voice products and services help Cisco IT achieve greater network reliability and maximize the use of IT resources.

**Enhanced business processes.** Cisco IT is better able to support and enhance business processes and resilience through integrated applications and intelligent network services. Integration is seamless for business applications such as customer response management (CRM) and communications functions such as unified messaging.

## LESSONS LEARNED

In evolving to the Cisco SONA framework and deploying Cisco Unified Communications solutions, Cisco IT has learned lessons that are applicable to many enterprises.

- A layered implementation model based on the Cisco SONA framework can help improve the effectiveness of a large-scale deployment such as a Cisco Unified Communications solution.
- Common, reusable services result in efficient use of network resources and decreased redundancy in applications.
- Verifying the underlying security services before new application deployment ensures that required security updates are in place.
- With the Cisco SONA framework, the network can adapt to the different requirements of applications. Conversely, the application deployment must reflect a clear understanding of the network requirements.
- Strong collaboration and communication between the application and infrastructure teams can facilitate near-seamless deployment of new, enterprise-wide systems.

## NEXT STEPS

Cisco IT has applied the Cisco SONA framework to other technology areas, such as data centers and mobility. As Cisco expands its presence in new locations, this framework will be applied to ensure the standard architecture is followed globally.

Within the area of Unified Communications, Cisco IT is investigating advanced solutions based on Session Initiation Protocol (SIP) and other new technologies. For example, deploying the Cisco TelePresence Meeting solution will change the way employees collaborate and communicate, while producing significant cost savings.

Cisco IT's standard cycle for upgrading equipment in its network will result in better voice and video services. For example, the upgrade cycle has provided the capability to support integrated security and higher performance for Cisco's own Unified Communications applications. In addition, deploying Cisco Unified Video Advantage to all locations will make video telephony a standard feature for all employees.

Several Cisco on Cisco case studies provide details on Cisco IT deployment of the Cisco Unified Communications solutions. For a complete list of all case studies, visit [http://www.cisco.com/web/about/ciscoitnetwork/case\\_study.html](http://www.cisco.com/web/about/ciscoitnetwork/case_study.html).

## FOR MORE INFORMATION

To read the entire case study or for additional Cisco IT case studies on a variety of business solutions, visit Cisco on Cisco: Inside Cisco IT [www.cisco.com/go/cisocit](http://www.cisco.com/go/cisocit)

## NOTE

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