CISCO APPLICATION-ORIENTED NETWORKING

Cisco Application-Oriented Networking transforms the economics of interapplication communication.

EXECUTIVE SUMMARY

Enterprises must contend with a level of complexity in their application infrastructures that is increasingly hindering their ability to respond quickly and cost-effectively to new market demands. These complexities include the growing imperatives to keep pace with new compliance and security regulations, the need for a single real-time view of customers and suppliers across disparate applications, and the imperative for business agility and real-time responsiveness.

For enterprises, these capabilities are critical for exploiting market opportunities or fending off competitive threats. With application infrastructures often containing hundreds of interdependent applications, enterprises are struggling to accommodate the increased complexity. Organizations have therefore begun to consider new standardized architectures such as those based on service-oriented architectures (SOAs) and Web services*.

To address these needs, Cisco Systems® has introduced Cisco® Application-Oriented Networking (AON), the first network-embedded intelligent message routing system for application interaction. Cisco AON acts as a platform or technology foundation for a new class of Cisco products that provide an essential point of convergence between intelligent networks and applications. It is helping to realize a new vision of a network for applications that provides a pervasive, nonintrusive application-oriented fabric built on the strengths of the existing packet-based network. With Cisco AON, networks and applications work together—as an Intelligent Information Network—so that organizations can simplify, align, and consolidate their IT infrastructures.

Cisco AON uses the underlying network to provide an essential communications infrastructure for messaging, security, and other shared services. A Cisco AON-based network can transparently intercept and selectively filter all traffic, understand and translate relevant traffic across different applications at the message level, and deliver wire-speed inspection and processing of information.

BUSINESS GOALS AND THE EVOLUTION OF INFORMATION TECHNOLOGY

A new approach is required to address the complexity of today's application communication architectures.

A schism has developed in the application infrastructures of most enterprises. Within the past decade, newer distributed, loosely coupled infrastructures based on SOA and Web services have joined the existing mix of proprietary, centralized application integration infrastructures based on traditional middleware and enterprise application integration (EAI). Although these new technologies provide more flexibility and have begun the shift to a nonproprietary, open environment, they suffer from a new set of problems. Among the most important: They lack the IT control and security of the centralized environments for handling the fragmentation that is occurring across organizational boundaries. Individual departments, for example, are developing and deploying applications and services independently, often using products and tools from new vendors in the emerging Web services market.

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* Considered the next wave of application development, SOA is a technology model in which business functions are organized as a collection of services, each with a clear business identity and strict formal interfaces. Web services generally refers to a simple, standardized way of integrating applications and is recognized as the first universally accepted and supported interface standard.

A case in point is the IT department at Cisco. By 2002, Cisco had developed more than five hosted environments to provide information and business-to-business (B2B) services to customers, partners, and suppliers. These environments evolved piecemeal over the years and reflected the various technologies in use at the time and the particular needs of each Cisco business unit. Although Cisco had begun to implement SOA and Web services a few years ago, each department still implemented its new technologies in an isolated fashion using disparate tools to manage and secure these services. The result has been a patchwork of integration technologies that have been costly to maintain and difficult to manage without a consistent, standardized way to implement, manage, and secure services across all of the environments.
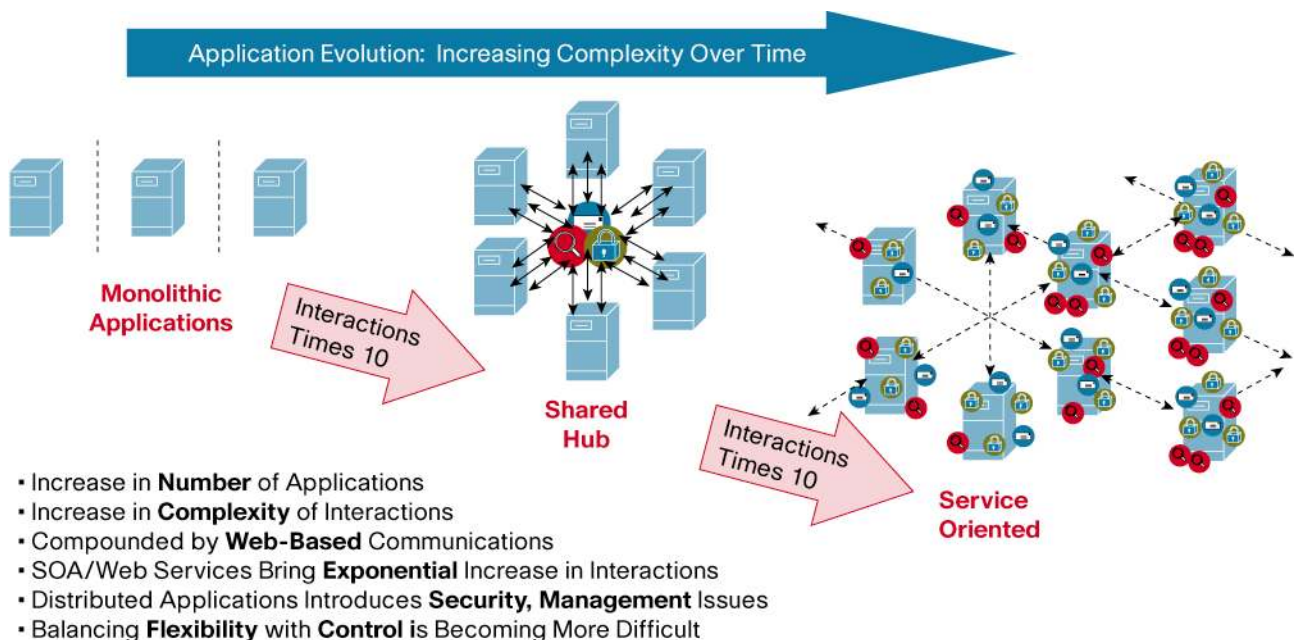
Like Cisco, the industry's initial steps into distributed and service-oriented computing continue to require that essential messaging and collaboration services be embedded into endpoint applications or isolated into middleware stacks that serve certain applications. To date, implementing wide-ranging application-level collaboration in this new distributed environment has required an ever-increasing proliferation of systems from application servers to load balancers to message brokers to various appliances and integration middleware.

Note: For general information on the evolution of application integration, see Cisco *AON's Application Infrastructure Primer for Network Professionals* at http://www.cisco.com/en/US/products/ps6438/prod_white_papers_list.html.

These problems are common across any large enterprise. Worldwide financial firms, for example, face challenges in their application infrastructures that are typical for many firms today. To keep pace with the dramatic changes occurring in the financial services industry such as consolidations, to facilitate better and faster collaboration with global offices, and to meet new compliance regulations such as Sarbanes-Oxley, firms have been forced to extend their systems into numerous isolated applications.

Across many industries today, companies are contending with complex application environments and business ecosystems consisting of hundreds and even thousands of distributed and service-oriented applications or services (Figure 1). Facing a corresponding increase in customer expectations, companies must learn how to be flexible while handling this complexity and yet maintain control. How can they enhance communications within these application architectures burdened with isolated applications and specialized system services so they can adapt quickly and transparently to ever-changing business needs? And how can companies dramatically improve on the current, unacceptable one-year timeframe and multiple person-years of specialized effort required to develop, integrate, and implement custom-developed projects?

Figure 1. Applications Have Been Moving to a Distributed Architecture

- Increase in **Number** of Applications
- Increase in **Complexity** of Interactions
- Compounded by **Web-Based** Communications
- SOA/Web Services Bring **Exponential** Increase in Interactions
- Distributed Applications Introduces **Security, Management** Issues
- Balancing **Flexibility** with **Control** is Becoming More Difficult

The solution is to have a complete system that is distributed and loosely coupled enough to allow flexibility of change while still maintaining centralized control and manageability.

CISCO AON: A PERVASIVE FABRIC FOR APPLICATION INTERACTIONS

Cisco AON is the foundation for a new class of network-embedded products and solutions that help converge intelligent networks with application infrastructure, allowing the network to speak the language of applications.

For more than 20 years, packet networking based on the IP protocol has provided a unifying network fabric across heterogeneous environments. IP-based networking has changed both the makeup and the economics of **user** and **machine communications** with radical improvements in global reach, ease of use, and cost reduction. Cisco has been leading the way in this social and economic transformation.

Today, this same idea holds the promise of a pervasive, distributed network for **applications** that will help businesses to realize equally dramatic advances in cooperative and coordinated business processes. Once again, Cisco is leading the way.

Cisco AON, the first network-embedded intelligent message routing system, speaks the language of applications (Figure 2). Because the network touches all parts of enterprise infrastructures, using Cisco AON to embed intelligent intermediary services within the network helps enable business policy decisions to be enforced within the network fabric. This intelligence allows the network to play a more active role. A Cisco AON-powered network makes more informed decisions about how the activities of applications and services should be handled and transactions processed. It also provides unprecedented, broad, real-time visibility into application and business transactions.

Figure 2. Cisco AON Allows the Network to Speak the Language of Applications

Improved Collaboration Between Applications and the Network
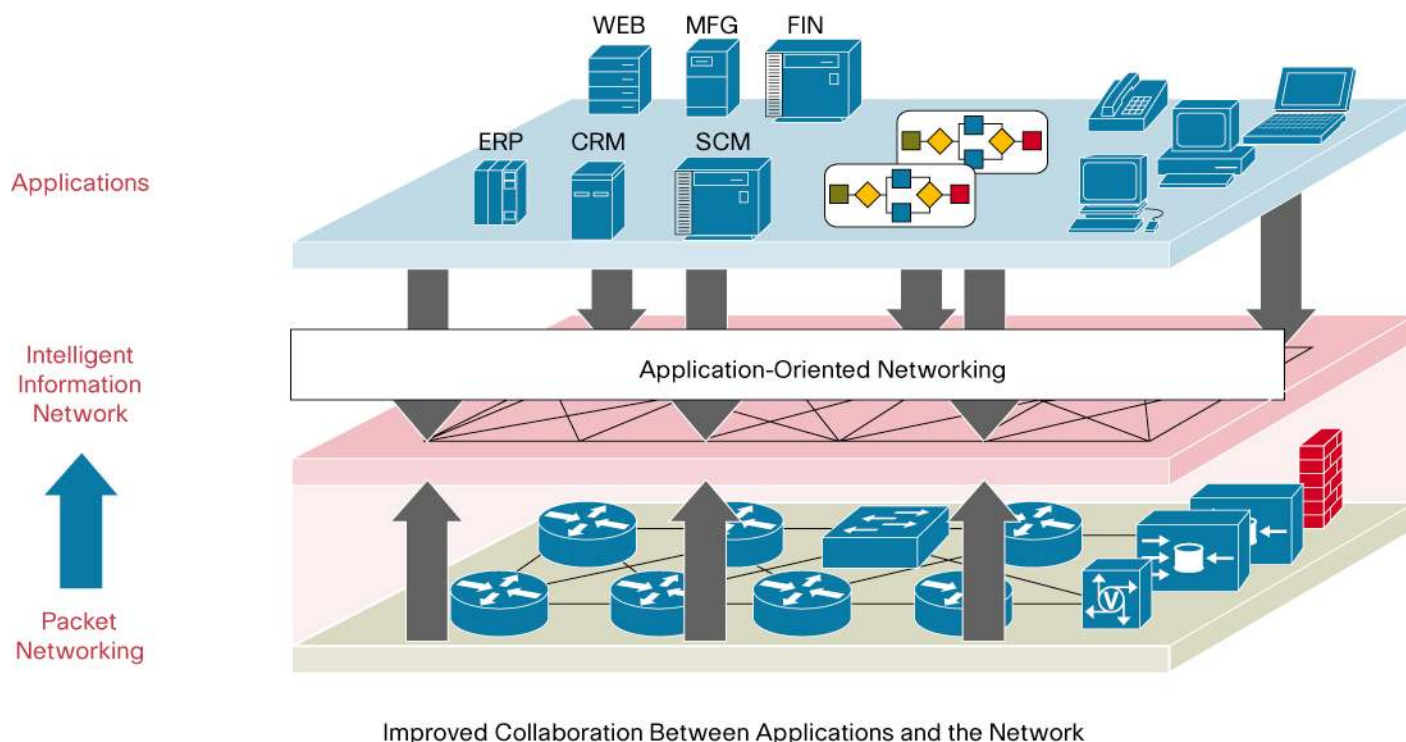
By embedding application-oriented foundation services within the network fabric, the cost and complexity associated with deploying application-level functions will decrease significantly over time. Instead of repeatedly needing to write this functionality into each application, or programming it through proprietary middleware, developers can make use of the functions offered within the network simply by turning them on.

The existing network already provides essential packet-based network services, such as quality of service (QoS), perimeter and session-level security, IP Security (IPSec) encryption, and extremely high throughput routing and switching fabrics. A network for applications integrates and significantly extends the packet-based connections among applications already provided by the existing network to create a pervasive fabric for true collaboration between applications at the message level. As discussed previously, today's enterprise IT environments consist of a diverse array of interdependent monolithic applications and now loosely coupled application components or services. As a result, the network is the ideal and, in many cases, the only place where such complex distributed environments can be provided with essential services. These range from message routing and security and include event capture and application message handling. This new level of networking can operate transparently (requiring no changes to endpoint applications), extend the existing network's value with improved visibility, security, and performance, and promote better business decisions with a lower total cost of operations.

BENEFITS OF CISCO AON

Network-based application intelligence allows new real-time capabilities.

The Cisco AON platform is the technology foundation for a new class of Cisco products that provide an essential point of convergence between intelligent networks and applications based on highly distributed, service-oriented, and traditional architectures (Figure 3). Cisco AON natively understands the content and context of application messages (for example, a purchase order or stock trade), and conducts operations on those messages in transit according to business policies and rules. Cisco AON now delivers this breakthrough level of application intelligence, allowing an increased level of insight for real-time business decision making. A Cisco AON-enabled network allows enterprises to dramatically improve business productivity in a way never before possible.

Figure 3. Cisco AON Core Capabilities
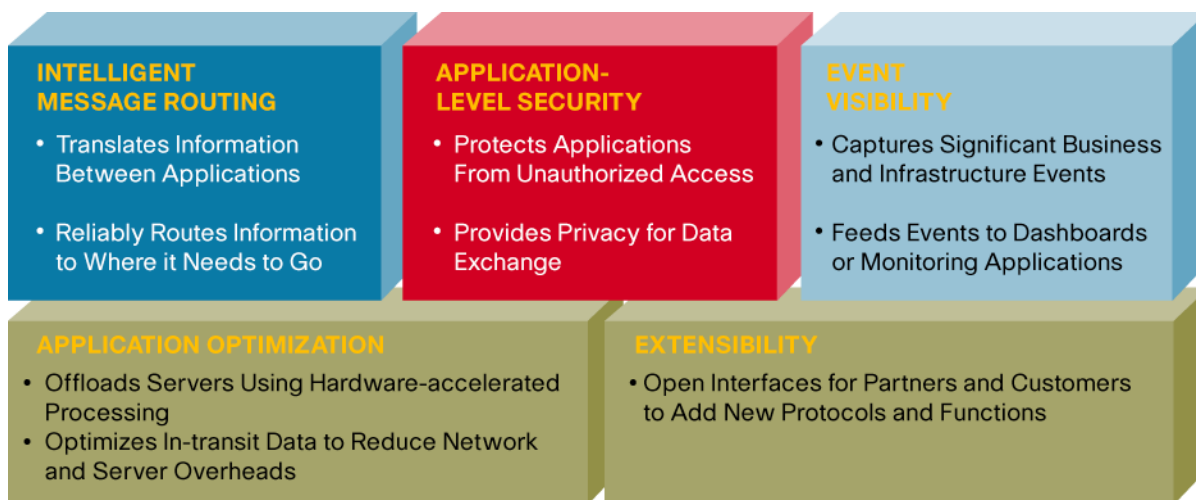
Cisco AON complements existing networking and application technologies by providing enhanced security, visibility, messaging, and optimization. These services help both IT and business users gain greater awareness of the business information flowing within the network. They also help to:

- **Enable disparate applications to communicate** by routing application messages to the appropriate destination, in the format expected by that destination
- **Enforce consistent security policies** for application access and information exchange through a pervasive, distributed network platform
- **Provide visibility of information flow,** including the monitoring and filtering of messages for both business and infrastructure purposes
- **Optimize applications** by providing application-level load balancing, offloading security and Extensible Markup Language (XML) operations, and offering caching and compression services at the application message level
- **Reduce complexity and improve time to deployment** by reducing some of the need for custom software development and systems integration

Any integration-application technology needs to align closely with the needs of applications. Cisco AON provides an extensible model to support different types of applications from multiple vendors, and Cisco has formed partnerships with leading vendors, such as IBM and SAP, to define the resulting infrastructure stack that can be shared across vendor implementations and highly distributed application topologies.

Cisco AON is blazing an innovative yet evolutionary trail in the enterprise market. Unlike custom software development, point appliances, and software communication systems that perpetuate the complexity of today's piecemeal approaches to application communications, Cisco AON is a network-based platform that simplifies the applications infrastructure. It does so by integrating intelligent application message handling for standalone applications and embedding proprietary and standards-based middleware into the existing network.

Cisco AON Use Scenarios

Cisco AON products support many kinds of deployments (Figure 4). These summaries describe typical uses for Cisco AON.

- **Cisco AON in the remote office or B2B spoke**—At a remote office or B2B spoke, Cisco AON modules can be deployed as an infrastructure consolidation device. A single Cisco AON module embedded in an edge router can provide all the application-level services required by the branch to effectively communicate with the central office. Cisco AON helps enable these services by bridging disparate applications and optimizing network usage at the application level. Additionally, the Cisco AON Management Console (AMC) provides centralized management of a distributed branch office deployment of application policies.

- **Cisco AON at the enterprise edge**—At the enterprise edge, Cisco AON can act as an application-security gateway or a B2B gateway, for example. As an application security gateway, Cisco AON can intercept and analyze traffic in message formats such as XML. As a B2B gateway, Cisco AON provides a transparent interface with trading partners by providing application-level security, protocol bridging, and message validation and transformation services.

- **Cisco AON at the enterprise core**—In the enterprise core, Cisco AON provides transparent interapplication communication and application delivery. It provides a network-embedded communication bridge between protocols and applications. Cisco AON optimizes application delivery by allowing applications to offload infrastructure functions, such as message-level load balancing, to the network, where they can perform more effectively.

Figure 4. Cisco AON Deployments
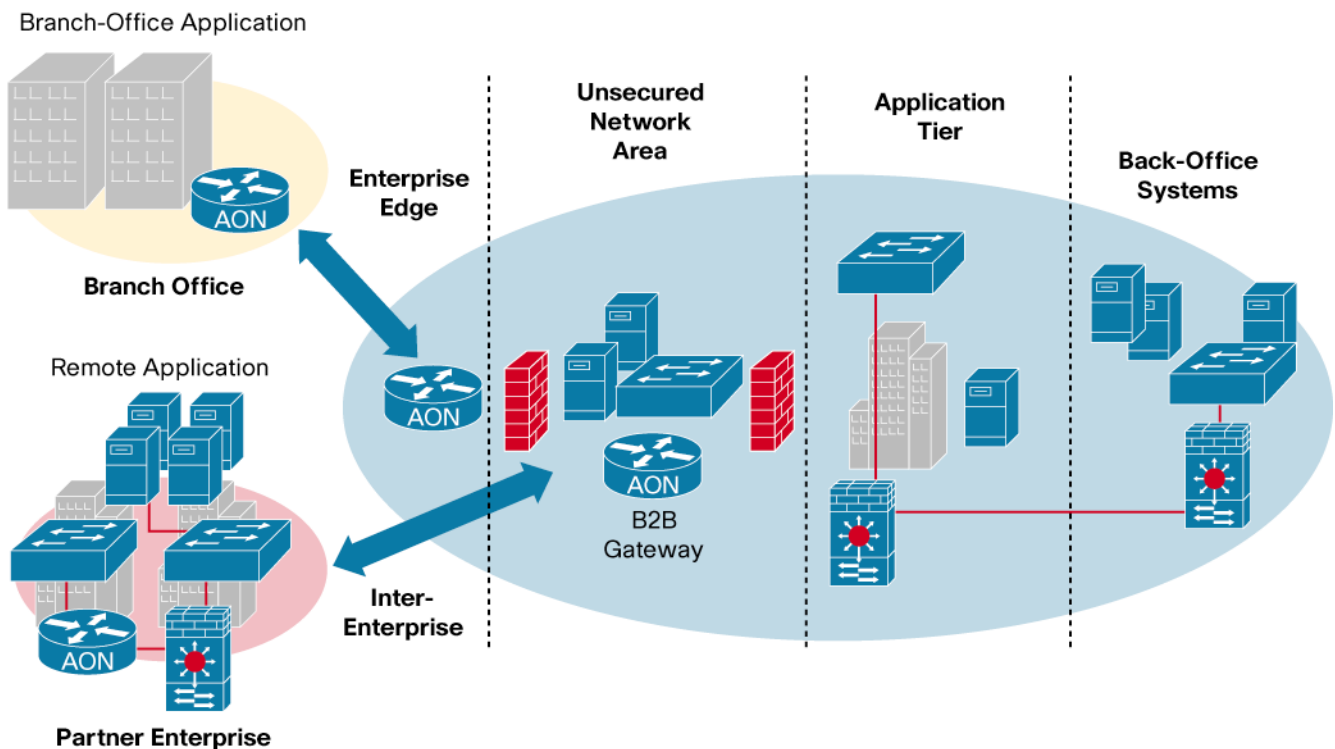
SUMMARY: A VITAL PART THE OF CISCO INTELLIGENT INFORMATION NETWORK

The Cisco intelligent information network moves toward its fullest realization with Cisco AON.

Cisco AON is the logical fulfillment of the ongoing vision at Cisco to build intelligence into the network infrastructure itself, called the Cisco Intelligent Information Network (IIN). Cisco IIN continues the value-adding tradition of enterprise-level infrastructure solutions that Cisco has delivered for more than 20 years.

The goal is to allow the network to perform tasks once handled on separate devices and standalone platforms. For example, if a company wanted to secure its network 10 years ago, it would have needed to install point products such as standalone firewalls or intrusion detection appliances at the outer edge of the network. But as network complexity increased and as new threats appeared from inside the network, from the Internet, or through wireless access points, point products were no longer sufficient. The response at Cisco was to employ a systems approach that embedded security at all vulnerable points in the network: in the routers and switches, the remote-branch access routers, intrusion detection and antivirus software, wireless access points, and voice-over-IP (VoIP) phones and call-processing components.

Cisco AON builds on this intelligence to handle application infrastructure services such as message transformation, application security, or message routing that are today handled in the applications or third-party hardware appliances. It helps deliver on the Cisco IIN vision, building a network infrastructure that meets a company's most strategic business objectives aligned with industry trends such as virtualized computing and service-oriented architectures. Cisco AON fundamentally transforms the network from being packet-based to also being *application message-based* and elevates the business value of an IT infrastructure while enhancing existing application and network investment.

With IIN, having Cisco AON as a cornerstone, companies will ultimately be able to enhance many application capabilities without being required to rewrite code in client applications at tens or hundreds of branch offices. This flexibility will allow the enterprise to adapt applications to address new markets, enhance productivity, or meet new regulations such as those from the Health Insurance Portability and Accountability Act (HIPAA) in the medical field or from government accounting mandates such as Sarbanes-Oxley. Most important, enterprises will gain increased visibility, closer to real time, into business transactions flowing across the network fabric. Security will also be applied consistently across all applications rather than application by application.

The results are the rapid time to market, readily extensible collaboration, and on-demand computing that will help today's enterprises become more responsive to changing business conditions permanently. Like the transformation that occurred many years ago at the data network level, application-level networking is poised to become the standard for performance and efficiency in enterprise application communications. Cisco AON now allows applications and the network to work together more fully as an integrated system, and only Cisco has the experience to make this advancement available today.

FOR MORE INFORMATION

For more information about Cisco AON, visit http://www.cisco.com/go/aon or http://www.cisco.com/en/US/products/ps6438/prod_module_series_home.html or contact your Cisco account representative.

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