



WHITE PAPER

## ACHIEVING DYNAMIC VISIBILITY WITH CISCO APPLICATION-ORIENTED NETWORKING

**Application-Oriented Networking calls for dynamic real-time, right-place, and relevant-content visibility.**

### INTRODUCTION

Today's new global business dynamics pose many demands. The search for a real-time advantage strongly influences the business case for implementing new supply chain efficiencies, simplified operations, real-time visibility, and real-time responsiveness.

The highly distributed IT infrastructures of major enterprises typically consist of hundreds of interdependent applications distributed geographically worldwide. Often, these applications reside at the premises of suppliers, distributors, and other third parties, while the enterprise's own systems might be outsourced to a managed service provider. Achieving real-time visibility from such a fragmented infrastructure has up to now mandated intrusive application agents, database triggers, network probes, messaging alerts, and monitors across this extended IT infrastructure and has not always been possible.

The most agile and successful enterprises are leading the transformation to IT infrastructures that allow operation in "real-time." They call for a single real-time view of the customer, an in-transit understanding of underlying operations and logistics, and an ability to react instantly to business events thousands of miles away while maintaining strict compliance with regulatory and corporate governance requirements.

New Application-Oriented Networking technology from Cisco® (Cisco AON) leverages the network to provide a pervasive and noninvasive fabric that facilitates dynamic visibility of business events through a unique and innovative infrastructure.

Cisco AON forms a pervasive foundation for application-to-application communications that bridges the inherent gap between application and network infrastructures that has existed since the beginning of commercial IT systems. Now, core services can migrate from the application stack to the underlying Cisco AON-enhanced network. This pervasive fabric naturally facilitates dynamic visibility—achieving views of the business that are real-time, right-place, and have the most relevant content—in a completely nonintrusive and natural way. Moreover, Cisco AON is secure and easy to maintain, and it substantially reduces the cost of achieving and maintaining visibility.

The core Cisco AON capability that allows dynamic visibility is the ability to process and interpret in-transit network events as business or application events *within the network itself*. This "business lens" promotes rapid and precise decision making at various points of presence in the network and also allows notifications and alerts to be sent to the right places across the extended business ecosystem. Cisco AON promotes the four essential elements of visibility—extraction, correlation and computation, notification, and action—that can be used by any existing distributed, service-oriented, or legacy application. Cisco AON complements business visibility engines like Business Intelligence tools, Dashboards, and Business Activity Monitors.

### NEED FOR DYNAMIC VISIBILITY

**Cisco facilitates a breakthrough approach to dynamic visibility through its new Application-Oriented Networking technology.**

The new rules for business as described above are being facilitated by an equally dramatic shift to distributed computing environments. The resulting distributed and service-oriented architectures help business use information more effectively in so-called "real-time." The goal is a customer-oriented understanding of changing business conditions, integration and visibility of information among partners, and holistic, in-transit visibility of internal assets.

The most agile and successful enterprises are the ones that operate closest to real time. Invariably, today's leaders across industries—technology, transportation and logistics, manufacturing, healthcare, and even formerly low-tech businesses such as agriculture—are the ones that compete best in the “time” domain. Additionally, concerns about homeland security are accompanied by significant business implications for timely and flawless operations, particularly in today's global business environment. Competing on “time” provides a source for innovation and trust, time-to-market, and competitive advantage along with operation excellence and stakeholder value. These and other factors influence the insatiable search for a real-time advantage and provide the business case for implementing new supply chain efficiencies, simplified operations, and dynamic visibility.

Companies seek dynamic visibility in order to share moment-to-moment demand and supply-chain information and to implement manufacturing and distribution operations. They also want to conduct joint product development; strategically source and optimize transportation and logistics; synchronize marketing, sales, and service; manage orders in real time; gain efficiencies in business and supply-chain processes; and facilitate shared business processes at each end of the supply-demand chain. In most of these visibility scenarios, none of the parties needs to see the whole, but just the parts that are relevant to their needs, in real time.

Achieving mastery of the real-time business requires a native understanding of how business processes work, where incentives can be realized, and which real-time processes are most critical to success. This mastery demands more than fast technology. Rather, it must consider the time required to restructure the business: How fast can a company transform or add end-to-end processes? Further, it must consider the time required to react. In other words, how can business value be realized through insight into business events and changing conditions and shared with immediacy across multiple applications?

Cisco Systems® facilitates a breakthrough approach to dynamic visibility through its new Cisco Application-Oriented Networking technology. Until now, applications have been the core processors of business logic, and the network has provided a heterogeneous foundation for delivery of communications. Now, dramatic changes in the rules of competition require new levels of business agility and real-time responsiveness across extended business ecosystems.

Cisco AON transforms yesterday's after-the-fact business intelligence based on historical information into in-transit awareness derived from real-time information and enforced with context-driven awareness of business rules and changing conditions. With Cisco AON, IT can be transformed to facilitate new and more sophisticated real-time decision making.

## **IN SEARCH OF THE REAL-TIME ADVANTAGE**

**The industry's initial forays into distributed and service-oriented computing have still required essential messaging and collaboration services to be embedded into applications or isolated into middleware.**

How do enterprises achieve real-time visibility today?

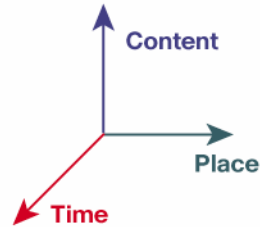
Enterprises go to great lengths to reduce the latency of visibility inherent in their IT infrastructures. Agents placed in the application infrastructure collect information from various devices and applications and forward that to specific monitoring applications that aggregate, correlate, and present the information to a variety of users. These agents can be in the form of database triggers, network probes, timers, embedded software agents, and so on.

This approach, which was state-of-the-art until now, is fraught with problems. First, by its very nature, this approach is invasive and unnatural. The use of entities foreign to the sanctity of application logic and consistency of databases can lead to serious maintenance problems at best and business failures at worst. Moreover, the use of such technologies can pose new security problems at the network and application levels. They can become the weakest link in the infrastructure, especially when these agents are developed in a transient fashion, with less regard for their security legitimacy. When the network devices, applications, and databases are upgraded, these agents might have to be rewritten, which could be a very costly endeavor. Finally, when problems arise, it could lead to disagreements between application infrastructure teams and network infrastructure teams. The problem gets further compounded in an extended enterprise, in which a company might demand that its suppliers or distributors implement similar invasive technologies in their infrastructures to achieve end-to-end business visibility.

In short, the current approach to reducing visibility latency is complex, expensive, and highly invasive, and it widens the gap between the application and the networking infrastructures in an enterprise.

**Figure 1.** The Search for Visibility

- Current (but limited) state of the art:
  - Business Intelligence—Achieves rich content visibility albeit with substantial latency
  - Business Activity Monitoring—Achieves more timely visibility, but is less content rich
- The problem is three-dimensional
  - Need: Dynamic Visibility
    - Real-Time
    - Right-Place
    - Relevant-Content



From the content point of view (Figure 1), two main approaches have been used to achieve business visibility: implementing a Business Intelligence (BI) solution on top of the traditional data warehouse and implementing a Business Activity Monitoring (BAM) solution on top of the existing business process execution engine. Both of these approaches solve only part of the dynamic visibility problem. Although the BI engines provide rich content based on significant data analyses, they cannot provide this content in real time. Indeed, the richer the content, the more latency in getting that content. It is not uncommon for the BI engines to deliver relevant content days after business events have occurred. This, however, has its place in getting the visibility that assists in long-term strategic planning for the business.

BAM, on the other hand, takes a more time-sensitive approach (as fast as the underlying business process will take to execute, although not necessarily real time). It cannot, however provide rich content since the information it can provide is limited to what the *underlying business process* can provide. The time bottleneck for the BAM approach is still the underlying process, which need not be in real time at all. In fact, the process itself could potentially be running for several days before completion.

### PERVASIVE CAPTURE OF INFORMATION

Where both of these approaches struggle, however, is in spreading their information across the complete extended ecosystem: The business processes do not run everywhere the business is running. The BI engine is likely to be centralized at the data center corresponding to the business headquarters, and the BAM engines are likely to be localized where the business processes are running. Even if the BAM engines are distributed through a service-oriented architecture, cost prohibits them from existing at every place where there is business activity. To get information rapidly from a wide variety of sources—manufacturing plants, suppliers, distributors, remote offices, warehouses, and so on—and to deliver information rapidly to an equally wide variety of destinations requires substantial additional help. Moreover, neither of these approaches is location-aware unless explicitly programmed for it; neither takes advantage of specific locations (network addresses or subnet addresses, for example) where the information is coming from. Each typically depends on the underlying network to provide the location or space dimension.

Further examination reveals that achieving real-time visibility is not just a two-dimensional problem with a trade-off between latency of content delivery and the richness of the content (Figure 1). It is, in fact, a three-dimensional problem that balances time, content, and location. Furthermore, the only pervasive and location-aware aspect of an enterprise's IT infrastructure is the network. The network connects to every server, every data storage unit, every backup server, every mobile device, every radio frequency identification (RFID) reader, and so on. It even extends to enterprises' business partners' networks and *their* partners' networks.

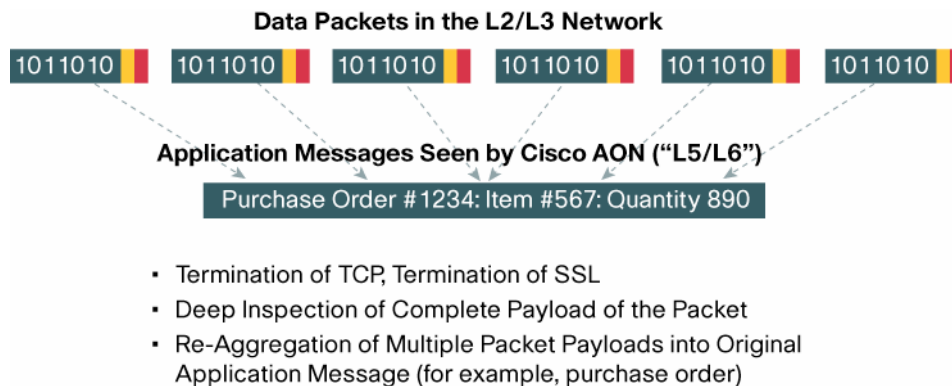
## CISCO AON APPROACH TO VISIBILITY

### The pervasive network is a rich source of business information.

Creating a pervasive network does not necessarily solve visibility problems. If the enterprise has to resort to unnatural and invasive acts to obtain real-time visibility, the network could in fact *prevent* cost-effective visibility because of its pervasiveness. The network needs to be used cooperatively to extract business information from it naturally and nonintrusively. Cisco AON is exactly that natural extension to networking.

Cisco AON takes advantage of the existing network by providing a “business lens” for dynamic visibility that focuses on the multidimensional aspects of time, place, and content. Cisco AON’s dynamic visibility overcomes the inherent latency in today’s business analysis engines by converting complex network events into a single in-transit view of business processes enforced by business rules and adaptable to customer needs and changing business conditions. With Cisco AON this process occurs right in the network, before any application layer sees those network events. This unique capability gives Cisco AON a tremendous edge in providing business visibility from the network itself: Once the business event is identified, Cisco AON is able to transform, enhance, and correlate the information contained in it and then transmit it to a variety of business dashboards. Again, it uses the power of the network to achieve this real-time, right-place, relevant-content visibility.

**Figure 2.** New Networking Paradigm: Cisco AON Aggregates Data Packets into Application Messages



Cisco AON, being a part of the network, provides a pervasive overlay that understands both the network and the applications that the network supports. Its pervasive nature allows Cisco AON to capture relevant network events without the use of probes or timers. By understanding application messaging, Cisco AON performs the task of agents without intruding into the application code itself (Figure 2). As part of the network, Cisco AON is maintained and managed like any other network device and is secure. Moreover, being the part of the network, Cisco AON brings location-awareness into the visibility, both from extracting information from specific locations and for delivering information to them, as demanded by the business. As an application-aware network, Cisco AON closes the gap between network and application infrastructures. It easily extends to the business ecosystem by taking full advantage of other Cisco AON devices at suppliers or distributors.

In short, the Cisco AON approach is simple, substantially more cost-effective, and nonintrusive. It forms the foundation for the transformation to dynamic visibility that is real-time, right-place, and content-relevant.

Cisco AON is not a replacement for BI or BAM engines. In fact, it is a perfect complement to them, because it provides the pervasive, nonintrusive infrastructure to extract *business* information from the network itself. After some processing, Cisco AON then sends the information to the other visibility engines, which can then create more complex information models and present them in a user-appropriate fashion. Cisco AON is also the carrier for the actions demanded by the users of these visibility engines to their appropriate locations in the extended enterprise, again in real time. For example, if a dashboard triggers a notification to a supplier for immediate action, Cisco AON can carry that notification information in the right format (security, content, etc.) and the right transport (e-mail, IP phone, Short Message Service, Web page, etc.).

## DYNAMIC VISIBILITY AT THE SPEED OF BUSINESS

### Cisco AON creates an Internet for applications that integrates people, partners, and processes using the existing network.

Today's enterprise networks are primarily characterized by a functional separation of application and networking elements, resulting in an application-network gap. This gap results in separate infrastructures for application and networks, with different "languages" for defining application and network services. Applications do not use the strengths of the underlying network today, so the capabilities of an application-independent network are largely hidden.

The application-network gap affects business priorities. It results in poorly used IT assets and unnecessary complexity, cost, and inefficiencies. The gap makes it difficult or impossible to achieve end-to-end real-time visibility. It produces uncertainties around the creation and enforcement of business and security policies. The gap makes it difficult to automate regulatory compliance. It creates challenges in service-level management and use of assets. And the gap results in shortfalls and bottlenecks in infrastructure performance.

**Table 1.** Cisco AON Enables Dynamic Visibility

Cisco AON Platform Features	Benefits for Visibility
Event filtering in the network	Substantially reduced latency
Message transformation	Enhanced and targeted content
Message-level security	Secure, customized dashboards
Application-aware transport	Notification and Actionability
Content-level caching	Reusable business dashboards
<b>Results in Real-Time Business Intelligence</b>	

On the other hand, Cisco AON creates the equivalent of an Internet for applications that integrates people, business processes, and IT resources using the existing network. Essential, core services migrate from the application stack to the underlying, Cisco AON-enhanced network (Table 1).

Because Cisco AON can act as a network interception and inspection point for application message traffic, each node can be configured to act as a 'sensor' that can capture, process, and log highly granular information about application messages. This in-transit capability allows Cisco AON to provide an event-capture fabric for application messages.

Cisco AON facilitates the four essential elements of dynamic visibility that can be used by existing distributed, service-oriented, or traditional applications.

- **Extraction**—selectively filters and extracts in-transit content as it moves through the network. Being a part of the network, Cisco AON is location-aware and hence able to extract events from other locations based on business policies.
- **Correlation and computation**—understands the context of complex business processes in transit using intelligence derived from its application internetworking, messaging, security, and optimization capabilities.
- **Notification**—publishes event-related visibility information to a variety of applications, middleware, and devices operating in parallel.
- **Action**—enables dynamic, in-transit action. These actions are keyed to in-transit content and inherent context of complex events processed according to business rules and enforced across network and organizational boundaries.

Cisco AON transforms yesterday's after-the-fact business intelligence, based on historical information, into in-transit awareness derived from real-time information. Relevant action is enforced with contextual awareness of business rules and changing conditions. With Cisco AON, IT evolves to allow new and more sophisticated real-time decision making based on accurate, current business metrics. Instead of the need for multiple reports or after-the-fact portals, distributed, service-oriented, and traditional applications use Cisco AON for real-time event dashboards. They use a real-time

push instead of a latent pull of information, actionable notification instead of passive alerts, and real-time actionable business insight instead of post-mortem analysis.

## **IMPACT ON BUSINESS TRANSFORMATION**

**Cisco AON's dynamic visibility has significant implications in the transformation of important business processes across industries that rely on real-time responses to customer needs and changing business requirements.**

Cisco AON's dynamic visibility can deliver measurable value across a variety of scenarios, including global supply chains, compliance, logistics, fraud detection.

### **Cisco AON and the Visibility of Application Performance**

The trend in globally distributed enterprises is to move to fewer data centers and fewer instances of applications. This trend makes sense because the cost of owning and operating replicated instances of enterprise resource planning (ERP) tools is high. The trade-off here is that many more of the application accesses are across continents (over a WAN). The end-to-end performance of these applications (response times, availability, and so on) directly affects the business. For a large company, a 5 percent reduction in application response time may result in 2 percent fewer orders processed over a week, which could translate into millions of dollars of lost revenue.

Cisco AON can be used to measure and monitor the performance of such distributed applications in a completely nonintrusive fashion. Strategically placed Cisco AON nodes can monitor the application traffic flowing through them, correlate the timing information and publish them to a real-time dashboard of application performance. Because Cisco AON can understand the application message content, these dashboards can be highly customized to receive only the relevant application performance information (for a particular application, for a given data center, for a certain time of the day, and so on).

### **Cisco AON and the Supply Chain Visibility Using RFID**

Consider, for example, how Cisco AON can help an RFID inventory application track orders across an extended supply chain. Cisco AON can intercept RFID data close to its sources to provide applications with real-time alerts about the interrelated status of an order, correlate a complex series of events across organizational boundaries, and instantly enforce business rules according to changing customer requirements or shifting inventory or supply chain conditions.

This level of real-time awareness and complex multidomain intelligence would otherwise require a complex set of invasive probes, after-the-fact triggers, and custom coding. Additionally, such isolated implementation schemes are difficult to enforce or adapt across organizational boundaries, disparate IT infrastructures, and global multipartner supply chains. In numerous instances, these types of challenges have impeded the general acceptance of RFID technologies. With Cisco AON emerging on the scene, many of these challenges can effectively be overcome.

### **Cisco AON and the Security Visibility for Sarbanes-Oxley Compliance**

Mandated compliance can be extremely demanding on enterprises. Spending related to Sarbanes-Oxley compliance by Fortune 1000 enterprises, for example, routinely exceeds \$25 million. The Health Insurance Portability and Accountability Act (HIPAA), Gramm-Leach-Bailey, and similar compliance requirements such as Basel II in the European Union have demanded major investments.

All compliance automation solutions have two major components: controls put in place at a variety of applications, servers, and networks to capture compliance violations, and monitors that create extensive audit logs for proving that the controls were in fact effective. By their nature, the controls and monitors are intrusive on the systems and the networks they control and monitor. They are expensive to create and even more expensive to maintain over time while the underlying systems and networks keep changing. One of the biggest costs in compliance solutions is to prove that the controls and monitors were effective in the presence of network security attacks and vulnerabilities in IT infrastructure. Indeed, by some estimates, about 60 percent of the typical Sarbanes-Oxley compliance solutions goes toward managing the security of the controls and monitors.



Compliance scenarios are tailor-made for Cisco AON. Because the network is ubiquitous and pervasive, Cisco AON becomes a highly effective platform for creating nonintrusive controls and monitors. Its application-aware framework provides a natural way to create controls. Its native logging and auditing facilities provide for automated monitors. Its built-in security policy features help ensure that these controls and monitors are natively more secure and less vulnerable to attacks and violations.

### **Cisco AON and the Real-Time Visibility of Global Logistics**

Cisco AON is useful for transforming business and technology processes for providers in the logistics, shipping, and transportation industries, where on-time delivery and fast cycle times are critical to customer satisfaction and multiple application service-level agreements (SLAs) define business policies. Such companies are focused on agility in adapting IT resources to address business requirements and responding quickly to changing customer needs.

Cisco AON's dynamic visibility facilitates real-time business processes that provide customers and internal users with a single source of information and allow the integration of critical information from multiple operating divisions and subsidiaries into a single view. Cisco AON equips portfolio management, billing, and customer service with real-time, in-transit information instead of after-the-fact analysis. It allows application-level SLAs to trigger real-time modifications to pricing structures or customer service requirements. The advantages of this dynamic visibility can spread across IT infrastructure, business processes, and disciplines to simplify information access and provide significant differentiation through IT innovation.

### **Cisco AON and the Dynamic Visibility of Fraud**

Fraud prevention and customer privacy and confidentiality are vital considerations in today's banking and finance industry. The success of these institutions is inextricably linked to the security and safety of its customers; the consequences of identity theft through "phishing" and "pharming" schemes and other fraudulent practices have a direct impact on customers. While the victims of identity theft are irreparably harmed, their financial institutions also bear substantial financial penalties through legislated actions. In this environment, it is vital to distinguish errors from fraud. This can be accomplished by determining whether people outside the institution, or in collusion with insiders, are committing fraud, such as unauthorized access to customer databases, fraudulent money transfers, or forgery through international monetary instruments, such as travelers checks and wire transfers.

Cisco AON facilitates highly granular application security and access policies in the network itself to counter and prevent fraud by adding detection and prevention processes to the existing network. It does so without requiring complex probes, triggers, and alerts to applications, adding latency into critical business operations, or requiring an additional tier of security devices. These processes are then made dynamically visible within the scope of application security monitors or business dashboards. Cisco AON can alert important applications and administrators, both business and IT, in the event of a suspect activity and can shut down access immediately if the activity is determined to be malicious. Through its inherent awareness of the underlying network, Cisco AON's pervasive intelligence can detect the difference between "false positives" such as operator error and actual malicious activity and can immediately invoke necessary countermeasures based on business policies.

These Cisco AON-powered scenarios indeed exemplify dynamic visibility: the most relevant information delivered to all the right entities in real time.

### **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](http://www.cisco.com/en/US/products/ps6438/prod_module_series_home.html) or contact your Cisco account representative.

**Corporate 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: 408 526-4100

**European Headquarters**

Cisco Systems International BV  
Haarlerbergpark  
Haarlerbergweg 13-19  
1101 CH Amsterdam  
The Netherlands  
www-europe.cisco.com  
Tel: 31 0 20 357 1000  
Fax: 31 0 20 357 1100

**Americas Headquarters**

Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA  
www.cisco.com  
Tel: 408 526-7660  
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

Cisco Systems has more than 200 offices in the following countries and regions. Addresses, phone numbers, and fax numbers are listed on **the Cisco Website at [www.cisco.com/go/offices](http://www.cisco.com/go/offices).**

Argentina • Australia • Austria • Belgium • Brazil • Bulgaria • Canada • Chile • China PRC • Colombia • Costa Rica • Croatia • Cyprus  
Czech Republic • Denmark • Dubai, UAE • Finland • France • Germany • Greece • Hong Kong SAR • Hungary • India • Indonesia • Ireland • Israel  
Italy • Japan • Korea • Luxembourg • Malaysia • Mexico • The Netherlands • New Zealand • Norway • Peru • Philippines • Poland • Portugal  
Puerto Rico • Romania • Russia • Saudi Arabia • Scotland • Singapore • Slovakia • Slovenia • South Africa • Spain • Sweden • Switzerland • Taiwan  
Thailand • Turkey • Ukraine • United Kingdom • United States • Venezuela • Vietnam • Zimbabwe

Copyright © 2005 Cisco Systems, Inc. All rights reserved. CCSP, CCVP, the Cisco Square Bridge logo, Follow Me Browsing, and StackWise are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, and iQuick Study are service marks of Cisco Systems, Inc.; and Access Registrar, Aironet, ASIST, BPX, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Empowering the Internet Generation, Enterprise/Solver, EtherChannel, EtherFast, EtherSwitch, Fast Step, FormShare, GigaDrive, GigaStack, HomeLink, Internet Quotient, IOS, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, LightStream, Linksys, MeetingPlace, MGX, the Networkers logo, Networking Academy, Network Registrar, Packet, PIX, Post-Routing, Pre-Routing, ProConnect, RateMUX, ScriptShare, SlideCast, SMARTnet, StrataView Plus, TeleRouter, The Fastest Way to Increase Your Internet Quotient, and TransPath are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or Website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0502R) 204183.BJ\_ETMG\_NN\_9.05

