



Application-Oriented Networking

How Cisco IT Uses AON to
Simplify Application
Development and Maintenance



A Cisco on Cisco Case Study: Inside Cisco IT

Overview

- Challenge

 - Accelerate application development and reduce costs

- Solution

 - Move repeatable application functions to the network, in an inline Application-Oriented Networking (AON) module

- Results

 - Deployed three AON applications to-date, reducing application costs, accelerating development, and increasing security

- Next Steps

 - Use AON for more Cisco external and internal applications

Challenge: Reduce Duplicate Development Efforts

- Cisco monitors 10,000+ applications in ten application development environments (ADEs)
- 900 full-time engineers work on application development and enhancement
- Developing one new capability, like SSL, requires a separate development effort for each:

Environment: cisco.com, intranet, manufacturing extranet

Server technology: WebSphere, Borland Application Server, Microsoft SQL Server

Language: Java, C, Perl

Challenge: Accelerate time to market and reduce costs

- Goal: standardize selected application functions *and* make them independent of technology or environment
- Internal survey revealed benefits of moving common application functions to the network:

Retire 100,000 lines of code and thereby...

Reduce application maintenance

Free up hardware and memory on application servers

Solution: Application-Oriented Networking

- Offload common application and service support functions to the AON module for Cisco switches and routers
- Function is developed once, implemented once in AON, and then used over and over
- Eliminate the need to write and test code for multiple environments



**AON is part of Cisco's vision
for the Intelligent Information Network (IIN)**

Solution: What AON Is—and Is Not

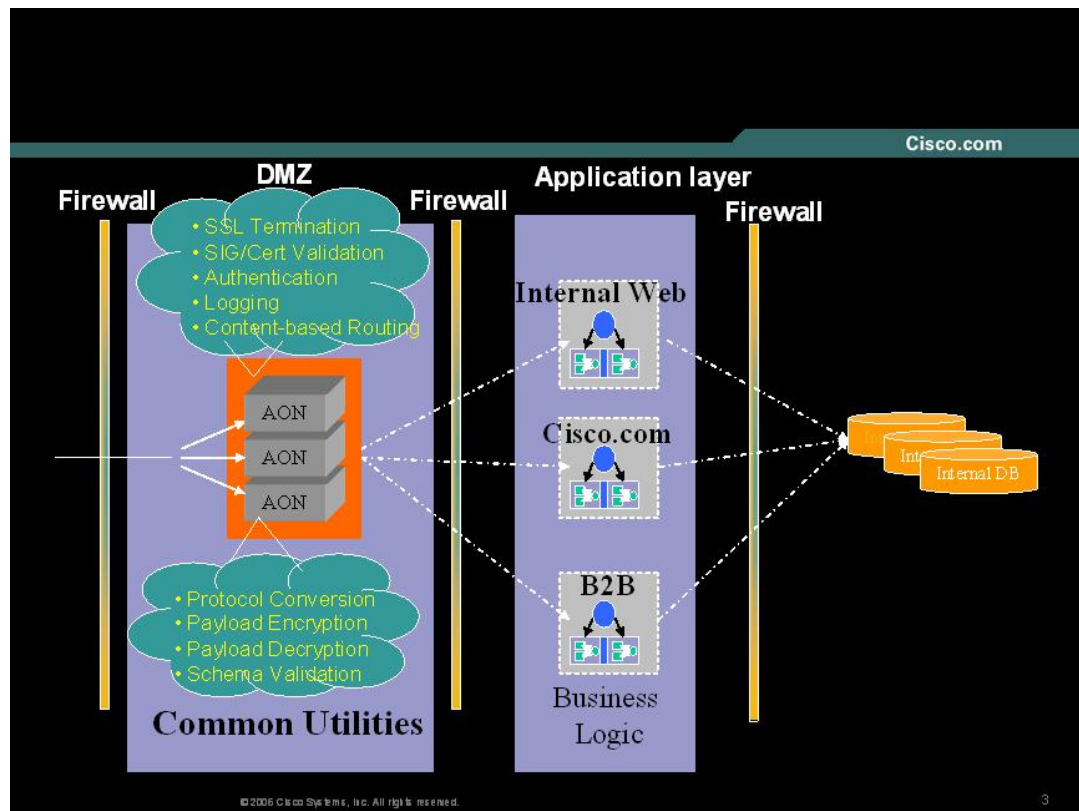
What AON Is	What AON Is Not
Service broker in service-oriented architectures (SOAs) Integration broker in application integration Security integrator	General-purpose application server Web Services orchestration engine

Solution: Current AON Functions

Security	Reliability	Manageability	Targeted Service
SSLv3 Payload encryption termination (XML) HTTP-to-JMS protocol transaction Digital signatures SSH or STA	Reliable delivery	Message and transaction- level logging Transaction monitoring	Service versioning Message/ content-based routing XML transfor- mation and mapping

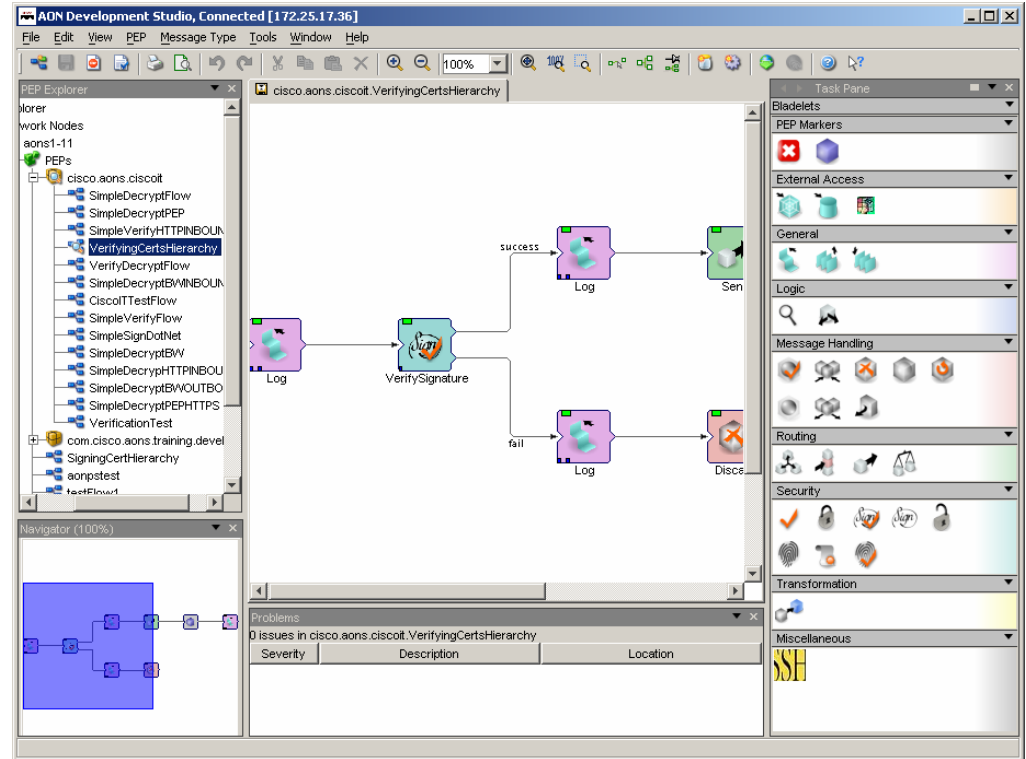
Solution: Invisible Message Router

- Developer simply inserts a short line of XML code to request that the AON module perform a function for its application flow before it arrives at the server



Solution: Deployment

- AON Modules reside in Cisco 6509 Routers in San Jose data center
- Developers use AON Development Studio, an Integrated Development Environment (IDE) to develop flow, or execution plan
- AON Management Console used for configuration



AON Development Studio

Results: AON Applications To-Date at Cisco

- HireRight: Reduced development and debugging time from 240 to 120 hours
- Pre-Order Check Service: Reduced time to add digital certificates for new partners from one day to two hours
- Virtual Logistics Network: Acquired flexibility to support partners' multiple payload formats

Use Case: Hire Right

- Challenge: Cisco HR employee had to manually enter results of third-party background checks for potential new hires, creating two-day backlog
- AON Solution: Vendor that checks new-hire backgrounds has a secure, real-time connection to Cisco HR database

Use Case: Hire Right (Contd.)

- Results:

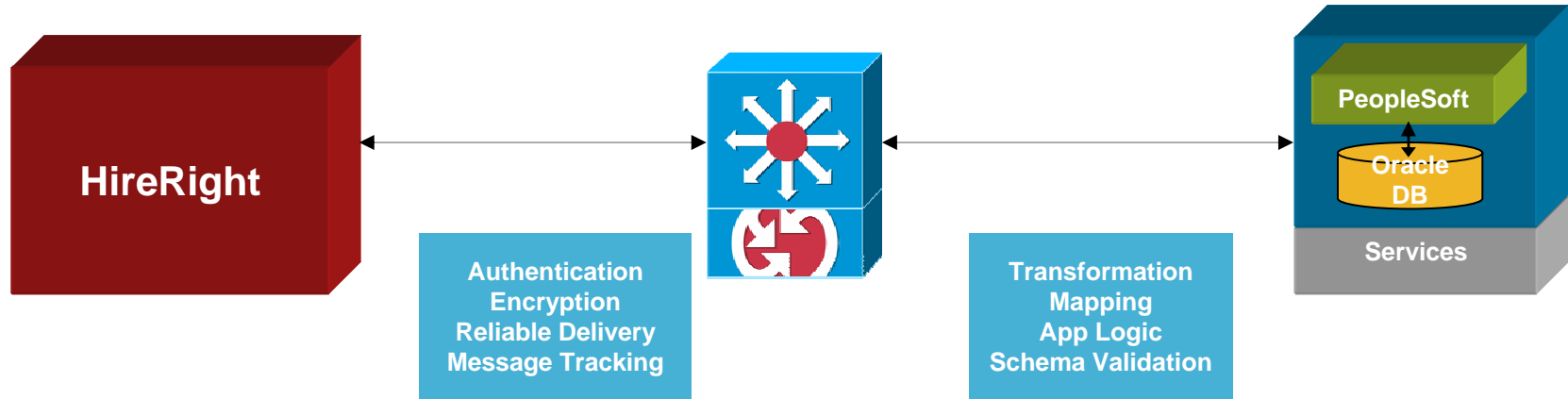
- Avoided 45-60 minute data entry per background check, and eliminated backlog

- Developed application in half the time planned (120 hours)

- Reduced server memory needs from 1800 MB to less than 100MB

- Increased security

Use Case: Hire Right



AON functions used:

- SSL v3 encryption with bidirectional authentication
- Certificate validation
- User authentication and logging
- Schema validation
- XML payload transformation between two dissimilar databases
- Content inspection
- Message verification and logging

Use Case: Pre-Order Check Service

- Challenge: Enhance the service that Cisco trading partners and customers use to validate their orders, and make it available to partners that do not use Web Services
- AON Solution: Replace existing Web Service with AON-based service

Use Case: Pre-Order Check Service (Contd.)

- Results:

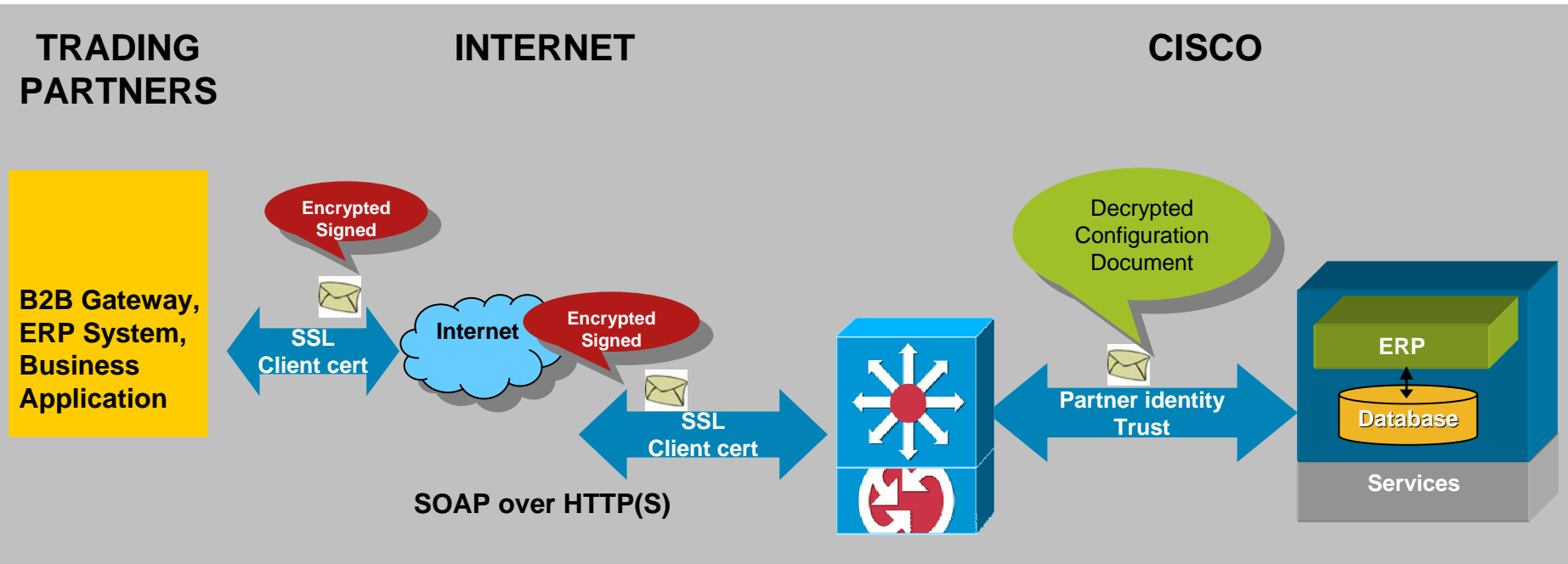
- Increased security

- Enhanced convenience for partners by providing the service in a multi channel, multi protocol format

- Accelerated implementation

- Will be able to quickly add support for the planned Rosetta Net Web Services standard

Use Case: Pre-Order Check Service



AON functions used:

- SSL v3 encryption with bi-directional authentication
- Tibco-JMS integration
- SOAP-XML transformation
- Standard activity logging
- Message tracking

Use Case: Virtual Logistics Network

- Challenge: Find a simpler way to connect the Cisco logistics database to the 4PL partner; avoid customized integration; support different message payload formats used throughout the world
- AON Solution: Use AON to enable an event-driven architecture rather than a polling architecture

Use Case: Virtual Logistics Network (Contd.)

- Results:

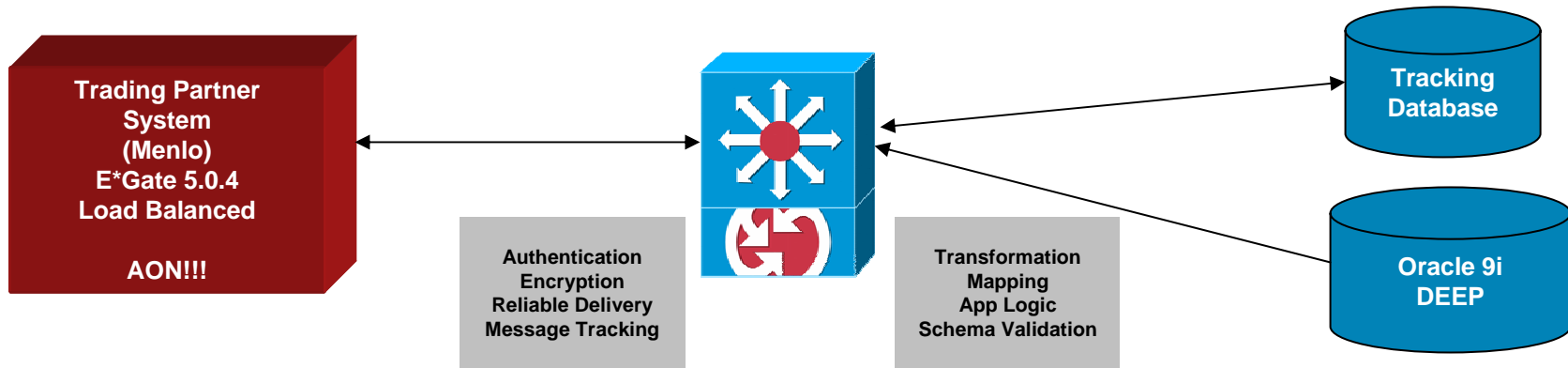
- Reduced dependence on vendors and technology, a result of supporting a payload-neutral business protocol (AS2)

- Simplified architecture, which costs

- Switched to standards-based integration

- Gained visibility into the message payload

Use Case: Virtual Logistics Network



AON functions used:

- Authentication
- Encryption
- Reliable delivery
- Message tracking
- Transformation
- Mapping
- Application logic
- Schema validation

Results: Lower Costs, Faster Development

- Return on investment

 - Reduced development costs, application costs, and server memory and storage costs

 - Licensing cost avoidance--\$300,000 to-date for Web Services management software

 - Avoidance of increased IT headcount

- Faster application delivery, twice as fast for HireRight application

Results: Lower Costs, Faster Development (Contd.)

- Enhanced security

Most exploitable application vulnerabilities result from the implementation, not the algorithm; with AON function is tested thoroughly and implemented once

- Ability to change or update application functions or policies in one place and apply them to all applications

Next Steps: More AON-Based Applications

- Integration with salesforce.com, an application services provider (ASP)
- Radio Frequency ID (RFID) for loading docks
- RFID for asset tracking in global centers, helping to locate misplaced network and server equipment
- Lease Record Service
- Approved Vendor List
- Mobility
- Contract Coverage
- Serial Number Check
- POS

Use Case: Integration with salesforce.com

- Challenge: Perform authentication and authorization within the Cisco network, not the ASP, with the goals of single sign-on and greater security and access control
- AON Solution: Used AON to integrate salesforce.com with the Cisco Lightweight Directory Access Protocol (LDAP)

Use Case: Integration with sales force.com (Contd.)

- Anticipated Results:

 - Adding authentication and certificate management in just weeks

 - Enabling secure, federated access to applications using SAML

 - Enabling Cisco employees and partners to log in just once to access shared applications

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

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