



Customer Case Study

Wachovia Corporation Builds an IP Architecture for Convergence with Cisco

Executive Summary

Customer Name

Wachovia Corporation

Industry

Financial Services

Business Challenge

- Support convergence of data, voice, and video
- Improve reliability of automated teller machine (ATM) network
- Retire aging protocols to reduce network deployment and management costs

Network Solution

- Cisco 7206 VXR routers and Cisco 12000 Series routers
- Cisco Catalyst 6509 switches
- A mix of Cisco 1700, 2600, 2800, 3600, and 3700 series routers

Business Value

- Successfully transitioned from Systems Network Architecture (SNA), data link switching (DLSw), and other protocols to IP
- Reduced the number of ATM network-related outages by 50 percent
- Built architecture for successful convergence of data, voice, and video

With a network foundation based on Cisco products and services, Wachovia Corporation is successfully transitioning to a pure IP environment while improving network reliability, reducing deployment costs, and benefiting from advanced capabilities, including voice.

Business Challenge

Headquartered in Charlotte, North Carolina, Wachovia Corporation is the fourth-largest bank holding company in the United States, with assets of US\$507 billion and 13 million retail and business customers in 15 states and Washington, D.C. Its full-service retail brokerage firm, Wachovia Securities, LLC, is the third-largest full-service brokerage firm in the U.S., serving clients in 49 states and five Latin American countries. The company's Corporate and Investment Bank serves clients in 10 industry sectors nationwide and global services are offered through 33 international offices. Supporting Wachovia's operations around the world is a comprehensive network based on equipment from Cisco Systems®.

In 2002 Wachovia initiated a complete network upgrade to meet several strategic objectives. One objective was to build a foundation for future IP services and to prepare for the convergence of data and voice over a single network backbone. A second objective was to accommodate growth, enabling Wachovia to connect a growing base of branch offices in the U.S. and internationally while assuring high application performance for a wide range of application traffic that includes market data feeds, teller application traffic, e-mail, Web browsing, video surveillance, and alarm traffic, as well as Wachovia's critical banking applications. Finally, the bank wanted to begin transitioning all of its automatic teller machine (ATM) traffic, as well as its existing mainframe protocols, to a pure IP environment for improved reliability, simpler management, and reduced costs.

"Cisco® was our primary data networking vendor," says John Burns, vice president of Network Services for Wachovia. "For our 'Next-Generation Network Project,' we looked to

Cisco again for solutions. We chose the Cisco 7200 Series Router because it offered superior performance and the density we needed, cost-effectively." Wachovia's Next-Generation Network Project completely redesigned and replaced the company's prior network, establishing a solid base for moving forward toward a pure IP environment.

Network Solution

Wachovia built its network core on Cisco 12000 Series routers. Cisco 12000 Series routers offer scalable, intelligent routing solutions that scale from 2.5 Gbps/slot to $n \times 10$ Gbps/slot capacity, enabling IP/Multiprotocol Label Switching (MPLS) core networks. With quality of service (QoS) capabilities and support for Frame Relay transport, the Cisco 12000 Series routers enable Wachovia to support IP/MPLS traffic and transport existing traffic through the core.

A distribution level is comprised of Cisco Catalyst® 6500 Series switches and approximately 300 Cisco 7206VXR routers. The Cisco 7206VXR Router is the industry's most widely deployed universal services router for enterprise edge applications. Its powerful Network Processing Engine provides Wachovia with high-performance WAN aggregation for DS-3 (44 Mbps) speeds. Approximately 120 Cisco 7206VXR routers are used as headends to aggregate Frame Relay traffic arriving from up to 180 sites per cloud over links ranging from 56 kbps to T1 (1.544 Mbps). These headend routers connect to Cisco Catalyst 6509 switches over dual 100-Mbps Ethernet links. The Catalyst 6509 switches are used as backbone switches for each of Wachovia's distribution areas, switching traffic between the distribution layer and network core.

Another 100 Cisco 7206VXR routers were originally deployed for their high-performance modular processors to support Systems Network Architecture (SNA) protocol conversion and data-link switching (DLSw) termination. Finally, the remaining Cisco 7206VXR routers were used for tunneling protocols using generic routing encapsulation (GRE). GRE tunneling capabilities allowed Wachovia to transport a wide variety of existing protocol packet types, such as Novell IPX, inside IP tunnels and create virtual point-to-point links over the network. A wide variety of connectivity options simplified connecting branch offices across the U.S. and overseas.

The Wachovia network engineering team has implemented QoS features throughout the network. Modified Deficit Round Robin (MDRR) and Weighted Random Early Detection (WRED) are implemented on the Cisco 12000 Series routers. MDRR provides relative bandwidth guarantees and allows for a low-latency queue, while WRED provides a congestion-avoidance capability. On the Cisco Catalyst 6509 switches, weighted fair queuing (WFQ) schedules interactive traffic to improve response time and it fairly shares the remaining bandwidth between high-bandwidth flows. In the network's distribution and access layers, Wachovia has implemented class-based WFQ to support eight user-defined classes of service. Wachovia also uses NetFlow technology as a troubleshooting tool, allowing technicians to verify the presence of specific traffic flows; as data exported to a collector instead of using expensive hardware probes on point-to-point T1 links; and for anomaly detection to analyze traffic trends and look for misbehaving devices.

In Wachovia's branch locations, a wide range of Cisco routers are used, including Cisco 2600, 3700, 3600, and 2800 series routers. In addition, Wachovia maintains a network of 5200 ATMs – 1500 of which are standalone units not connected to a local bank branch infrastructure.

Originally, ATM traffic ran on Synchronous Data Link Control (SDLC) and other traditional protocols over a carrier-provided 56-kbps multidrop network. Co-located with each ATM was a carrier-provided channel service unit/data service unit (CSU/DSU), which plugged into the multidrop network and into the ATM. These aging infrastructures were becoming less and less reliable, resulting in ATM downtime. The network design team wanted to migrate the ATM network to Ethernet and IP to improve reliability. There were several challenges, however, that had to be overcome.

“The first challenge is finding a solution that can be cost-effectively deployed for more than 1500 ATM locations,” says Burns. “The second challenge is one of space – there are serious space, power, and cooling constraints inside the ATM enclosure. Finally, we needed to be able to connect more than one ATM to the router without adding a switch, for which there was no space. We chose the Cisco 1700 Series Router with a four-port Ethernet switch, which has been a big success for us. It is enabling us to migrate all of our ATMs to Ethernet and achieve our reliability goals while also simplifying manageability, and significantly reducing deployment costs.”

“The Cisco 7206 VXR routers fulfilled their initial purpose and have allowed us to now use them to take on new tasks. We left them right where they were connected, added new features, and implemented the IP SLA capability and VoIP gatekeeper features in Cisco IOS® Software. It saved us millions of dollars in new deployments.”

– John Burns, vice president of Network Services, Wachovia

Business Value

Originally Wachovia’s Cisco 7206VXR routers terminated DLSw traffic bound for multiple mainframe locations. The Cisco routers resided in front of the IBM and Tandem mainframe systems where they would decapsulate the traffic and then deliver it over Token Ring to IBM front-end processors. Now using Cisco SNA switching technology, the bank has moved away from bridged SNA protocols and can receive IP traffic end-to-end across the network. ATM traffic is in the process of being converted completely to IP, and aging protocols will be retired.

“Since we no longer need to tunnel numerous aging protocols, we redeployed the Cisco 7206VXR routers in a variety of roles,” says Burns.

“The Cisco 7206 VXR routers fulfilled their initial purpose and have allowed us to now use them to take on new tasks. We redeployed some as new WAN aggregation and IPSec tunnel routers. We left other routers right where they were connected and added new features, like VoIP gatekeeper or the IP service-level agreement (SLA) capability in Cisco IOS Software. It saved us millions of dollars in new deployments.” The Cisco IP SLA features allow Cisco 7206VXR routers to be used for measuring voice-call responsiveness across the network, with voice-call setup time monitoring planned next.

Reliability of ATM traffic has improved dramatically as well. Burns believes that simply moving to an IP infrastructure significantly enhanced ATM availability because there is no longer a need to rebuild SNA circuits between two systems if anything in that path goes down. Instead, IP can dynamically reroute traffic. “By moving to the Cisco 1700 Series Router for our ATMs, I estimate that we’ve reduced the number of ATM network-related outages that we were seeing by half.”

Now using IP as a transport, Wachovia has the option to enhance ATM functionality with IP Communications, streaming video, or other new features. The company already delivers video over its network to employee desktops using multicast technology. The corporate television channel, conferencing, music-on-hold, and a call-center statistics application are just a few of the uses Wachovia has for multicast. In addition, some disaster recovery and backup is accomplished using multicast. Wachovia can mirror hundred of workstation images, or configurations, simultaneously to quickly support new users or to provide temporary support for large numbers of users in the event of a disaster, such as a hurricane or earthquake.

Next Steps

After working with Cisco IP telephony solutions in limited deployments for several years, Wachovia is beginning to pilot an enterprisewide Cisco IP Telephony solution, which will converge the company’s voice with data and multicast traffic over its network. The Wachovia Network Architecture team is using Cisco IP SLA to monitor QoS for potentially thousands of conversations flowing over the network, which helps assure that each call is receiving the QoS levels assigned to it.

“Our customer contact center technologists are very interested in the capabilities that IP telephony brings to the table,” says Burns. “We have several centers running IPCC Express today, and the promise of complete virtualization of agents and call queues is the Holy Grail of contact centers.”

“We’re very interested in applications for 802.1x-based security capabilities,” says Burns. “We’ve run a very successful pilot of that and expect to move forward with that over time. We now have the infrastructure in place to move forward and do all of these things – and more.”



For More Information

To learn more about Cisco routing solutions, visit: <http://www.cisco.com/go/routing>.

To learn more about Cisco switching solutions, visit: <http://www.cisco.com/go/switching>.

To learn more about Wachovia Corporation, visit: <http://www.wachovia.com>.

This customer story is based on information provided by Wachovia Corporation and describes how that particular organization benefits from the deployment of Cisco products. Many factors may have contributed to the results and benefits described; Cisco does not guarantee comparable results elsewhere.

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