

# How Cisco IT Migrated US WAN to Optical Edge Router Platform

Cisco 7600 Series Router provides high-speed, reliable, and economic routing for corporate backbone.

**Cisco IT Case Study / Routing and Switching / Optical WAN Migration:** This case study describes Cisco IT's internal deployment of the Cisco 7600 Series Router within the Cisco global network, a leading-edge enterprise environment that is one of the largest and most complex in the world. Cisco customers can draw on Cisco IT's real-world experience in this area to help support similar enterprise needs.

## BACKGROUND

During the 1990s Cisco's growth was record-breaking in terms of revenue and employees. Between 1990 and 2000, the number of Cisco employees grew at an annual average rate of 61 percent, while revenue grew at an annual average of 73 percent for the same period. And as Cisco grew, its network needs grew, both in capacity and capability—connectivity to begin with, but soon afterward larger data transport and business applications, globally.

What the Cisco IT team learned is that running a global company also means supporting a global infrastructure. By the end of the 1990s, the Cisco WAN, while powerful by most standards, had a set of next-generation applications to support. Rethinking, rearchitecting, redistributing, and bringing next-generation routing online would make a tremendous difference in how well the WAN could support Cisco's business needs.

## CHALLENGE

In 2001 Cisco's business foundation—a WAN across North America—reflected the evolution of Cisco technology and product development, but it could no longer support the growing bandwidth demands resulting from Cisco's astronomical growth and several new, real-time peer-to-peer applications that multiplied traffic across the WAN. Its original configuration, hub-and-spoke, had been designed and implemented when Cisco was a much younger, smaller company.

By 2001, sites all over North America were fully operational and dependent upon the WAN to deliver data and applications. But as the number of people and sites grew, performance became a problem from several perspectives. All Cisco traffic had to pass through the San Jose hub, no matter where it originated or where it was going. The average site-to-hub-and-back circuit length for any traffic across the WAN was 1800 miles—slowing the applications that ran Cisco's business. This WAN architecture turned out to be a latency-causing bottleneck that didn't support Cisco's business goals: The original hub-and-spoke architecture was optimized for client server, but peer-to-peer applications, including video and other Cisco AVVID (Architecture for Voice, Video and Integrated Data)-based applications, needed better performance with minimal latency. Even with a redesign, speed and capacity would still be important. The routers that supported the WAN backbone, the Cisco 7200 Series routers and the Cisco 7500 Series routers had been ideal for Cisco's growing needs, but the IT team would need to reevaluate them as part of the larger WAN reevaluation.

## SOLUTION

The solution had to accommodate future needs. In the end, it would incorporate a rearchitecture of the WAN to accommodate increasing bandwidth requirements, including growing real-time demands on the network.

Collaboration, voice, video, and peer-to-peer traffic were already starting and would be growing in the future. The solution would also include agreements with Tier 1 service providers across the continent to provide OC12 fibre connectivity, increasing WAN bandwidth six-fold over the current WAN capacity. Whatever solution the team put in place would need to scale, both in terms of performance and applications. In the final analysis, it was important to keep the network transparent, making sure that users experienced the best response times, application performance, and productivity. Most important of all, the solution would have to standardize a routing platform across the network that would lower the cost of management while providing a predictable environment for new applications and growth.

For Cisco, the solution foundation turned out to be the Cisco 7600 Series router. As an edge router that delivers robust, high-performance IP and MPLS capabilities—including metro-Ethernet aggregation, private line (high-speed and low-speed) aggregation, WAN aggregation, and core routing, it was the heavy-duty answer to Cisco's growing needs. It supported a huge set of interfaces, making connectivity across multiple sites much easier.

The Cisco network already had both Cisco 7200 and 7500 series routers, but they couldn't support many of the new needs that Cisco's network demanded. At the time, the Cisco 7600 Series was the next step for both systems. It offered multigigabit capacity per slot, a range of form factors, and advanced optical service modules (OSMs) for high-performance service delivery. Neither the 7200 nor the 7500 series could handle OC12, which was critical for the Cisco backbone. It was also important to have robust capabilities to support OC3, and the 7200 Series would be pushed to the limit to support it.

John Cornell, a member of the IT team responsible for the rearchitecture and upgrade, addressed the reasons why the Cisco 7600 Series made sense: "The most important things about the 7600 were that it was available, it met our needs, and it was mature enough that we weren't afraid to put it in our backbone. It was a Cisco platform that could support line rate OC12—for this backbone, we needed that platform for traffic at that rate. We also have some 7600s with multiple circuits in them—DS3, OC3, and OC12. The 7600 Series can handle aggregated rates and interfaces at those speeds that were more appropriate speeds to each interface. Also, the footprint of the 7600 Series—it's about the same size as the 7200 Series—was important. We're paying for rack space and carrier facilities, and because we were leasing space from carriers for part of the network, the footprint became an important driver."

## RESULTS

Today, because of the investment in the Cisco 7600 Series as a comprehensive platform, the Cisco network is much more stable, with best-in-the-business reliability. The IT team monitors the network very closely on a quarter-by-quarter basis. Over the past year, they have measured four-nines and more recently, five-nines reliability over full quarters. Over the last year, some months have experienced no downtime at all, proving that the 7600 Series can deliver 100 percent reliability.

Because of the standardization on the Cisco 7600 Series, the network is easier to manage and the IT team is much more productive. It's also much easier to add capacity, and to deploy advanced applications, because the network's 7600 Series foundation lends itself to greater predictability as well as stability. Best of all, according to Craig Huegen, "We've had lots of feedback from users about how great this is. The performance has really improved and they can get their work done a lot faster."

## Contacts

For more information about Campus / WAN / Metro production deployment, start a conversation with the IT subject matter experts in [Cisco@Work](#) forum at:

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