

## London Underground: Juniper Networks Takes Stress Off Web Site and Speeds User Access

### Key Challenges:

- Needed to speed access on public Web site, even during huge traffic spikes
- Peak load provisioning impractical
- New Web kiosk application to launch

### Key Benefits:

- Increased capacity of four high-end servers
- Reduced bandwidth by 80 Mbps—an 80% decrease
- Increased server capacity by 25%
- Faster user downloads, even during peak periods
- Easier IP address management

It was a day in late October 2002, and millions of Londoners were wondering how they would get home from work. Their usual ride was the London Underground subway system—“the Tube”—but, just a couple of hours earlier, a workers’ strike had been called to begin at 5:00 p.m. It would be a dramatic understatement to say that an unusually high number of commuters were accessing the Tube’s Web site ([www.tfl.gov.uk/tube](http://www.tfl.gov.uk/tube)) that day.

“All of London was on our site trying to find out if they could get home,” recalled Peter Wilson, program manager for the Tube Web site. “We saw a 50-fold spike in traffic that afternoon, reaching a level of about 15,000 concurrent users. Lots of users were timing out. We even started throwing graphics off the site trying to keep it up.”

### 30 Million Page Impressions a Day

That autumn day, Wilson said, was the culmination of a “difficult period of industrial relations” spanning 2001 to 2002, in which a series of 24-hour Tube strikes took place. On a typical day, people access the Tube Web site chiefly for live travel information and route maps. In a crisis, they’re looking for real-time news from the Underground’s press office. On the day of the impending 5:00 p.m. strike, the site went from about 200,000 page impressions per day to nearly 30 million. Peak usage, surging in this manner to many times the site’s normal traffic loading, was causing increased concern about the existing Web infrastructure’s ability to cope.

“We’re a small unit and pride ourselves on our tech savvy,” said Wilson. “We began looking at the site from the consumer’s point of view, observing how it behaved under ‘stress.’”

Phil Bird, a technical manager in Wilson’s group, said, “We knew we needed more servers, but we didn’t want to add too many, because, except during peak loading times, most of them would end up being redundant. So we first considered compression as a solution to our bandwidth woes.

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**Peter Wilson**  
Program Manager  
London Underground

“The native compression tools that came with the Windows IIS (Internet Information Services) weren’t particularly robust. And some third-party software compression solutions, while fairly low-cost, didn’t let us multiplex our IP connections. This was important, because reducing the number of IP addresses each server handles would reduce the stress on the servers, allowing us to do more with the same hardware architecture.”

## A Solution Emerges

Wilson and Bird had heard by word of mouth that an online game site, Gamer.TV, also in London, had successfully implemented a new Web-acceleration product from Juniper Networks. They visited the vendors website to learn more about the DX™ family application acceleration platforms.

In February 2003, the Tube Web site installed a DX 2200 platform, one of a family of application front ends that boost Web-site performance using an operating environment and software architecture optimized specifically for Web-based I/O functions. Outbound traffic payloads are compressed and optimized in real time, speeding transmission of static, dynamic, secure sockets layer (SSL), or clear content to modem and broadband users, while reducing bandwidth usage and increasing server capacity.

“We started by putting the Juniper Networks box in our hosting provider’s site, where it was tested to evaluate how it would fit into our hardware mix,” said Bird. “It seemed to do what it promised, but we were accessing it through a LAN, not the Internet, and couldn’t really measure bandwidth performance. So we dropped it into our live environment – an easy task, since the box doesn’t require any configuration – and gave it a baptism by fire.”

The results were “instantaneous,” said Bird. “For the user, the page comes down much faster because it’s compressed. For us, we’ve cut our bandwidth usage by four-fifths, from 100 MB to 20 MB. Loading on our Web server farm is down by 30 percent to 35 percent, while at the same time we’ve seen a server capacity

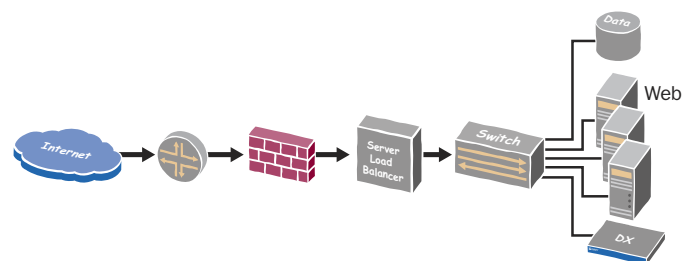
increase of 25 percent. We’ve even noticed a 50-percent reduction in CPU usage. The Juniper Networks box has definitely paid for itself.”

## DX Platform Helps Out During Derailment Crisis

A true test of the DX 2200 platform’s utility came not long after installation, when a severe train derailment occurred. While there were no casualties, one of the Underground’s busiest lines was shut down for several weeks.

“Not only did commuters need to find alternative routes to work, but we also had season ticket holders wanting their refunds,” Wilson said. “Our customer service center couldn’t keep up with the number of e-mails it was receiving – 15,000 in the first week alone. The Tube Web site was able to divert some of the pressure by creating an online form that would let people claim their refunds through the Web site. More than 100,000 users took advantage of this form, and Juniper Networks was a major factor in keeping the system robust during this period.”

One of the Tube Web site’s future projects will be to install Web touch-screen kiosks at Underground stations, where riders can get travel updates and print route maps that would be downloaded from DX-accelerated servers. Most importantly, though, the kiosks will provide a highly interactive, touch-screen system with a very rapid response time. “The average user of our site has the patience of a London cab driver,” Wilson said. “If he doesn’t get what he wants in 10 seconds, he goes somewhere else. Juniper Networks is helping us keep this kind of customer happier.”



The Tube Speeds Web Access Even During Traffic Spikes



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