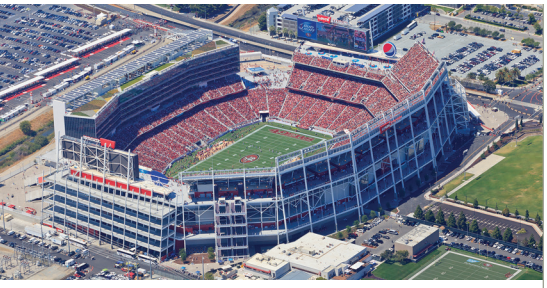
BROCADE

SUCCESS STORY

Levi's® Stadium



EXECUTIVE SUMMARY

Challenge

Create an unmatched sports venue and fan experience, as well as an innovative technology showcase

Solution

- Brocade MLXe Core Routers for core routing and aggregation
- Brocade ICX 6610 Switches for access
- Brocade ICX 6450 Switches for access
- Brocade Network Advisor for simplified management
- Brocade Resident Consultants

Results

- Delivered an award-winning state-of-the-art sport and technology showcase as well as a superlative fan experience
- Achieved nonstop reliability for all services delivered over the network
- Supports 70,000 fans, thousands of endpoint devices and up to 500 terabytes of data traffic during every game day effortlessly
- Gained a foundation for innovation in stadium services, including ultra-high definition video, mobile, and goods and services delivery

Transforming the Fan Experience through Unprecedented Digital Capabilities

From 1971 to 2013, the home of the iconic San Francisco 49ers football team was Candlestick Park—a Bay Area landmark. Times change however, and the aging Candlestick Park lacked the technology foundation needed to deliver state-of-the-art features for an optimal fan experience.

"We were committed to building something that would immerse fans in the action and excitement of a real-time live event," said Ethan Casson, Chief Revenue Officer for the San Francisco 49ers. "We wanted to give our fans a completely different experience, one enhanced by technology and amenities while taking advantage of innovation within our industry."

Defining a Silicon Valley Experience

The new facility was to be named Levi's® Stadium, and in 2010, the management team initiated conversations with fans, sponsors, partners, and potential customers. They visited and researched new stadiums and those still under construction to shape their vision and strategy, all the while wanting to convey the Bay Area's unique spirit.

"First and foremost, we wanted the stadium to become a technology showcase," said Casson. "It's in the heart of Silicon Valley, and we wanted it to embody the Valley's entrepreneurial and startup mentality."

At the same time, having an outstanding fan experience was critical. The stadium's management team considered every aspect of a fan's journey—from home, to the stadium, inside the venue, and back home again—as they began designing the building's features, functionality, and amenities. Their goal was to create a stadium that delivered superior value, efficiency, and an environment that drew people from the comforts of home and their large-screen televisions to experience live sports and entertainment in a way never before seen.

First and Ten

As they began their drive to the goal of achieving a premier venue, having the right technology foundation was essential. The building had to be scalable

WHY BROCADE

"Brocade and our network are enabling us to innovate and achieve things that have never been done before."

— Ethan Casson, Chief Revenue Officer, San Francisco 49ers

to accommodate high volumes of data and users on demand and deliver rock-solid reliability. On game days, 70,000 fans pack the stands, along with national broadcast networks, and 4,000 employees operating concessions, ticketing, security, and other vital functions—all of which rely on the network. Services simply can't go down.

Levi's® Stadium also had to offer flexibility to support a wide range of vendor systems and customizations without compromising performance or reliability. For example, the building needed to be able to support any type of vendor or event being hosted. That meant enabling the freedom to choose any wireless LAN vendor, support sponsor applications, and simplify setup for stadium-scale concerts and entertainment. The IT team also wanted to be able to separate network traffic streams in order to provide distinctly different services to individual parts of the facility or individual vendors.

As a result, the stadium IT team looked at the stadium as a technology stack, with the network and infrastructure as the backbone of everything. Levi's® Stadium also had its own mobile app and electronic ticketing system, so the fan experience relied heavily on the wireless network that would be chosen. That meant the wired underlay network had to offer dense Power over Ethernet (PoE) and Quality of Service (QoS) capabilities to power thousands of devices while delivering optimum performance for each.

A Highly Effective Ground Game

With a huge stadium to complete and an equally ambitious vision to fulfill, the stadium's five-person IT team began working closely with Brocade to design, test, and deploy the stadium's backbone network. The result is one network that supports open mobility for any wireless network infrastructure, total flexibility, and nonstop reliability.

The stadium's core network provides carrier-class routing and Internet connectivity for the entire venue through five separate service clusters. Each cluster carries traffic requiring specific functionality. Within each cluster, the IT team can further separate traffic using Virtual LANS (VLANs) to create separate network segments for internal services and for supporting specific partner and vendor needs.

The stadium core network is based on redundant Brocade® MLXe Core Routers with redundant 40 Gbps links. The stadium uses Border Gateway Protocol (BGP) and Intermediate System to Intermediate System (ISIS) protocol for routing. Four diverse 10 Gbps Internet connections ensure high availability with a total capacity of 40 Gbps.

Each service cluster also has two Brocade MLXe Core Routers, which perform Layer 3 Core routing and Layer 2 and Layer 3 aggregation for Brocade ICX® 6610 Switches and Brocade ICX 6450 Switches at the access layer. There are 52 IDFs located throughout the stadium, and each IDF supports between 100 and 500 connections. All IDFs are connected to their core routers using redundant 10 GbE links. Brocade ICX 6610 and 6450 Switches provide PoE across all ports for 802.11ac wireless access points, IPTVs, security cameras, VoIP phones, and sensors.

The Levi's® Stadium architecture is highly scalable, enabling pay-as-it-grows investment protection. Brocade ICX Switches are stacked as needed for scaling capacity. Brocade stacking functionality allows the IT team to view and manage the stack as a single device—down to individual ports.

Goal to Go

When the 1.85 million-square-foot Levi's® Stadium opened on July 17, 2014, it welcomed fans with enhanced parking efficiency, 10 clubs, 14 suites, and 370 concession items. Fans used the Levi's® Stadium mobile app to enter the building with e-tickets, order food and beverages delivered to their seat, and watch multiple-angle instant replay views immediately on their phones. Coupled with high-definition video boards among the largest in the NFL, 2,400 Sony LCD displays that range up to 85-inch 4K UltraHD models, and phenomenal sight lines from every seat, fans don't miss a single second of action.

What is less visible to fans is the Brocade network powering everything they experience. All told, the network supports 600 security cameras, 1,300 wireless access points, and 1,000 VoIP phones using PoE.

"On a game day, we move approximately 500 terabytes of data," said Jim Bartholomew, Director of Information Technology for the 49ers. "And every packet that travels over the stadium network runs through a Brocade device. Without that functionality and without the level of PoE that the switches can provide, endpoint devices would not function."

Touchdown

The inspired vision and thoughtful planning has paid off handsomely. Levi's® Stadium was awarded the 2015 Super Bowl® before the building was even finished. In May 2015, the facility won Sports Facility of the Year, awarded by Sports Business Journal. It also won Venue of the Year and Venue Technology awards from The Stadium Business Awards in Barcelona, Spain. Levi's® Stadium has already hosted the NHL Stadium Series™ and WrestleMania™ 31, and it will host the College Football Playoff championship game in 2019. In addition to the lure of spectacular live sporting and entertainment experiences, approximately 185,000 people come to Levi's® Stadium annually just to tour the building.

From Zero to 74,000 Effortlessly

"With the Brocade backbone built the way that it's been built and connected, we routinely scale from supporting zero to more than 70,000 visitors and 4,000 employees and back to zero within a few hours every game day," said Casson. "We're able to monetize our digital displays, WiFi-enabled plazas, our LED ribbon boards, and our scoreboards in real time from when the doors open to when they close. Our revenue success correlates directly to our partnership with Brocade."

When asked how challenging it is to manage the infrastructure, Bartholomew was silent for a moment. "We only have five people on our internal tech team, but I don't think it's much of a challenge because everything just works," he said. "It's simple and reliable."

Dynamic Communication

With 2,400 monitors strategically placed throughout the concourses and club spaces, the stadium allows maximum opportunity to integrate messaging and advertising and update it all in real time. The network enables dynamic communication between fans, advertisers, and the team. The system can be customized to deliver specific messages with laser-sharp accuracy to any point of sale. Stadium management can update inventory status of memorabilia or food items, gaining more exact data for forecasting. They also can enable instant discounts or notify fans of an emergency or scheduling update that could occur within a game or the stadium itself.

Dynamic communications allow venue visitors to build a closer relationship with the stadium and events held there.

Traffic Separation Supports High Quality and Availability

Every game involves multiple broadcast teams from a range of different networks. By separating traffic, the network has to deliver big-league connectivity and QoS to each of them.

"We segment network broadcast traffic using VLANs and physical hardware," said Bartholomew. "We also segment the IPTV network and all of the VoIP phones so that traffic doesn't step on each other to maintain performance, QoS, and security. Segmentation also allows us to make sure that if one service has a problem, it doesn't affect anything else throughout the stadium."

Open Mobility Offers Choices

The stadium also chose Brocade solutions because they are based on open standards for multivendor interoperability and innovation. The Brocade open wired network underlay infrastructure allowed the IT team to choose the best wireless LAN solutions for Levi's® Stadium without worrying about integration or interoperability issues. The Aruba wireless network works well with the Brocade wired network, and together, they power innovative entry technology for the stadium.

The eTicketing application enables Bluetooth entry to the stadium. Fans can print out their tickets or simply scan the tickets on their phones in the entry kiosk for admittance. Typically 25 to 40 percent of attendees use the mobile scan to validate their tickets. Bluetooth entry works seamlessly with the Levi's® Stadium app, enabling fans to easily locate their seats, concessions, restrooms, and the shortest lines; order food; and access exclusive in-stadium content.

At the same time, the app delivers valuable data to facility management for optimizing operations. For example, understanding food concessions patterns has enabled the stadium to reduce food costs and waste. And understanding fan traffic patterns helps optimize physical security planning.

Simplified Management Saves Time

Brocade Network Advisor monitors all Brocade devices for visibility across the stadium network, simplifying management and troubleshooting. Now the IT team can streamline processes and update 700 switches and routers from a central console.

Consolidated Layer 2 switching and Layer 3 routing enables the IT team to facilitate faster, simpler setup for concerts and other events. Performers' support crews arrive before the musicians, and Bartholomew gives them a Layer 2 VLAN and port assignments so that they can just plug equipment in and they're ready. They don't have to reconfigure their equipment for the network or for connectivity in the stadium. Simplified management contributes to a 50 percent lower total cost of ownership and high network availability.

A Trophy for Sports Leadership

Other stadium owners are now coming to Levi's® Stadium to learn more about delivering an outstanding fan experience and the technology insight behind it. Casson says that they are sharing the insights, vendors, decisions, and tools gained from creating Levi's® Stadium with their counterparts to help them in their own journeys.

As the Levi's® Stadium team looks ahead, they continue to evaluate and look for ways to improve the fan experience. They are open to considering any advancements that will improve the fan experience and make the network, bigger, faster, and better.

"We have received superb support from Brocade," said Casson. "Brocade and our network are enabling us to innovate and achieve things that have never been done before."

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