Global Wireless Leader Installs First High-Speed Commuter System

WiFi Rail selects Cisco wireless equipment to design first continuous high-speed connectivity solution to improve commuter quality of life.

EXECUTIVE SUMMARY

WIFI RAIL, INC.

- Transportation
- Gold River and Newport Beach, California USA
- 15 employees

CHALLENGE

- Design, build, operate, and maintain a wireless network to provide continuous connectivity for rail-line commuters, with access to the Internet, email, VoIP, and online entertainment
- Provide enough capacity and reliability to support bandwidth-intensive applications at high travel speeds

NETWORK SOLUTION

- Unified wireless network provides connectivity to Bay Area Rapid Transit (BART) trains, platforms, stations, underground rail sections, surrounding areas, and parking lots
- Autonomous access points with train-top antennas bridge the "in-train" LAN, provide communication to local APs for commuter devices, and backhaul traffic to a fiber optic backbone network
- Guest access capabilities with network sign-in enable commuters to access the Internet and corporate VPNs, retrieve email, and receive live streaming voice and video

RESULTS

- Continuous high-speed connectivity gives commuters the ability to choose how they spend their time, improving the overall quality of their lives
- High throughput and maximum reliability at fast travel speeds support a wide range of bandwidth-rich mobile services, including video conferencing
- Cisco collaboration with WiFi Rail's patent-pending technology enabled the company to become the global leader in predetermined path communications

Challenge

Founded in 2005, WiFi Rail, Inc. is the world's leading service provider of high-speed mobile Internet connectivity to mass transit environments. In support of bandwidth-intensive applications, such as voice and video, the company addresses the specific needs of high-speed commuter rail systems and the growing demands of its travelers.

Cooper Lee, WiFi Rail's founder and CEO, developed the business concept for the company while traveling the rails in Southern California. "I started commuting by train to cut my travel time by two hours every day," says Lee. Hoping to use his commute for working purposes, Lee soon became frustrated when lack of wireless connectivity made it impossible to remain productive. "My calls dropped every few minutes, and the wireless access cards didn't work," he says. Lee chose to turn his dissatisfaction into innovation. "I decided to design and build a wireless network that could provide continuous connectivity for rail-line commuters. That's why I founded WiFi Rail."

Solution

As an IT telecommunications professional, Lee had 12 years' experience working with Cisco® solutions and immediately discussed his new company's objective with his Cisco representatives. "At the time, no vendor had an architecture that could support the speed of a train. But the Cisco sales team was willing to support a trial," he says. Lee worked closely with Cisco to build a demo of the broadband wireless network, and in early 2007, the Bay Area Rapid Transit (BART) in the San Francisco Bay Area became the first to permit the network deployment as a trial. After testing for several months, wireless access on BART became available to the public in four downtown San Francisco stations in April of 2007and through the interconnecting tubes in 2008.

The WiFi Rail solution consists of two Cisco wireless networks. The trains communicate to the network via pole-mounted Cisco Aironet® 1310 outdoor bridges. The commuter access network is a Cisco Unified Wireless Network that provides connectivity to the BART trains, platforms, stations, underground rail segments, surrounding areas, parking lots, and in-transit commuters. The access points located underground and outdoors function as bridges, while the ones located in the stations operate as normal APs. Cisco Aironet 1131 and 1140 access points residing on the inside of the train ceilings communicate with the commuters' devices, as well as to the backhaul network. Separate Service Set Identifiers (SSIDs) for pole-mounted and in-train access points make it possible for the

communication links to act separately. In addition, the WiFi Rail patent-pending technology positions the access points to enable transmission handoffs to occur without gaps, helping to ensure smooth roaming. “The robust capabilities of Cisco’s solutions made it possible for us to create this unique configuration in order to provide continuous bandwidth to commuters while they travel at high speeds,” says Lee.

Today, the networks have been deployed throughout 2.6 miles above ground at BART’s Hayward Test Track facility, and underground for two miles interconnecting the four principle downtown stations. Using the guest access capabilities of Cisco networks, commuters can access the Internet, corporate VPNs, and live streaming voice and video. “Some commuters now watch TV from their devices,” says Lee. The RADIUS server automatically captures and identifies guest addresses and provides a webpage where users can register. “We currently provide wireless as a complimentary service, but in the near future we will offer subscriptions,” says Lee. “The Cisco Service Selection Gateway (SSG) makes it easy to transition to and manage wireless users as a paid service and prevents users from accessing it for free.”

WiFi Rail has successfully tested the Voice over Wi-Fi capabilities of the network and is considering using Cisco Wireless 7921 VoIP phones to provide mobility and flexibility for rail operator staff. “Station agents could then leave their booths to help commuters,” says Lee. “And more agents on the platforms translate into improved customer service.”

> “We’ve given commuters the ability to choose how they spend their time, improving the overall quality of their lives.”
> **—Cooper Lee, founder and CEO, WiFi Rail**

Results

Cisco wireless solutions made it possible for WiFi Rail to prove its patent-pending technology and achieve its vision of providing continuous high-speed connectivity to commuters. “By providing bandwidth equal to the capabilities in their homes and offices, we’ve given commuters the ability to choose how they spend their time, improving the overall quality of their lives,” says Lee.

“For instance, travelers can now start their commutes later because they know they can work on the train.” Because the Wi-Fi network covers parking lot areas, commuters also have the option to work from their cars while they wait. “And they can choose to take a later train if they don’t want to interrupt their work flow. For the first time, travel time can finally be truly productive for commuters,” Lee says.

The reliability and high-speed capabilities of the Cisco wireless solutions enable WiFi Rail to provide a wide range of mobile services to a growing subscriber base. According to Lee, “Many wireless solutions easily support data connectivity, but we wanted to provide mobile access to voice, video, and new bandwidth-intensive applications as they become available. Cisco provides massive bandwidth with maximum reliability.”

Commuters can now conduct two-hour video conferences easily without worry. “The network provides an average of 15 Mbps of actual throughput on trains traveling at 81 miles per hour,” says Lee. “Users might experience 100 milliseconds of latency in a bad case scenario, which is indiscernible to users, and no drops.”

Cisco has helped WiFi Rail gain a leadership position globally. Currently, similar mobile systems depend on cellular providers’ 3G technology. “Because we use our patent-pending technology to deliver the RF, we are able to transmit more bandwidth to ten laptops than an entire cellular tower can provide,” says Lee.

With more than 100,000 sign-ons, nearly 19,000 users have registered to the WiFi Rail network using various devices, but the company expects usage numbers to increase. “We have Cisco to thank for its strong support as we deployed this system,” says Lee. “The Cisco network provides the capabilities needed to support our growing number of users and their evolving demands, making us the global leader in the rail transit communications space.”

Next Steps

WiFi Rail will continue to provide high-bandwidth connectivity to a variety of transit environments now and in the future. By 2010, it expects to complete the deployment of the wireless network throughout all 104 miles of BART tracks and 43 stations, including downtown San Francisco and Oakland, creating the largest continuous layer-2 WLAN in existence.

Future projects for WiFi Rail solutions include regional commuter rail systems, such as Miami-Dade Metrorail, Washington Metropolitan Area Transit Authority (WMTA), Southeastern Pennsylvania Transportation Authority (SEPTA), Dallas Area Rapid Transit (DART), Port Authority of the Trans Hudson (PATH), as well as the international entity, Nipon Telephone and Telegraph Broadband Project (NTTBP). In addition, WiFi Rail is also working with a Formula One team and vendor to provide converged high-bandwidth continuous wireless connectivity to race cars for a variety of audio, video, and data applications.

WiFi Rail is a Cisco Advanced Technology Development Partner (ATDP) and continues to work closely with Cisco's Advanced Technology and Research group to further enhance the technology of the mobile network. "We are continually exploring new opportunities to provide wireless access in different transit environments, such as trains, ferries, and highway arteries," says Lee. "We look forward to continuing our collaboration with Cisco as we expand and support Emergency Medical Services and Homeland Security requirements."

PRODUCT LIST

Wireless

- Cisco Aironet 1131/1140 Series Access Points
- Cisco Aironet 1310 Outdoor Access Points and Bridges
- Cisco 3200 Series WMICs
- Cisco 4400 Series Wireless Controllers (to be installed in March 2009)
- Cisco Unified Wireless IP Phones 7921G

Voice and IP Communications

- Cisco Unified IP Phones 7960G
- Cisco CallManager Express

Routing and Switching

- Cisco 3800 Series Integrated Services Routers
- Cisco 2600 Series Multiservice Platforms
- Cisco 3750 Catalyst® Series Switches

For More Information

To find out more about the Cisco Unified Wireless Network and 802.11n technology, visit: http://www.cisco.com/go/nextgen-wireless

To find out more about WiFi Rail, visit: http://www.wifirail.com

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