Testing Center Sets Standard for State-of-the-Art Auto Development

Cisco Borderless Networks
NCCAR Case Study

Executive Summary

- **Customer Name:** NCCAR
- **Industry:** Automotive
- **Location:** Garysburg, North Carolina, United States

Business Challenge:

- Provide ubiquitous indoor/outdoor connectivity
- Maintain solid security
- Manage all services with small staff

Network Solution:

- Deployed Cisco borderless network, built on end-to-end Cisco switching, wireless, security, unified communications, and video solutions

Business Results:

- Unique capabilities differentiate test center from other facilities
- Ubiquitous, easy-to-use network access for clients
- Support advanced automotive research

North Carolina Center for Automotive Research uses borderless network to keep engineers connected to data and services anywhere, anytime.

Business Challenge

Developing a new car is not what it used to be. Twenty years ago, manufacturers would build and test countless prototypes. Today much of that work is done in the lab, with computer simulations. One aspect that has not changed at the same pace is vehicle proving grounds. Although today's prototypes use telematics systems to track minute details of vehicle performance, the test tracks on which they run are holdovers from a previous era.

The North Carolina Center for Automotive Research (NCCAR) aims to change all that. Created through state and federal funding, the nonprofit center is part of a statewide effort to recruit auto companies and create new high-value jobs in North Carolina. The goal of the project: to build the automotive technology center of the future, with a testing facility unlike anything else in the United States.

"Imagine you are testing a vehicle somewhere out in the desert," says Simon Cobb, chief operating officer, NCCAR. "You've got two weeks to get that vehicle compliant with certain specifications, but all of your calibration support systems are in a lab thousands of miles away. If you want to test that system, you have to collect the data from the vehicle and drive back to an office somewhere to hook into a wired connection. It's very inefficient. Alternatively, if you can test inside a Wi-Fi network, you can download calibration files, send live data to someone across the world, even stream video."

"I want NCCAR to be a national center for the development of visionary automotive concepts. Our Cisco technology platform is a major reason why we're making that a reality."

Simon Cobb,
Chief Operating Officer,
NCCAR

Making this idea a reality, however, requires a unique IT infrastructure. The network must provide reliable high-speed wireless access across a vast space, including indoor offices and garages, staging areas, a 2-mile outdoor test track, and a vehicle dynamics area. It must be highly secure to protect the confidentiality of vehicles still in development. And, it must be supremely easy to manage by NCCAR's limited on-site staff.

Network Solution

NCCAR's leadership worked with the Institute for Next Generation IT Systems (ITng) at nearby North Carolina State University to begin planning the network backbone, even before construction began on the facility itself. At ITng's advice, NCCAR also brought in Cisco® Gold Partner, Internetwork Engineering. Together, the organizers developed an ambitious technology plan, including ubiquitous indoor and outdoor wireless access, wired and wireless voice services, IP video surveillance, and network and physical security. Powering it all was a Cisco borderless network, including Cisco Aironet® wireless access points and Cisco Catalyst® switches.

Incorporating advanced wireless and security solutions, remote connectivity, and support for dynamic voice and video services, a "borderless" network lets users access any kind of data or service, anywhere and anytime, securely, reliably, and seamlessly. These capabilities are essential to support NCCAR's unique multitenant operations model, in which competing auto manufacturers may be using different parts of the facility at the same time.

NCCAR's wireless network extends across all garages and office sites. To provide connectivity throughout the extensive outdoor track, the organization mounted Cisco Aironet 1500 Series Wireless Access Points on special lightweight poles surrounding the test track at safe locations.

"We can give customers secure access to an individualized wireless connection from anywhere in the facility," says Dennis Holmes, mobility practice manager for Internetwork Engineering. "It doesn't matter if they're indoors or outdoors, connecting to the Internet or to their home office, or using a wireless IP phone. Wherever they are, they have access to their unique network."

"The Cisco solution facilitates competitive organizations working in parallel," says Cobb. "Our clients can work right next to a competitor in an adjacent garage and have complete confidence that their data cannot be intercepted."

Video-Optimized Network

NCCAR's borderless network goes beyond voice and data services. The infrastructure hosts video surveillance systems both for security and to provide customers with video feeds for research and development purposes. To accomplish this, NCCAR employed a medianet architecture, an infrastructure optimized for demanding high-definition video services.

"The network was designed with video in mind from the very beginning," says Sean Rollman, vice president of technology solutions, Internetwork Engineering. "We deployed high-speed fiber connections between IP cameras and the Cisco switching infrastructure, and implemented advanced quality-of-service [QoS] in the Cisco Catalyst switches to guarantee ample bandwidth and low latency."

Product List

Routing and Switching
- Cisco Catalyst 4500 Series Switch
- Cisco Catalyst 3560 Series Switch

Security and VPN
- Cisco ASA 5500 Series Adaptive Security Appliance
- Cisco AnyConnect VPN Client

Wireless
- Cisco Aironet 1522/1252/1142 Wireless Access Points
- Cisco Wireless Control System (WCS)
- Cisco 3300 Series Mobility Services Engine

Unified Communications
- Cisco Unified Communications Manager
- Cisco Unified Wireless IP Phone 7925G

Data Center
- Cisco UCS C-Series Server

Physical Security
- Cisco Video Surveillance Operations Manager
- Cisco Physical Access Manager

NCCAR uses the IP video services to capture the movement of properties on site and through the entrance gate, monitor for hazards, and record and archive key event situations. NCCAR staff can access the video feeds from their laptops or any other web browser, in their offices or from home. They can also provide feeds to customers, and allow them to share live video of test runs with their associates anywhere in the world.

Simplified Management and Provisioning

NCCAR's network was designed to be easy to manage by the organization's small staff. The solution includes tools such as the Cisco Wireless Control System (WCS) and the Cisco 3300 Series Mobility Services Engine, which make it easy for NCCAR personnel to set up new, unique wireless domains for each customer and tear down the domains when the customers leave.

The network is also designed to allow Cobb, as well as Internetwork Engineering personnel who assist with day-to-day network operations, to manage the entire environment remotely. NCCAR uses the virtual private network (VPN) capabilities in Cisco ASA 5500 Series Adaptive Security Appliances, which also provide robust firewall protection. The Cisco ASA platforms allow remote users to connect using IP Security (IPSec) VPN clients, or via a secure web browser connection with the Cisco AnyConnect Secure Sockets Layer (SSL) web-based client.

"Because NCCAR is in a rural area, and most of the stakeholders are not local, VPN is an ideal solution to keep their systems running smoothly," says Rollman. "We can easily and quickly perform administration and maintenance on the various IT systems, without having to wait for a technician to make an onsite visit. NCCAR's director and his staff also use VPN to remotely monitor video surveillance cameras when away from the facility."

Business Results

Opened to customers in May 2010, NCCAR has generated significant buzz within the auto industry and attracted more than 400 users to date. The Cisco borderless network wired, wireless, voice, and video services have performed flawlessly, and the state-of-the-art technology that NCCAR can offer its clients is proving to be a major differentiator.

"The network we've put in place definitely separates us from other testing facilities," says Cobb. "I get calls every week from people asking what we can do here. We've only been operational for a few months, but the response we're seeing has been extremely positive."

Despite NCCAR's advanced technical capabilities, much of the technology is transparent to users. They simply know that wherever they are, they can connect to the information and services that they need.

"My top priority for our IT system was to make everything easy for our clients," says Cobb. "There's nothing more infuriating than having to spend an hour reconfiguring a machine or diagnosing a connection problem when you're testing on a deadline. At our facility, clients can come in and work like they're in their home offices. If they want to pull data from a corporate server through a VPN, if they want to run video conferencing over the Wi-Fi network, either in a garage or even outside from the vehicle, it's all just simple."

NCCAR is already using the Cisco borderless network to push the boundaries of automotive research and development, taking advantage of the unique capabilities of the wireless infrastructure.

"We're working now with North Carolina State University on visual recognition algorithms that will use the cameras at our track and inside the car to actually guide the vehicles, whether autonomously or as a driver assist system," says Cobb. "I want NCCAR to be a national center for the development of these kinds of visionary automotive concepts. Our Cisco technology platform is a major reason why we're making that a reality."

No matter what challenges these new automotive development projects present, Cobb and his partners are confident that the Cisco borderless network will help NCCAR and its clients meet them.

"We're collaborating with NCCAR to take advantage of their technology infrastructure," says John Bass, senior technical director of ITng Services. "By combining the Cisco wireless network with GPS systems, telemetry systems, and industry-standard vehicle sensors, we can provide extremely useful real-time data to our clients. These kinds of capabilities really demonstrate the value of our technology platform to enable groundbreaking automotive research. And I feel very confident in Cisco's ability to continue innovating to keep up with our needs."

Next Steps

In the coming months, NCCAR's leaders and partners plan to continue building on their network foundation, and take advantage of even more Cisco borderless network capabilities. For example, the group plans to introduce radio frequency identification (RFID) asset tracking using the wireless network. Soon, NCCAR staff will be able to track the location of any device or piece of test equipment on the site in real time.

The group also plans to use Cisco EnergyWise intelligence to automatically power down components of the network when they're not in use to reduce power consumption across the site. And, they plan to expand the video services and display live and pre-recorded video content on digital signs at the track. For all of these applications and more, the Cisco network provides a robust, versatile technology foundation.

For More Information

To find out more about Cisco borderless networks, visit: www.cisco.com/go/borderless.

For more details on Cisco solutions for the automotive industry, visit www.cisco.com/go/automotive.

For more information about NCCAR, visit www.nccar.us.

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at **www.cisco.com/go/offices**.

C36-652693-00 03/11