"Portable" Cisco Aironet **Wireless Network** Added to Top NASCAR Team

Hendrick Motorsports now uses Cisco Aironet® wireless technology to enhance the performance of its three NASCAR racing teams. Winner of 102 NASCAR Winston Cup points events and six NASCAR championships, including four consecutive NASCAR Winston Cup titles in the 1990s, Hendrick Motorsports deployed Cisco Aironet wireless technology for quick, convenient sharing of vehicular performance data accumulated at NASCAR tracks.

Hendrick Motorsports is based in Charlotte, North Carolina, not far from Lowe's Motor Speedway. What began in 1984 as a one-car race team has grown into a multicar operation whose drivers include Jeff Gordon, Terry Labonte, Jerry Nadeau, NASCAR Craftsman Truck Series drivers Jack Sprague and Ricky Hendrick.

Gathering Performance Data

NASCAR allows each racing team to conduct seven tests per year, which can be conducted on any NASCAR track. Test sensors on each Hendrick Motorsports race car provides 7 to 12 MB of valuable performance data on everything from wheels, brakes, and suspension to the engine itself. Team engineers analyze the data to determine how a car is responding throughout a trial run, and they perform real-time telemetry on parameters such as oil pressure, revolutions per minute (rpms), and fuel pressure.

The data from a particular race car is downloaded to a central server and then distributed to PCs used by that team's engineers. Since earlier this year, the process is now facilitated wirelessly through the use of a Cisco Aironet 350 Series Access Point and several Cisco Aironet Client Adapters. Now the team engineers can download performance data to a PC or laptop from virtually anywhere in a garage.

Cisco Aironet 350 Series Access Points and Client Adapters are IEEE 802.11b compliant and Wi-Fi™ certified by the Wireless Ethernet Compatibility Alliance (WECA) for interoperability. Based on direct sequence spread spectrum technology; they operate in the 2.4-GHz band and support data rates up to 11 Mbps.

"We initially tried the wireless approach during track tests at the Atlanta Motor Speedway in April, and everybody agreed that it worked very well," said Chris Newsome, Hendrick Motorsports IT Manager. "We got very positive feedback. There were no glitches of any kind."

Wireless Workgroup Bridge Permits Data Sharing

This setup was fine for the members of individual racing teams, but it left a large number of other experts at Hendrick Motorsports out of the loop: the automotive engineers who are not assigned to specific race cars but focus exclusively on specific areas, such as engines or chassis. "Some of these engineers approached us and asked if we could set it up so they could receive the same data that the individual car teams were getting. And they wanted it from all three cars at the same time," Newsome said.

Once again, Cisco Aironet technology offered the solution: Aironet 350 Series Workgroup Bridges, designed to provide high-speed, long-range connectivity for Ethernet-wired devices between structures such as racing garages. The wireless bridge product is built to withstand wide varying-temperature ratings and is ideal for harsh climates. The bridge supports data rates up to 11 Mbps, and wirelessly connects up to eight Ethernet-wired devices.

Each of the three racing teams operates its own local-area network (LAN) within its assigned garage at a NASCAR track. The three Hendrick Motorsports racing teams are not always given adjoining garages, but with three Cisco Aironet 350 Series Workgroup Bridges, all three LANs are seamlessly linked, no matter how great the separation between the three garages.

Checkered Flag at Indy Speedway

Workgroup bridges were first used during a series of tests at the Indianapolis Motor Speedway. Matt Cochran, LAN Manager for Hendrick Motorsports, and Cisco Systems Engineer Meredith Davison positioned the three Cisco Aironet 350 Series Workgroup Bridges in July 2001, when the racing teams were preparing for the Indianapolis Brickyard 400.

"Once again, we got very positive feedback from all the engineers. They found that they could easily move around in their garages while receiving data wirelessly. They could even visit other Hendrick garages without a lapse in transmission," Cochran said. The goal in these tests is to prepare race cars for the peculiarities of a particular track. Shortly after the wireless-aided testing was completed, Gordon took the Brickyard 400 checkered flag.

"Greater Distance" with Cisco Aironet

Hendrick Motorsports considers itself a "Cisco shop," using a Cisco 6509 at the core, a Cisco 2600 Series Router at the Internet, a Cisco PIX® 515-UR Firewall, and both Cisco 2524 and 1750 routers to reach the super truck shop. The system also includes one Cisco 3548 and two Cisco 3524 switches. Nevertheless, selecting a Cisco Aironet wireless system for the wireless implementation was not automatic.

"We tested a number of competitive solutions ourselves. Frankly, the Cisco Aironet product gave us significantly greater distance than the others, and that sealed the deal," said Cochran. "Of course, Cisco has consistently provided excellent products and exceptional support, so that helped us in our decision. And Meredith went beyond the call of duty in joining us for the wireless tests in Indiana. All these factors entered into our decision."

Another consideration, he added, was the Cisco Aironet security solution. "We will be setting up the standard wired-equivalent-privacy (WEP) security architecture very shortly. We are also aware of—but haven't yet implemented—the Cisco Aironet authentication type for the new wireless security standard. It is just one more feature that makes the Cisco package appealing."

The new wireless security standard, 802.1x for 802.11, features mutual authentication, session-based encryption keys, centralized user administration, and extensible authentication support. Only Cisco provides 802.1x support on its access points and supports an 802.1x authentication type, called EAP-Cisco Wireless, or LEAP.

Hendrick Motorsports has made its Cisco Aironet wireless system a permanent part of its racing package. "The system is portable—I keep everything in one bag. Not only will we use it at all seven test venues this year, but we can take it to every race," Cochran said. Data acquisition is not permitted during actual races, but the wireless setup facilitates quick pre- and post-race performance analysis. NASCAR stages 36 points races annually.

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