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Horseracing enthusiasts in the Greater Toronto area count Woodbine Racetrack as one of their top destinations. They not only have access to live race action 12 months of the year, but each is able to track and wager on equine events happening around the world, be it in Australia, Hong Kong, the United States or the United Kingdom.

A pioneer in online wagering applications for the horse racing community for a number of years through its Horse Player Interactive (HPI) platform, the Woodbine Entertainment Group is now reaching out to a new generation of fans.

Last year, the company decided it was time to bring the online experience to the track by building a hotspot to allow racing enthusiasts to place their bets using wireless devices. Deploying a wireless network at the facility was a challenge of significant proportions because of the large size of the buildings and grandstand, as well as the property's sizeable acreage.

In addition, the network had to have the reliability and redundancy to handle the huge spike in demand from last minute wagering (80% of wagers are placed within two minutes of the start of a race). Using traditional distributed access points to provide the needed performance was an extremely costly option. It was estimated that the site would require 120 access points to cover the public areas plus an additional 120 for redundancy. In addition, signal strength could easily be compromised in open areas from overlapping of channels.

Consider WEGZ, a 6,700 square-metre stadium sports bar. As well as hockey, football and other sports-bar staples, Woodbine dedicated one section to horse racing, where multiple screens show various events.

Executives at Woodbine also took note of young professionals harnessed to notebooks in cafes and tapping PDA screens in restaurants, many of which offer Wi-Fi Internet connections.

"Even McDonald's is putting wireless into some of its restaurants," says Randy Folmes, Woodbine's Director of Information Technology.

Today, patrons can place bets directly on the Horseplayer Interactive web site ([www.hpibet.com](http://www.hpibet.com)), an online service that allows subscribers to bet on a horse race from their own wireless devices.

Woodbine's road to a Wi-Fi-enhanced customer experience posed several challenges. Unlike a McDonald's restaurant, which needs just one data closet, Woodbine had to cover 183,000 square metres.

"Wi-Fi isn't really designed for large areas," says Michael Brunet, vice president of Lcomm Global Solutions, the firm that supplied Woodbine's antenna systems. (Woodbine's IT staff completed the rest of the install.) He cites the main issue of channel conflict: "When you have more than three access points, you need to ensure that each of the three channels that do not conflict with each other -- 1, 6 and 11 -- will not be on top of each other.

"In a traditional Wi-Fi access point deployment, the radio frequency from one AP reaches far into the circle of the adjacent AP. If a Channel 1 AP signal is so strong that it crosses adjacent 6 or 11 sectors to overlap with another AP on Channel 1, wireless devices experience confusion. They recognize packet loss and have error correction built in, but the more they ask APs to retransmit, the more these 'sticky clients' slow the network's bandwidth capacity."

LComm's Distributed Wireless Infrastructure System (DWIS) uses broadband antennas that handle frequencies between 700 and 3,000 MHz, which means that Woodbine can later choose to install other applications wirelessly including VoIP, video conferencing, pagers and cellular using the same wireless infrastructure that handles Wi-Fi.

However, no network could run these applications if channel conflict saddled the system with problems such as

excessive latency. In Woodbine's DWIS design, up to five antennas connect to Cisco Systems' access point via plenum-FT6 rated passive coaxial cable. The result is that each AP handles a larger area. LComm defined the edge of each AP's range by tuning the power of each signal so that it "dies" as it reaches the edge of an adjacent AP's sector, long before the next sector that uses the same channel comes up.

"We are such a large building, we figured we'd need 200 to 400 APs," says Folmes. "We did the whole building with 68 APs, plus another 68 in sleep mode in case the heartbeat on the main AP dies."

At press time, wireless had not quite yet arrived at WEGZ, but when it does, Woodbine will be able to cover the entire room with only two APs.

DWIS also differs from traditional Wi-Fi deployments in the placement of APs. Rather than going into ceilings throughout the building, APs reside in data closets. Coax carries signals from antennas to the APs, which connect to the wired network via three-foot Category 5 cables.

Antennas never fail, but APs do, says Brunet, citing a failure rate of 20%. Placing APs in data closets instead of ceilings means staff can test, reset and change equipment more easily. This is especially true for Woodbine's grandstands, where the overhang height of 24.28 metres called for more directional antennas than those used indoors.

Woodbine's IT team conducted an extensive two-year test of the network prior to going live. The backbone had already been prepared: Woodbine runs dual gigabit as well as two 10-Mbps pipes for redundancy and load balancing, each of which go through separate providers at opposite ends of the building. Cisco switches and QOS round out the solid foundation upon which Woodbine built its wireless network.

Testing turned up hurdles that had little to do with the network, but could have been showstoppers. For example, while notebook computer users navigated HPIBet.com with ease, people who used handheld devices endured excessive amounts of scrolling to place their bets. "Our big focus has been on the handhelds such as the HP iPaq, which has Wi-Fi capabilities built into them," says Folmes.

Today, when bettors log in to HPIBet.com using Windows Mobile devices, they can download HPIBet Mobile Edition to their devices in seconds. Like Windows Mobile, HPIBet Mobile is formatted for small PDA screens and thus enhances the handheld experience for customers.

To put the network through its paces, Woodbine first needed to measure baseline network traffic without Wi-Fi. Then, testers added data loads to the betting VLAN equivalent to the data volumes wireless betting would generate.

Of particular interest was the typical rush during the last two minutes before a race when most people place their bets. Woodbine wants HPIBet to handle each bet within a second or two.

Woodbine's IT team used Etherscope Series II Network Assistants from Fluke Networks to observe the network, as well as mimic the data load the network could expect from a flurry of wireless betting.

They also allowed the team to quickly identify any connectivity problems, determine cable lengths, flag configuration problems and detect interference from any outside signals (e.g. microwave or external access points), as well as to log in to perform troubleshooting. Since the installation was completed, the team continues to use them to perform day-to-day testing, monitoring and troubleshooting.

"Theoretically, 802.11b should handle 11 Mbps but you need to know what the actual throughput is," says Eugene Suarez, business development manager for Fluke Networks Canada. "Randy and his team tested amounts of data equal to a typical iPaq transaction multiplied by the number of bets the network could expect at peak traffic times."

Having used Etherscopes to design the network as well as test it, he adds they saw no problems with network

performance.

"Etherscopes are a huge benefit," says Folmes. "They allow us to test wires, to see all the equipment, look for errors. They also let us switch to wireless mode, to evaluate signal strength. We can monitor the login process of a wireless device. The Linux-based OS on Etherscopes features a browser that lets users see different devices in the field. It also has a serial cable on it so that you can connect to a switch."

As far as data security is concerned, Woodbine uses Cisco's LEAP (Lightweight Extensible Authentication Protocol), but not all devices and cards are LEAP compliant, so Woodbine implemented Cisco's Building Broadband Service Manager or BBSM. It enabled Woodbine to tie in its Radius server, redirect browsers to its home page at login and ask for authentication credentials before allowing access to the network.

Wi-Fi on today's handhelds is largely 802.11b, not its faster, more power-hungry cousin, 802.11g. Since some handhelds do not connect properly to combination b/g access points, Woodbine clawed all APs back to 802.11b to ensure reliable connectivity for all clients. Another technical point supported this decision: if an AP is set to handle 'b' and 'g,' anybody using the AP at g drops back to 'b' the moment a 'b-only' device connects.

Out of the gate, Woodbine lent iPaks to some of their best customers. "It was challenging finding the right device," says Folmes. "There are a lot out there. You want one that is robust enough to keep the signal while you move around, robust enough to run the application, and has the battery life to run for a day of racing."

Thoroughbred devices are such an important part of wireless wagering that bettors can now choose iPaks from Woodbine's customer loyalty rewards list preloaded, of course, with HPIBet Mobile. Prizes like this propel Woodbine past the customer service post.