



Wireless Goes for a Ride: WLAN and the Mountain Glider

As they fly through the air, the passengers on the Mountain Glider adventure ride are completely unaware that they are taking part in the world's most striking example of Wi-Fi mobility. That's because the Mountain Glider is using wireless technology to monitor the progress of ride cars weighing a ton and moving at speeds of up to 72 kilometers an hour.



When Austrian cable car specialist Doppelmayr built the radically innovative Mountain Glider for Belgium's Walibi Amusement Park, a critical part of their design required the use of a Wireless LAN (WLAN) that would allow onboard safety systems to be constantly connected to a central control station. To do this required a robust solution that delivered seamless mobility without handoff delays between access points (APs). The solution chosen to meet this challenge was the Extricom WLAN System.

A New Way to Ride

Roller coasters and their close cousin, the adventure ride, can be addictive: their riders scream, freefall, and want more. And "more" for amusement park owners means rides that are higher, faster, and go further than the competition. In that past, that meant building a gigantic structure with long trains of cars, and heavy steel tracks with giant girders to support them. They were exhilarating to ride, but difficult to maintain.

Doppelmayr has changed this paradigm. Their new Mountain Glider ride is an "aerial ropeway"; a graceful, spidery concoction of towers and cables. The riders, perched in individual 4-person cars, are lifted over 160 feet in the air and then fly down through a maze of twists and turns, enjoying a spectacular, if dizzying, view of the park and surrounding countryside. It's about as close to flying as you can get.

Keeping Up to Speed

As is the case with most innovations, a lot of hard work went on behind the scenes to overcome the technical challenges the Mountain Glider posed. In a significant departure from traditional infrastructure for this type of ride, Doppelmayr abandoned hard-wired control systems in favor of a WLAN system that would control the speed of each individual car and make sure they maintained a safe distance from each other.

But most WLANs have a fundamental drawback: they're built for wireless portability, not mobility. In other words, as wireless clients (in this case the transmitters in each adventure ride car) move from AP to AP, they are forced to hand off (i.e. to de-associate from one AP and re-associate with the next AP). In a fast-moving environment, this means latency, and for many wireless applications, latency can lead to connectivity problems. And on a wirelessly controlled adventure ride, connectivity issues can affect performance.

Doppelmayr was certainly not the first to have to deal with the issue of Wi-Fi hand-offs. Many companies have discovered that mobile applications don't always perform as advertised in real-world conditions. This is not due to any problem in the applications themselves, but rather because their data requirements are evolving faster than the wireless infrastructure that supports them.

Beyond Roaming

The hand-off issue was a challenge throughout the Mountain Glider's construction and field-testing phases. Doppelmayr consulted with wireless solution provider WirelessConsulting as to how this issue might be addressed. The company's WLAN specialist, Alexander Bendler reasoned that the roaming hurdle would be



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Alexander Bendler
Managing Director
Wireless Consulting

Project Scope

Provide uninterrupted WLAN connectivity for safety monitoring infrastructure in adventure ride cars moving over 70 km per hour.

Solution

- Extricom WLAN system, consisting of an EXSW-2400 24-port switch and 13 EXRP-20 UltraThin Access Points.
- Radio client is handed over between the transmitters with 0 ms latency. In the event of the failure of one transmitter, a neighboring UltraThin AP can close the gap, thus guaranteeing an even signal level over the entire route.

Results

- Zero latency roaming guarantees failsafe communication between a central control database and the cars at all times. Allows system to be safely operated at speeds several times faster than comparable systems using cell-planned technology.

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eliminated by leveraging new innovations in WLAN technology.

As Bendler put it, "Other WLANs were not able to achieve the roaming times Doppelmayr needed and would have required extensive customization. They were looking for a system that would inherently provide robust and guaranteed connectivity, even when pushed to the limit. That was the Extricom WLAN in a nutshell."

A Moving Target

What was attractive about the Extricom WLAN was its radically different architecture. In an Extricom system, rather than associating with individual access points and then roaming between them, a mobile wireless client associates directly with the WLAN switch, and then maintains continuous connectivity across multiple APs without the need to hand off between them.

The result is uninterrupted mobility, even when the wireless client is moving extremely fast as is the case with the Mountain Glider. With the hand-off latency eliminated, the cars are able to maintain real-time network connectivity, allowing park personnel to monitor over 500 safety and performance elements even as the cars hurtle through the air. As project consultant Vanya Toperich stated, "In the kind of environment the Mountain Glider represents, we can't have disconnections. The Extricom system is ideal for meeting this challenge."

Heading in a New Direction

The deployment of an Extricom 24-port switch and 13 UltraThin APs proved more than equal to the challenge of the Mountain Glider. The seamless mobility provided by the Extricom WLAN has enabled flawless operation for tens of thousands of riders, all in complete safety and exhilaration. As an added bonus, the Extricom WLAN's channel blanket architecture allows the wireless signal to be separated into layers at the same AP, thus enabling Doppelmayr to deploy an emergency VoWLAN phone system over the same infrastructure without conflict between two differing data types.

Extricom's "always connected" architecture means that the ride's cars can operate at exponentially faster speeds than comparable rides that use cell-based wireless systems. As

a result, since its opening in July 2007, the 700-meter long the Mountain Glider has become one of the most popular adventure rides in Europe. "The key is a roaming-free infrastructure that allows the speed and thus the efficiency to be significantly increased. That's the Extricom value-add," stated Bendler.

Next Steps

With the success of the Mountain Glider, Doppelmayr is racing to extend their aerial ropeway concept to a number of other unconventional projects, including an installation at a ski resort to allow summertime visitors to swoop down the mountain as if they were flying. Whatever project challenges the Doppelmayr team might face, the issue of wireless handoff should not be one of them. The award-winning Extricom WLAN has proved its mettle in the toughest conditions possible.