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High Roller, Las Vegas

Setting New Heights for World's Tallest Observation Wheel

Setting a new Guinness World Record for observation wheel height, the High Roller provides passengers with a silky-smooth 30-minute ride with unimpeded 360-degree views of the Las Vegas skyline. The IP-based communications infrastructure makes every aspect of the control and emergency systems accessible to operators at the central control room, enabling the High Roller to meet the highest standards for operational reliability and passenger safety.

AT A GLANCE BUSINESS CHALLENGE SOLUTION RESULT

AT A GLANCE

A Landmark Las Vegas Attraction

The Las Vegas High Roller has been high profile since its announcement in August 2011. With 28 enclosed, high-tech passenger cabins, each capable of carrying 40 passengers (2200+ passengers per hour), the High Roller was envisioned as the focal point behind Caesars Entertainment's $550 million investment in The LINQ, an outdoor shopping, dining, and entertainment complex. At 550 feet, the multi-colored LED-lighted High Roller observation wheel would be the world's tallest and most advanced observation wheel, ensuring its status as a landmark Las Vegas attraction.

The size and complexity of this project required the involvement of various industry leaders. The project manager, Randy Printz of Themed Development Management, has over 30 years of experience in major development projects for theme parks such as Disneyland, Epcot Center, and Universal Studios.

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Randy Printz
Project Manager, Themed Development Management

Themed Development Management

Headquarters: California, U.S.A

Industry: Themed entertainment

Website: themeddevelopment.com

Results

- Extreme reliability with low maintenance and maximum uptime under harsh operating conditions
- Rock-solid wireless communications
- Live, on-demand management of cabin control and communication

BUSINESS CHALLENGE

Building a Complex Industrial Control Network in Tough Conditions

Within each cabin were a number of control and safety systems that communicated with the central control room on the ground. There were also emergency communication systems with video capability in each cabin that needed to be available at a moment's notice at all times. Finally, in-cabin entertainment, position tracking, and wireless networking were essential towards delivering a quality passenger experience during the 30-minute duration of the ride. Due to the critical nature of these systems, wireless communications from each cabin to the main wheel and from the wheel to the ground needed to perform with the utmost reliability.

One of the biggest challenges was designing and deploying the network. "According to one of the field engineers, the network that we were putting in place was the most complex industrial control network they had ever seen," said Randy Printz, the project manager overseeing design and deployment of the High Roller. In addition, this was to be installed outdoors in Las Vegas, a very difficult environment. Sixty wireless networks needed to function simultaneously and seemlessly up to 18 hours a day without fail in a difficult environment, with temperatures ranging from 12 to 120°F (-11 to 49°C), high winds, large quantities of dust, and a lot of radio traffic. The equipment would be 200 to 500 feet in the air, and would be in constant motion and constantly changing orientation. No one had done this kind of thing before—that was the technical challenge.

"We encountered numerous communications issues on site that were extremely tough to diagnose and address. With all the different types of equipment and vendors involved, it was an enormous challenge simply determining where communication issues were occurring and why."

Challenges

- **Requires a high level of communications redundancy and reliability to ensure passenger safety**
- **Highly complex network topology that relies heavily on wireless communication**
- **Difficult to install and troubleshoot**
- **Unexpected communication issues**

Technical Expertise Saves the Day

A high level of technical expertise in both IP-based communications and industrial systems was critical in order to ensure the success of the project. Moxa's industrial-grade wireless and wired networking hardware was used for the communications infrastructure connecting each cabin on the High Roller to the central control room. To ensure the greatest degree of reliability, two separate, fully redundant networks were used for the dual redundant network within each cabin that connected to that cabin's fire and life safety systems, intercom systems, and drive control systems.

Moxa Partner

Industrial Networking Solutions

Moxa Solutions

- Wi-Fi solution, 2x2 MIMO 802.11 a/b/g/n AP/bridge/client
- Rugged industrial design with integrated antenna and power isolation
- IP68-rated weatherproof housing designed to withstand -40 to 75°C operating temperatures
- 5 GHz DFS channel support

Specialized Moxa Wi-Fi access points were used to bridge communications between the rim and each cabin. Instead of using traditional wireless antennas, leaky coax cable was used to ensure the most stable and reliable connection as the wheel and cabins went through their respective rotations.

Perhaps even more valuable to the project was the technical expertise demonstrated by the Moxa team in both IP communications and industrial control systems. Initially brought on as a component supplier, Moxa's unique understanding of how to apply networking technology to industrial control systems became a critical asset in later stages of the project. The high complexity of the network and unique features of the site introduced unanticipated issues that were extremely difficult to resolve, especially with the number of different systems and equipment vendors in place.

Solutions

- **Backbone network using industrial-grade Layer 2 and Layer 3 switches with redundancy and security features**
- **Specialized Wi-Fi APs used to bridge communications**
- **Easy-to-use network management software to identify any communication issues**
- **A highly responsive support team with technical expertise in automation and networking**

RESULT

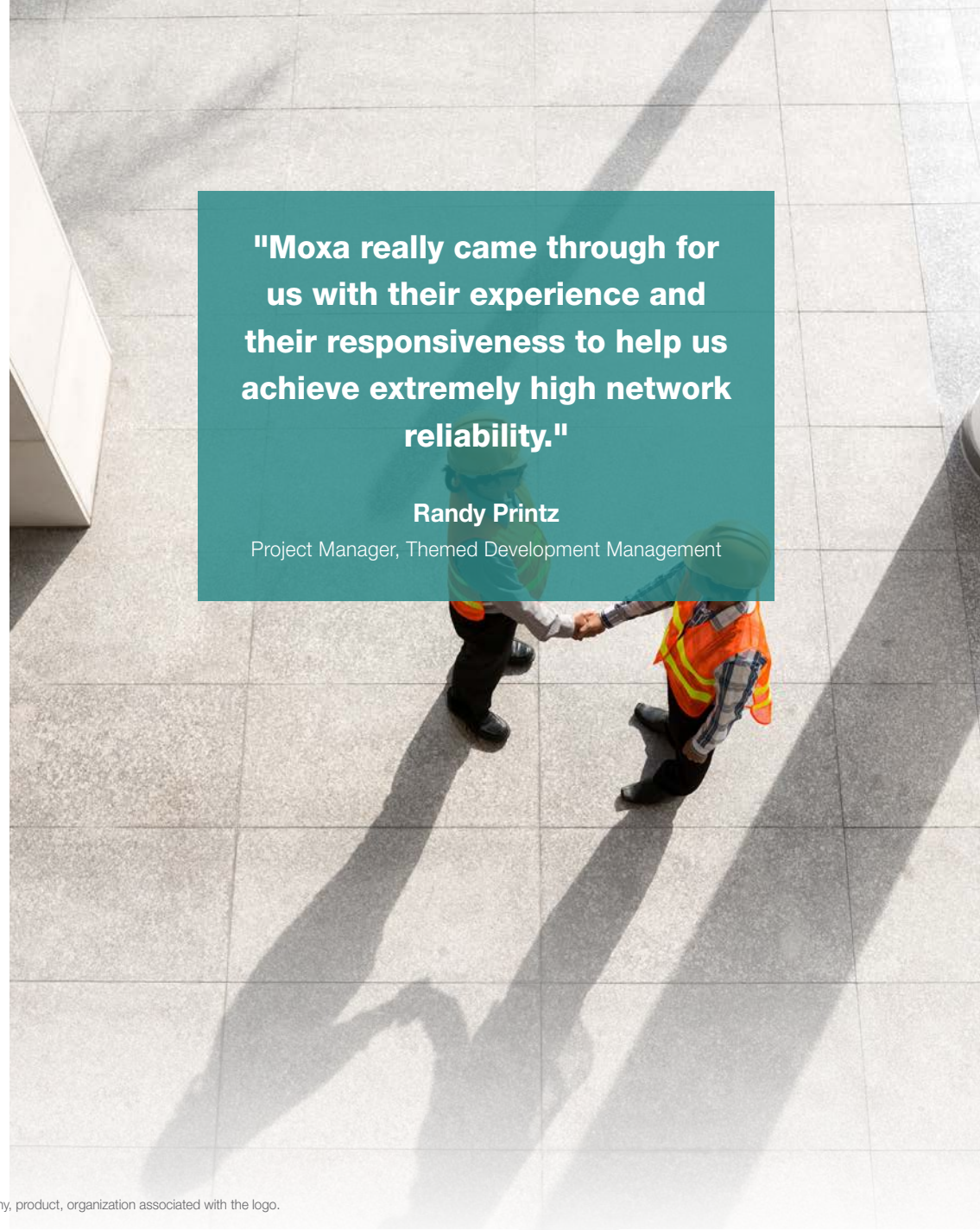
The Pinnacle of Network Reliability

“We came to a point where the networking issues were threatening to delay this very high-profile project,” according to Printz. “The network was one of the most critical aspects of the system. All of our safety critical data is carried on this network. If the network doesn’t work, we’re not operating.”

“We reached out to the Moxa team for help, and they came out on very short notice, spent a considerable amount of time working side by side with us on more than one occasion,” said Printz. “They were incredibly experienced and professional, and were able to work cooperatively with us alongside our equipment vendor, primary suppliers, and contractors to not only resolve these issues, but help us achieve extremely high network reliability.”

“In as complex a system as we’re operating, it’s never exactly clear which components are having issues,” said Printz. The Moxa engineers were able to assess the entire communications infrastructure, not just the parts involving Moxa hardware. Based on their recommendations, some additional steps were taken that helped address all communication issues and ensure that the control network was extremely reliable. This was a service that no other component supplier was able to provide and proved essential in the ultimate success of the project.

“The fact that Moxa specializes in industrial networking was key,” according to Lance Heywood, one of the contractors working on the project. “They aren’t just a networking manufacturer—they are familiar with industrial equipment and know how to connect to things like PLCs. They understand the difference between reliability in a business setting and reliability when it is a life-critical system.”



"Moxa really came through for us with their experience and their responsiveness to help us achieve extremely high network reliability."

Randy Printz

Project Manager, Themed Development Management

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