

## COVERAGE SYSTEMS

## DAS for World-Class Las Vegas Resort/Casino

Powerwave Solution Contributes to an Extraordinary Guest Experience

**Challenge** To provide guests and visitors at a new Las Vegas resort with ubiquitous access to wireless voice and data services throughout their stay.

**Solution** A wireless communications system incorporating radio frequency (RF) combining/splitting, filtering and amplification with Fiber Optic conversion/distribution.

**Result** An in-building distributed antenna system (DAS) that supports multiple carriers and technologies.

**Raising the Bar for Sophistication and Convenience, World-class Las Vegas Resort Leverages Powerwave's Indoor DAS, Providing Guests with Ubiquitous Access to Wireless Voice and Data Services**

**Active Components: RF Amplifiers**

**Passive Infrastructure: Fiber, Cable and Antennas**

In 2001, Powerwave Technologies, a leading source for end-to-end wireless infrastructure solutions, was selected to provide a comprehensive in-building DAS for a new Las Vegas resort and casino, a \$2.7 billion luxury hotel and destination casino resort located on the Las Vegas Strip. The resort, which celebrated its grand opening on April 28, 2005, features 2,716 luxurious guest rooms and suites; an 111,000 square foot casino; 22 food and beverage outlets; an on-site 18-hole golf course; approximately 223,000 square feet of meeting space; an on-site Ferrari and Maserati dealership; and approximately 76,000 square feet of retail space.

The resort prides itself on its ability to create an extraordinary experience tailored to the individual needs of its guests. From the electrifying casino to the sophisticated guest rooms and suites, world-class dining, exceptional shopping venues and relaxing spa facilities, each amenity was designed expressly for the comfort and convenience of the resort's guests.

"We are pleased to be a part of the vision to create an exceptional guest experience at this world-class resort and casino," said Dave Quinn, VP, Global Wireless Solutions division, Powerwave Technologies. "With the implementation of a comprehensive wireless coverage system on its premises, the resort can provide visitors with the same level of access to their personal wireless communications services as if they were at home or in their office."

To further enhance its guest experience, the property has been equipped with the most advanced technologies including in-room Voice-over-IP (VoIP), flat screen LCD high-definition televisions, and high-speed Internet access. Leveraging Powerwave's indoor DAS, the resort also provides guests and visitors with access to wireless voice and data services throughout the premises.

Exceptional guest service is the owners hallmark. When designing the resort, they made a firm commitment to leverage the latest and most innovative technology advances to provide their guests with an unparalleled level of sophistication, comfort and convenience. Powerwave helped to meet this challenge by providing an advanced solution for wireless voice and data access, enabling guests to stay connected throughout their stay.



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Among the resort's key objectives in establishing a comprehensive in-building DAS were to:

- Create a common, non-discriminatory, comprehensive communications access system that leverages state-of-the-art technology to provide hotel operations and guests with reliable, seamless wireless communication coverage throughout the resort's entire premises.
- Provide equal access for all wireless service providers serving the Las Vegas Strip.
- Accommodate the current technology and capacity requirements for the in-building DAS, with the ability to add capacity and support for emerging technologies as the need arises.
- Provide an efficient administrative reporting interface for resort operations.
- Install a wireless backbone capable of accommodating the future communication needs of the resort.
- Construct a centralized RF Infrastructure that can accommodate the future growth.

### Leveraging Industry Leadership, Exceeding Expectations

Powerwave Technologies offers one of most extensive families of end-to-end wireless infrastructure solutions for cellular, PCS, 3G and Wi-Fi frequency bands. With a proven track record for developing and implementing comprehensive DAS networks for some of the world's most challenging indoor and outdoor environments including major metropolitan areas, airports, train stations and hotels, resort management felt that Powerwave was the best choice to design a comprehensive in-building DAS that would not only enhance the ability for guests to stay connected during their visit to the resort, but exceed their expectations in terms of convenience and ease-of-use.

### Striving for Perfection

Delivering uninterrupted wireless access 24 hours a day, seven days a week can be daunting, unless you are the leading supplier of wireless infrastructure products and coverage solutions.

Powerwave faced some unique challenges during the development and implementation of the in-building DAS at the property, many of which were related to the complexities inherent in new construction project. For example, when Powerwave designed the DAS system, there was no building structure in place, so the entire plan was based on architectural specifications. Once construction began, Powerwave was then required to implement the DAS system one step at a time as various parts of the Resort and Casino were completed. Another challenge was to ensure that the construction schedule and installation quality control were met on such a massive construction project. To overcome these challenges, Powerwave hired its own construction manager to coordinate installation efforts with the countless contractors and subcontractors building the resort.

One final challenge faced by Powerwave in the design of the DAS was the architectural restrictions placed on the system. The three architects hired by the resort would not allow any antenna infrastructure to be visible, so Powerwave was required to design the system with additional margin to accommodate for unpredictable signal attenuation factors.

### Exceptional Wireless Voice and Data Access for an Extraordinary Venue

The in-building DAS network that Powerwave designed and implemented now provides seamless wireless phone and data service throughout the entire premises of the resort including its luxurious guest rooms and suites; casino; restaurants; golf course; meeting rooms; retail outlets and common areas. The DAS network supports all major wireless carriers serving the Las Vegas Strip, as well as major wireless technologies including cellular and PCS. WiFi access was also added to the system, and Powerwave included multiple Internet Access Points (IAPs) throughout the Wi-Fi design. Carrier-dedicated equipment installed at the site enables carriers leveraging the system to be completely independent of one another.

### Conclusion

The flexibility and scalability of Powerwave's in-building DAS can accommodate the current technological and capacity requirements as well as those of emerging technologies and future standards through the addition of new repeaters/amplifiers as needed. The future possibilities are endless with an increasing number of wireless enterprise applications being developed.



**Powerwave Wideband Coverage System (WCS)** product line is a flexible platform for wireless enhancement of a base station signal remotely. This line of products can be connected via coax or fiber cable to provide capacity to underserved areas of the network. Applications for this versatile product are indoor distributed antenna systems (DAS) and outdoor coverage challenges. Future expansion and upgrading is made easy using a modular design. Same reliable, field proven technology as Powerwave's Repeater products, as well as the same O&M software for complete NetWay Manager (NWM) and OM-Online compatibility.

#### Key Benefits

- Ultimate flexibility
- Proven technology
- Fiber or Coaxial feed
- Ease of installation
- Output Power options
- Standard O&M platform

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The system is designed for 800Mhz to 2.4Ghz frequency bands. As the municipalities migrate to the 800Mhz band, the system can enable in-building communications while meeting interoperability requirements. Additionally, with the proposed new towers at the property, the system can scale to meet the requirements of the new buildings. Powerwave's DAS technology can also be used to enhance the internal 900Mhz two-way radio communications and 900Mhz paging systems.

Powerwave is planning to perform network monitoring of the system for an initial period of one year. The recently completed Powerwave Technologies, Network Operations Center (NOC) located in Dallas/Fort Worth, Texas will provide day-to-day operation, management and support of the system. The NOC staff performs ongoing optimization and operations activities for critical network elements. This service is supplemented with training for a client's internal network operations and support staff.

This resort joins the Mandalay Bay Resort Group as another Las Vegas property to recently install Powerwave's indoor DAS.

### About Powerwave Technologies

Powerwave Technologies is a leading source for end-to-end wireless solutions for wireless communications networks. Powerwave designs, manufactures and markets antennas, boosters, combiners, filters, repeaters, multi-carrier RF power amplifiers, tower-mounted amplifiers and advanced coverage solutions, all for use in cellular, PCS and 3G networks throughout the world. Corporate headquarters are located at 1801 E. St. Andrew Place, Santa Ana, CA 92705. Telephone (714) 466-1000. For more information on advanced wireless coverage and capacity solutions, please call (888)-PWR-WAVE (797-9283) or visit our web site at [www.powerwave.com](http://www.powerwave.com). Powerwave, Powerwave Technologies and the Powerwave logo are registered trademarks of Powerwave Technologies, Inc.

### The Powerwave Advantage

- IP65 classified cabinets to meet difficult environmental conditions.
- Flexible and scalable solutions where a fiber-optic distribution system (backbone) or antenna/leaky feeder system can be shared among different operators and technologies.
- Operator-dedicated repeaters ensure complete integrity, and enable operators to individually optimize their networks, while remaining independent during future system expansions and modifications.
- An advanced operations and maintenance platform (OMS) with some configurations.
- Superior RF performance through remote hubs with higher effective radiated power and lower noise figure, allowing for higher data throughput on new 3G services
- Independent link budget for each technology through dedicated amplifier nodes.
- Independent cell topology for each technology through a flexible central hub configuration.
- High dynamic range supporting long fiber runs and high number of carriers over a common fiber infrastructure.
- Aesthetically pleasing design.



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