

CASE STUDY

BMW Formula E Team Races Toward Innovation, Thanks To Fortinet Security-Driven Networking

For nearly 90 years, BMW Motorsport has fielded teams for various auto racing series around the world. A division of BMW Group, the organization now competes in GT racing around the world—with successful racecars such as the BMW M8 GTE, the BMW M6 GT3, and the BMW M4 GT4—as well as partnering with Andretti Autosport to compete on the Fédération Internationale de l'Automobile (FIA) Formula E circuit.

The unique technology requirements of the Formula E team focus attention on BMW Motorsport's small IT group. "Formula E is very special," says Stefan Frost, Head of IT for BMW Motorsport. "Winning races in this series is roughly 50% about the car's hardware and 50% dependent on on-car software to gain maximum efficiency out of the limited battery power."

Racecar Strategy Driven by Data

Software and data are critically important because Formula E racecars have an electric powertrain. The series' governing body, the FIA, provides a power usage limit for every car in each Formula E race. Teams then use live data from the vehicles to constantly calculate optimal power consumption at each moment of the race.

"The driver has to push the car at the right times," Frost explains. "It is possible for a driver to be leading the race going into the last lap and then have the car simply stop before the finish line because it has already used all of its power allotment for the race." Avoiding such an embarrassing power management failure is a key objective of the team's engineering group. So, they continuously monitor factors such as battery temperature and power flowing from batteries to powertrain, and analyze that data to determine the race strategy the driver should pursue. The team is continuously making these decisions throughout the race. Any lag time in access to this information would reduce the team's competitiveness.

In addition to regulating power consumption, the FIA tightly restricts the personnel that each team brings to the track. BMW i Andretti Motorsport can have only one member of the IT staff in the race garage. This IT representative must set up the temporary local-area network (LAN); connect that back to BMW Motorsport headquarters via whatever internet provider is servicing the track; and deploy and manage all radio, intercom, and telecommunications.

"We are limited in having specialized data-analytics staff onsite to gain a complete picture of what is going on with the car, second by second, throughout the entire race," Frost says. "However, we are allowed to have an 'ops room,' where a maximum of six engineers can connect to the track in real time during the race and analyze data to help the trackside team take the right decisions. Leveraging their insights is key to racing in Formula E."



"The FortiGate firewall provides the high-performance connection we need between the racetrack and headquarters, while also addressing all aspects of BMW's security policy. This connectivity is a driver of our success in Formula E."

— Stefan Frost, Head of IT, BMW Motorsport

Details

Customer: BMW Motorsport

Industry: Transportation

Location: Munich, Germany

Business Impact

- Improved performance of racecars through real-time data analysis in BMW Motorsport headquarters
- Streamlined rollout of secure connectivity to headquarters from every racetrack

Thus, the garage-to-headquarters connection established by the one on-site IT team member is vital to ensuring BMW i Andretti Motorsport has a competitive racecar. “Connecting the race team at the track to the ops room, in real time, is absolutely mandatory,” Frost emphasizes. Any latency is unacceptable. “Connectivity and network performance are success factors in Formula E, more than in any other racing series I have been involved with.”

Taking Network Security on the Road

The data connection between the “ops room” at BMW Motorsport headquarters and the trackside race team must fully comply with the IT requirements of the corporate BMW Group, because ultimately all the trackside systems are connecting into the broader BMW Group network.

“We are a customer of the BMW Group’s central IT department, so we have to follow their policies, including security protocols,” Frost says. “Both the BMW Group LAN, and the WAN [wide-area network] connecting corporate headquarters to BMW factories and facilities around the world, are very secure. Each BMW Motorsport race team can be seen as a small, mobile BMW facility whose IT environment must comply with corporate rules. But extending the BMW Group’s high level of IT security to racetracks around the world can be a big challenge.”

The BMW Group relies on a combination of Fortinet solutions to bring global production plants into line with corporate policy. Frost’s team worked with the central BMW Group IT organization to ensure that a FortiGate firewall would also be effective in securing connectivity for the Formula E race team. “We did a joint check and test of FortiGate next-generation firewalls [NGFWs], and we agreed that the solution does comply with all of BMW Motorsport’s encryption and other security requirements,” he says.

As a result, BMW Motorsport deployed a FortiGate NGFW in its ops room to provide its traveling Formula E team with secure remote access to the headquarters network. The firewall provides high-performance Internet Protocol security (IPsec) virtual private network (VPN) connectivity. It automates the establishment of those VPN tunnels for flexible hub-to-spoke or full-mesh deployment at scale, to provide bandwidth aggregation and encrypted WAN paths. Now, when the BMW i Andretti Motorsport’s IT infrastructure components arrive at the track on a mobile server rack, the on-site IT support team member easily establishes a VPN connection to the Munich-based firewall.

Easy-to-Manage NGFW Makes Mobile, Global Security Feasible

Efficiency, performance, and acceleration are the three pillars of the relationship between Fortinet and BMW Motorsport. Efficiency in firewall configuration is key to ensuring that the team can set up its network infrastructure quickly in each new location. Technology conditions at racetracks vary with the locale. In the 2018-2019 season, as an example, the series raced on four continents in 12 different countries—from New York, Paris, and Monaco to China, Chile, and Morocco.

“Managing firewalls can be complex, especially when you have to set up your IT environment every two weeks at a different place and adapt to local preferences,” Frost says. “Administration of the Fortinet firewall through its web GUI [graphical user interface] is more or less self-explanatory. This means our IT specialist traveling with the race team can quickly adjust configurations to the local circumstances, even if that person does not have deep firewall-specific expertise. This is one of the main reasons we chose Fortinet.”

Business Impact (contd.)

- Minimal latency on wide-area network connections to Munich from locations around the world
- 100% uptime since deployment
- Full compliance with rigorous BMW Group security policies

Solution

- FortiGate Network Firewalls

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– Stefan Frost, Head of IT,
BMW Motorsport



Performance was another reason. Frost reports that even as it provides effective security, the FortiGate NGFW adds no latency to the VPN connection between the track and the ops room. “The engineers in the ops room can access telemetry data in the same millisecond as the engineers in the garage,” he says. “We can even transport live video feeds from Chile or Saudi Arabia to our engineers in Munich, with a delay of less than 100 milliseconds.

“The FortiGate firewall provides the high-performance connection we need between the racetrack and headquarters, while also addressing all aspects of the BMW Group’s security policy,” he continues. “Providing this connectivity to the team is a driver of our success in the Formula E series.”

Perhaps most important, the FortiGate NGFW has proven highly reliable. “This is the best benefit we can achieve as an IT team,” Frost says. “Since we implemented the FortiGate, we have never had a network connection drop—the firewall has worked 100% of the time, without any interruptions.”

Just as Formula E cars deliver immense acceleration, Frost has found that having dependable and secure VPN connectivity enables BMW i Andretti Motorsport to accelerate innovation, particularly in the growing sophistication and importance of data analysis to team decision-making. “We rely on FortiGate network firewalls to secure the data we produce, which is the basis for the ongoing development and improvement of our racecars,” he concludes. “Racing is a fast-changing sport, and our team is very pleased to have a partner that shares our core values. We look forward to continuing to work with Fortinet as our teams race toward future innovations.”



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