# AVNET CASE STUDY

Creating "Future Lab" conditions through secure, remote automatic testing



## AT A GLANCE

► **Customer**: Avnet, Inc.

► **Task**: Creating an automated remote testing solution for 5G mmWave RF systems with Avnet's Xilinx RFSoC and RFSoC Explorer® for MATLAB® with Rohde & Schwarz test and measurement equipment.

► **Challenge**: Establishing secure, 24/7 remote access from any location worldwide with complete control of any connected device without an on-site operator.

► **Solution/product**: LANCOM R&S®UF-360 UTM firewall as centerpiece of the Rohde & Schwarz Secure Application Gateway™.

► **Key benefits**: Creation of reproducible international cooperation method via secure connections, combined with automated, remote T&M procedures that require no on-site personnel. Combines 5G FR2 solutions with cybersecurity for a tailored solution.



### Customer

The company is based in Phoenix, Arizona and one of the world's largest distributors of electronic components and embedded solutions. Avnet delivers diverse applications featuring high-speed signal processing applications based on Xilinx's Zynq® UltraScale+™ radio frequency system-on-chip (RFSoC) architecture. The solutions and toolsets from Avnet are used by customers working with wireless applications, radar and electronic warfare.

When Avnet launched a 5G mmWave radio development kit for RFSoC Gen-3, the solution was too complex to be demonstrated at customer premises. Avnet needed a best-in-class test and measurement environment that also allows access by remote contributors and remote customer demos. A critical requirement was eliminating security risks when sharing confidential waveforms over the internet.

## ROHDE & SCHWARZ

Make ideas real

# LANCOM R&S®UF-360 NEXT-GEN FIREWALL

▶ Enterprise-class security and Unified Threat Management
▶ Flexible networking and SD-WAN functionalities Intuitive operation via web interface
▶ IT security "Made in Germany"

The whole testing process had to be automated and allow visual monitoring at any point. Rohde & Schwarz was selected as the partner, thanks to their combined state-of-the-art 5G NR T&M equipment and application know-how as well as their network and cybersecurity solutions – all from a single source.

## The challenge of worldwide access
Addressing the Avnet requirements meant overcoming several challenges. Since engineering teams are located in different locations around the globe, the platform required secure uninterrupted remote access from anywhere in the world.

Another requirement was the ability to visually inspect the test setup and control and power-cycle the connected device without on-site operators. The only time an on-site operator was needed was during the initial setup.

## Combining remote access and cybersecurity with automated testing
Rohde & Schwarz decided to work with their subsidiary, LANCOM Systems – a leading manufacturer of secure networking and next-generation firewalls. A solution that met customer requirements could be created by combining LANCOM's cybersecurity systems with Rohde & Schwarz 5G NR test and measurement setups and applications. Rohde & Schwarz also used a remote-controlled, multiple-socket outlet to power-cycle the equipment remotely or

activate the T&M equipment. An IP camera was used to monitor the test and measurement processes along with web based access from remote desktops. The brand-new LANCOM R&S®UF-360 UTM firewall is the central point for remote access, network security and data control. Unlike other standard IT solutions, the firewall understands Rohde & Schwarz T&M network protocols and remote-control payloads such as SCPI commands. The Secure Application Gateway™ platform from Rohde & Schwarz can handle all data and networking connections. This ensures that no code or development and debugging tools needed to be adapted, enabling remote access to the DUT in a controlled lab environment with cybersecurity levels equivalent to those of modern financial transactions.

The RF equipment included the Xilinx RFSoC ZCU208 Evaluation Kit and an Otava DTRX2 dual transceiver mmWave radio card with native connection to MATLAB® and Simulink® through the Avnet RFSoC Explorer®. These were combined with the high-end R&S®FSW signal and spectrum analyzer, an R&S®SMW200A vector signal generator as well as an R&S®OSP open switch and control platform from Rohde & Schwarz.
All these instruments were connected via Ethernet to the LANCOM R&S®UF-360 UTM firewall. Developers from outside the lab can connect via VPN with an authenticated login.

# DISTRIBUTED mmWAVE RADIO DEVELOPMENT
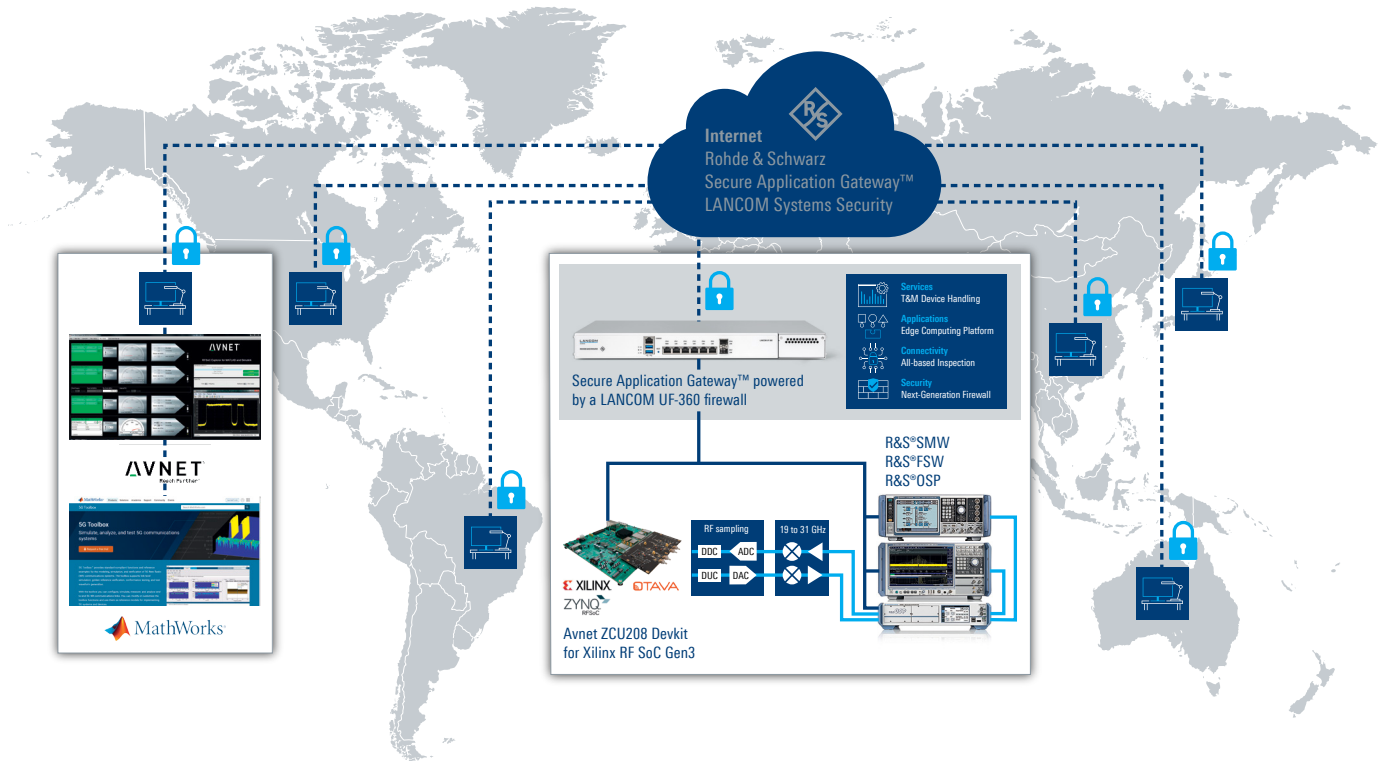


The Rohde & Schwarz solution provides access to everyone and features a web browser and a webcam connection on an Edge platform.

As a result of this cooperation between Rohde & Schwarz, Avnet and external partners, such as Otava LLC and MathWorks Inc., a holistic 5G mmWave RFSoC Gen-3 application solution was developed. The solution is based at the Rohde & Schwarz offices in Munich, with access from Avnet and Otava locations in the US and Canada. All driven by the LANCOM R&S®UF-360 UTM firewall.

The solution proves that a highly secure collaborative test and measurement setup over a network in lab environments is doable and sustainable thanks to the technical know-how of Rohde & Schwarz and its partners along and their flexible leveraging of leading-edge solutions. The solution features distributed design and development, allowing for seamless global collaboration.

MathWorks recently released the "Automated Remote Testing of 5G mmWave RF Systems with Xilinx RFSoC" webinar. It showcases Avnet's RFSoC Explorer® for MATLAB® with 5G Toolbox from MathWorks automating remote testing through the new Rohde & Schwarz Secure Application Gateway™. It also demonstrates how distributed design groups can leverage this programmatic test instrument control for repeatable measurements through secure, internet based communications in full confidence that sensitive data will not be compromised.

## The benefits
The tailored approach combining cybersecurity and 5G knowledge allows Rohde & Schwarz to provide Avnet with a solution to remotely perform testing with Rohde & Schwarz instruments over secure connections worldwide. Remote access to a radio development system in a centralized lab environment has the potential to massively increase productivity.

"We needed a best-in-class test & measurement environment allowing co-development without the security risks of exchanging confidential waveforms. The innovative solution from Rohde & Schwarz helped us leverage their test equipment and the expertise of their application engineers and cybersecurity specialists."

**Luc Langlois, director, products and emerging technologies/DSP at Avnet**

## Service that adds value

► Worldwide
► Local and personalized
► Customized and flexible
► Uncompromising quality
► Long-term dependability

## Rohde & Schwarz

The Rohde & Schwarz technology group is among the trail-blazers when it comes to paving the way for a safer and connected world with its leading solutions in test & measurement, technology systems and networks & cybersecurity. Founded more than 85 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

### Sustainable product design

► Environmental compatibility and eco-footprint
► Energy efficiency and low emissions
► Longevity and optimized total cost of ownership

Certified Quality Management
ISO 9001

Certified Environmental Management
ISO 14001

### Rohde & Schwarz training

www.training.rohde-schwarz.com

### Rohde & Schwarz customer support

www.rohde-schwarz.com/support