

5G Manufacturer Reduces Test Time by 20X

PATHWAVE

A leading manufacturer of multi-antenna high-frequency 5G transceivers needed a technology partner with a comprehensive test platform that included hardware, software, and services. Working with Keysight, they achieved a 20X improvement in speed, 10X improvement in asset utilization, and easily repurposed their test stations.

Challenges: Traditional Test Approach Lacked Readiness

A worldwide transceiver manufacturer made a substantial investment in the design and manufacture of equipment for 4G and new 5G networks. Their 5G product designs include arrays of massive MIMO radio transceivers that need to operate at higher mmWave frequencies than 4G equipment. The test team needed a manufacturing test platform that could handle an increasing number of transceivers and antennas at mmWave frequencies. The test platform also needed to perform over-the-air measurements quickly.

“Our future depends on our ability to innovate new 5G products at competitive prices.”

-Design & Test Director



Company:

- 5G transceiver manufacturer

Key Issues:

- Fast testing of large transceiver arrays
- Underutilized test hardware

Solutions:

- Keysight consulting services
- PathWave Test software
- PathWave Analytics software

Results:

- 20X test speed improvement
- 10X improved asset utilization
- Flexible test station repurposing from 3G to 5G

The new test architecture had to be flexible. Since 5G is an emerging standard, many of the required tests are not fully defined. The new frequency bands with numerous channels are at higher frequencies than 4G networks. The test equipment must manage mmWave measurements potentially up to 71GHz on up to 128 transceivers, and must include OTA (over-the-air) testing.

Figure 1 is the manufacturer's test approach using a multi-channel RF measurement system with a PC controller to compute the desired test parameters sequentially. For example, EVM, SEM, and ACPR align with one specific signal format. Test times with this approach increase linearly with more channels. This quickly becomes cost prohibitive. Moreover, the test hardware sits idle while the calculations are run, causing under-utilization of test assets.

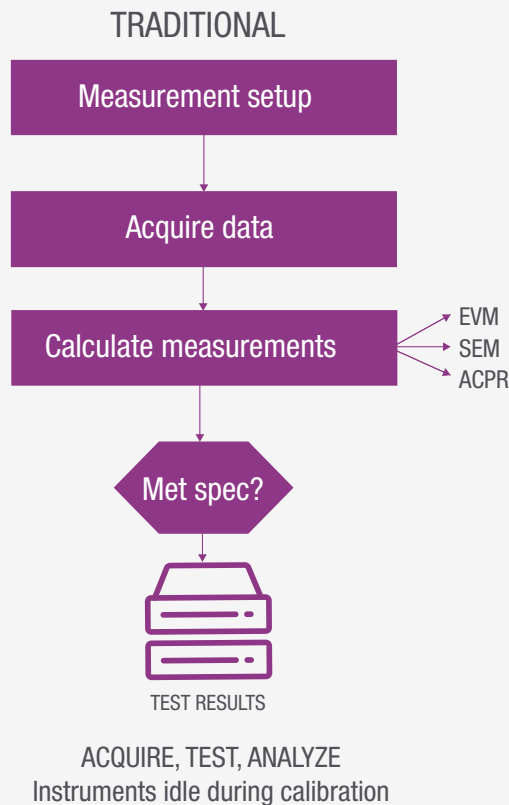
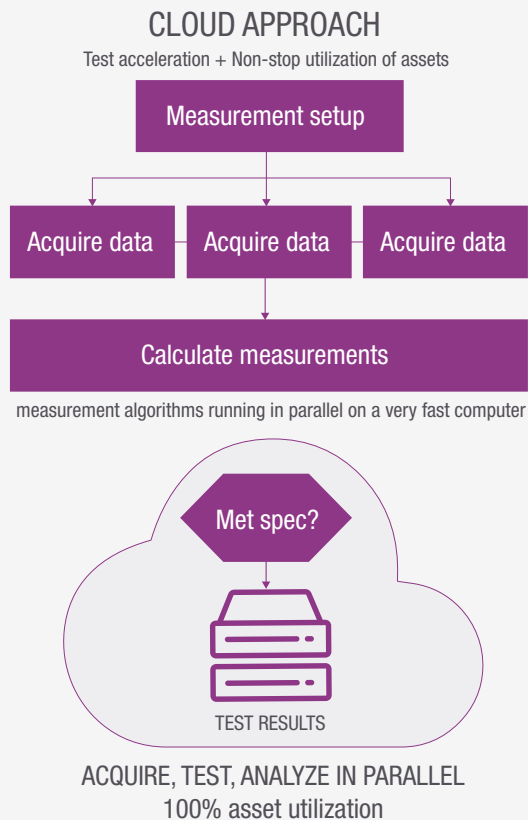


Figure 1: Traditional testing approach leaves test hardware idle

Solution: A Breakthrough with Distributed Architecture

The company partnered with Keysight Technologies to create a new test strategy using a cloud-based concept shown in Figure 2. In this approach, the test hardware continuously acquires measurement data while the computing workload is handled in private cloud servers. The critical calculations run in parallel on the faster servers, providing significant speed improvements. The test equipment is now fully used with minimal idle time, resulting in higher asset utilization and lower capital expenditure.



“This customer needed a breakthrough approach to testing multi-antenna, high frequency products. We proposed a distributed processing approach using computing resources on the customer’s private cloud servers.”

-Applications Engineer, Keysight 5G Specialist

Figure 2: PathWave software enables parallel measurements and faster processing in the cloud, dramatically improving test speeds

Figure 3 shows the overall test solution architecture. Modular PXI hardware provides the necessary test signals and acquires the time and frequency data needed for the transceiver electronics; including power supplies, filters, digital, and RF sections.

PathWave Test manages the test sequences across the various test stations. High-powered network computers collect the data from the remote test stations to quickly compute the required measurement parameters; EVM, SEM, and ACPR using PathWave. Those results are available in a central database for easy access and analysis via PathWave Analytics software.

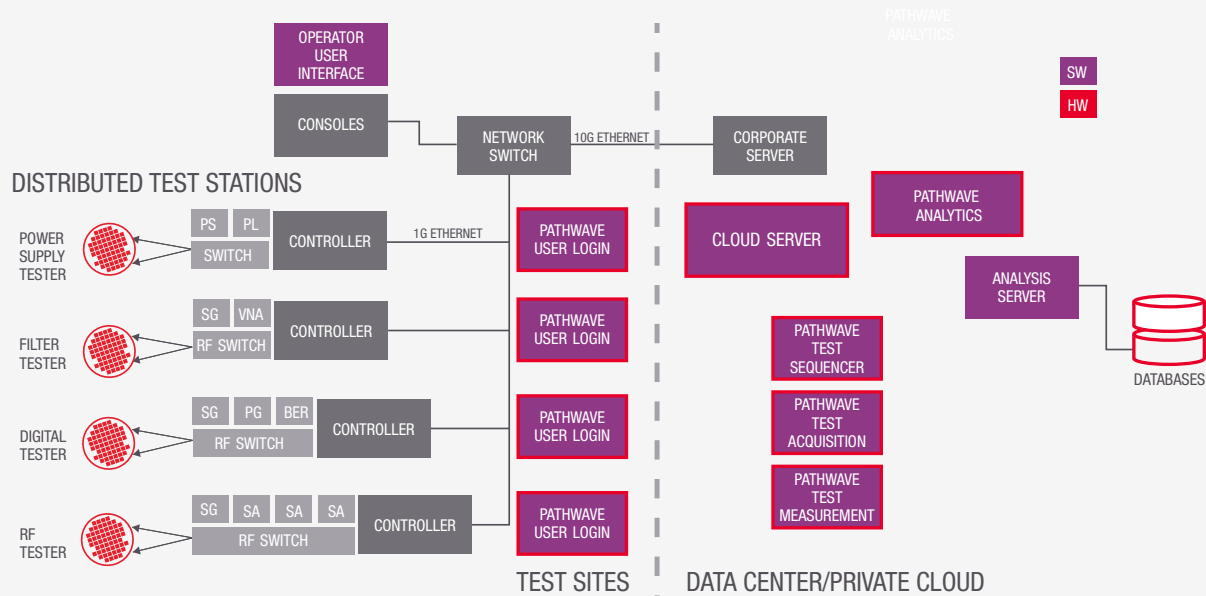


Figure 3: PathWave software provides significant test speed and asset utilization benefits

The new test architecture is more efficient, with measurement algorithms shared across test stations and easily updated to support new signal formats and hardware. Also, test station software is managed and updated remotely by authorized users. By reconfiguring the software, test stations are modified to test any device across a variety of signal formats from 3G to 5G. Pathwave test software provides fast measurements for every format via the cloud server. The solution increases manufacturing flexibility because each test station is used to test a wider variety of products.

Results: Preparing for the 5G Future

With Keysight’s solution, the manufacturer successfully accelerated the process of commercializing their 5G transceivers. Keysight gave them increased confidence because of the high-precision measurement tools in their testing equipment. They knew Keysight stays up-to-date with the latest 5G standards. The test automation software shortened their workflow and reduced their complexity.

“Keysight showed us a comprehensive approach to testing 5G that included measurement hardware, PathWave software, and Keysight Engineering Services to give us confidence in their strategy. They really understood our problem and helped us develop a solution that enables us to transform and win in our markets.”

-Design & Test Director

The manufacturer experienced speed improvements quickly by using PathWave's new innovative test approach. They reported a 20X increase in measurement throughput by moving data processing to their cloud servers. The resulting increase in test speed and reduced idle time resulted in a 10X asset utilization improvement. The flexibility of the test architecture allowed the manufacturer to repurpose test stations across a variety of 3G to 5G transceivers.

Learn more about Keysight's modern 5G test solutions

www.keysight.com/find/5G

Video: Manufacturer streamlines 5G development with a scalable solution

<https://youtu.be/Rolxpg9X-gU>

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