

# The expanding footprint of test and measurement

By Sulagna Saha, Technology Editor

# I CONTENTS

Foreword	3
Key RCR Takeaways	4
Chapter 1: The state of the market – Stubborn pains and works in progress	5
Chapter 2: Diversification in downturn	7
Chapter 3: The next big battlegrounds	9
Chapter 4: The physical and the digital	11
Chapter 5: Trends to watch	13
Conclusion	14

# I FOREWORD

Test and measurement has, since the beginning, carried the weight of innovation, but remained largely out of sight for the rest of the world. It has rightly been described, among other things, as the hidden layer that makes things work.

Now, as we approach an era of technological advancement unlike anything we have seen in the past — driven by rapid expansion of AI, rise of cloud computing, emergence of satellite communication technologies, and proliferation of edge infrastructures — intelligence and awareness have become central to keeping colossal and complex systems working like well-oiled machines.

Testing is critical in a myriad of contexts. But especially in sectors where reliability and efficiency are the cornerstone of monetization, rigorous testing frameworks ensure service performance. Leading sectors like telecom, AI infrastructure, cloud and data center, semiconductor, healthcare, autonomous vehicle, IoT, and many others rely heavily

on testing to build reliable solutions that users can trust and yield return on investment (ROI) for business.

In wireline and wireless networks, for example, everything from capacity to connections, signal strength to cable integrity, to security and compliance, signal strength to cable integrity, hinges on early inspection and continuous test and assurance. And as terrestrial and non-terrestrial networks (NTNs) converge, marking a turning point in communication, continuous monitoring and measurement will become the backbone of reliable communication networks.

Similarly, in data centers, ethernet performance, collective communications, tail latency, job completion time (JCT), encryption, etc. are key metrics to watch. Continuous testing and monitoring guarantee optimal conditions and ensure the network meets the needs of the AI traffic and workloads.

Within cloud environments, companies are embracing “lab-to-live” testing as a

way to leverage intelligent automation capabilities, like update validation, real-world load modelling, evaluation of quality of service (QoS), and risk mitigation — all of which are essential to keep the network “always on” and meet service level agreements (SLAs).

And in the semiconductor industry quality-control procedures and reliability checks remain embedded at the root of production.

This report delves into the state of the test and measurement market in 2025, and surfaces its current challenges vs biggest opportunities. It explores the strategies companies are deploying to remain resilient in a volatile market, and the latest advancements and biggest trends at play, uncovering their implications on the trajectory of the industry.

## Key RCR Takeaways:

**Test and measurement (T&M) vendors have sustained the telco investment slowdown by making strategic pivots towards new end markets to derisk and increase likelihood of long-term returns.**

**As cutting-edge technologies, like 5G-Advanced, 5G NTN-NR, 6G, AI, and quantum take shape, the commercial success of the companies will depend on identifying demand areas and diversifying resiliently to deliver to new use cases.**

**Providers are moving towards building more comprehensive portfolios, that, in addition to serving the core telecom market, also extend testing capabilities to AI infrastructure, defense, automotive, and other industrial sectors.**

**Siloed testing domains are a thing of the past. Full-stack and integrated test and validation methodologies are fast replacing fragmented processes.**

**New partnerships and collaborations between T&M vendors, and hyperscalers, chip companies, and enterprises will set the tone in this next chapter.**

# THE STATE OF THE MARKET – STUBBORN PAINS AND WORKS IN PROGRESS

According to market data, the global test and measurement market in 2025 stands at \$19 billion, and Mordor Intelligence predicts it to surpass \$23 billion by 2030 — reflecting a modest CAGR of 4.29%.

At the regional level, Asia Pacific dominated the market in 2024, commanding 38% of the market share. Demand in those geographies is supported by 5G/6G build-outs, coupled with the region's deep capacity for electronics manufacturing. The Middle East and Africa represent the fastest growing market, projected to expand at 5.4% CAGR in the next five years.

To better understand the broader landscape, its current challenges, and drivers of growth, we spoke with analysts on the frontlines of the industry. They all surfaced a common set of challenges and opportunities.

**“There was a 5G exuberance and just like any other cycle, it collapsed,”**

— Roy Chua, Founder and principal of AvidThink,

## 5G investment pause

With larger fiber and 5G builds in the past now, the telecom industry is tightening its belt. After seeing historic capital intensity between 2022-2023, the ratio started to temper beginning 2024. Stats show that telco operators scaled back both wireline and wireless investments last year.

In Q1 2025, earnings of leading operators like AT&T, Verizon, Comcast, T-Mobile, Lumen, Charter, and Frontier, all pointed to a clear shift in spending patterns compared to previous years. The Dell'Oro Group forecasts carrier capex to decline at 2% CAGR over the next 3 years, but predicts investment conditions to stabilize in 2025, rising toward 15% by 2029.

“There was a 5G exuberance and just like any other cycle, it collapsed,” said Roy Chua, founder and principal of AvidThink, an analyst firm offering research and advisory services on AI, data center, networking, and mobile infrastructure technologies.

The implications have been unmistakable on the test and measurement industry, which finds itself in “a bit of a capex winter,” as a result, said Patrick Kelly, founder and principal analyst at Appledore Research. Kelly has been watching the industry from the front row for the past 20 years, and he observed

that the broader network automation industry spending has been down for two years straight.

He sees this as the biggest challenge facing the test and measurement industry right now. “Across the board, most companies have not been able to get their core customers to spend at the rate at which they were spending years earlier,” he said.

As a result, despite some continued investment, revenue has been soft — with some vendors even seeing double-digit revenue dip in certain segments.

## A turbulent macroeconomic environment

A host of market headwinds, including but not limited to trade wars, tariffs, and inflation have made things worse. Higher interest rates have made debt costly, stalling funding for R&D for many companies. On top of that, inflations have driven up operational and capital costs — reflected in higher costs of equipment, energy, labor, and site leases, bumping up cost bases.

Suppliers are deploying a combination of strategies to weather the broader conditions and minimize damage, including repricing backlog inventory and introducing surcharges.

“We made some pretty significant changes to the way we were moving material and inventory around Keysight to ultimately reduce the tariff exposure,” Keysight Technologies’ CEO, Satish Dhanasekaran, said at a recent Goldman Sachs conference.

“We’re focused on a few things. We have a pretty diverse manufacturing footprint ourselves, primary manufacturing in Malaysia, second though would be in the U.S., and then we have other manufacturing locations around the world. Our big subcontractors obviously have global capabilities as well. Trying to find the right mix between tariff rates and how to use the capacity that exists in this ecosystem,” Dhanasekaran explained.

“In addition, there are potential opportunities to work with customers, for example, in the defense industry that may be exempt from some of these tariffs or to accelerate the reclamation of some tariffs where you see things imported into the U.S. only to be re-exported. Those are all things that can help to minimize the exposure,” he added.

## Signs of recovery

Regardless, there’s a silver lining amid all this. “We are on the recovery track,” Chua assured. “The lag in 5G standalone [SA]

from non-standalone [NSA] will catch up. That’s a matter of time.”

“A lot of the early 5G deployments were non-standalone, meaning that they upgraded the radio access network (RAN) because that was what they believed added the most value immediately,” he explained.

As a result there were instant spectral efficiency boosts, capacity gains, higher throughput, improved handover speed, all of which amounted to better speeds, reduced call drops, and improved energy efficiency in the RAN. But the core had largely remained untouched.

“Now they’re upgrading the core; so there is a level of 5G investment around it. That will continue because once you go NSA, eventually you go SA. You can only delay that by a certain number of years, but eventually you have to take it on,” Chua said.

A shift in operator investment in Q2 supports this outlook. “Capex is past the peak, but it is not falling off a cliff,” Stefan Pongratz, VP of RAN and telecom capex research at Dell’Oro, said in September.

CEOs are cautiously optimistic. Dhanasekaran indicated that the market is on a slow and gradual recovery. “We saw

a mixed market recovery as an outlook. And we said, look, our markets might grow at the low end of our expectations this year, and I think it’s largely held to our expectation,” he told analysts.

Viavi reported strong growth in demand for fiber monitoring solutions among hyperscalers and service providers. Echoing Dhanasekaran, CEO Oleg Khaykin said earlier that the wireless segment is bouncing back. Growth in demand for wireless field instruments is “a leading indicator for the resumption of 5G network buildout,” he said.

At the company’s third-quarter earnings call, chairman, President and CEO of Teledyne Technologies, Robert Mehrabian said, “Our energy and defense businesses continue to perform very well due to market strength, but also our specific portfolio of technologies serving growing sectors, such as unmanned air and subsea systems, space-based sensors, NATO defense spending, and offshore energy productions. Sales from our shorter environmental and test and measurement instrumentation businesses also increased mid-single digits, and this is about the greatest level in a few years.”

Teledyne reported strong quarterly sales in Q3 — with the greatest organic growth in three years.

### Trend:

Investment cycles are shifting as operators move from a phase of rapid 5G buildout to slimmer, more targeted upgrades of the core infrastructure.

### Implication:

The capex slowdown, made worse by macroeconomic pressures, like tariffs and broad-based inflation, is pushing T&M suppliers to adapt operations and manage costs to build resilience and stay relevant.

### Opportunity:

There are growing indications that the spending lull is easing, with operators beginning to resume more typical spending patterns. That shift opens a window of opportunity for T&M vendors, as operators look to validate the new round of infrastructure upgrades.



# DIVERSIFICATION IN DOWNTURN

The situation begs the question — can T&M companies remain profitable in the current market? History shows they can — and trends show, they are.

As the telecom industry evolved from basic voice services to 5G broadband—graduating from low- to high-density networks and steadily expanding spectral capacity—test and measurement vendors have moved in step. Each major inflection point, from Massive MIMO and Open RAN to network slicing and edge-driven architectural shifts, has pulled testing requirements along with it, forcing vendors to adapt to rising complexity.

No longer confined to validating individual components, they have evolved alongside the operators, broadening their portfolios to support new performance metrics and emerging requirements, such as infrastructure benchmarking and device validation to over the air testing.

Keeping with the trend, today many companies are seen realigning their roadmaps to support the physical and digital pieces underpinning the AI infrastructure. In doing so, they have been

able to cushion the impact of the broader telecom investment slowdown by growing out their portfolios—a tried-and-tested strategy as old as business — to capture new opportunities emerging around artificial intelligence and machine learning.

Spirent, for example, pioneered lab-to-live testing when traditional testing methods couldn't keep up with the demands of the cloud-native networks. Lab-to-live bridged the gap between pre-deployment validation and real-world performance assurance by integrating lab testing, network deployment, and operational monitoring into a complete lifecycle — an approach that is now an industry standard.

Anritsu, meanwhile, has extended its 3GPP validation capabilities across multiple standards and is now actively engaged in research, development, and trials for up and coming technologies, like quantum communications and 6G.

And nearly all big players have deepened partnerships with mainstream counterparts like Nokia, Samsung, Broadcom, Qualcomm, Nvidia, and Intel.

The shift is also evident in portfolio

expansion to areas like enterprise, data center, semiconductor, cybersecurity, healthcare, aerospace, and defense. Keysight Technologies is a great example of this. The company has built competitive moats by following attractive end markets, like semiconductor, satellite communications, and industrial automation — a strategy that has enabled it to maintain stable margins in a lukewarm market. Healthy demand drivers in areas, like communications, aerospace, defense, and government sectors have supported organic growth in these business units.

By and large, Keysight has remained anchored to two key domains — communications and electronics. Within these sectors, the company has edged out its portfolio to include testing of AI-driven systems, semiconductors, smart TVs, etc., and is keeping focused on 5G and edge testing. As telcos and defense contractors pour money into high-speed low-latency networks, Keysight is capitalizing on the demand and adding new momentum to the revolution by bringing to market end-to-end solutions covering signal generation to network optimization.

Viavi Solutions is another company

that is maintaining organic growth and momentum through its network enablement segment that is growing in effect of hyperscaler demand for 800G/1.6T optical upgrades and deeper data center integration. Strategic shifts into defense and aerospace with its position, navigation, and timing (PNT) technology — and acquisition of Inertial Labs have also helped Viavi push into high-growth markets and maintain revenue and stability. The company's recent contract with the U.S. Department of Transportation (DOT) on the CPNT Action will see its technology used in prevention of jamming and spoofing attacks on cellular networks.

Meanwhile, pureplay company NetScout has doubled down on network and security observability solutions leveraging its data assets. "They're getting some pretty good traction," said Kelly. "Their monetization model is they're just going to expose their data."

## Diversification through M&A

The diversification efforts are also reflected in the broader consolidation wave that has lately defined the T&M landscape. It has allowing players to stay competitive, while managing risks to the business by foraying into new markets. Below are the biggest

M&A between 2023 and 2025.

- Synopsys' \$35 billion acquisition of rival test and measurement company, Ansys — announced in January of 2024 and closed in July of 2025 — expanded its silicon design expertise to multi-physics system simulation, creating a complete "silicon to systems" portfolio.
- Synopsys also acquired Bangalore-based SAP S/4HANA solutions provider Valtrix in 2024, expanding its RISC-V-based CPU and SoC testing capabilities with the integration of Valtrix's flagship bare metal functional verification tool, STING.
- Keysight Technologies and Viavi Solutions' took ownership of Spirent Communications in Oct, 2025 over deals worth \$1.46 billion and \$435 million respectively — an acquisition that took close to two years to close — and opened new opportunities for revenue growth for both.
- The merger brought Spirent's satellite emulation and lab-to-live portfolios to Keysight, building a more comprehensive suite of design, emulation, and testing solutions. For Viavi, it brought high-growth business opportunities through addition of Spirent's high-speed Ethernet, network

security, and channel emulation testing businesses.

- Reports of a potential merger between test, inspection, and certification giants SGS and Bureau Veritas emerged earlier this year, but the two parties failed to arrive at an agreement. Regardless, through its LEAP I 28 strategy focused on "portfolio, performance and people," BV has continued to make small bolt-on acquisitions — closing eight purchases year to date.
- Going a little further back, Emerson acquired National Instruments (NI) in 2023, for the equity value of \$8.2 billion, that besides strengthening Emerson's position in the global market, also enhanced its exposure to discrete markets, like nearshoring, sustainability, and decarbonization.

### Trend:

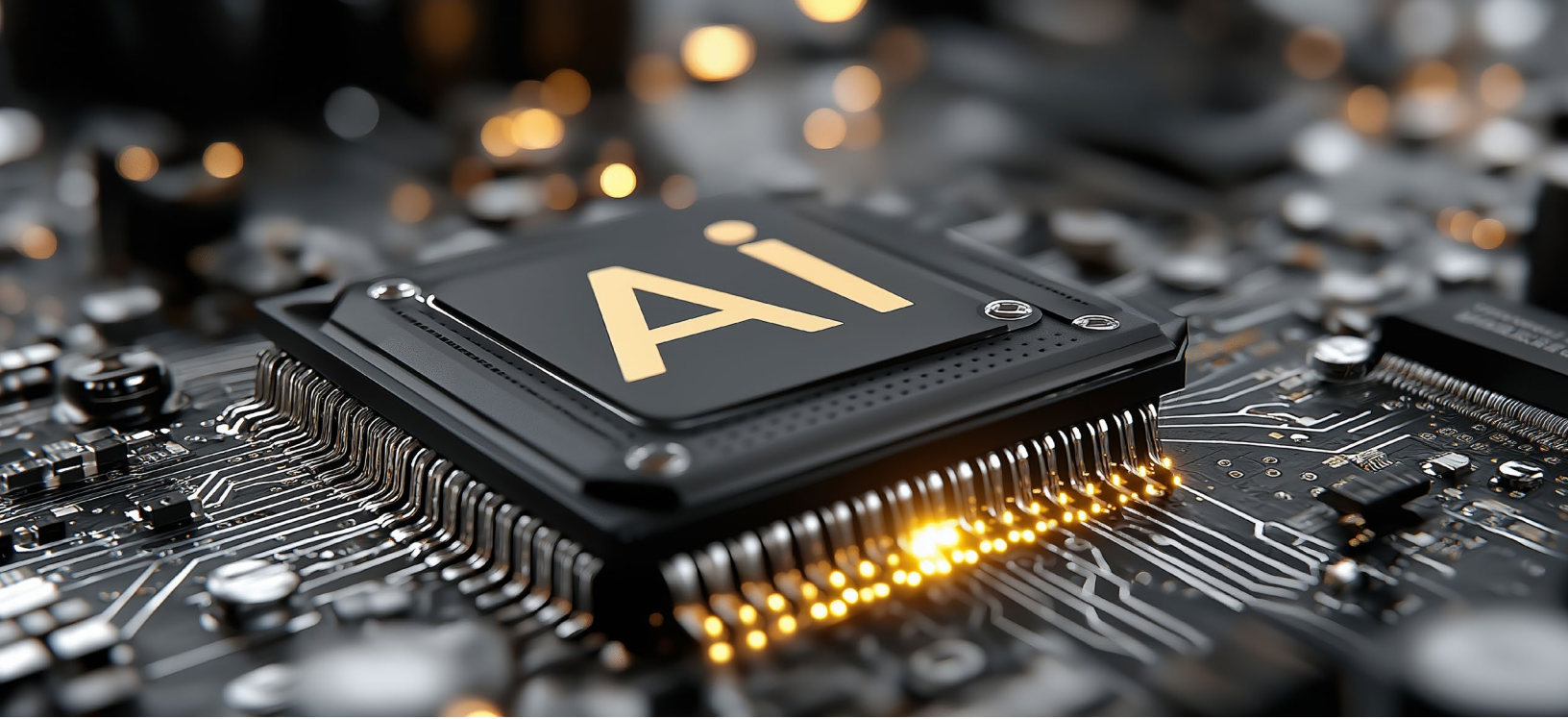
Vendors are increasingly diversifying beyond the traditional telecom sector to build more resilient, cross-sector portfolios.

### Implication:

Those broadening their offerings and growing strategic partnerships have a better chance of weathering the storm, and maintaining stable margins by creating new revenue streams.

### Opportunity:

This reduces dependency on a single market and creates a wide opening to acquire market share in many new high-growth sectors, previously untapped.



# THE NEXT BIG BATTLEFIELDS

Several sectors are in the midst of a step change, driving staggering levels of growth. Nowhere is this more visible than the data center market which, this year, has exceeded all forecasts. Harvard economist Jason Furman estimates that without data center investments, U.S. GDP growth in H1 would have flatlined to 0.1% on an annualized basis.

Based on their quarterly earnings, Microsoft, Alphabet, Meta, and Amazon have collectively allocated \$370 billion in capital expenditure in 2025, with Microsoft in the lead with \$35 billion in data center and other spendings in the last quarter.

So, it should come as no surprise that spending on compute and storage hardware jumped 166% year-over-year in the second quarter of 2025 — or that the

AI infra market consistently demonstrated high double-digit growth since 2022.

## Riding AI market tailwinds

The rapid proliferation of AI workloads is placing unprecedented strain on the data center infrastructure, especially among hyperscalers, telcos, and AI giants — and performance volatility remains a first-order challenge. This is a problem that is addressed by the test and measurement players.

Inside data centers, right from the silicon layer to system-wide performance, testing and validation is essential. Providers are particularly focused on four key areas: network, compute, interconnect, and power.

**AI workloads are temperamental.** They demand massive parallelism and show dynamic traffic patterns. The end-to-end fabric with its constituents — GPUs, NPUs, memory stores, high-speed interconnects, network layers, and storage pipelines — must be tested to ensure all components perform at peak capacity under changing conditions to support these workloads.

By reproducing these communication patterns in a lab, they can pre-determine KPIs like, job completion times, network throughput and latency — as well as identify and troubleshoot bottlenecks before deployment.

**System-level validation is mission-critical.** Unlike with the traditional data center infrastructure, the highly-interconnected AI data center fabric is infinitely more complex and

demanding. “Components may pass every performance pressure test and still fail at the system level, meaning that a single weak link can have a system wide impact on AI data centers leading to increased job completion times,” said Ram Periakaruppan, vice president and general manager, at Keysight.

As a result, more emphasis is being laid on full-stack validation and optimization strategies spanning the physical layer up to the application layer. Instead of testing components in isolation, the new infrastructure with all its components and subsystems needs integrated benchmarking and performance testing across all layers.

This allows engineers to anticipate how systems will behave in the production environment, and tell in advance if the fabric can handle the demands of the workloads.

Adopting a holistic approach provides the required operating efficiency, and minimizes risks of workload failure. With performance issues surfaced early — a concept popularly known as shift left testing — bottlenecks can be eliminated resulting in a system that delivers consistently under pressure.

**A third of GPUs remain below 15% utilization.** Studies have shown that the GPU infrastructure is vastly underused, and as a result, companies see muted performance improvements from scaling. This is sometimes linked to improper scaling in clusters spanning hundreds and thousands of nodes. The result is underutilized resources and network congestion issues.

High-speed interfaces and interconnects

help keep the utilization up, but without high-speed validation and compliance tools required to optimize them, engineers cannot validate these new designs, nor tackle signal integrity issues that hold back performance.

**Optimizing the interconnect is a critical piece.** A slow interconnect is a performance bottleneck. Maintaining low-latency, high-bandwidth connections is integral to LLM training, real-time inference, edge to core connectivity, and distributed AI.

New technologies like linear-drive pluggable optics (LPO) and co-packaged optics (CPO) are pushing the envelope towards the 1.6T range, but as with any new architectures, these cutting-edge solutions also present validation challenges. They have their own thermal limitations, signal interferences, and compliance needs.

Companies are now embracing benchtop test systems and interconnect testing software to validate functionality and reliability of these interconnects. An end-to-end testing framework that evaluates performance and identifies chokepoints through Layer 1 through 3 ensures that the fabric remains performant under pressure.

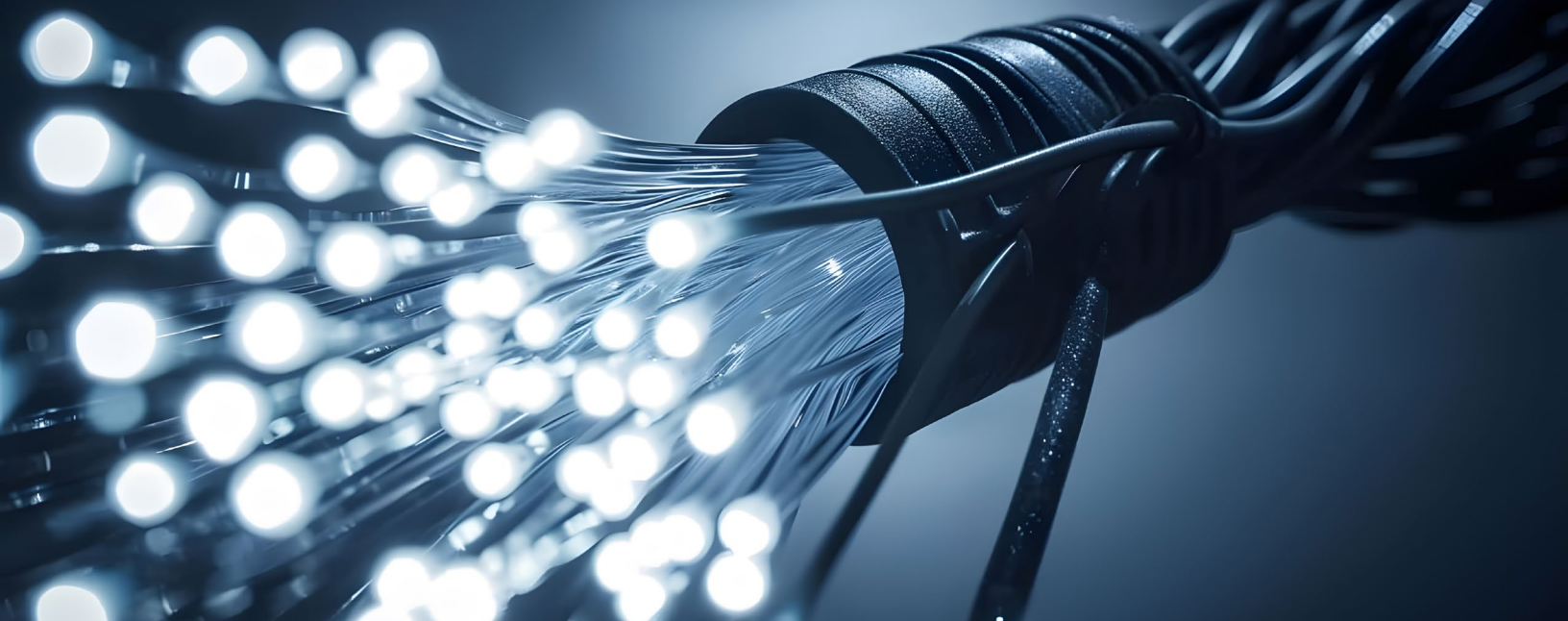
**New designs bring new challenges.** Ethernet, PCIe, DDR, and Compute Express Link (CXL) standards are evolving every year, unlocking faster data transfers and lower latency. While that’s critical for building high-performance AI systems, the new standards also introduce design challenges.

Specialized testing solutions like digital communication analyzers and bit error

ratio testers (BERTs) help prevent signal integrity issues or power limitations that tend to result from these upgrades, while ensuring interoperability between vendors, making sure components of different models and makes work compatibly with each other.

**AI’s appetite for power is growing.** Linesight predicts that data center energy capacity will shoot from 25 GW in 2024 to 80 GW by 2030. This is not unnatural considering a) High-density AI clusters run on 3 to 5x more power per rack compared to general purpose servers, and b) AI training jobs are prone to cause power draw fluctuations causing consumption to spike and drop at short intervals. GPUs also introduce thermal volatility leading to overheating and eventual component degradation.

These factors demand more efficient power systems in data centers that can contain the impacts new profiles of power consumption have on operations and the environment. Powerful probes, analyzers, oscilloscopes, and EDA software are required to analyze and optimize power supplies and thermal management systems to ensure that integrity issues do not impact performance.



# THE PHYSICAL AND THE DIGITAL

**T**est and measurement companies are focused on addressing the complexities and challenges of the physical and digital infrastructure of the network.

## Fiber monitoring

Fiber remains the most versatile medium of connectivity, thanks to its blur-fast data transmission speeds and low power consumption. With fiber deployment topping over 88.1 M homes in the U.S., and builds expanding continually to support ultra-fast data center connectivity, the global fiber infrastructure will become the backbone of communication for game-changing technologies like AI/ML, IoT, quantum, and 6G. Fiber monitoring and management is vital to keep this colossal infrastructure pumping.

A gigantic operation, fiber monitoring

entails physical inspection, fault detection, performance metrics analysis, real-time threat detection, and integrated and remote monitoring. First and foremost, testing focuses on ensuring the physical integrity of the cables which is a must, given their inherently fragile nature. Beyond that, testing ensures correct polarity, prevents optical loss and attenuation, and extends the lifespan of the fibers.

Testing begins at production where all components — fiber, connectors, splices, laser sources, detectors, and receivers — are checked for build quality and compatibility. Post-installation, the cables are tested for polarity and insertion loss. OTDR tests are carried out to ensure individual splices are good. Once the network is lit, remote monitoring solutions are used to conduct on-demand tests and automated monitoring to ensure optimal performance.

## Service Assurance

Traditional methods of network management are redundant in the era of 5G, cloud, AI, and edge computing. Today's networks demand proactive assurance delivered through closed loop automation. This is causing service assurance to evolve from reactive to proactive. What used to be a tedious process of capturing and analyzing every byte of data in the network is now a seamless DevOps cycle of integrated service activation, monitoring, and rapid automated root cause analysis and troubleshooting.

This new kind of service assurance is designed to keep networks efficient and reliable from core to edge, while meeting SLAs. The approach relies on deploying active test agents across the network to get a real-time view of all domains and their individual performance and health.

As issues are detected, their sources are identified, and operators are alerted, enabling a seamless loop of proactive identification and resolution.

## Semiconductor testing

The AI economy is dominated by chips. According to the Semiconductor Industry Association, global semiconductor sales totaled roughly \$208.4 billion in the last quarter, soaring 15.8% from the quarter before. For perspective, the state of Arizona alone has attracted \$200 billion in semiconductor investment in the last five years.

Beneath all that growth, the semiconductor testing industry is experiencing its own boom. According to the Yole Group's Market Monitor, the semi test equipment market saw strong upward movement in the second-quarter of 2025, growing 13.1% quarter-over-quarter, driven largely by sales in SoC and DRAM-HBM testers.

Testing is critical to ensure quality and reliability in silicon devices. It evaluates the health and quality of the devices, revealing physical defects in production and functional bugs later in the pipeline, and confirms that each design meets the required specifications and standards.

In the recent years, test and measurement companies, like Keysight, Rohde & Schwarz, and Anritsu have expanded their product lines to accommodate a growing list of semiconductor testing solutions for design and simulation, wafers and dies, functions, parameters, and IP management. This is no coincidence. In fact, it reflects an effort to attract fresh investments from hyperscalers, neoscalers, and tech giants that are committing trillions of dollars to chip procurement.

### Trend:

AI's explosive demand is transforming data centers, fiber infrastructures, and semiconductor markets.

### Implication:

In this new landscape, end-to-end validation from silicon to full-stack infrastructure is a non-negotiable architectural requirement.

### Opportunity:

As investments in GPU clusters, 800G/1.6T optical interconnects, evolving compute standards, and fiber expansion continue to surge, advanced validation, power integrity tests, and service assurance tools will be essential to keep the lights on in data centers — and the network, always on.

# I TRENDS TO WATCH

Here are the top trends reshaping the test and measurement landscape in 2025:

**AI is reshaping testing.** One of the most talked about developments in testing in the recent years is the inclusion of AI for test automation. Field processes that have been largely analog are now finding ways to incorporate AI for greater efficiency; same with lab testing which now uses AI or AI-powered technologies like emulators, digital twins, and synthetic testing, or AI-enabled continuous and active assurance in lab and live environments.

While new use cases are emerging every day, some of the areas where AI has been helpful so far are spotting sleeping cells delivering poor customer experience, hunting RF interference, in RAN to predict coverage network coverage and quality, for inspecting fiber cable end-faces with AI image analysis, catching network anomalies and service degradations, and generating alerts to prioritize action.

The next step in the evolution is AI test assistants. These generative AI assistants will support complex test and analysis processes by automating test case development, execution, and root cause analysis (RCA).

**Digital Twins are setting new performance standards.** As elements constituting and impacting the network — from traffic to devices, spectrum to software — continually shift, they give rise to new risks and uncertainties that are beyond the control of operators. Digital twins help gain control over this entropy.

Digital twins represent a smart, alternative approach for manipulating the live network. It produces an always-on replica through emulation that can mirror the behaviors of the production network with all its accompanying bottlenecks and blindspots. Engineers can monitor KPIs in real time, produce what-if scenarios, dig into sources of past problems, and implement fixes for present and future problems — in short, preventing costly downtimes and repairs that were not possible before.

Digital twin has emerged as a widely-adopted technology in the test and measurement segment in the past few years where companies are leveraging it to deliver reliable diagnostics ahead of time without having to perform tests in complicated real-world network conditions.

**Quantum testing is the new imperative.** Recent advances in quantum computing suggest the technology is edging close to primetime. And the race among some of the biggest corporations, like IBM and relatively younger contenders, like Google, Microsoft, and AWS, to seize the center stage in quantum R&D shows awareness of its transformative potential.

The big players in the test and measurement sector too are ramping up efforts to stay at the forefront of this. They are partnering with the top industry players, and rolling out purpose-built hardware and software stacks at a steady clip to help unleash quantum's extreme performance.

**Early 6G development works will define the future of industries.** The transition to 6G is one of the most anticipated moments in telecom. Ericsson estimates deployments and uptake to take place between 2025 to 2031. The company predicted 180 million live connections by 2031. This may sound questionable considering that 5G SA is yet to be deployed in many markets and still unavailable on a nation-wide basis, but the fact is 6G R&D is already in full swing. And so is testing and validation works.

Many leading T&M companies are now partnering with the usual suspects, Nokia Bell Labs, Samsung, and Qualcomm among others, to pioneer early trials addressing roadblocks like uplink coverage limitations and performance QoS. They are lending digital twins capabilities for high-fidelity modeling and mapping of 6G mobile networks; testbeds to characterize hardware and measure network performance achievable for 6G; and hardware-in-the-loop testing to assess the effectiveness of AI channel estimation models — clearing the road to quick standardization.

# I CONCLUSION

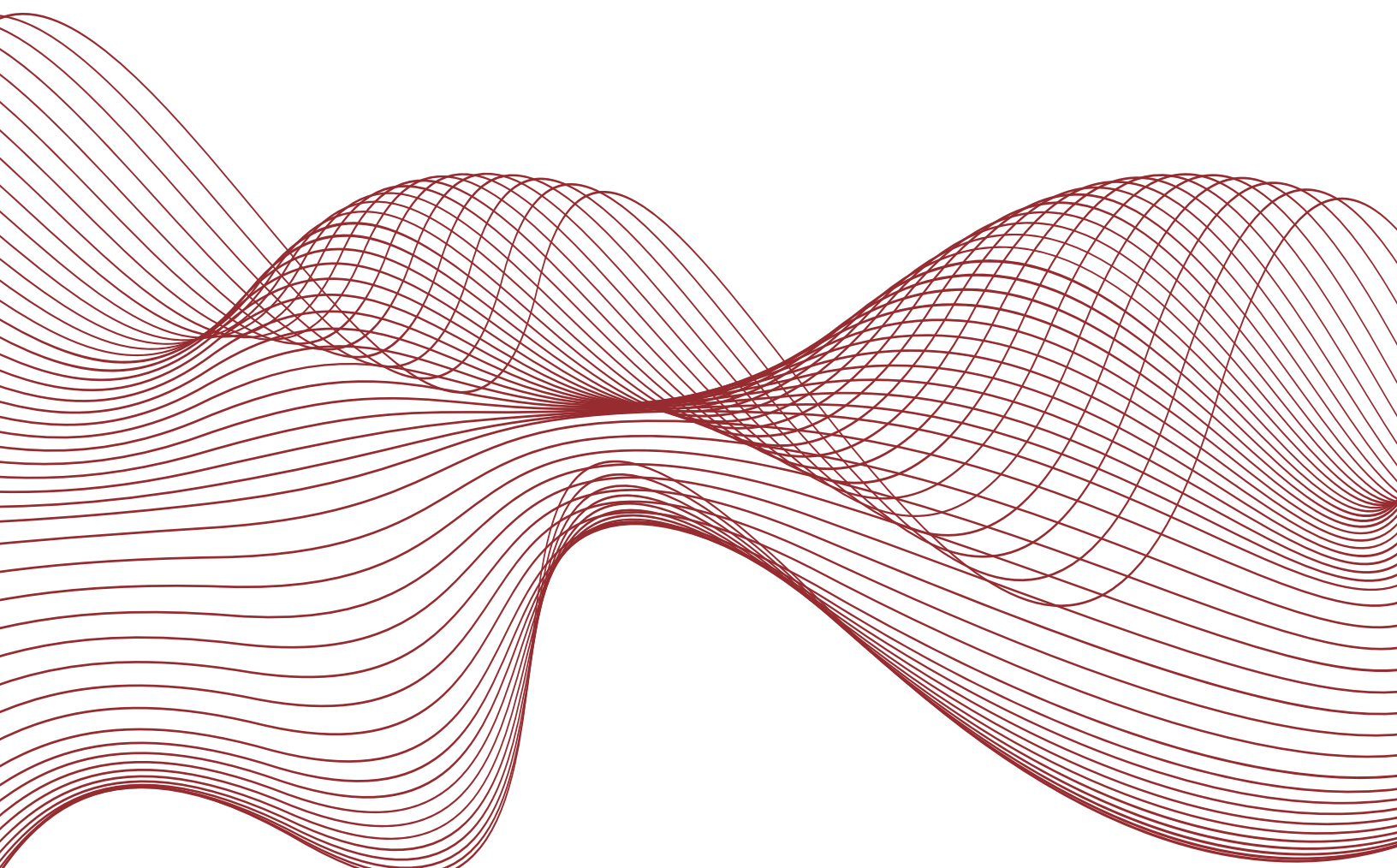
With the rapid advancements in cloud computing, edge, and AI technologies, testing complexities have grown tenfold. Traditional testing methods and gears were never designed to support these systems. T&M companies are reinventing themselves, adapting with the ebbs and flows to best serve the needs of their customers. They understand that capturing the value of a new technology does not begin with bold launches — but with real intelligence that gives way to measurable efficiency and performance gains.

With planned partnerships and new forays, the industry is now entering a new era where strategic multi-specialization and new collaborations lead to success. Rather than every player attempting to build its own stronghold with point solutions and siloed stacks, the industry is seeing a recognition that a comprehensive stack and wider participation create more value than a one-track focus.

Throughout the ecosystem, one theme resonates: the motivation to streamline

test, measurement, and monitoring across not one or two domains, but throughout telecom and AI infrastructure.

Next-gen testing will determine not just the future trajectory of these markets, but also the future successes of all cutting-edge technologies.



# The expanding footprint of test and measurement

By Sulagna Saha, Technology Editor