Accelerating Tomorrow's Innovations

Mark Wallace
*Senior Vice President, Keysight Global Sales*

Change is constant

But technology is changing the world more than ever before

5G

10x Speeds | **10x** Mobile Data Volumes | **1/10**th Latency

25% of all traffic carried by 5G networks by 2024

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Automotive

>470 million connected vehicles on the road by 2025

>8 million with level 3 or higher self-driving capabilities

IoT

22B connected devices by 2025

1T sensors to power the Internet of Things by 2025

Data Center

Annual global IP traffic will have increased **127-fold from 2005-2021**

Data center infrastructure market will grow to **$90 billion by 2024**

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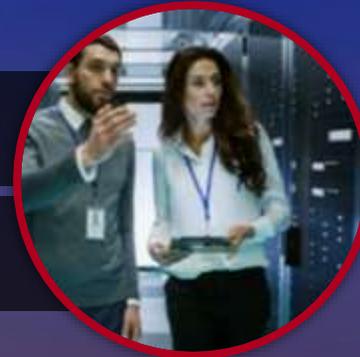
Networks

80% Cloud breaches and rise of shadow clouds by 2020

54% of enterprises monitor only half of their network segments

We Are at the Heart of the Digital Revolution

Wireless

Automotive

Networking / Cloud

Aerospace / Defense

IoT

KEYSIGHT TECHNOLOGIES

We are Committed to Accelerating Your Innovation

And Enabling Your Success
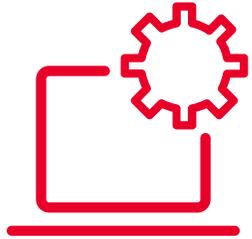
Shifted to **software-centric solutions**
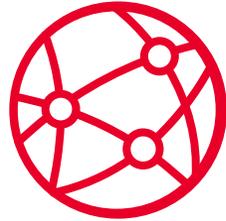
Reorganized around end markets
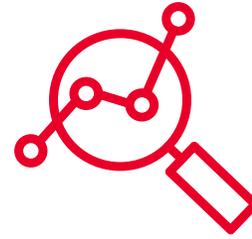
Amplified investment in **R&D**

Made **strategic acquisitions**

THE RESULT: FIRST-TO-MARKET SOLUTIONS, WORKFLOWS, AND SERVICES FOR EVERY STEP IN YOUR LIFECYCLE

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The 5G Race Is On…

Deployments are accelerating
More mobile operators launching 5G networks to capture new business models

Standards are evolving
New use cases driving new standards evolution

Technical complexity is high
Diversity driven by multiple regional ecosystems progressing in parallel

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We Accelerate Your 5G Innovation

Early Industry Leader Partnerships → Leadership in Emerging Standards → 5G NR Design & Simulation → RF/mmWave Coverage → Layer 1-7 Testing

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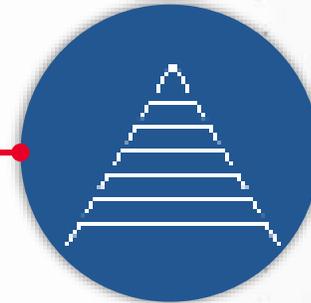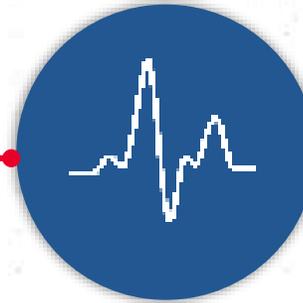
We Engage Across the Entire Ecosystem

Components & Chipsets

Device Manufacturers

Network Equipment Manufacturers

Service Providers

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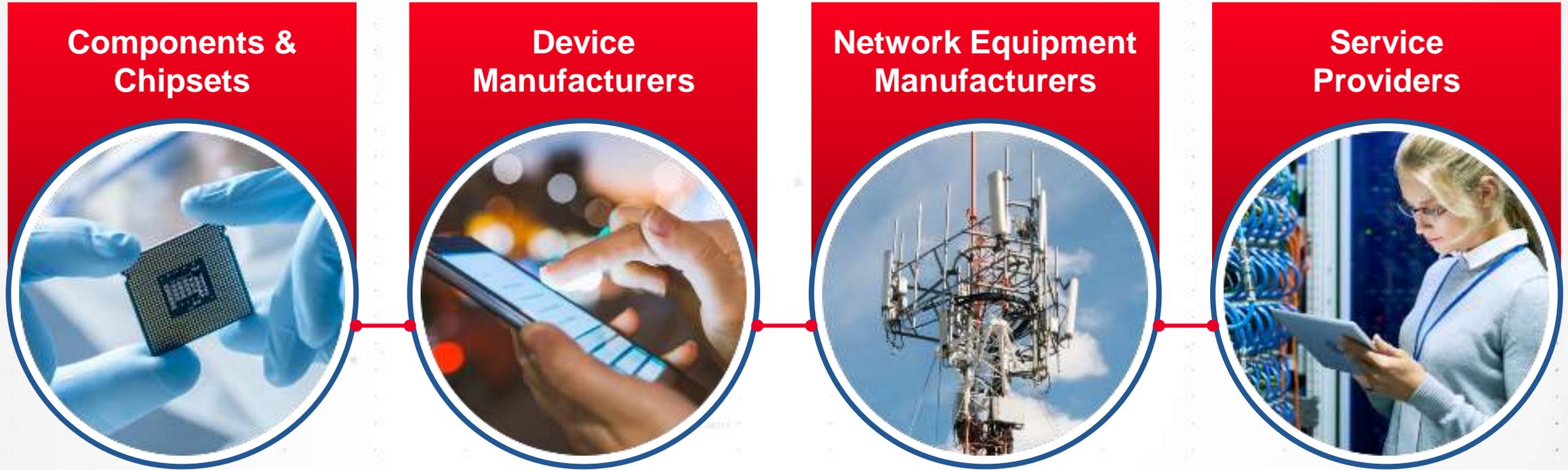
We Collaborate Around The World

U.S
- Verizon
- AT&T
- Qualcomm
- Skyworks
- Ball Aerospace
- Anokiwave
- Cohu
- Motorola Mobility (Lenovo)
- ETS-Lindgren
- Telecom Infra Project
- NYU Wireless
- UC San Diego
- O-RAN Alliance

Europe
- CommmSolid
- Aselan
- Nokia
- Bluetest
- Triangle
- 5G Automotive Assoc.
- NGMN
- University of Bristol
- University of Surrey 5GIC
- University of Oulu
- 5G-VINNI

India
- Tech Mahindra

China
- China Mobile
- China Telecom
- UNISOC (Spreadtrum)
- Xiaomi
- OPPO
- CICT (Datang)
- Askey
- CAICT
- CMRI
- IMT-2020
- 5G Device Forerunner Initiative
- Future Forum
- SEU Nanjing

Taiwan
- MediaTek
- ASUS
- SGS
- NTU Taiwan
- NCTU Taiwan

S.Korea
- SK Telecom
- KT Corporation
- Samsung
- DT&C
- 5G Forum
- 5G MF

Japan
- NTT DOCOMO
- SoftBank

- Engaged early with 5G industry leaders across the connected ecosystem

- Delivered end-to-end 5G solutions to accelerate workflow

Legend:
- Mobile Operator
- Wireless Manufacturer
- Test House or System Integrator
- Consortia or University

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THE CHALLENGE
First-to-market 5G modem chipset design validation required network emulation capability that didn't exist

THE SOLUTION
Over-the-air test solution and chamber capable of validating 5G performance at mm-wave frequencies

THE RESULTS

- Measured **OTA at 28GHz**
- Number of aggregated 100MHz carriers: **8**
- Demonstrated throughput of **4+ Gbps**

Global Semiconductor and Telecommunications Equipment Company

Case Study

The Future of the Automobile is Here

Vehicle-to-Everything (V2X) Communications

Electronic Stability Control Module

Climate Control System

Infotainment/Navigation Modules (DVD, eCalls, Hands Free Telephony, GPS)

Anti brake Locking system
Tire Pressure Monitoring system

Emission Control Module

Hybrid Electric Vehicle (HEV) / Electric Vehicle (EV)

Power Steering Control
Rear-view camera
Backup sensors
Power Seat Control

Personnel Occupancy Detection Systems (PODS) for Air Bag systems

Remote Keyless Entry

Instrument Clusters

Fuel Injection Module
Power Train & Engine Management (MiL, SiL, HiL)

Adaptive Lighting Control

Radar Collision Avoidance

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Automotive Technology Requirements Keep Advancing

Electronics

- More systems
- Better diagnostics
- Automotive Ethernet

E-Mobility

- More eco-friendly
- Higher density
- Longer range

Connectivity

- More infotainment
- Better safety
- Easier navigation

Autonomy

- More sensors
- Driver vision
- Electro-mechanical

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We Drive for First-to-Market Solutions in Automotive

INDUSTRY'S BROADEST AND MOST RELIABLE SOLUTIONS PORTFOLIO

Autonomous Driving Test

77 / 79GHz with 4GHz BW Signal Generation and Analysis

Radar Testing

EV and Battery Test

Battery Test

Charging

Connected Car Test

Fast, accurate, and scalable Cellular and Wireless Connectivity Test

Automotive Wireless, DSRC, V2X

Rapid testing of automotive network devices

Automotive Ethernet

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We Bring Experts Close to You

Novi, MI

Boeblingen, Germany

Nagoya, Japan

Shanghai International Automobile City (SIAC)

Automotive OEMs

Electronic Component Suppliers

Battery Manufacturers
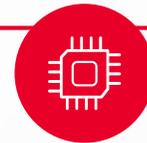
Chipset Vendors

Infrastructure Providers

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We Partner With You Across Industries

Wireless
- Be 5G-Ready
- Reduce the risk of chip re-spins
- Ensure optimum QoE
- Monitor and secure your network

Aerospace & Defense
- Enhanced realism in EW
- Precise signal monitoring
- Complete testing for satellite workflows
- Advanced troubleshooting for Milcomms

Automotive & Energy
- Precise design and test for life-critical sensors
- V2X emulation and test solutions
- Intelligent electronics testing

IoT
- Eliminate crosstalk and EMI
- Optimize power consumption and battery life
- Ensure wireless connectivity
- Verify cellular IoT conformance
- Realize network reliability and security

Data Center
- Verify components and transceivers
- Optimize high speed digital system design
- Ensure interoperability
- Validate SDN/NFV and traffic loading

Network and Cloud
- Verify your network
- Eliminate network blind spots
- Identify bottlenecks and optimize performance
- Get deeper insight into traffic
- Strengthen and validate network security
- Bulletproof cloud security

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Innovation Processes Impact Speed

MOST ORGANIZATIONS USE STANDALONE PRODUCTS

Simulate → Prototype → Manufacture → Optimize

Siloed datasets

Disconnected workflows

Higher risk of errors

Silo'ed Toolsets are Biggest Contributors to Project Delays

61%
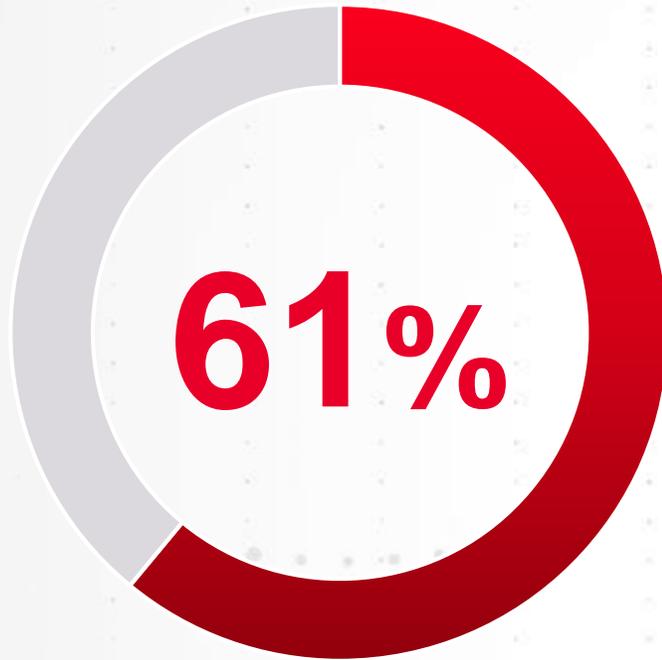
Engineers use 5+ design tools

91%
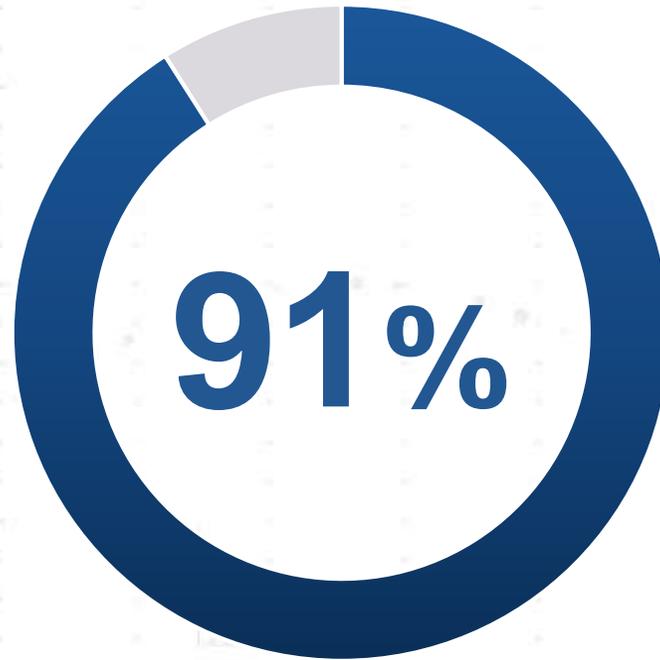
Engineers use 3+ test tools

67%

2+ hours fixing tools & software integration gaps

PATHWAVE

The PathWave Platform
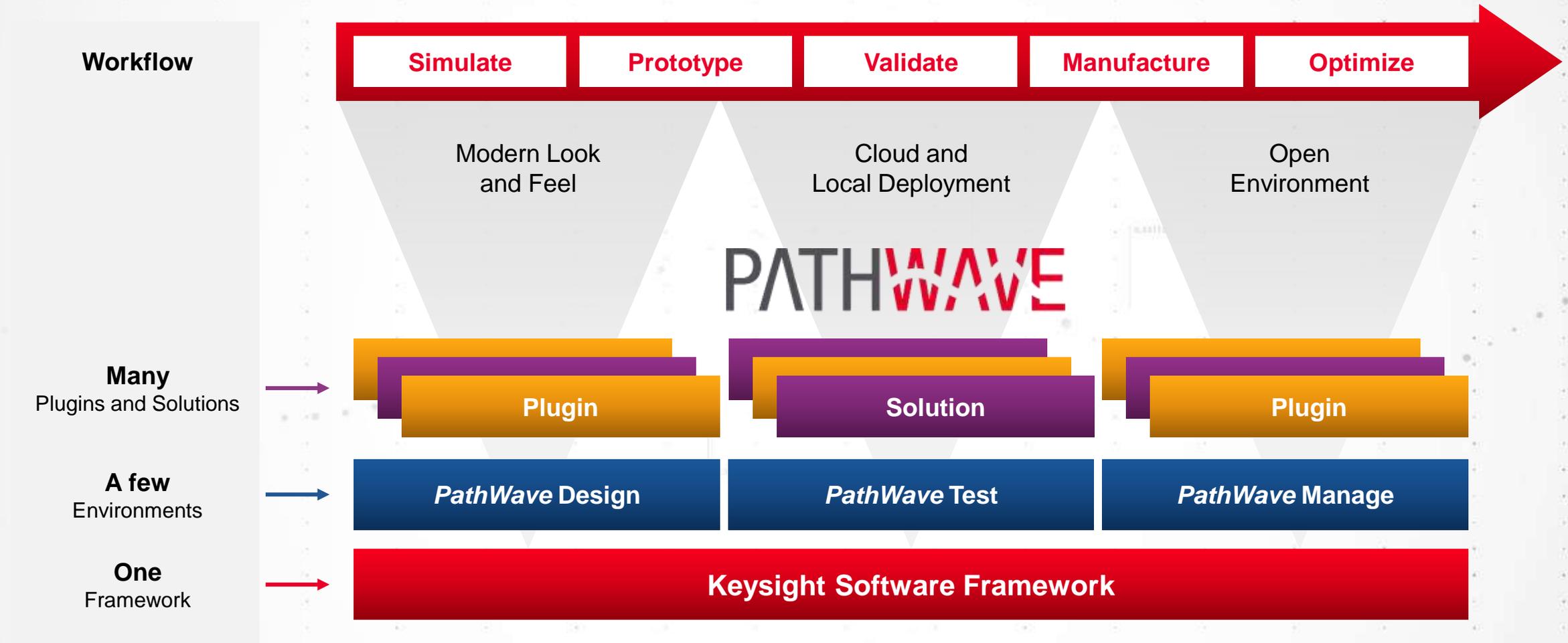
Beyond Product Development: Ensuring Readiness

Upgrade Your Labs	Technology Refresh	Financial Services
Upgrade Your Process	Process Analysis	System-Level Consulting
Upgrade Your Skills	Advisory Services	Training and eLearning
Maintain Your Labs	On-Site Calibration	System Uptime Support

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KeysightCare Minimizes Unplanned Downtime

COMPLETE CUSTOMER CARE, BEYOND BASIC WARRANTY

Cloud-based Customer Portal

Proactive Software Updates

Dedicated Resources with Committed Response Times
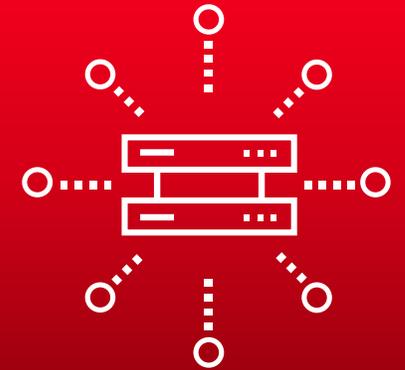
Equipment Configuration Management

Let's Get Started at Keysight World!

First to Market Solutions
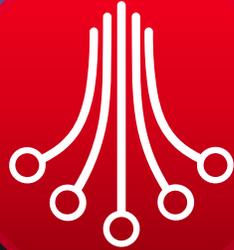
A Wide Range of Test Capability
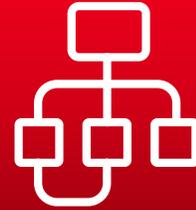
One Architecture to Connect your Lifecycle

Access to the best calibration and support services