



KEYSIGHT
WORLD 2019

Realize your Vision of Mobility Faster

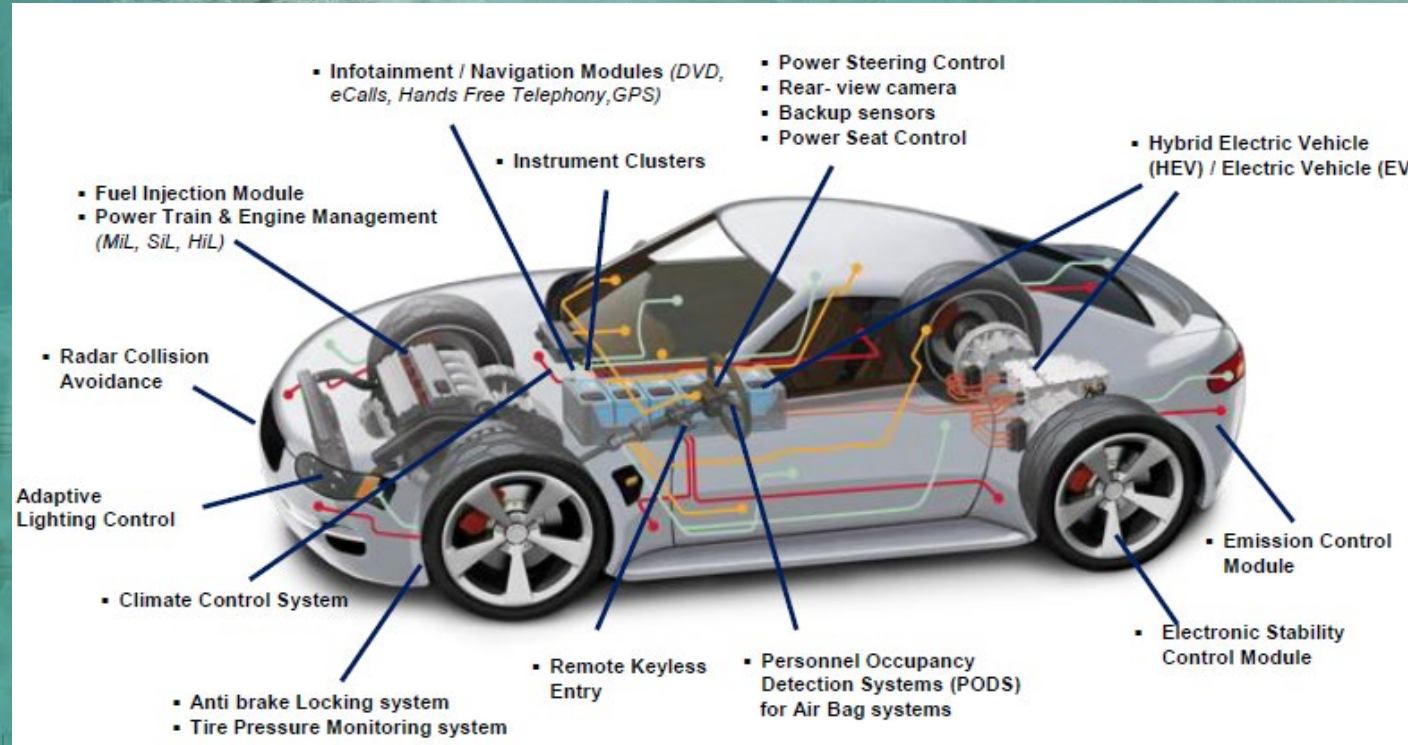
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Keysight Technologies*



Automotive & Energy Transformation

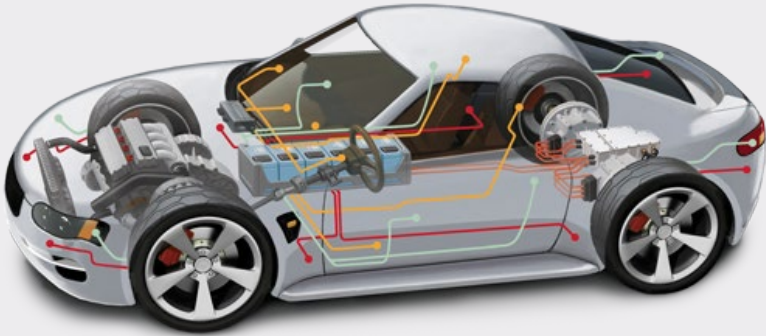
BASED ON THE ELECTRIFICATION AND DIGITAL REVOLUTION IN AUTOMOBILES



Automotive & Energy Markets Merging

E-MOBILITY ENABLES PROVIDERS FOR ALTERNATIVE ENERGY TO EXPAND THEIR BUSINESS INTO INDIVIDUAL MOBILITY

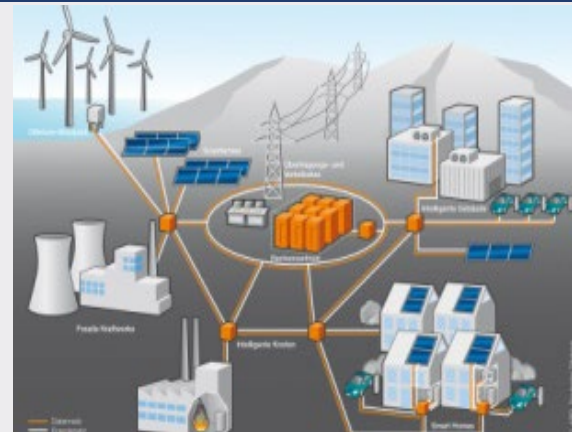
Automotive



Electrification is occurring at astonishing speed

- Electrical powertrain
- Fast Charging Concept needed
- Emission Free Miles
- Battery Reuse in Solar Installations

Energy

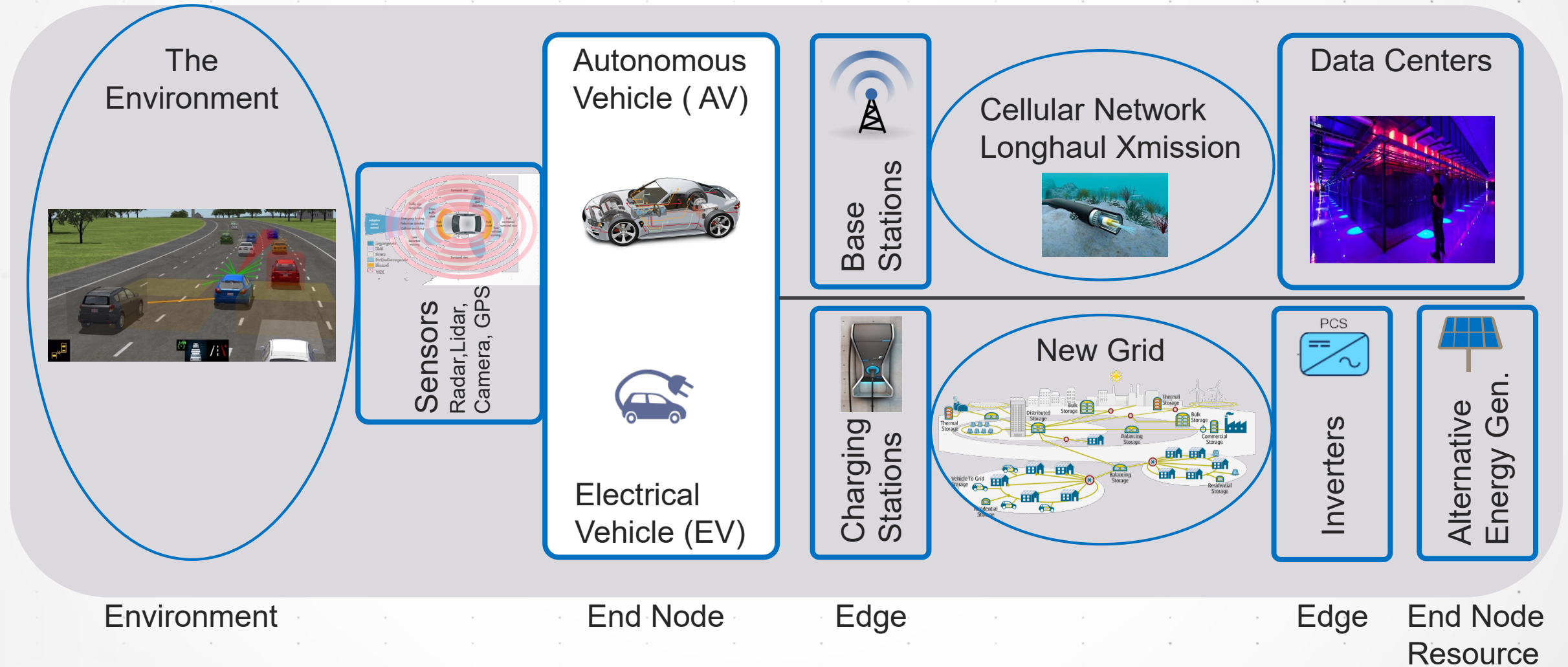


Distributed generation of energy is driving innovation

- Alternative energy generation
- Smart consumption
- Storage solutions
- New power semiconductor technology

Emerging Mobility System

ADDRESSING AV, EV TEST NEEDS FOR CARS, V2X AND CHARGING INFRASTRUCTURE



Market Drivers in Automotive



Safety
1.23M Road Deaths



Environment
+50% CO₂, NO_x Emission



Connections
In Vehicle

**ADAS
Autonomous Driving**

**Hybrids &
E-Mobility**

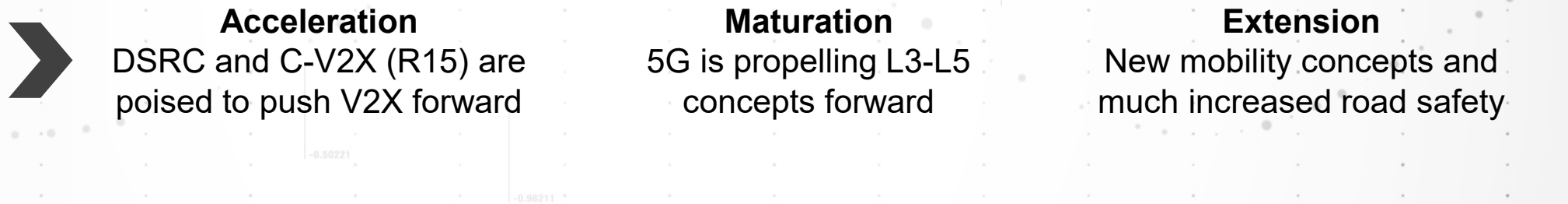
**Connected
Cars**

Vision of Mobility – Automotive Trends

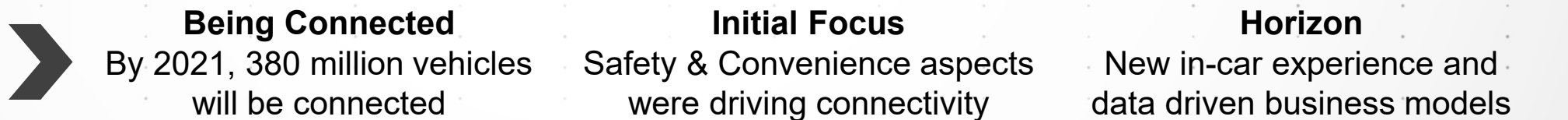
Electrification investments are increasing



Path to V2X is accelerating



Connected Cars are a reality soon



E-Mobility

CREATING EMISSION-FREE MOBILITY



Batteries are the critical enabling Factor

- Lower Cost/kWh
- Higher Energy Density
- Recycling System



Clean Energy is required to generate emission-free miles

- LCOE will come down
- New Cellular Grid Structure needed
- Efficient Inverters



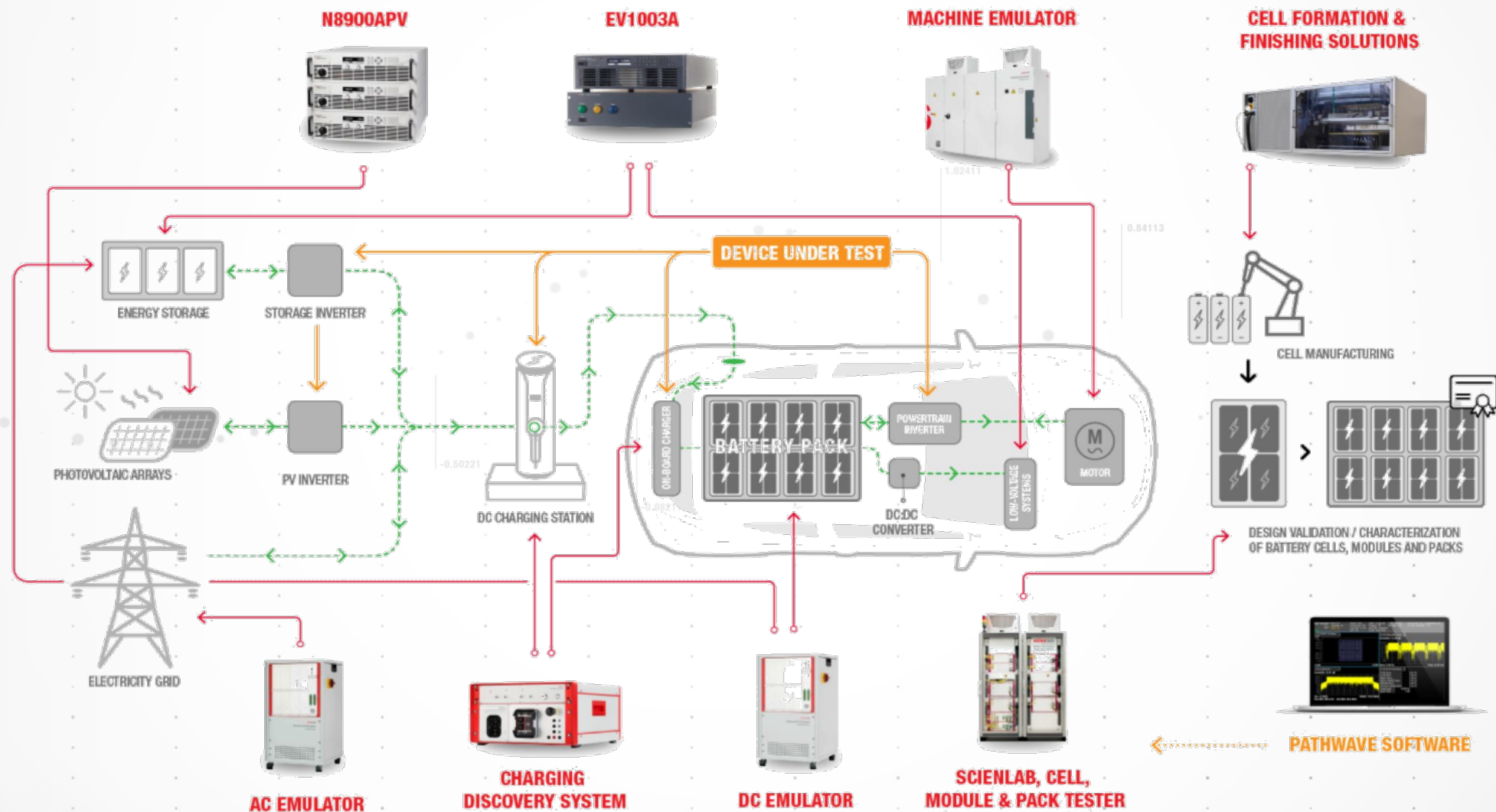
Charging Infrastructure needs to be build up broadly

- Standards to be established
- Interoperability needs to be ensured



Energy and Power Solutions

FROM THE GRID TO THE ROAD



Autonomous Vehicles

INNOVATIONS FOR ALL ADVANCED DRIVER SYSTEMS



Sensors are the enabling technology

- Short and long-range Radar
- Lidar for object recognition
- Camera Systems



System Integration

- Sensor Fusion
- AI system training for decision making



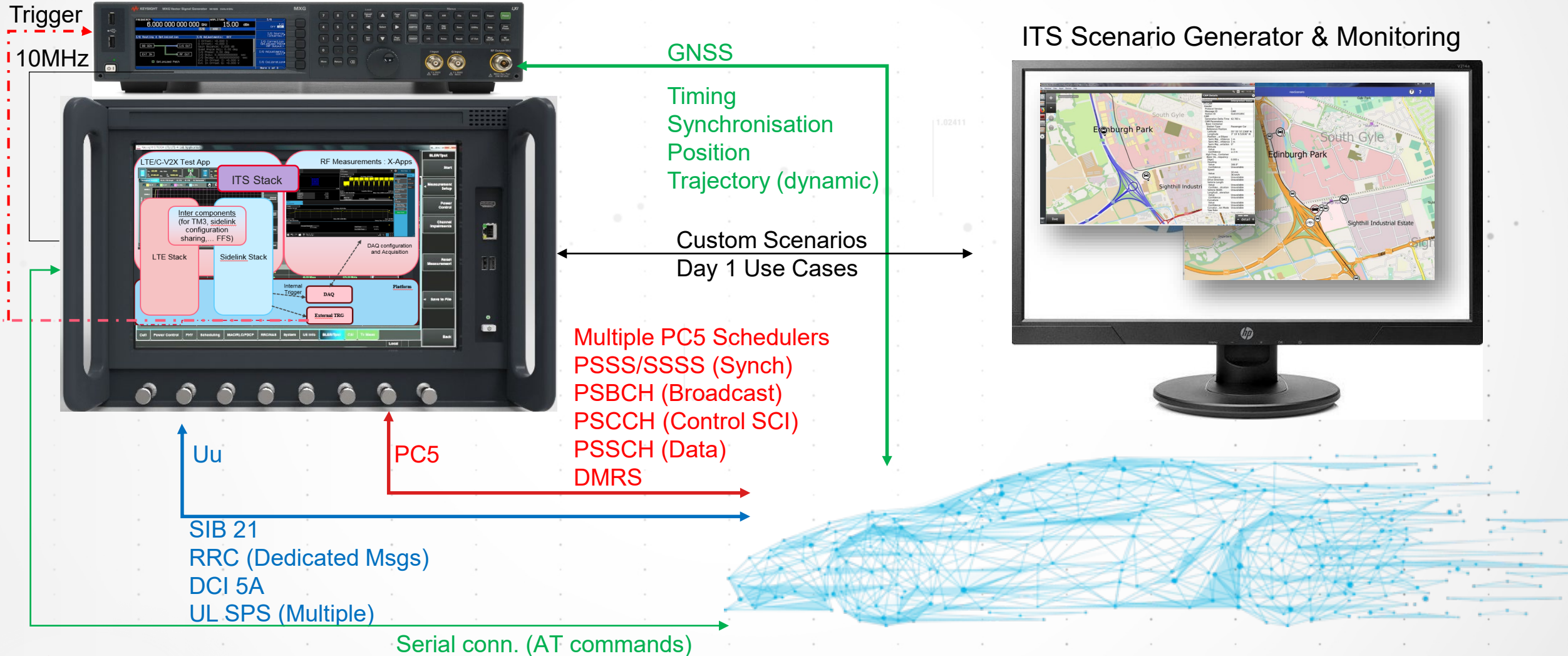
V2X technologies

- Sensor reach extension with Car-to-Car and Car-to-Infrastructure Technologies
- Realtime Map Download



C-V2X Test System

C-V2X PROTOCOL, FUNCTIONAL, RF TEST AND ITS STACK



Connected Cars Enable New Services

COMMERCIALIZING CONNECTED MOBILITY



Quality of Service in a dynamic environment

- Drive Test needed
- Managing wireless technology from 2G to 5G



New Functions <> New Business

- E-Call
- Telematics & Maintenance
- Enhanced e-commerce platforms



Cybersecurity becomes mission critical

- Architectural solution needed
- Penetration Testing required



Automotive Cyber Security PEN Test Platform

SYSTEM SETUP



Management
Servers

Connectivity
Gateways,
protocol
specific

Management Server (Windows)
PEN Test Platform

Recon and Fuzzing Server (Linux)
Exploitation and service attacks

Cellular Gateway

WIFI/BT Gateway

Automotive Ethernet

CAN

USB

Enterprise Platform

Integrates multiple instances in a single workflow

PEN Test Engine

- Connectivity
- Reconnaissance
- Fuzzing
- Testplan generation
- Testplan execution (regression testing)
- Reporting

Protocol Specific Libraries

Scanning, fuzzing, attack services

- Cellular (2G, 3G, 4G)
- Wifi
- Bluetooth
- Automotive Ethernet
- USB
- CAN

Key Customer Values

AUTOMOTIVE CYBER SECURITY PEN TEST PLATFORM

- **Enables the implementation and enforcement of company-wide security standards**
 - Consistency in penetration testing across all R&D teams
 - Own and subcontractors
 - The “out of the box” exploitation mechanisms detect a vast majority of all known attacks
- **Covers ALL relevant interfaces, from the HW connectivity to application layer**
 - Cellular, Wifi, Bluetooth, USB, CAN, Automotive Ethernet, ...
- **Subscription to our threat database updates allows for pro-active measures**
 - Find out that there is a security risk BEFORE a car is attacked
- **Documented workflow and results**
 - Traceability and reporting
- **Repeatability of tests (regression testing)**
 - Faster validation of SW bugfixes
- **Seamless integration into OEM's /Tier1's enterprise platform**
 - The framework is open for the customer to integrate their own tests
 - Release management of sub-components up to complete cars



Industry Solution Focus

OUR ENGAGEMENT MODEL IS PARTNERSHIP



Workflow

Maximum Contribution

Help customers optimize workflow processes with Keysight tools. Become part of automation flow



Solutions

Higher Value

Complete end-to-end answers to a customer problem
Software, Fixturing, HW, Expertise



Applications

One Supplier

Multiple Keysight products based on fit to specific customer applications.
One Stop Shopping Value



Products

Single Product

Single products based on best-in-class attributes.

Summary

Fundamental disruptive innovations in automotive will create a new mobility ecosystem

It is our chance to create together a connected and better world

Let's partner to master the technological challenges and bring your innovations to market first



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