



# Automotive Systems

## Standardizing Component Testing with a Smart All-in-One Platform

NI Days, 2017

Arnoud de Kuijper, Sales & business development Western-  
Europe



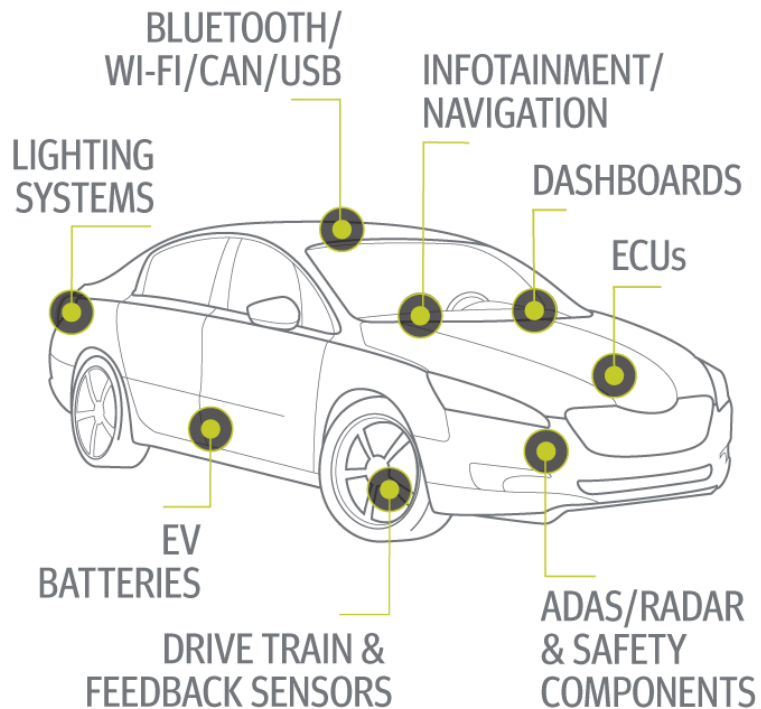
# Agenda

## Global Test & Quality Solution Leader

- Avera's Automotive and Signal expertise
- Current Industry Trends & Challenges
- Test Strategies and Standardization
- Proposed Test Architecture
- Customized Architecture
- Use Cases
- More About Avera
- Q&A



# Expertise for Automotive Systems



## Proven turnkey test solutions & global support

- Test & measurement solutions
- System bus monitoring
- Consumer technology integration
- Defect-detection systems
- Vision-based assembly
- Infotainment test platforms

# Signal Application Expertise

Software-Defined  
Radio (SDR)

Record &  
Playback

Wireless and  
Connectivity  
Protocols

Military & Public  
Safety Radio  
(P25)

Channel  
Emulation

**Broadcast  
Protocols**

Wireless Power  
Charging

Power  
Amplifiers

Radar

Passive  
Intermodulation  
(PIM)

Embedded  
Medical Radio

RF System  
on a Chip

# Current Industry Trends & Challenges

Roadblocks preventing Tier 1/2s and OEMs  
from reaching their quality, production and  
financial goals



# Evolution of the Automotive Industry

Early 1900s

1970s

2000+

2020+



Automotive 1.0

Vertically integrated OEMs  
Mass production  
Low technologies



Automotive 2.0

Major suppliers are formed  
Faster/better automobiles  
Technology integration,  
invisible to consumer



Automotive 3.0

**Globalization of  
OEMs/suppliers**  
**Electrification/digitalization**  
**Improved safety & ADAS**



Automotive 4.0

**Technology convergence**  
**Automated driving**  
**Shared mobility**  
**Connectivity/V2X**

Today's technologies are creating the future of the Automotive industry.

# Automotive Industry Challenges



Electronics systems contribute more than **90%** of innovations and new features



Cost of electronics and software is **35%** of the total cost  
(It was 15% a decade ago)



Cycle of new software in automobile is measured in **months**, not years



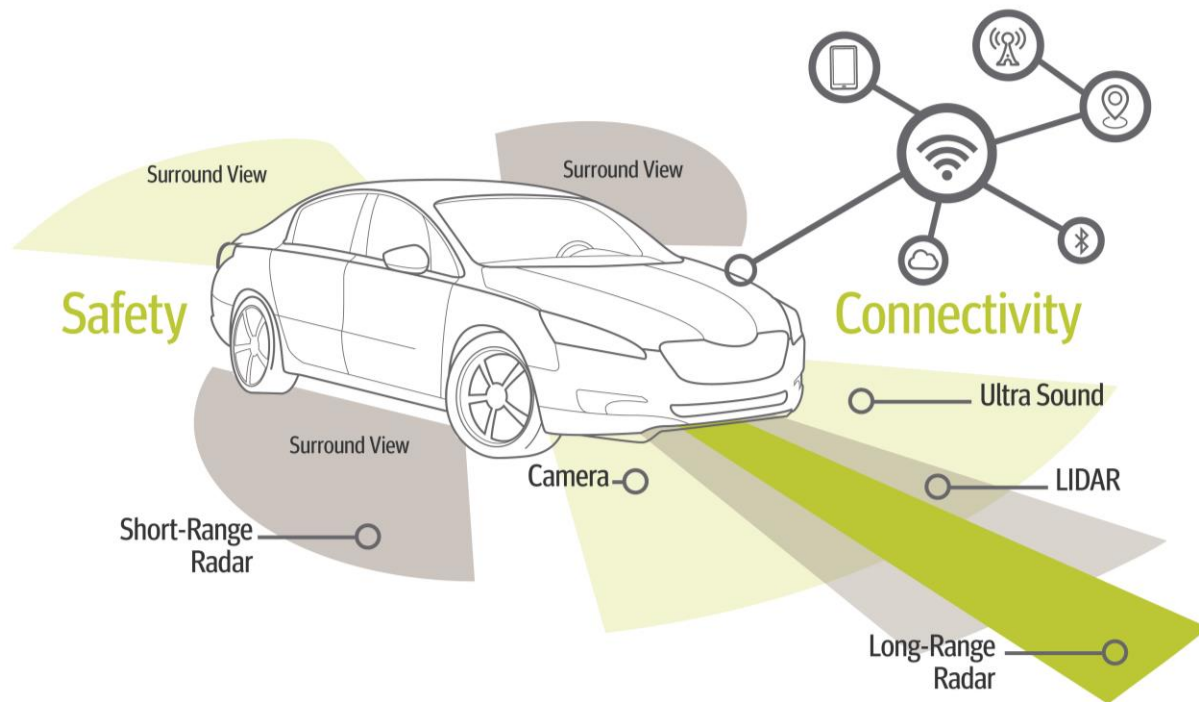
Tech companies have a strong impact on OEM Strategies.

**Maintain quality and reliability while scaling maturing technologies to meet growing demands.**



# Automotive Key Technologies

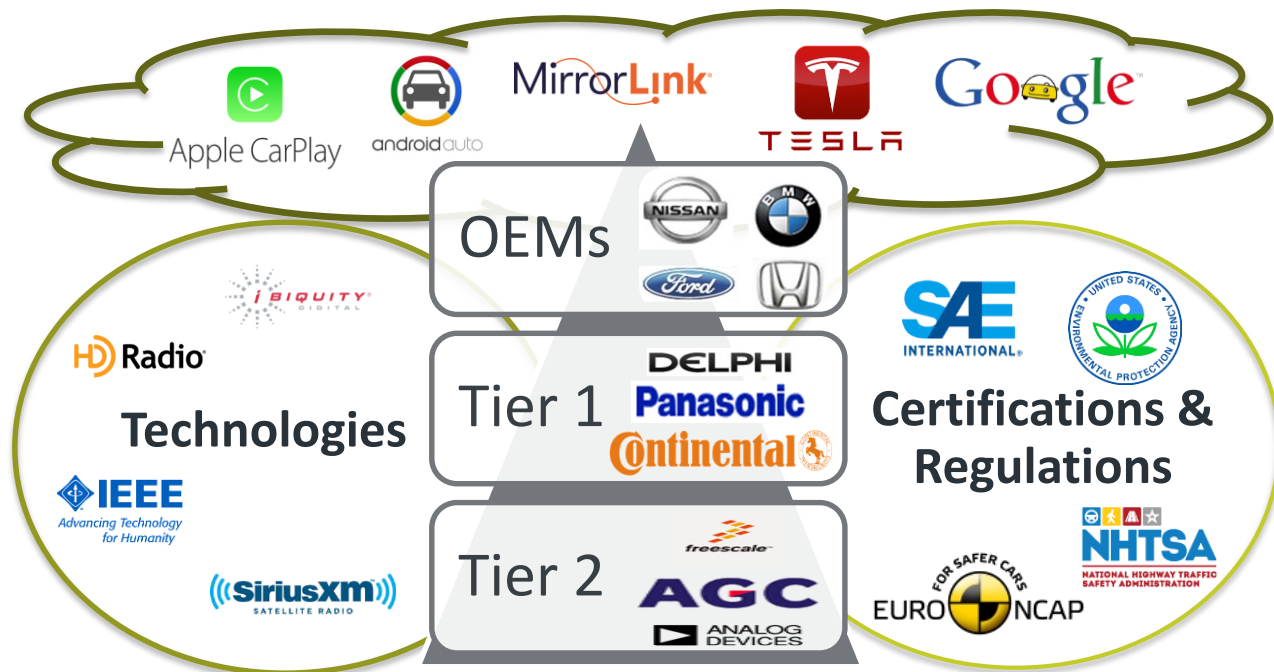
## The Three Cs: More Components, Communication and Complexity





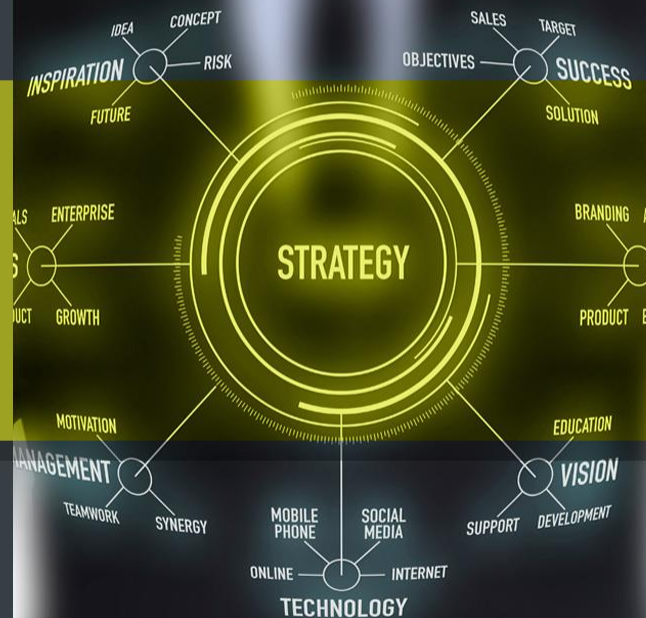
# Market Segments

## Highly Integrated Ecosystem



# Test Strategies and Standardization

Agility is key for adapting to the new reality



# Test Strategies

## Capping Your Investment and Evolving with New Technologies



### Standardization

- Standardized equipment & test methodologies avoids compatibility problems, reduces overall cost and improves consistency and efficiency



### Scalability

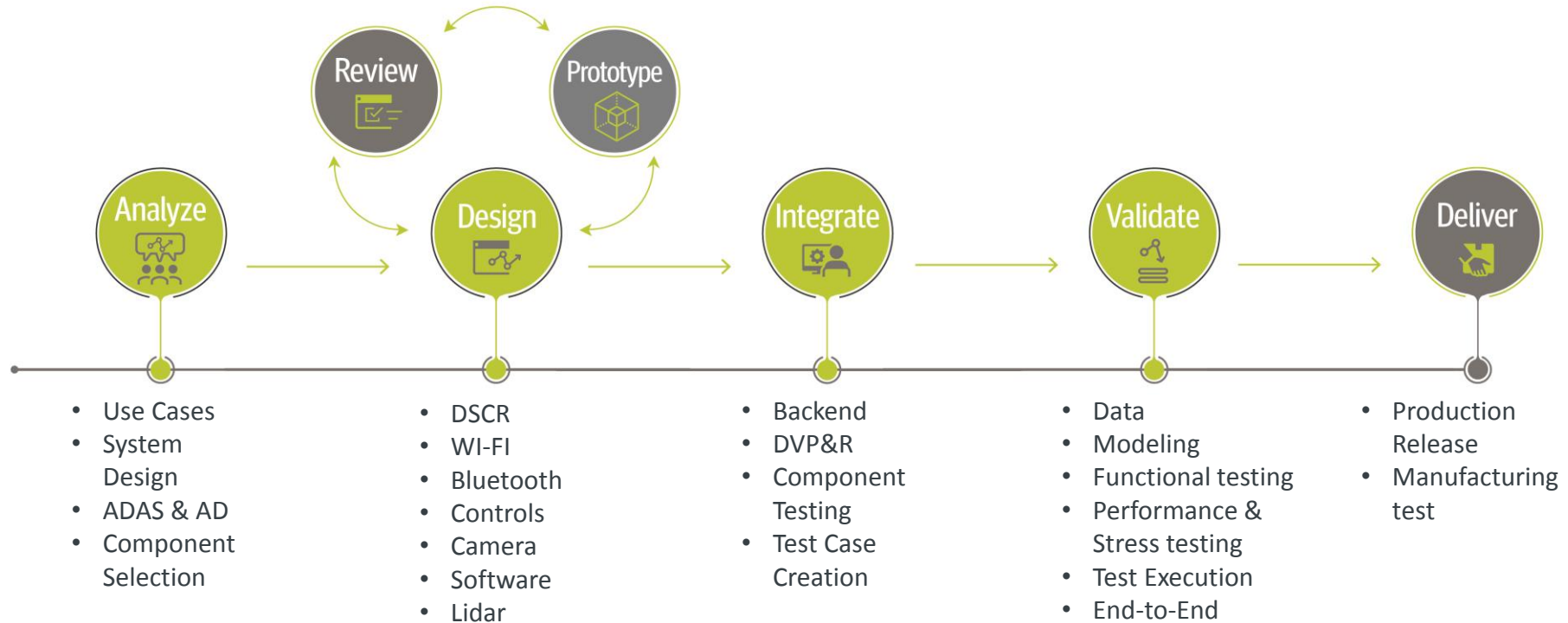
- Equipment that is scalable and upgradable, scaling at the speed of new technology innovations



### Modularity

- Modular building blocks that can be interchanged, combined and replaced easily

# Testing across the value chain



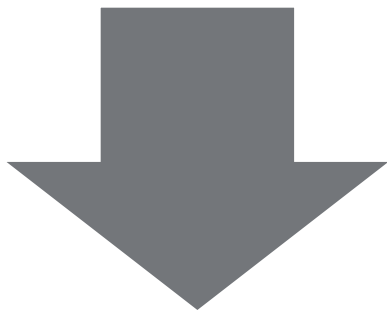
# Test Goals

Reach your quality, production and financial goals



## IMPROVE TEST

- **Coverage**
  - Better road-test data by higher bandwidth of recording
- **Quality**
  - Ensure tight synchronization with other systems like vehicle bus by single platform
- **Standardization**
  - Use same equipment for road test and lab test

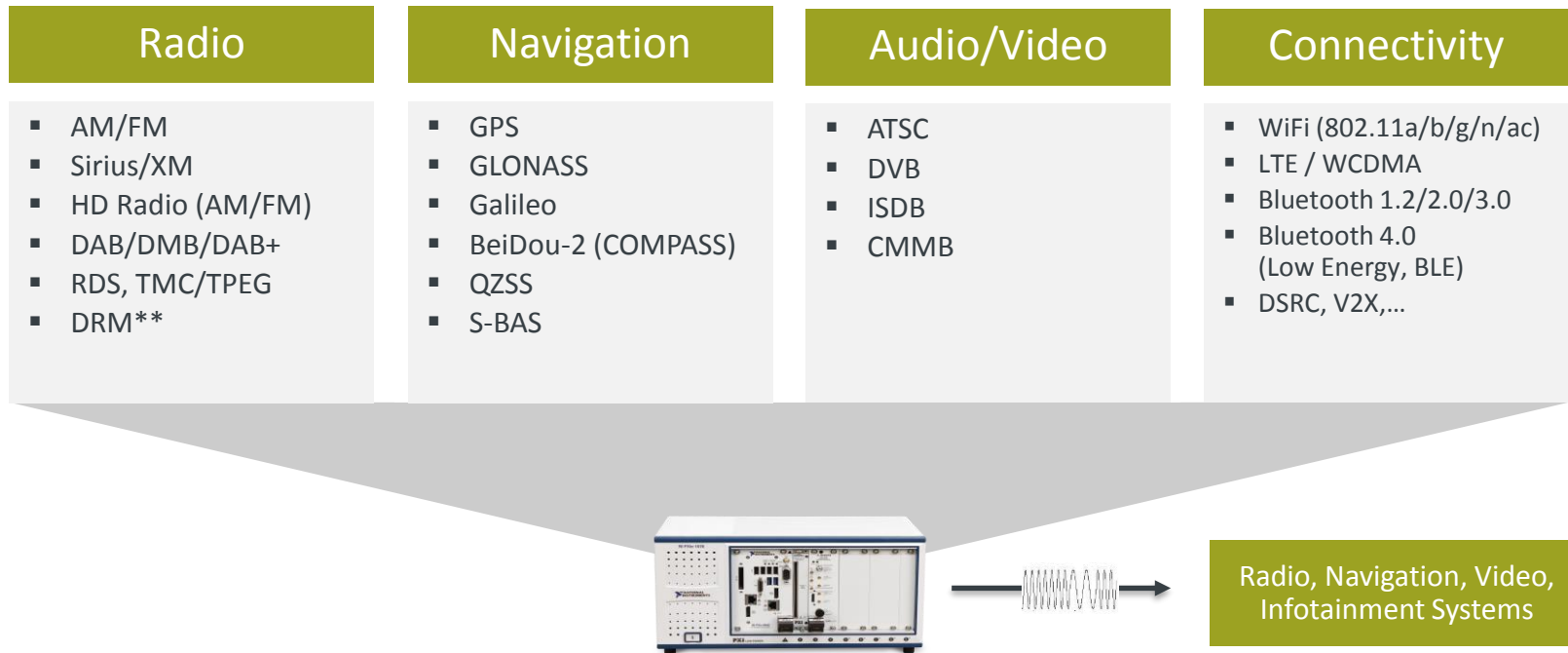


## REDUCE

- **Time**
  - Playback recordings of road-test in Lab
- **Cost**
  - Combine video, navigation, RF and telematics in single platform

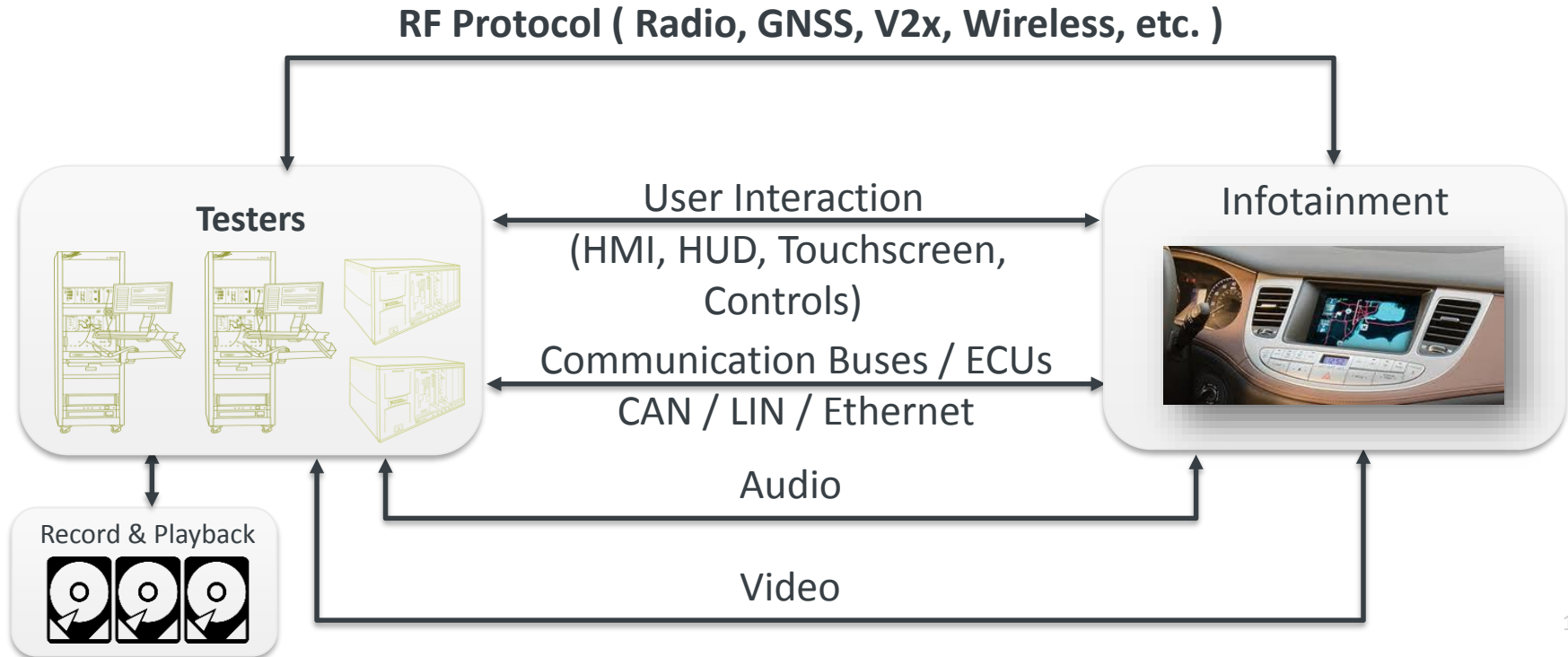
# Global Wireless Standards Generation

Purpose-built, expandable platform ideal for evolving Automotive market



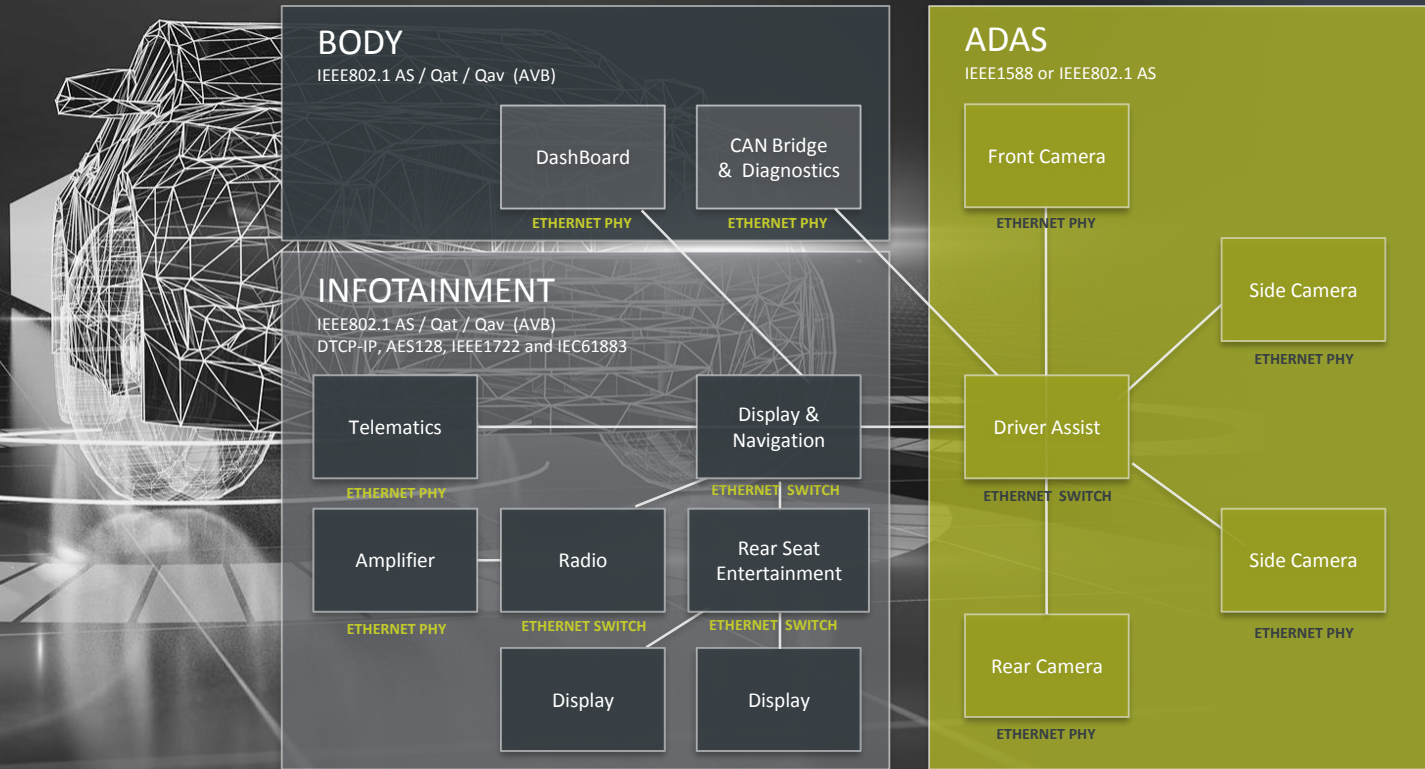
# High-Level Architecture

## A Complete Infotainment Solution





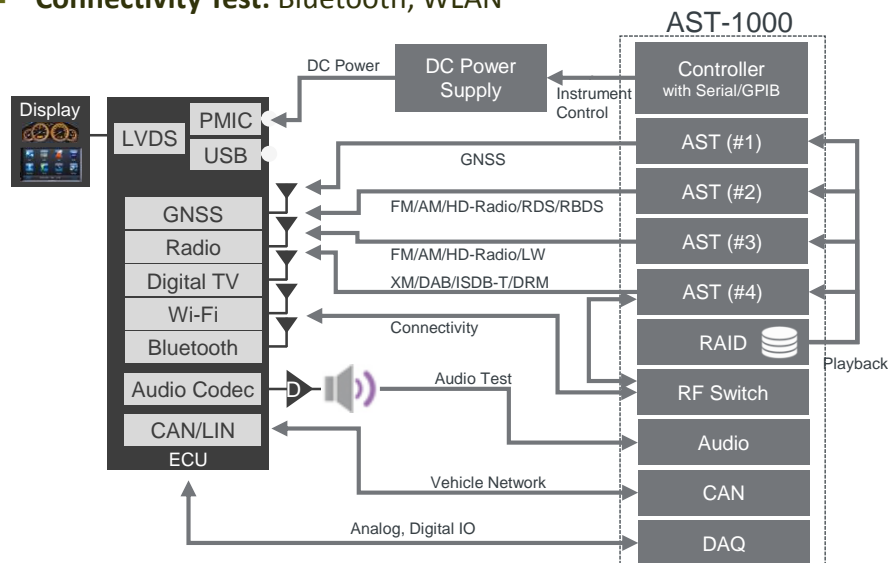
# Architectural flexibility for multiple applications



# Use Case - Major Automotive OEM Infotainment

## Four AST transceivers in one PXI chassis cover common tests and different protocols for four regions

- **Radio Test:** AM/FM, Sirius/XM, HD Radio/IBOC, DAB/DAB+/DMB, RDS/RBDS
- **Navigation Test:** GPS, Galileo, GLONASS, QZSS, BEIDOU
- **Multimedia Test:** ATSC, T-DMB, ISDB-T, CMMB
- **Connectivity Test:** Bluetooth, WLAN



**Avera AST-1000**

RF Signal Source for  
Infotainment

**Avera RF Studio**

Record & Playback  
Software Suite



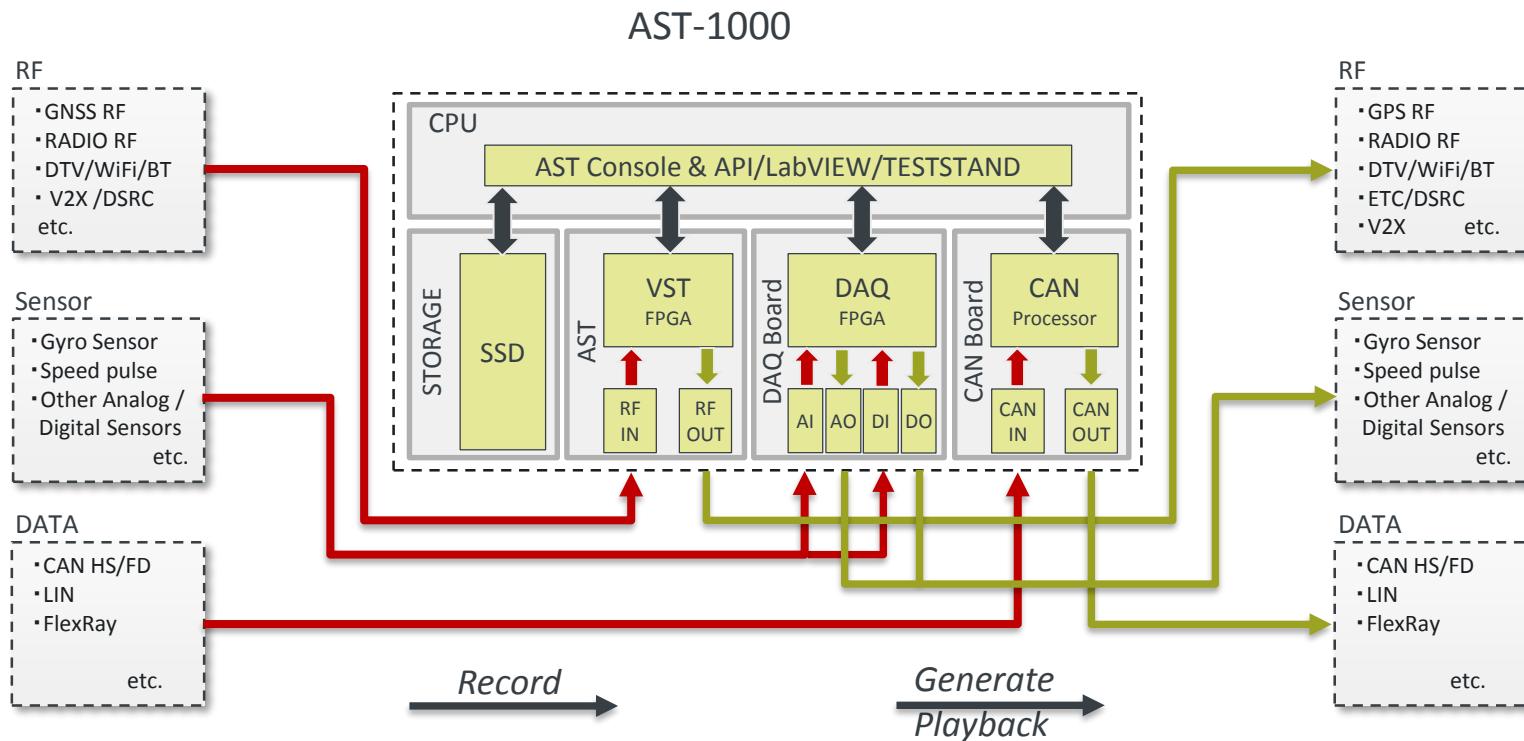
**NI Bluetooth/WLAN**

Measurement Suite

	AST #1	AST #2	AST #3	AST #4
<b>Europe</b>	GPS	FM / RDS HD Radio	LW (AM) / AM HD Radio	DAB
<b>North America</b>	GPS	FM / RBDS HD Radio	AM HD Radio	XM
<b>Japan</b>	GPS	AM	FM	D-TV (ISDB-T)
<b>Other Regions</b>	GPS/GLONASS Galileo/BeiDou	FM / RBDS HD Radio	AM HD Radio	DAB/DRM
Record & Playback				

# A Combined Architecture

Increased you test capabilities

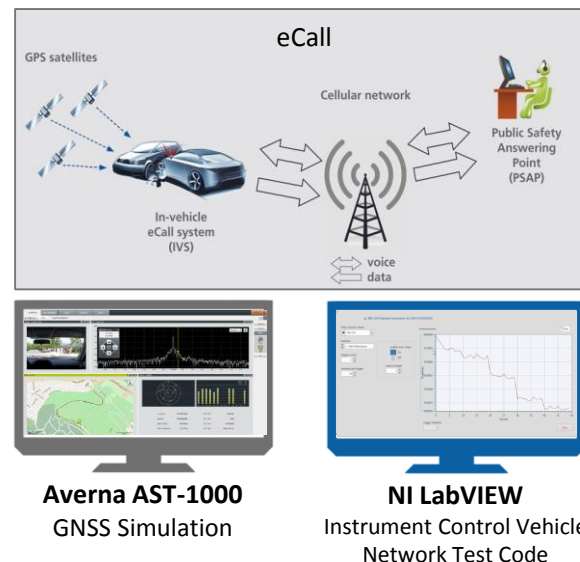
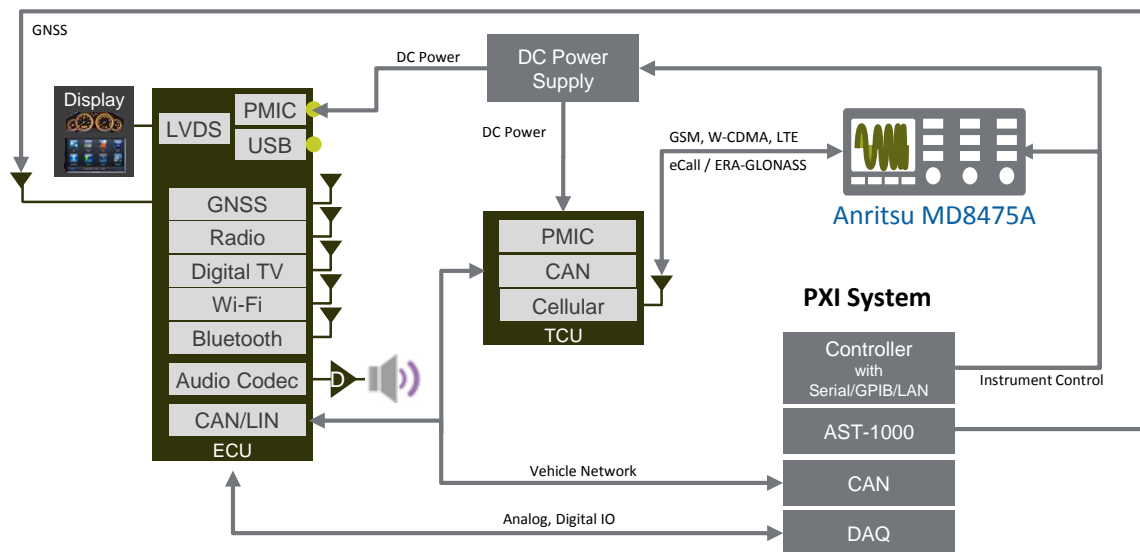


# Use Case- Telematics & Signaling Test

Cellular Standards (GSM, W-CDMA, CDMA2000, LTE FDD/TDD, HSPA, EV-DO)

eCall / ERA-GLONASS (MSD - Minimum Set of Data, SMS, Voice)

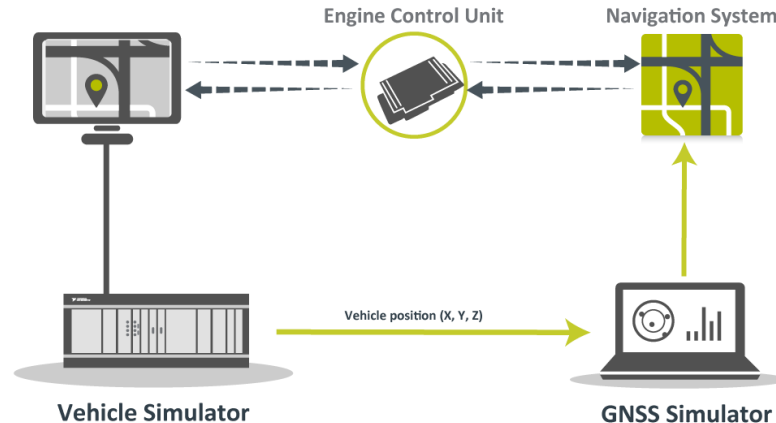
GNSS (GPS, Galileo, GLONASS, QZSS, BEIDOU)



# Use Case - Autonomous Driving & ADAS

## GNSS in HIL - Real-Time Integration

- By using a real-time GNSS Simulator, users and developers can take advantage of highly realistic vehicle performance and positioning.
- It can be integrated and synchronized with CAN and other wireless protocols



# Summary

- Today's disruptive technologies will become mainstream
- Automotive suppliers and OEMs must adapt quickly to integrate and test all new technologies
- AST-1000: All-in-One Signal Source
  - Ideal for Infotainment testing (radio, audio/video, navigation and connectivity)
  - Can extend to test communication buses used for ADAS/Autonomous Driving
  - Evolves as your test needs change
- Avera is dedicated to clients' product quality & integration success

What are your challenges?

Thank You!

Questions?

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