

APTIV CONNECTED SERVICES

Simulation Services

Optimize your testing workflows with hardware and software that increases efficiency, reduces costs, and improves quality.

Traditionally, automotive hardware-in-the-loop (HiL) benches have been extremely complex and expensive. In some worst-case scenarios, it took testing teams so long to get their HiL set up that the vehicle was already in production before testing could begin.

It doesn't have to be that way. Aptiv's Simulation Services can help you streamline your workflows, shift left, and gain greater transparency throughout the process.

PROVEN LEADERSHIP

As a leading ADAS solution vendor, Aptiv's internal testing capabilities are among the best in the world. While other teams might take weeks to execute one full test cycle, we can execute the same content in a matter of hours. Thanks to our industry-leading automation and virtual ECU capabilities, individual staff members are able to oversee multiple HiL labs, and we enable developers to execute testing on their own.

We've also optimized our hardware, minimizing our costs and lab space requirements. And our dashboards allow us to track the processes from start to finish from anywhere in the world.

These capabilities help us to catch more bugs earlier in the development process. And now we're making them available to customers for use with Aptiv ECUs or hardware from other vendors.



BENEFITS

- **Speed up your testing processes so that you can run more test cycles per sprint**
- **Reduce your HiL and bench setup costs**
- **Optimize your processes with DevOps automation and transparency**
- **Find and fix more software bugs**

TAILORED TO YOUR NEEDS

Every OEM takes a slightly different approach to SiL, HiL, and ViL testing. That's why Aptiv doesn't offer a one-size-fits-all solution.

Instead, we have an established process for evaluating your current workflows. Depending on your needs, we provide hardware, software, and/or services to help speed up your processes and reduce your costs. In some cases, we can provide hardware that costs as much as 80% less than a typical HiL setup. And our automation architecture may speed up testing cycles by 4x or more. For short-term projects, we can even run testing on our HiL setups to eliminate your capital investment.

We also offer unique solutions, like AI driver simulation for validating in-cabin monitoring. We can customize the solution for whatever you need. To learn more, talk to your Aptiv representative or visit [Aptiv.com](https://www.aptiv.com).

• **APTIV** •



Example Projects

Each simulation project is different, so Aptiv tailors our offerings to each use case. While other vendors offer only hardware or software, our strength is in our ability to offer a complete solution that optimizes the components and workflows so that you maximize your benefit while minimizing your costs. The three examples below have been applicable to multiple different customers, and Aptiv has also created other solutions that we can adapt for your specific needs.

LOW-COST OPEN-LOOP HiL REPLAY BENCH

Early in the development process, software engineers often need some HiL capabilities to supplement their software-in-the-loop (SiL) testing, but they don't necessarily need a full-featured bench costing hundreds of thousands of dollars.

Aptiv's HiL Replay Bench (HILRP) resides in your data center with easy access to your vehicle logs. Our queuing software allows developers to initiate the testing for fast debugging.

The solution costs about 10x less than a normal HiL bench and can be deployed very quickly.

CLOSED-LOOP VIRTUAL ECU BENCH

It's no secret that virtual ECUs offer many benefits. They enable testing earlier in the development cycle (shift left), reduce dependence on physical hardware, and allow for faster test execution with greater coverage.

Aptiv has combined virtual ECUs with advanced automation and DevOps expertise to run in a closed-loop SiL environment that is completely hands-free. The tests run themselves while providing complete transparency with details about progress at every stage visible through dashboards. This solution integrates with CI/CD pipeline software as well as requirement management software. And with multiple benches running in parallel, Aptiv is able to execute thousands of tests per hour with almost no human intervention.

AI DRIVER SIMULATION

Aptiv's AI Driver Simulation solution makes it easier to validate driver monitoring systems (DMS) and advanced driver assistance systems (ADAS) and comply with regulations like Euro NCAP.

Manufacturers need to be sure that their DMS and ADAS systems will function properly no matter the race, gender, height, or other physical characteristics of the driver. But conducting all those tests in the real world is a logistical nightmare.

Aptiv's AI Driver Simulation solution can generate images of drivers with various skin colors, hair colors, eye colors, facial hair, hats, glasses, scars, and other features. In addition, it can simulate drowsiness, distraction, gaze direction, phone usage, passenger interaction, and other states. It projects these images to aid in algorithm and requirement verification.

This solution allows testing to scale and covers far more test cases than could ever be achieved with physical testing alone.

About Aptiv



Aptiv PLC (NYSE: APTV) is a global industrial technology leader delivering advanced solutions people trust when it matters most across automotive, commercial vehicle, aerospace and defense, telecom and datacom, and other diversified industrial end markets.

Our differentiated portfolio enables devices and systems to sense, think, act, and continuously optimize performance. Building on decades of innovation, Aptiv brings global scale and a resilient, localized value chain to customers across the globe. Learn more at [Aptiv.com](https://www.aptiv.com)