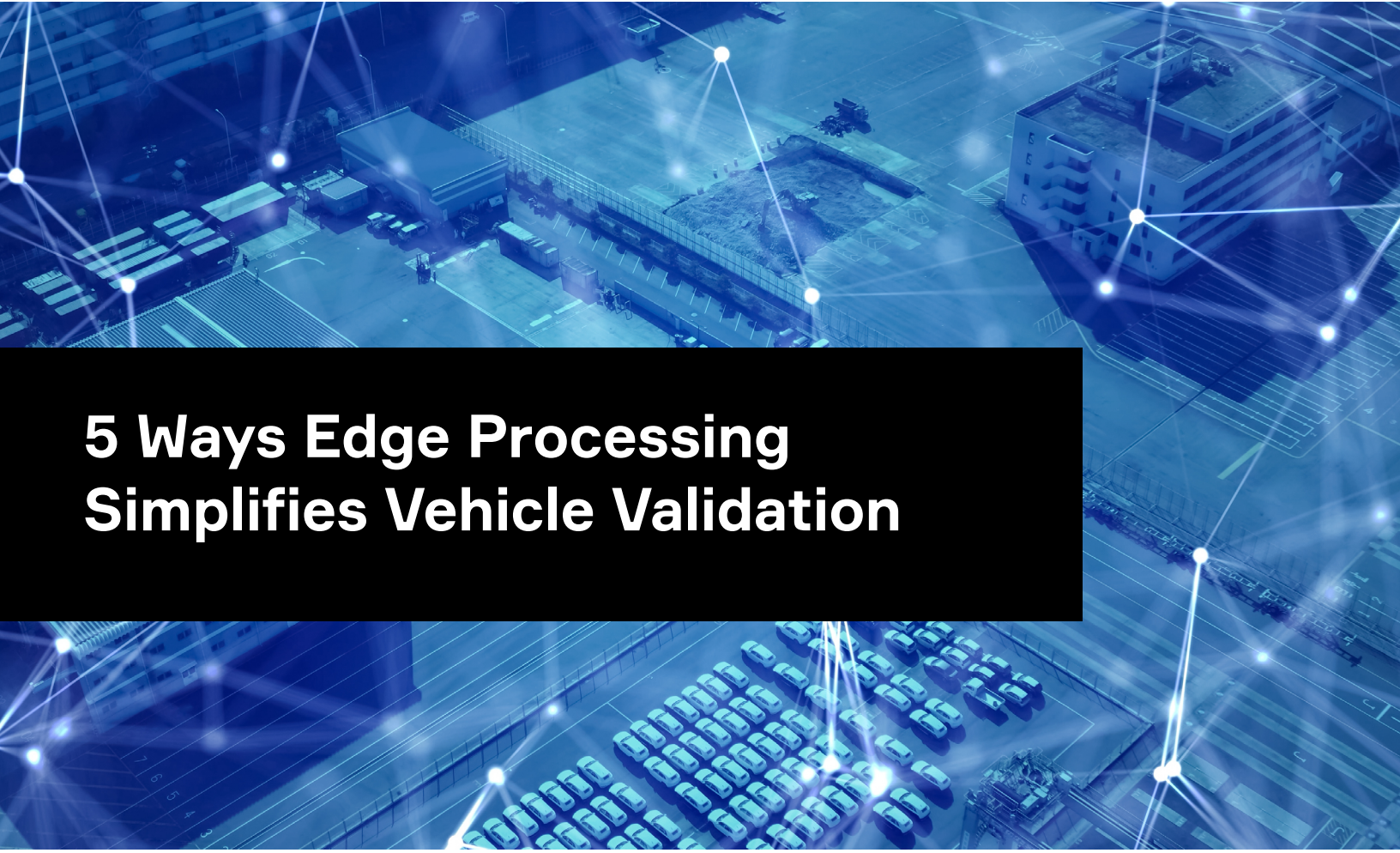


5 Ways Edge Processing Simplifies Vehicle Validation

Other data loggers don't miss anything. That's actually the problem.

"We went from waiting days for post-processed reports to having actionable data the same day, and the KPIs are consistent across platforms."

Your test and validation fleets generate gigabytes of data per trip. And your data loggers are doing their job. They're capturing a lot of that data. But when a warranty trend shows up, or a chart starts drifting in the wrong direction, or an issue that wasn't there last month starts showing up across the fleet, the question isn't whether the data exists. The question is whether it's already processed, organized, and ready to act on, or whether someone still needs to pull it apart.

For teams that don't use Aptiv Connect Qualifier, the answer is the latter. The raw data is there, but getting from a trip file to an actionable report still takes hours of post-processing. And there's always the nagging question: did we actually capture the right detail at the right moment, or were we recording at the wrong rate when the event happened?

Edge processing eliminates both problems. By moving intelligence to the vehicle, it processes data at the point of acquisition, monitors every signal against configurable thresholds in real time, and makes the decision about what to capture in detail and what to summarize before anything is transmitted. The result is a cleaner path to root cause. Anomalies are captured in full detail, everything else is summarized and available if you need it, and reports that used to take hours of post-processing are available near-immediately. Same coverage, less sifting, faster time to insight.

APTIV

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Here are five ways this edge processing makes validation easier:

1. It gives you confidence that nothing was missed.
Aptiv's Connect Edge algorithms run directly inside the vehicle data recorder, monitoring every signal against configurable thresholds and synthetic parameters in real time. Every event is evaluated. When a signal stays within normal range, the system records a compact summary. When something crosses a threshold, it flags the event and triggers a detailed capture automatically. No human intervention, no after-the-fact discovery that you were recording at the wrong rate when the anomaly occurred.

What that means in practice is that when you need it, the data is already there. It's been processed, sorted by engineering relevance, and the high-speed detail around any anomaly is preserved in full. You don't have to hope you caught it. The system was watching the whole time.

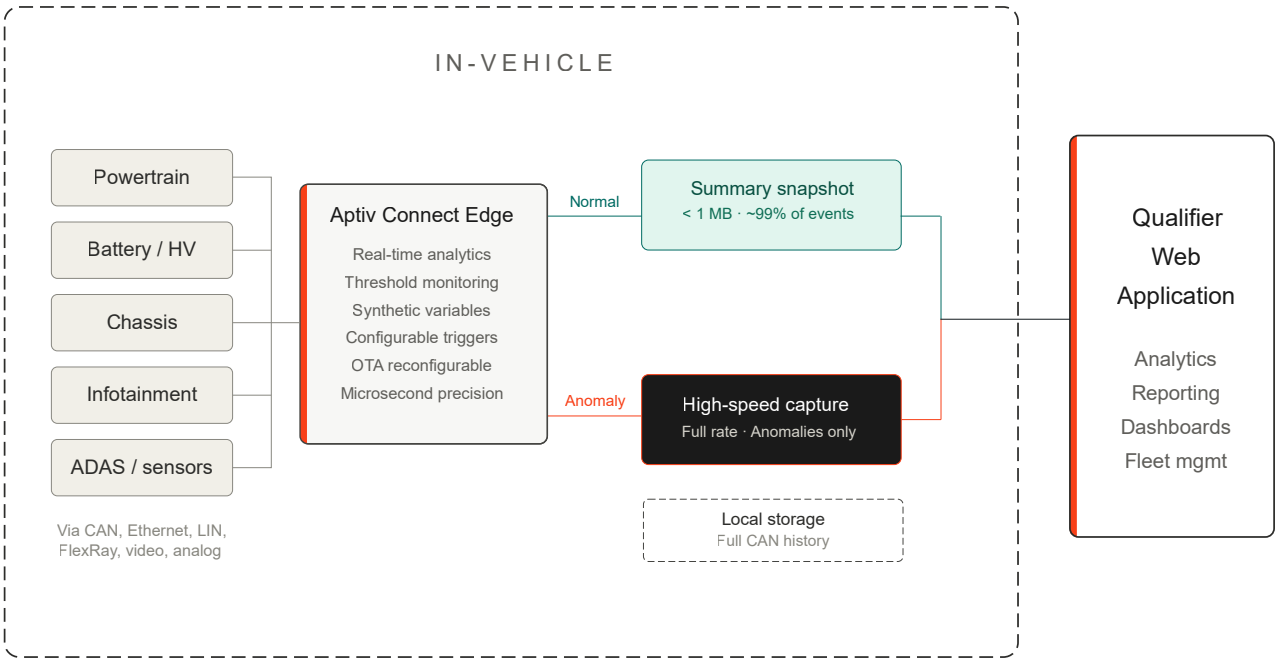
2. It gets you to the report faster.
Because the edge logic does the heavy processing inside the vehicle, the data that reaches your analytics platform is already structured around engineering intent. Trip summaries, threshold exceedances, and high-speed event captures arrive organized and ready for analysis. Reports that traditionally required hours of post-processing can be generated near-immediately.

When the edge algorithm detects an anomaly or a predefined trigger, it initiates a capture at full CAN broadcast rate, preserving the granular, time-stamped detail you need for root-cause analysis. You get the high-speed data for the events that matter without running continuous high-rate recording across every trip. The triage cycle shrinks from days to hours, sometimes less.

3. It works across product lines and evolves with your program.
If you've solved a data collection problem on one vehicle program, you shouldn't have to solve it again from scratch on the next one. Because the edge logic translates vehicle-specific parameters into common organizational metrics, a configuration that works on one platform can be adapted to another without rebuilding your data strategy. KPIs stay consistent across product lines, which means cross-platform comparisons actually work.

That matters more than it might sound. The engineer down the hall working on a different vehicle model may be chasing the same kind of intermittent issue you solved last quarter. With shared edge processing configurations and common metrics flowing into Qualifier, that knowledge transfers rather than staying siloed inside one team's program.

The system is also OTA reconfigurable. When a calibration changes, a new software build drops, or a subsystem gets redesigned, you can tune the data acquisition specifically around that change and get immediate feedback on whether the new version performs better than what it replaced. You don't have to wait for the next round of test drives to find out. A configuration that took weeks to develop can be deployed to a new fleet in hours.



4. It dramatically reduces transmission costs.
For routine driving, the system transmits only an end-of-trip summary snapshot, reducing a file that might otherwise be multiple gigabytes down to less than a megabyte. That's a reduction of several orders of magnitude per trip, and across a fleet transmitting daily, the cellular cost savings are substantial. Because the decision about what to transmit is made inside the vehicle, you're not paying to move data to the cloud just to decide you don't need it.

The cost scales with the number of meaningful events, not with the total volume of raw data your fleet generates.

5. It cuts ongoing storage and compute costs.
The cost benefits extend well beyond transmission. Every gigabyte stored in the cloud continues to cost over time, and each time you run reports, cross-fleet comparisons, or trend analyses, you're computing against that entire database.

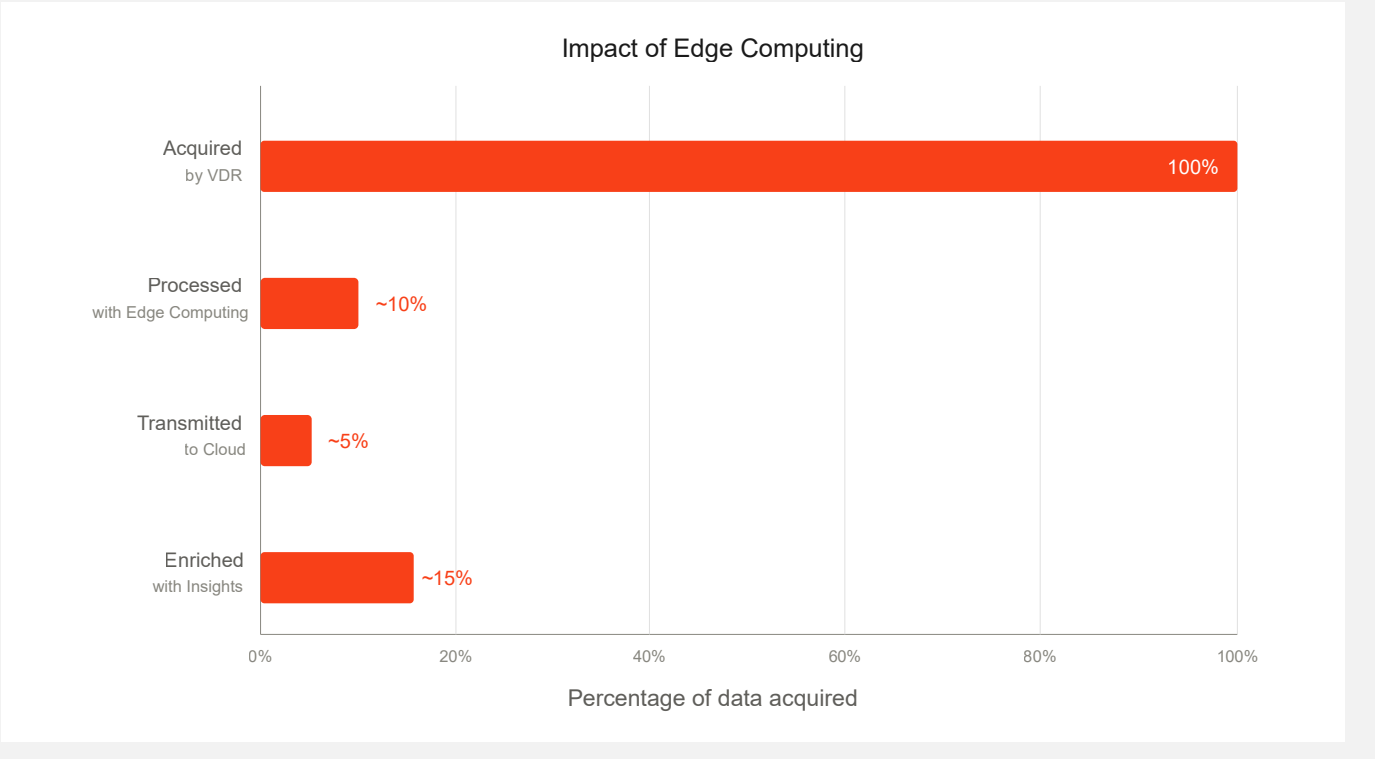
Edge processing shrinks the database to what actually has engineering value, which means every downstream operation, from queries to machine learning, runs faster and costs less. By leveraging what is effectively free compute at the vehicle, you reduce the ongoing cost of reporting, computing, and storage, and those savings compound with every trip added to the program.

Case Study: Anomaly Detection

An OEM was investigating intermittent engine start anomalies that couldn't be reproduced on demand. The engineering team needed continuous field data from a large fleet, but transmitting full trip files for every drive cycle would have been prohibitively expensive. They needed something more targeted: compact summaries of every trip, with high-speed captures triggered only when a start event crossed a threshold.

Aptiv configured its edge processing to monitor every ignition-to-crank sequence across the fleet, evaluating crank time against engine coolant temperature and applying predefined thresholds. Normal starts were recorded as compact snapshots. Anomalous starts triggered full high-speed captures at the CAN broadcast rate.

Over the course of the program, the system analyzed more than 100,000 start events. Only the small percentage that exceeded threshold triggered a high-speed capture. That selective approach eliminated terabytes of unnecessary data from transmission, storage, and ongoing computation.



Hardware: purpose-built for edge processing

Aptiv's edge processing runs on a family of vehicle data recorders that share the Connect Edge software platform. Both handle synchronous multi-protocol data streams spanning CAN variants including J1939, J1979, and CAN FD, calibration protocols such as CCP and XCP, plus Ethernet, LIN, FlexRay, DoIP, video, and analog inputs.



EP-2000



EP-800

EP-2000: Aptiv's most popular data acquisition platform. Supports 16 CAN FD channels, six BroadR-Reach Ethernet channels, up to four video cameras, and more than 1TB of optional storage. Designed for preproduction validation of gasoline, diesel, hybrid, and electric vehicles, including ADAS and autonomous driving programs. Certified in more than 25 regions worldwide.

EP-800: A compact, IP68-rated recorder supporting up to four CAN channels along with Automotive Ethernet, LIN, and DoIP. No external antennas required. Ideal for motorcycles, utility vehicles, commercial trucks, boats, agricultural equipment, and employee fleet deployments where size and durability matter.

The Aptiv Connect Qualifier ecosystem

Edge processing is one piece of a larger platform. Aptiv Connect Qualifier is a complete, end-to-end vehicle data solution used by more than 70% of the world's leading vehicle manufacturers. It dramatically reduces the time it takes to find and fix vehicle problems, helping save millions of dollars.

Qualifier includes Aptiv's Edge hardware that collects more signals in finer detail than other solutions and the Connect Edge software that begins analyzing that data right in the vehicle. Qualifier transmits this pre-processed data to the cloud for additional processing before making it available in the Qualifier web application.

Qualifier web application: View your vehicle data, perform analytics across your fleet, run reports, investigate root causes, set up alerts, and build customizable dashboards. Includes automated Cpk analysis for robustness assessment and IUMPR compliance monitoring.

Developer configuration tool: Define triggers, thresholds, synthetic variables, and data collection strategies. Push OTA updates to your entire fleet or a single vehicle without physically interacting with the hardware.

Professional services: Aptiv's team of customer success engineers and data scientists, including EV and ADAS specialists, help ensure you achieve maximum value from your investment.

Optional capabilities: Video Insights with AI-powered scene labeling, Environmental Insights for integrated road and weather data, Qualifier Ingest for centralizing data from multiple logger brands, and the ADAS Solution for advanced perception system validation.

Getting ahead of the data curve

The vehicles your team is validating today generate more data than the vehicles you validated five years ago, and the ones you'll validate five years from now will generate more still. The question isn't whether you'll face a data challenge at fleet scale. The question is whether you solve it at the source or continue paying for it downstream.

Edge processing resolves the problem where it starts: inside the vehicle. It gives you confidence that every event was captured, gets you to the report faster, keeps your KPIs consistent across platforms, and reduces the infrastructure costs that come with storing and computing against data nobody uses. As your vehicles evolve, the data acquisition evolves with them.

If you're managing a connected vehicle program and feeling the pressure of growing data volumes, edge processing is worth a conversation.

Talk to Us!

Want to see what this looks like with your data? Email us at qualifier@aptiv.com for a demo or to talk through your program needs and how Aptiv can help.