



CASE STUDY

BYD Plans For Growth With Faster Automotive Ethernet Testing

Car Manufacturer Upgrades to Automotive Ethernet

BYD, one of the largest automobile manufacturers in China, needed to upgrade to Ethernet for the communication technology in their car network. This modernization shift would connect essential components like the digital instruments, driving data recorder, the panoramic ECU, and the AVB switch allowing faster testing when new capabilities are added.

The customer was using an older, but well known, controller area network (CAN) for their system bus. First developed in 1983, the CAN standard is now outdated. The move to Automotive Ethernet provides higher-quality, lower latency, time synchronization of audio and video in Ethernet standard format to transmit realtime audio and video streams.

BYD wanted to upgrade to the new standard to improve the customer experience that they could deliver and also to save costs by moving to current, lower cost technology. Since automotive manufacturers typically use electronic control units (ECUs) from different vendors, the customer needed to be sure that the solution would work before they took on the expense to retool their manufacturing plant.



Company

BYD Automotive

Industry: Automobile Manufacturer

Key Issues

- Upgrade older CAN network test to robust Ethernet IEEE AVB test
- Reduce production test time and costs

Solutions

- IxNetwork with AVB test solution
- IxAnvi with automotive Ethernet test suite
- Keysight DS09404A oscilloscope
- Keysight E5063A vector network analyzer

Results:

- Test time reduced by 50% with a Layer 1-7 end-to-end solution
- Demonstrated 600 OPEN Alliance conformance tests, over 6x greater than competitors
- Successful shift to IEEE standard reduced BOM



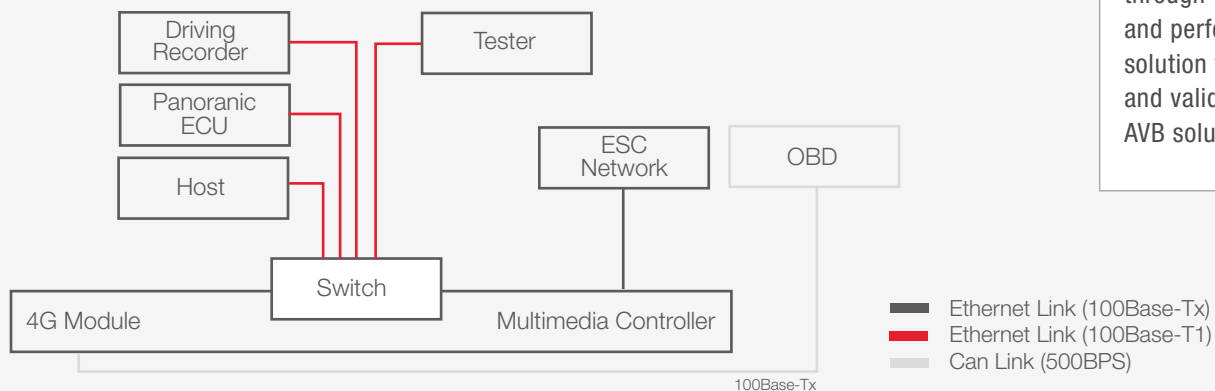
New Test Solution Increases Expansion with Less Test Time

BYD is developing a new car methodology which will use automotive Ethernet for data communications, system diagnosis, and software upgrades. Defining a new communication network so different from the existing automotive networks brings huge challenges. This requires validation of the new physical layer, protocol conformance and automotive application performance. BYD specifically wanted to conduct comprehensive automotive Ethernet testing scenarios like the following:

- Perform PHY or physical layer validation for the 100 Base T1 standard.
- Validate multiple PHYs in an ECU, which is an implementation of classic Ethernet switch
- Validate conformance for the various protocols used in the ECU – like IP/TCP/UDP/ICMP as well as AVB protocols.
- Validate deployed networks and debugging using automotive data loggers
- Validate application over automotive Ethernet (including Diagnostics over IP)



Ixia along with its partners, put together a total solution that addressed these needs. Keysight physical test layer components were deployed in conjunction with Ixia's Layer 2 through 7 conformance and performance testing solution to demonstrate and validate that the new AVB solution worked.



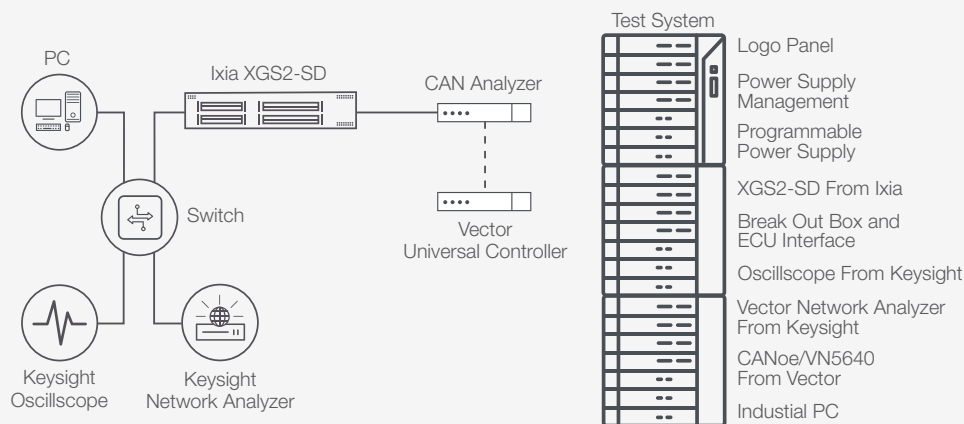
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Another vendor, Vector, was incorporated into the solution to validate the coexistence of existing CAN based links along with the new Ethernet based links in the car network.

BYD Cuts Test Time in Half and Reduces BOM Costs

Ixia and Keysight jointly provided the most powerful end-to-end testing solution for automotive Ethernet spanning from physical layer testing to protocol conformance and performance validation.

BYD could achieve their goal to build a single integrated testbed with all the test equipment (Ixia's IxANVL, IxNetwork, and Keysight's Oscilloscope) to enhance the test coverage and efficiency as well as use remote programming interfaces to achieve comprehensive automation across tools.



By deploying the Keysight/Ixia solution, BYD was able to cut their testing time from two days down to one day. The previous manual test cases could now be replaced with automated test cases that not only reduced the time involved, but made the whole testing process simpler to run and less complicated to set up and maintain. The ability to run automated test sequences from Layer 1 to Layer 7 also allows for greater ability to add new features in the future, without adding complicated manual test sequences. In addition, parts that are CAN-compatible are less plentiful every year. By moving to the more modern automotive Ethernet standard, BYD was able to replace older, harder to source, and more expensive parts with higher availability, less expensive parts.

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

